MULTIPLE CASE STUDY ON HOW PHYSICS TEACHERS' CHARACTERISTICS AFFECT STUDENTS' MOTIVATION IN PHYSICS

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submitted by **FİKRET KORUR** in partial fulfillment of the requirements for the degree of **Doctor of Philosophy in Secondary Science and Mathematics Education Department, Middle East Technical University** by,

Prof. Dr. Canan Özgen _____
Dean, Graduate School of **Natural and Applied Sciences**

Prof. Dr. Ömer Geban _____
Head of Department, **Secondary Science and Mathematics Education**

Assist. Prof. Dr. Ali Eryılmaz _____
Supervisor, **Secondary Science and Mathematics Edu. Dept., METU**

Examining Committee Members

Assoc. Prof. Dr. Ahmet İlhan Şen _____
Secondary Science and Mathematics Edu. Dept., Hacettepe University

Assist. Prof. Dr. Ali Eryılmaz _____
Secondary Science and Mathematics Edu. Dept., METU

Assoc. Prof. Dr. Behiye Ubuz _____
Secondary Science and Mathematics Edu. Dept., METU

Assoc. Prof. Dr. Jale Çakıroğlu _____
Elementary Education Dept., METU

Dr. Ömer Faruk Özdemir _____
Secondary Science and Mathematics Edu. Dept., METU

Date: 26.06.2008

I hereby declare that all information in this document has been obtained and presented in accordance with academic rules and ethical conduct. I also declare that, as required by these rules and conduct, I have fully cited and referenced all material and results that are not original to this work.

Name, Last Name : Fikret KORUR

Signature :

ABSTRACT

MULTIPLE CASE STUDY ON HOW PHYSICS TEACHERS' CHARACTERISTICS AFFECT STUDENTS' MOTIVATION IN PHYSICS

Korur, Fikret
Ph.D., Department of Secondary Science and Mathematics Education
Supervisor : Assist. Prof. Dr. Ali Eryılmaz

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This study was aimed to explore the interaction between effective physics teacher characteristics, from teachers' and students' shared perceptions and students' motivation. The thesis included two main parts. The first part was quantitative and the characteristics were identified. The second part was qualitative and the characteristics were used as criteria to select two case teachers and the interaction between their characteristics and students' motivation was investigated.

The questionnaire, in the quantitative part, was administered in 3 regions of Turkey and 3 cities for each region including 214 high school physics teachers. There were two different questionnaires, derived from the quantitative part, to select the two case teachers for the qualitative part. The qualitative data included interviews with the two case teachers and their students, field notes, and videos.

The data in the quantitative part was analyzed by descriptive statistics. Findings revealed that there were 38 effective physics teacher characteristics affecting students' motivation in physics within 8 categories as perceived by teachers and students. The characteristics were important in terms of students' motivation as perceived by teachers more than as perceived by students. The teachers' subject matter knowledge and their personal characteristics were the two categories that mostly affected the students' motivation.

The data in the qualitative part was analyzed by cross case analysis. The findings revealed that the positive characteristics increased students' motivation, when the teachers exhibited them. When the teachers did not display the positive characteristics, the students' motivation decreased. If teachers exhibited the negative characteristics in a positive way it was likely to increase students' motivation. The qualitative part enhanced results of the quantitative part in that it enlightened the way that those characteristics affected students' motivation and what would cause if those characteristics were not exhibited or were exhibited negatively.

Keywords: Teacher's characteristics, students' physics motivation, students' physics achievement, students' perceptions of teacher characteristics, teachers' perceptions of teacher characteristics, case study, multiple case study, effective physics teacher characteristics

ÖZ

FİZİK ÖĞRETMENLERİNİN NİTELİKLERİNİN ÖĞRENCİLERİN FİZİKTEKİ MOTİVASYONLARINI NASIL ETKİLEDİĞİ ÜZERİNE ÇOKLU DURUM ÇALIŞMASI

Korur, Fikret
Doktora, Ortaöğretim Fen ve Matematik Alanları Eğitimi Bölümü
Tez Yöneticisi: Yrd.Doç.Dr. Ali Eryılmaz

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Bu çalışmanın temel amacı, öğrenci ve öğretmenlerin ortak algılarından belirlenen etkili fizik öğretmen nitelikleri ile öğrencilerin motivasyonu arasındaki ilişkiyi araştırmaktır. Tez iki ana bölümden oluşmuştur. Nicel olan birinci bölümde bu etkili nitelikler belirlendi. Nitel olan ikinci bölümde ise, bu nitelikler durum çalışması yapılacak öğretmenleri belirlemede bir kriter olarak kullanıldı ve bu öğretmenlerin nitelikleri ile öğrencilerin motivasyonları arasındaki ilişki araştırıldı.

Nicel bölümde kullanılan anket, Türkiye'deki 3 bölgede ve her bölgeden 3 ilde, toplam 214 lise fizik öğretmenine uygulanmıştır. Nicel bölümden yaralanılarak oluşturulan iki farklı anket ise nitel bölümde çalışılacak öğretmenleri seçmek amacı ile kullanıldı. Nitel veriler, durum çalışması yapılan iki öğretmenle ve bunların öğrencileri ile yapılan röportajları, alan notlarını ve video kayıtlarını kapsamıştır.

Nicel bölümde verilerin betimsel istatistikleri yapıldı. Bulgular göstermektedir ki öğrencilerin fizikteki motivasyonunu etkilediği belirlenen 38 etkili fizik öğretmen niteliği vardır ve öğretmen ve öğrencilerin ortak algılarına göre bunlar 8 kategoride toplanmaktadır. Öğrencilerin motivasyonu etkilemesi açısından bu nitelikler öğretmenlerin algılarına göre öğrencilerin algılarından daha

önemlidir. Öğretmenlerin konu bilgisine hakimiyeti ve kişisel nitelikleri öğrencilerin motivasyonunu en çok etkileyen iki kategoridir.

Nitel bölümde veriler karşılaştırmalı durum analizi ile değerlendirildi. Bulgular göstermektedir ki öğretmenler bu niteliklerden olumlu olanları sınıf ortamında sergilediği zaman öğrencilerin başarısını artırmışlardır. Öğretmenler bu olumlu nitelikleri sergilemedikleri zaman ise öğrencilerin motivasyonu azalmıştır. Eğer öğretmenler olumsuz bir niteliğin tam tersini sergilerse öğrencilerin motivasyonunu artırması muhtemeldir. Çalışmanın nitel bölümü, burada bahsedilen niteliklerin hangi yolla, etki ettiği ve bu niteliklerin tam tersi sergilenirse veya bu nitelikler hiç sergilenmezse öğrencilerin motivasyonunda ne gibi sonuçlar ortaya çıkaracağı konusuna açıklık getirerek, nicel bölümdeki sonuçları geliştirdi.

Anahtar Kelimeler: Öğretmen nitelikleri, öğrencilerin fizik motivasyonu, öğrencilerin fizik başarısı, öğrencilerin öğretmen niteliklerini algıları, öğretmenlerin öğretmen niteliklerini algıları, durum çalışması, çoklu durum çalışması, etkili fizik öğretmen nitelikleri.

To my love, Hatice and my sweetie, Batu Kayra.

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I wish to express my deep appreciation to the principals of the all of the schools that applied and sent back the questionnaire to me from outside Ankara. They are the unnamed heroes and heroines of this study. I would like to express my heartful gratitude to the two case teachers who shared their lessons with me and improved my perspectives. I would also like to thank all of the other physics teachers involved in the study and of course all of the students, without whom this research would have been impossible. And special thanks to my dear friends Dr. Ufuk Yıldırım, Sarah J. Şener, Havva Loga, Muhammed Gökalp to support my study with their extraordinary efforts.

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ETAM	: Effects of teachers' characteristics on high school students' physics achievement and motivation questionnaire
TACH	: Items of physics teachers' characteristics affecting students' achievement
TMOT	: Items of physics teachers' characteristics affecting students' motivation
ETIQ	: Effective teacher identification questionnaire
ETIQST	: Effective teacher identification online questionnaire - students
ST1	: The five students of Teacher 1 interviewed for the qualitative part
ST2	: The two students of Teacher 2 interviewed for the qualitative part
N	: Sample size
α	: Significance level

CHAPTER 1

INTRODUCTION

Teaching and learning are the central processes in education, and these processes are mainly based on the interactions and communications which take place between the teacher and the students. Teachers are supposed to play a primary role in this process. To adequately perform this role, teachers should promote students' learning because students imitate their teachers and always try to reflect those ideas which they have learnt from their teachers.

Effective teacher characteristics, including the actions and behaviors from the beginning till the end of the lesson, are paramount in terms of students' learning. Teachers should be aware of their own characteristics and they should try to improve these characteristics in order to create an effective teaching and learning process. Teachers who do not possess effective teacher characteristics are not able to guide students. Moreover, motivating students and increasing their achievements cannot be expected from those teachers. On the other hand, teachers who possess effective teacher characteristics, on the condition that they are aware of their students' needs and interests, are able to motivate the students and increase their achievements. Through possessing effective teacher characteristics, teachers are able to apply proper methods and well designed activities in the classroom and thus increase the motivation of the students.

Teachers always want to be successful in their teaching. Practically, to achieve teaching success, effective teacher characteristics are important aspects to explore (Klausmeier & Goodwin, 1975). In fact, what happens in the classroom not only depends on how teachers conceptualize their effective characteristics, but also on how students perceive and conceptualize their learning and the characteristics of their teacher (Robinson, 1995). The students always observe their teachers and, whether intentionally or unintentionally, they are affected by

the characteristics of their teachers. Moreover, teachers are observers and by using or implementing their characteristics, they can try to understand whether the students have grasped the subject or not. Therefore, effective teacher characteristics should be carefully identified from both teachers' and students' perspectives to contribute to effective teaching (Guskey, 1984; Lawrenz, 1975). In fact, even where teachers do possess the effective characteristics, what is more important is that those characteristics affect students' motivation and how they interact with the teacher possess them.

Throughout the last fifty years, there have been ongoing attempts to explore the characteristics of effective teachers. Teachers possessing effective characteristics could be described as those who encourage active student participation, give relevant assignments, and arrange lots of successful engaged time as perceived by students (Witcher & Onwuegbuzie, 1999). Effective teachers' characteristics are also assessed under the categories classroom management skills of the teacher, subject matter knowledge, attitude to discipline and methods used in the lecture (Richardson & Thomas, 1989).

Students' motivation is mostly affected by teachers' characteristics such as enthusiasm. Enthusiastic teachers motivate their students to engage in the learning process. Students become a part of the lesson and they are motivated to learn. In relation to this, if students notice a teacher's willingness to teach, they will probably approach the classroom activities in the same way as teachers do. Therefore teachers, by possessing just one of the teachers' effective characteristics, such as enthusiasm, would create active learners and increase the achievement of their students (Alkhayyatt, 2000). Regardless of some particular factors like classroom size or being a novice teacher, if teachers possess effective characteristics they will promote students' learning skills (McLaughlin, Pfeifer, Owens & Yee, 1986).

Teachers' characteristics are directly measured by their effectiveness in teaching. They are related to student outcomes and they should be analyzed particularly to enhance the understanding level of students. Moreover, teachers who possess effective characteristics should be analyzed in terms of students' motivation in the class (Knowles, 1999).

All teachers have some characteristics whether they are effective or not and those characteristics are independent of the teachers' subjects like mathematics, physics, chemistry and so on. The teachers also have some characteristics that are dependent on their subjects. Therefore, attempts to identify the teachers' characteristics include both types of characteristics. For example, a physics teacher is a teacher and he or she has some characteristics as a teacher rather than as a physics teacher. Furthermore, he or she also possesses some effective characteristics that promote students' motivation in physics and their learning of physics.

There should be interaction between the students and the teacher in science and physics classes. These lessons require many experiments and real life examples, so in order to motivate the students' learning they should share their ideas and views. An increase in students' motivation and achievement would also foster the interaction between students and the teacher (Brekelmans, Wubbels & Creton, 1990; Piburn & Baker, 1993; Tuan & Chin, 2000).

Student-student and student-teacher interactions would also promote the students' motivation to think critically. If the teachers give suitable feedback to the students for their level, and students share their ideas in classroom discussions then the students' achievement would increase as well as their motivation (Gylnn & Koballa, 2006). Moreover, the teachers should apply various instructional methods and learning activities as much as they can to make the students aware of the concepts. The teachers should take into account the students' instructional needs and they should adapt the methods they apply with respect to those needs. These features are necessary to motivate the students (Brophy, 2004). In fact, there are many factors affecting students' motivation in science and physics lessons. Teachers who possess effective characteristics can evaluate internal and external factors affecting students' motivation and they can use inquiry or discovery techniques to enhance their motivation by stimulating interest and curiosity. Additionally, science or physics teachers should give their students the opportunity to control what and how they learn a specific concept in the lesson.

Physics teachers should contribute to the understanding of effective teachers' characteristics to help students increase their knowledge building and

conception of physics. A physics teacher possessing effective characteristics enables students to think critically and reflect on the trustworthiness of physics with regard to events in their daily lives. As a result, the characteristics of an effective physics teacher are important not only in terms of students' success at high school level but also in terms of students' scientific skills for their future experiences in education.

Teachers who possess effective characteristics like 'subject matter knowledge' or 'making students active in the class setting' prevent them from failure in learning the concepts. Moreover, teachers' classroom management skills, their behaviors and reactions to some critical cases affect students' motivation. Teachers' subject matter knowledge and ability to transfer this knowledge to the students together with their pedagogical knowledge skills are the crucial dimensions of the effective teacher characteristics. Therefore, attitudes toward discipline, classroom management skills and possessing and transferring subject matter knowledge are the three main concerns for effective teacher characteristics in Turkey (Büyükkaragöz & Kesici, 1998; Duruhan, Akdağ & Güven, 1990; Ergün & Duman, 1998).

Characteristics such as using technology in the lesson or using the laboratory for meaningful learning cannot be measured easily in Turkey. Physics lessons usually do not include experiments, especially in the public schools. In fact, it is known that these characteristics would affect students' motivation and achievement in physics (Eryılmaz & İlaslan, 1999). Most of the physics lessons are in the class setting instead of the laboratory. Therefore, effective teacher characteristics related to laboratory oriented activities could not be assessed for most of the teachers.

Most of the lessons are teacher centered in Turkey. Therefore, teachers and their characteristics are directly related to students' motivation and achievement. In other words, teachers' characteristics gain importance in teacher centered class sessions in terms of students' learning. In these lessons teachers who possess effective characteristics increase the cognitive level of their students by promoting their motivation. Teachers are usually considered to be role models, so their effective characteristics are crucial in terms of promoting students' motivation and

achievement (Akboy, 1991). Moreover, teachers' attitudes toward discipline are another crucial dimension of effective teacher characteristics that affect students' motivation towards the in-class activities in Turkey.

Physics teacher characteristics and their effects can certainly be defined in the broadest sense as students' perceptions, teachers' perceptions, and the shared perceptions of students and teachers. In fact, students' perceptions of teachers' characteristics were analyzed by Korur (2001) and his study is also a base for this study. Within that study, a considerable amount of students' opinion was gathered related to the effects of teachers' characteristics on students' motivation, achievement, and attitude. It is known that classroom management skills, being prepared for the lesson, possessing subject matter knowledge, and possessing pedagogical knowledge are the most effective teacher characteristics (Korur, 2001). Physics teacher characteristics affecting students' achievement, motivation and attitude provided some categories related to those characteristics. The categories such as teachers' pedagogical knowledge, preparation for the lesson and personal characteristics had an effect on students' motivation (Korur, 2001). In fact, the teacher characteristics that affected students' motivation in physics classes also affected their achievement (Korur, 2001).

Students' perceptions identify the main features of the effective teacher characteristics. However, there is still a need to investigate the teachers' perceptions of the physics teacher characteristics affecting students' motivation. In addition, there should be some common effective characteristics derived from the students' and teachers' perceptions. Furthermore, teacher-student interactions in the classroom activities and teachers' behaviors and activities to stimulate students' motivation are important features of the effective teacher characteristics that need to be investigated. The "Introduction" chapter includes the sections like 'research problems', 'definition of important terms', 'significance of the study', and 'the design of the chapters in the study'. The rationale of this study is fully explained by these sections.

1.1 Research Problems

The quantitative and qualitative methods could have been used separately or together to support the weaknesses of each other as the nature of mixed design. The research problems of this study can be categorized into two groups as the first two problems are quantitative in nature. The third problem is qualitative in nature and a multi case design was utilized for the qualitative part of the study. Two case teachers possessing the effective physics teacher characteristics were included in the qualitative part of the thesis.

The students' perceptions of effective physics teacher characteristics had already been defined in a previous study from 2177 students in Turkey (Korur, 2001). Teachers' perceptions of the effective teacher characteristics on students' motivation have been analyzed in the quantitative part of this study. The first problem is aimed at identifying the perceptions of physics teachers on effective physics teacher characteristics. In addition, it was necessary that physics teachers' characteristics be analyzed in terms of the shared perceptions of teachers and students in a combined manner so as to conclude the most effective physics teacher characteristics with regard to students' motivation. The students' and teachers' perceptions were matched related to physics teachers' characteristics and the second problem was utilized to explore the common effective physics teacher characteristics in Turkey.

The research problems that were derived for this purpose were as follows;

1. What are the perceptions of physics teachers on teachers' characteristics that affect students' achievement and motivation the most?
2. What are teachers' and students' shared perceptions of physics teachers' characteristics that affect students' achievement and motivation the most?

The third problem aims at exploring the interaction between the teachers who have effective physics teacher characteristics determined from the first two research problems and their students by using in-depth interviews and observation. In other words, teachers who were thought to possess those

characteristics were identified according to the procedures discussed in the "Methodology" section of the qualitative part of this thesis. The qualitative part was used to compensate for the narrative data based on students' and teachers' perceptions of teachers' characteristics affecting students' motivation. The characteristics of these case teachers were described and at the same time the teachers who have effective characteristics were observed in class activities to find out how those characteristics are interrelated to students' motivation. More specifically, the qualitative part of this study attempts to answer the research problem below.

3. How do the effective physics teacher characteristics, from students' and teachers' shared perceptions, interact with students' motivation in physics classes?

The quantitative part of the thesis covered students' achievement and motivation that were affected by physics teachers' characteristics as perceived by both teachers and students. However, in the qualitative part of the study the students' achievement could not be included in the analysis since it was difficult to ascertain the students' achievement gains by observing or interviewing. Therefore, the qualitative part of the study includes the interaction between students' motivation and effective physics teacher characteristics. Although the main part of this study is related to the motivation of the students it should be kept in mind that there is a relationship between students' motivation and achievement.

1.2 Definitions of Important Terms

There are five terms that should be defined in this study. These items were teachers' perceptions of physics teachers' characteristics affecting students' achievement, teachers' perceptions of physics teachers' characteristics affecting students' motivation, and teachers' and students' shared perceptions, effective physics teacher characteristics, and students' motivation.

The following terms are necessary to understand this study more efficiently;

a) Teachers' Perceptions of Physics Teachers' Characteristics Affecting Students' Achievement: The physics teachers' views on which

characteristics of physics teachers affected students' achievement. It is the mean score determined for each of the 142 items in the achievement column of the Effects of Teachers' Characteristics on High School Students' Physics Achievement and Motivation Questionnaire (ETAM).

b) Teachers' Perceptions of Physics Teachers' Characteristics Affecting Students' Motivation: The physics teachers' views on which characteristics of physics teachers affected students' motivation. It is the mean score determined for each of the 142 items in the motivation column of the Effects of Teachers' Characteristics on High School Students' Physics Achievement and Motivation Questionnaire (ETAM).
c) Teachers' and Students' Shared Perceptions: The common perceptions of the students and teachers on the effective physics teacher characteristics. The mean scores for each item from students' and teachers' perceptions were listed, added and they were sorted to determine the shared perceptions for both achievement and motivation columns in the questionnaire.
d) Effective Physics Teacher Characteristics: The characteristics displayed by a physics teacher which positively or negatively affect the students' motivation and achievement as perceived by both the teacher and the students.
e) Students' Motivation on Physics: The students' internal tendency to find the physics course meaningful and worthwhile (Brophy, 2004). On the other hand the motivation that was emphasized to the students during this study is situated motivation. It is the motivation that does not depend on usually intrinsic motives but depends on the effective physics teacher characteristics.

1.3 Significance of the Study

The review of the literature in the area of effective teacher characteristics, and the effects of teachers' characteristics on students' motivation and achievement reveals that these characteristics have not been considered

extensively in terms of students' and teachers' perspectives. In this thesis I intended to reveal students' and teachers' shared perceptions of effective teacher characteristics and their effects on students' motivation in physics classes.

Most of the studies related to effective teacher characteristics and students' motivation have not covered the effects of physics teachers' characteristics on students' motivation. Therefore, neither effective physics teachers' characteristics nor the effects of physics teachers' characteristics on students' motivation have been analyzed extensively in the literature. This study is expected to fill this gap in the literature on effective physics teachers' characteristics on motivation. Moreover, through conducting this thesis, I aimed to investigate the effects of physics teachers' characteristics on students' motivation by quantitative and qualitative aspects which as a result present new dimensions into teachers' characteristics. Furthermore, this study was utilized to investigate how teachers use those characteristics to motivate their students in physics classes.

In my previous research (Korur, 2001); I investigated physics teachers' characteristics affecting students' physics achievement, motivation and attitude as perceived by students. The students' views were collated through a questionnaire which included 142 teachers' characteristics. Within this study I did not have the chance to gather the teachers' perceptions of their characteristics. In fact, there are only limited studies related to teachers' perspectives on this subject in Turkey. In the quantitative part of this study the teachers' perceptions of the physics teachers' characteristics affecting students' motivation were determined. The number of participant teachers was increased as much as possible to define a better tendency about physics teachers' characteristics affecting students' motivation in physics.

In most of the cases, physics teachers did not take into account their characteristics to increase the motivation of students or to increase the students' achievement. Instead, teachers usually had some expectations from students such as studying more, listening carefully, solving more problems, taking notes and so forth. Through the help of this study I located teachers who possess the effective physics teacher characteristics and I carried out some direct in-depth interviews with those teachers and their students in order to ascertain what kind of characteristics were most effective in relation to the students' learning. Classroom

observations during the lessons of those teachers were undertaken in order to explore the interaction patterns between the teacher and the students in terms of students' motivation. Therefore, both quantitative and qualitative aspects of the effects of physics teachers' characteristics on students' motivation were analyzed by means of this thesis. The results of this study could be used as a resource in Faculties of Education to teach pre-service physics teachers the effective physics teacher characteristics and to help them improve their characteristics with respect to those characteristics.

Students usually believe that the physics is not easy to learn. They want to rediscover and build upon their own personal knowledge about physics. Physics teachers should guide them while they construct their knowledge. Therefore physics teachers have an important role in improving students' achievement and motivation in the physics lessons. Physics teachers should try to improve themselves, as all teachers need to, and try to increase the quality of instruction. This study provides explanatory results for the teachers in terms of effective teacher characteristics. They can adapt themselves to those characteristics in order to increase students' motivation in physics courses. The results of this study could also be used in in-service teacher training programs to ensure that physics teachers are aware of the effective physics teacher characteristics.

Effective teacher characteristics are one of the main factors that affect students' motivation. There may be a link between students' achievement and their motivation that should be analyzed thoroughly. It could be considered that teachers' characteristics that affect students' motivation, also affect their achievement in physics (Korur, 2001). Related to the third research question of this study, it is important to explore the effective teacher characteristics, by gaining students' and teachers' perceptions, how they interact with students' motivation and which one of those characteristics affects students' motivation more than the others do in the classroom environment. Additionally, the observations of the lessons of the physics teachers who are supposed to possess the effective characteristics and the interviews with those teachers make this study crucial to find out the extent of the interaction between the teachers who do possess most of the effective characteristics and students' motivation.

1.4 Design of the Chapters in the Thesis

The quantitative and qualitative aspects of this thesis were analyzed in two parts. In the quantitative part of the study the answers to the first two research questions were investigated. In the qualitative part of the study, I examined the third research question. The quantitative part and qualitative parts of this study are linked together in that the first part is the foundation study enabling the latter to be undertaken. The relevance between the quantitative and qualitative parts of the study and the links between the chapters are shown in Figure 1.1.

The quantitative part will support the qualitative part of the thesis in terms of selecting the case teachers and determining the categories and codes of the observations and interviews. The overall conclusions of the study and the implications and recommendations for further research for both parts have been included at the end of the thesis. In the quantitative part of the thesis, the methods, results and conclusions and discussions have been discussed.

The second part of my thesis is wholly related to the qualitative aspects of effective teacher characteristics. The main aim was to find out the answer to the third research question of the study. I should emphasize that both the qualitative and quantitative parts are intrinsic. The findings from the quantitative part of my thesis were mainly used in the data collection and data analysis process. The effective physics teacher characteristics, determined in the quantitative part of the study, were directly used as a base for selecting the case teachers, to collect the data and to define the categories of the codes for analyzing the data. Furthermore, the second part of my thesis provided me with a wide point of view to understand and implement the paradigm of effective teaching and effective teacher characteristics. The data gathered from my observations and interviews enabled me to focus on the effective physics teachers and their interaction with their students.

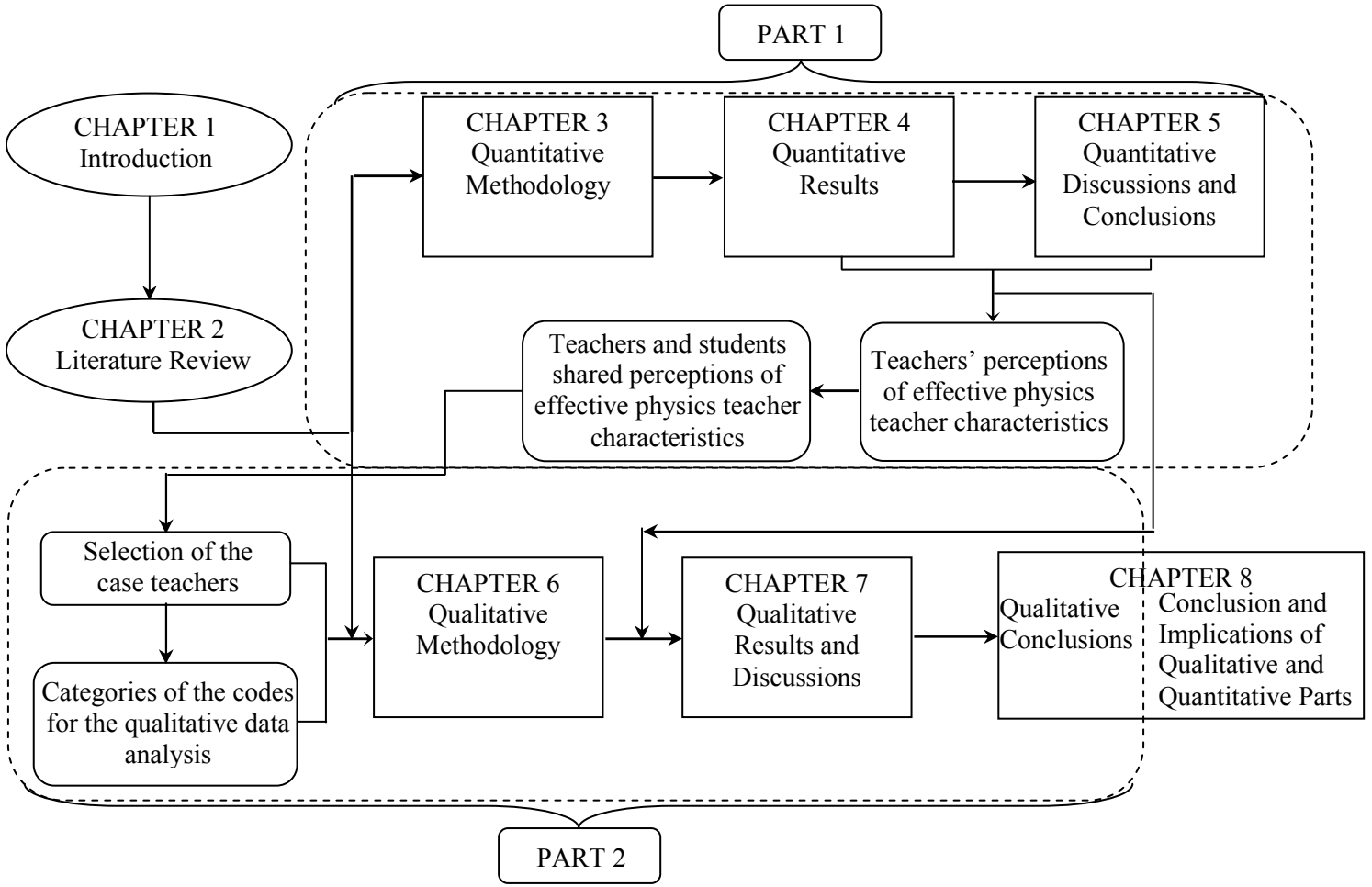


Figure 1.1 Design of the Chapters

CHAPTER 2

REVIEW OF RELATED LITERATURE

The quality of instruction and effective teaching can be analyzed in terms of teachers' ability to assess and meet the students' needs. The quality of instruction can also be enhanced by increasing the teachers' professional practice, broadening their knowledge of instructional strategies and giving feedback related to teachers' characteristics (Champagne & Hornig, 1987; McLaughlin et al., 1986). Therefore, the characteristics of teachers should be taken into account in order to increase the quality of instruction and to ensure effective teaching.

Druva and Anderson (1983) emphasized this relationship and they stated that teachers' characteristics and teachers' behaviors should be analyzed together. They declared that the students' outcomes and teachers' characteristics were interrelated to each other. Teachers' primary role was to increase students' motivation and achievement in the lessons. To adequately support this role, teachers should have effective teacher characteristics. Moreover, in another study (Hall, 1976), the role of the teacher was described as a motivator. Teachers' characteristics supported that role in class activities. Therefore, the students' motivation and teachers' characteristics were directly related to each other.

The effective teachers' characteristics affecting students' motivation towards physics could not be derived directly from the literature findings. However, there were many studies that analyzed various sub-categories of teachers' characteristics such as teachers' classroom management behaviors (McGarity & Butts, 1984; Opdenakker & Damme; 2006), attitude toward discipline (Gallagher & Tobin, 1987), teaching strategies and methods that the teachers use in the class (Powers, Nitcavic & Koerner, 1990; Rowan, Chiang & Miller, 1997), teachers' personal characteristics and interpersonal relations (Fox & Peck, 1978; Ogden, 1994) and teachers' subject matter knowledge (Richardson

& Thomas, 1989; Rowan et al., 1997). To construct a theoretical and conceptual base for this study, the studies related to effective physics teacher characteristics and students' motivation were reviewed. Those studies have been compared and collected under certain titles.

The effective teacher characteristics could be analyzed under two main sub titles; effective teacher characteristics in general, teachers' and students' perceptions of effects of teachers' characteristics, respectively. The studies related to effects of teachers' characteristics on students' motivation have been analyzed under two separate titles; current theories of students' motivation and the role of the characteristics of teachers on students' motivation.

2.1 Effective Teacher Characteristics in General

The questions of effectiveness, what are the best ways to teach and who are the best teachers have generated research in education for most of the last century. The effectiveness of the teacher was usually considered to be related to the students' learning outcomes, including students' motivation and achievement (Fives, 2003; Shadid & Thompson, 2001).

The effects of teacher characteristics and teachers' behaviors were the main concerns of the many studies in the past decade. A review study was carried out by Wayne and Youngs (2003) to find a relationship between students' achievement gains and the characteristics of teachers. Moreover, one of the aims of this study was to collect the many studies related to teachers' characteristics so as to encourage the researchers who had been working on this subject. The study includes a review of 21 studies with meta-analyses and individual studies. The authors at first listed all the findings and then they categorized the findings of different studies. One of the conclusions of the study stated by the authors was that students' learning depended on certain characteristics of teachers such as teachers' testing skills, subject knowledge, and positive relationships with the students.

Teachers' characteristics can be assessed by students gain in subject-matter knowledge and psychomotor skills, teachers' behaviors, students' behaviors,

student-teacher interactions and teachers' personal characteristics (Klausmeier & Goodwin, 1975). Teachers' characteristics, such as being nice, warm, friendly and caring were the most effective characteristics as perceived by students (Wright, 1984). In the same way, Ogden (1994) declared that teacher characteristics like understanding, caring, humor, interpersonal skills and personality were important in terms of effective instruction. Students expected their teachers to have those characteristics and they evaluated the quality of instruction with regard to teachers' characteristics.

Teachers should be knowledgeable as regards their professional branch and its related cultural background. An effective teacher was the one who could transfer a sufficient amount of knowledge to the students. He or she should have enough pedagogical knowledge to manage the class and to maintain discipline in the class (Aydın, 1989; Büyükkaragöz & Kesici, 1998; Temel, 1989).

Teachers' characteristics such as possessing content knowledge, methods used in lessons, classroom management behaviors and attitude toward discipline should be considered together. The prospective teachers should also be engaged to possess those characteristics adequately. Therefore, teachers were able to create a positive relationship with the students easily (Aksu, 1987).

Some of the characteristics of mathematics teachers were crucial to consider since they also reflected the important points in terms of characteristics of teachers. Rowan, Chiang and Miller (1997) designed a quantitative longitudinal study to develop and test a model of teachers' effects on students' achievement in mathematics. They concluded that teachers' teaching ability such as subject-matter knowledge and teaching strategies were effective characteristics of teachers on students' math achievement. Opdenakker and Damme (2006) concluded that teaching was not just to deliver the subject matter to students and the learning of students was not just to get high marks on a particular test. Effective teaching should involve "reflection on oneself, on classroom practice, on the students and their learning" (Opdenakker & Damme 2006, p.15). It should also involve a sufficient amount of teacher-student interactions and communications. In Turkey Duruhan et al. (1990) designed a survey study to explore the effect of teacher attitudes and behaviors on mathematics courses. Ergün and Duman (1998) carried

out a survey study to analyze the behaviors of teachers in critical conditions in the class. Both studies analyzed and represented the data descriptively, by giving percentages of tendency of the students' answers to the questionnaire. Ergün and Duman (1998) did not confine their analysis to a specific lesson, but Duruhan et al. (1990) concentrated the analysis on mathematics. Both studies implied that the teachers' characteristics like attitudes and behaviors of teachers to the students, solving problems related to university entrance examinations, contacting the students to understand the reasons for failure, and ensuring active participation in the class would be stated as perceived by students. Likewise, Aydın (1989) studied the characteristics of secondary school mathematics teachers. In the results of the study, the author stated that in Turkey lecturing characteristics of mathematics teachers including preparation for the lesson, providing fair tests and fair grades, enthusiasm for teaching and problem solving were the characteristics of an effective teacher. The characteristics of the science teachers and physics teachers have been analyzed under separate titles.

2.1.1 Effective Teacher Characteristics in Science

The interactions between teachers possessing effective characteristics and students in science classes have been analyzed in the literature. For example, in science classes, students need to have fun. Thus, teachers should attract the attention of the students in the lesson. For this reason the classroom management behaviors of the teachers were one of the essential teachers' characteristics. The students whose teachers exhibited competency in classroom management were more motivated than those whose teachers did not. The students' involvement in the class sessions and students' motivation through science depended on the science teachers' classroom management behaviors (Mc Garity & Butts, 1984). Students' achievement and motivation towards science lessons is usually assessed by teachers' performance. Teacher performance as a source of teachers' effectiveness was a criteria that affected classroom management procedures and students engagement in science learning tasks (Tobin, 1986).

Piburn and Baker (1993) designed a qualitative study, during the period of 1976-1986, which was mainly based on students' perceptions of science and teaching science. Since the study is similar to this study, the review was kept comparatively long. The sample was randomly selected with stratified random sampling. The sample of the study consisted of 149 students; 75 male and 74 female. The instruments were not clearly defined, but Piburn and Baker (1993) used a semi-structured design for interviews during their qualitative study. The interviews were taped to decrease the interviewing effects. The results of the study were analyzed case-based under 3 headings; "Instructional strategies", "Cognitive demands" and "If I were the teacher". In the representation of the results no figures, visuals or tables were used and there is nothing about the coding process.

The results were just given as students' answers to the appropriate questions and the answers were just used for giving information about students' perceptions and beliefs. The questions were usually open-ended and it can be said that the analysis was thoroughly undertaken by Piburn and Baker (1993). The results of the study show a decline in attitudes toward science. The results in terms of instructional strategies are that the teachers should always find time to talk with students and make an effort to implement their suggestions. From elementary to the high school level teachers should support meaningful learning by using activities, implementing useful class work, and giving proper assignments. The teachers should ensure that the students at any level like science and enjoy the way they learn. In fact, the students enjoyed the science activities and students considered student-student and student-teacher interaction important in the science class. When the students took the place of the teacher, they said they would change the science class to an activity and exploratory-based one (Piburn & Baker, 1993). Especially at high school level, if the science lessons were abstract and if there were complex concepts that students could not understand then the students did not enjoy science and they did not try to understand it. There could be more laboratory sessions in the science class, since they enjoyed the social aspects of science activities. The real world problems would be solved in their mind if they had extra hours to undertake investigations in laboratories. The study was prepared to recommend a series of strategies that would improve the attitude of

students toward science (Piburn & Baker, 1993). Therefore, providing activities for meaningful learning, doing experiments and using daily life examples could be concluded as the effective characteristics of science or physics teachers.

Another study in science education was carried out by observing and interviewing three teachers (Sanders, Borko & Lockard, 1993). In this study, the authors suggested analyzing teachers' characteristics in terms of content knowledge and pedagogical knowledge on their planning, teaching and reflecting. Content knowledge was defined as teachers' knowledge of a specific concept to teach. Pedagogical knowledge was defined as teachers' knowledge of theories and principles of teaching and learning, knowledge of principles of classroom behavior and management. The participants were interviewed and observed as they taught over a two-week period. They were asked about their plans and planning processes, goals, reflections and explanations about in-class activities (Sanders et al., 1993). The interviews and observations completed by the researchers were audio taped. Expanded field notes were created. Additional documents like lesson plans were collected. The domain, taxonomic and componential techniques were implemented in order to do data analysis. Detailed case studies were written for each teacher. Comparisons were made between the two areas for each teacher, followed by comparisons between the three teachers. Sanders et al. (1993) declared that the results of this study confirmed that the teachers' classroom management behaviors and pedagogical knowledge provided a framework for teaching in science.

McGarity and Butts (1984) offered similar results. The teachers having the characteristics of content knowledge and pedagogical knowledge could easily transfer the concepts of science to the students. Those teachers also gave importance to teacher-learner interactions in class activities, as students could easily assimilate the concepts. Those teachers were also experts on identifying strategies for teaching and learning processes during the lesson. As a result, students could easily concentrate on the science lesson. Therefore, having the effective characteristics of content knowledge or classroom management behaviors, teachers could transfer the knowledge of science easily (Mc Garity & Butts, 1984; Sanders, Borko & Lockard, 1993). In fact, Gallagher and Tobin

(1987) explained that students' poor achievement and motivation was usually related to teachers' inappropriate behaviors such as lack of preparation for the lesson. The students of such teachers did not concentrate on the science lesson and they did not enjoy sharing ideas. Students' motivation declined in the science lessons. Gallagher and Tobin (1987) also stated that most high school science teachers tended to teach in a way that would ensure coverage of the content. The majority of the class time was spent on dictating or presenting the subject matter. The teachers would generally interact with the top 25 % of the students, and if those students understood the concept taught the teachers would directly start to explain a new concept. In Turkey, Şahin (2001) also stated that teachers usually carried out the tasks in the lessons with a few students and those students were always the same ones. The results of Gallagher and Tobin (1987) are also supported by the review study of Çimer (2007). In this study the author collected and analyzed research studies related to effective science teaching. He concluded that when the teachers helped their students to be motivated in the science lessons by activating their existing ideas and conceptions and by modifying their knowledge of science, the understanding and learning level of students improved. One of the important issues in effective science teaching was that the teacher should make use of technology in the class, such as simulations, and he should also support meaningful learning in the class such as constructing analogies, concept maps, diagrams and pictures. These results also confirmed that the six principles of effective teaching were: dealing with students' existing ideas and conceptions, encouraging students to apply new concepts or skills in different contexts, encouraging student participation in lessons, student inquiry, co-operative learning among students and offering continuous assessment and providing corrective feedback (Çimer, 2007). Teachers should also promote students to use their recently learned scientific knowledge in different situations both in and out of the class. In the Turkish perspective Çimer (2007) suggested that science teachers should be familiar with the characteristics of effective teaching and they should "…construct their own knowledge and understanding of effective teaching and develop their own theories of teaching and learning…" (p. 36).

The study undertaken by Aiello-Nicosia, Sperandeo-Mineo and Valenza (1984) included 35 junior high school teachers with their 780 students from the eighth grade. The authors tested the relationships between science teacher characteristics and student outcomes. Two sets of variables were assigned to each teacher as teacher characteristics and mean characteristics of their students. The differences between the two groups were analyzed through a multivariate significant test. The two sets of variables, student outcomes and teacher characteristics, were related through the canonical correlation analysis. Aiello-Nicosia et al. (1984) found that there was a statistical significant correlation, $r=.53$, $p<.001$ between teacher knowledge of subject matter and students' outcomes of achievement. However, the researchers did not cover the effect size, so there is a weakness in the generalization of findings to the population of the study. In particular, teachers were able to effectively teach science processes if they could perform effective characteristics.

Brunkhorst (1992) carried out a similar study to examine the characteristics of 13 key teachers in middle high science programs and the learning outcomes of their students. The author identified various criteria for teachers' characteristics to analyze the effect on students' science achievement. He compared the factors of the teacher/instructional program defined by the National Assessment of Educational Progress with the students learning outcomes. The author found similar results with those of the Aiello-Nicosia et al. (1984) study. Brunkhorst (1992) collected the teachers' characteristics in groups such as doing daily hands-on activities and giving importance to discussions in the class sessions. The students whose teachers support those characteristics achieved a high level of science knowledge and developed positive attitudes toward science. They also liked science and scientific issues. The two studies confirmed that teachers' characteristics were crucial in terms of students' learning, motivation and their attitudes toward science.

A review study of Morgil and Yılmaz (1999) also declared similar results to the Brunkhorst (1992). A science teacher should possess effective characteristics like subject matter knowledge, using laboratories to adapt real life problems into class setting, promoting active and meaningful learning of students, improving the

cognitive level of students, and using technology in the classroom. These characteristics enhanced the quality of instruction and students were easily motivated to learn science.

Teachers' pedagogical knowledge was also a part of teachers' characteristics. Lederman, Ges-Newsome and Latz (1994) carried out a qualitative study to assess the development and changes in pre-service science teachers' subject matter and pedagogy knowledge structures. They used 12 pre-service teachers and 6 professional teachers for this purpose. The study of Lederman et al. (1994) was a longitudinal study between 1991 and 1994 and it informed us about the relative effectiveness of differing knowledge structures and whether teachers' knowledge structures truly impact on student learning. They used a case-study design, using multiple subjects. Data were collected and analyzed in two phases. For the first phase each subject was given 30 minutes to answer the questions such as "What topics make up your primary teaching content area?" and "If you were to use these topics to diagram your content area, what would it look like?" In the second phase an attempt was made to assess changes in the pre-service teachers' knowledge structures and to clarify any patterns elucidated in the first phase. Each subject was asked to participate in a 45-minute videotaped interview. All interviews were transcribed for analysis. Data were compared within and between individuals to derive any evident patterns for this particular group of pre-service teachers. Both phases of data analysis were conducted by one of the researchers and later corroborated by independent and blind analyses performed by researchers, looking for any evident patterns in the responses provided across time within individuals and between individuals. The results indicated that pre-service teachers were very uncertain and confused about what to write or what to draw in both phases. In other words, pre-service teachers usually did not possess adequate knowledge of subject matter. Their organizational patterns were traditional, simple and pedagogy structures tended to be organized in a linear fashion coinciding with the temporal sequence of instruction, as shown in Figure 2.1.

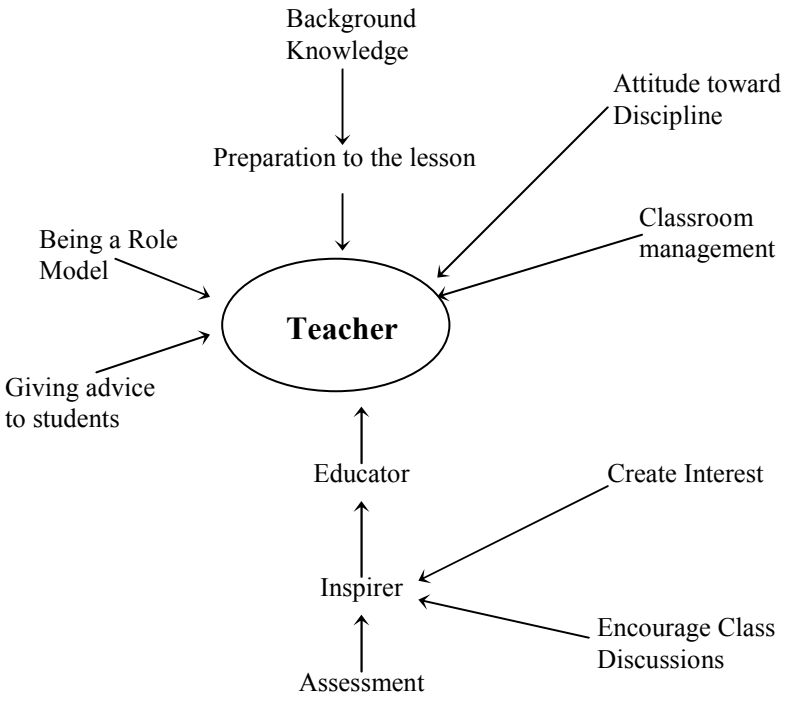


Figure 2.1 Temporal sequence format for the teachers' pedagogy structure based on Lederman et al. (1994).

Lederman et al. (1994) stated that teaching and possessing adequate knowledge of subject matter were two different phenomena. An effective teacher should have both. The results of the study were very important in terms of representing the knowledge formation of science teachers. Teachers' beliefs, perceptions, attitudes and interests toward science teaching, teaching techniques and teaching behaviors were the parts of the teachers' characteristics that affect students' science achievement.

A survey study was carried out with 29 in-service and 29 pre-service teachers in Turkey to compare teachers' perceptions about effective science teachers' characteristics (Ünal, Tatlı & Eryılmaz, 2000). The authors used a questionnaire with 50 questions including six categories of teachers' characteristics. These were teachers' classroom behavior, teaching and other experiences, school relations, subject matter knowledge, professional activities and bilingualism. The data were analyzed in terms of mean, standard deviation

and frequency analysis for each category. Both groups of teachers agreed that subject matter knowledge was the one of the most effective teachers' characteristics. The authors also stated that students' achievement, mainly having a high grade point average, in science did not mean that the teacher possessed effective characteristics. This result differed from the previous results of the other authors including Aiello-Nicosia et al. (1984) and Brunkhorst (1992).

2.1.2 Effective Teacher Characteristics in Physics

Wubbels, Tartwijk and Brekelmans (1995) analyzed the interpersonal physics teacher behavior in the classroom from three perspectives: content knowledge, pedagogical and interpersonal perspectives. The teachers' classroom management behavior and attitude toward discipline were concluded to be important characteristics of the teachers in terms of the students learning process. Most of the studies did not cover the teachers' nonverbal behaviors like gestures or facial expressions or teachers' empathy and teachers' leadership behavior. In this study these items were also considered to be effective teachers' characteristics.

An effective teacher was one who could change the lesson plan, teaching method, learning environment or instructional strategy when he/she realized that a failure in students' learning had occurred (Bridge, Reitsma & Winograd, 1993). In a similar manner, students in the physics class did not want to just learn some concepts or they did not want to cope with certain apparatus in the physics lab. Students wanted to have a teacher who was associated with the interests of students (Haussler & Hoffmann, 2000). Norton (1997) emphasized that personal effectiveness and teachers' pre-service and in-service professional development activities were crucial issues for effective teaching.

The present difficulties in physics education depend on many factors including teachers' characteristics like inadequate teacher preparation, lack of subject matter knowledge, deficiency in problem solving skills and teachers' instructional and teaching effectiveness (McDermott, 1990). Brekelmans, Wubbels and Creton (1990) designed a study to explore student perceptions of the

behavior of physics teachers in relation to some other variables in the classroom setting. The data of the study were gathered in 65 classes of physics teachers. There were 1105 students included in the study. The sample was divided into three groups to measure the curriculum effects and each group undertook a different curriculum covering the same subjects. There were no systematic differences in teaching methods in the three school types. The authors used a questionnaire on teacher interaction to measure the teacher behavior effects. The items in the questionnaire were to be answered in a five-point Likert type scale with the higher score representing more significant or frequent display of the item in question. Both teachers and the students were administered with the questionnaire. The authors used another questionnaire to measure the outcomes of students' experience and motivation towards physics and physics lessons. The questionnaire included again a five-point Likert type scale. The results of both scales were analyzed with multivariate analysis of variance (MANOVA). Then a t-test was performed for selected scales. Finally, product-moment correlations were computed between interactional teacher behavior scale scores and students' outcomes scores. There was a strong relation between interactional behavior and student outcomes in physics. In order to improve the cognitive and affective outcomes of the students, there should be more interaction between teachers and students (Brekelmans, Wubbels & Creton, 1990). Therefore, the interactional behavior of physics teachers could be concluded as being one of the effective teacher characteristics.

Teachers and students are the two important factors in education (Uz & Eryılmaz, 1999). Between the two, teachers have the most important role. Teachers serve as models for both children and adults. However, from the perspective of the teachers, they could have personal problems both inside and outside schools. Teachers are the directors and the applicators of knowledge. There would not be an adequate education system if teachers were not qualified. Similarly, this fact is also valid for the students if they are not ready to learn.

2.2 Teachers' and Students' Perceptions of Effects of Teachers' Characteristics

Students' perceptions and needs were interrelated to teachers' characteristics like caring, teachers' knowledge level, skill level and involvement in students' learning (Reyes, 1997). Teachers' and students' perception of the characteristics of effective teachers were analyzed in a quantitative study by Richardson and Thomas (1989). They designed a 36 item Likert-type scale to assess their goals. The sample of the study contained 220 students from elementary to high school level. The data were statistically analyzed by t-tests for each grade level. Results indicated that both students and teachers suggested that the characteristics of teachers were related to effective teaching. However, some specific characteristics were perceived by students as being more effective including letting the class know the objectives of the lesson and giving extra help to the students. Teachers, on the other hand, perceived grooming, clothing, knowledge of subject matter and use of teaching aids as the effective characteristics of teachers (Richardson & Thomas, 1989).

Güner (1995) and Özler (1998) studied the effects of teachers' characteristics on students' achievement in general. Güner (1995) carried out the study with 142 middle and high students in four schools whereas Özler (1998) concentrated on three elementary schools in Turkey. The two studies differed just in terms of the grade levels included in the study. They both used a questionnaire to measure the students' perceptions of teachers' characteristics. Both researchers found similar results for the characteristics of an effective teacher as defined below.

a) Cooperative in class activities,
b) Relating to the personal problems of students,
c) Relating to academic and social facilities designed by the students,
d) Explaining the objectives of the lesson,
e) Trying to increase their knowledge of their profession,
f) Setting proper connections between concepts,
g) Lecturing in a planned manner,

h) Announcing the results of the exams as soon as possible,
i) Improving the creative thinking skills of the students,
j) Transferring scientific improvements to the lesson.

2.2.1 Teachers' Perceptions of Effects of Teachers' Characteristics

Lawrenz (1975) carried out a study to determine the extent of the relationship between teacher characteristics and student outcomes and to provide an indication of the order of importance among the teacher characteristics. He randomly selected 236 science teachers, 41 of whom were physics teachers. Each teacher randomly selected one of his classes to complete the instruments of the study. In order to make the teachers more receptive to participation, the testing was completed in one class period. The response rate for the initial request for participation was 60 percent. Students' achievement and attitudes were measured by achievement and attitude tests, respectively. Knowledge of subject matter and instruction variables were also included in these tests. Lawrenz (1975) made multiple regression analysis and canonical correlation to evaluate the data. The results of the study showed that teachers' characteristics were obviously highly related to student achievement and attitude. The high relation to student outcomes was consistent with other research on teacher characteristics, which generally holds that the teacher's personality is one of the most significant teacher variables relating to student outcomes. Lawrenz (1975) also stated that new teachers should be proud of their profession and should consider the importance of the teachers' characteristics and students' needs. The students' outcomes were mostly related to teachers' characteristics such as teachers' knowledge of their profession, teaching techniques and teaching ability.

Witcher and Onwuegbuzie (1999) carried out a similar study to examine pre-service teachers' perceptions of the characteristics of effective college teachers with 219 pre-service teachers who were attending a university. The method and procedure of this study was almost the same as the Witcher, Onwuegbuzie, Collins, Filer, Wiedmaier and Moore (2003) study, except the questionnaire was administered to the teachers. The results of this study suggested

that teaching methodology, knowledge of subject matter, classroom and behavior management were the teachers' characteristics that make teaching effective.

The study of Eryılmaz and İlaslan (1999) also stated the same result as the study of Lederman et al. (1994) related to the effective science teachers. Eryılmaz and İlaslan (1999) carried out their study with 50 pre-service physics teachers from four different universities in Turkey. They administered a questionnaire to measure pre-service physics teachers' qualifications and the attitudes of pre-service physics teachers towards being an effective physics teacher. 70 percent of the pre-service physics teachers agreed that their physics knowledge was very far from high school physics curricula and 68 percent of the pre-service physics teachers indicated that they lack knowledge of subject matter and pedagogical structures. Eryılmaz and İlaslan (1999) also stated that physics teachers' characteristics should be taken into consideration, and pre-service physics teachers should be informed about the characteristics of an effective teacher. In particular, subject matter knowledge and pedagogical knowledge were also considered effective physics teachers' characteristics in Sperandeo-Mineo, Fazio and Tarantino (2006).

2.2.2 Students' Perceptions of Effects of Teachers' Characteristics

A qualitative study carried out by Witcher et al. (2003) used multi-stage concurrent mixed-methodological analysis to examine students' perceptions of the characteristics of effective college teachers with 912 graduate and undergraduate students. All the students were administered a questionnaire asking them to identify, to rank, and to define between three and six characteristics that they considered excellent college instructors possessed or demonstrated. The analysis of data was carried out with a sequential qualitative-quantitative mixed analysis. This analysis contained inductive and deductive reasoning, including the qualitative and quantitative data analytic techniques in a sequential manner. Data verification was achieved by double coding. Two researchers independently coded the students' answers and concluded the effective themes. By the help of those analysis the authors identified nine themes which were "student centered,

knowledgeable of subject matter, professional, enthusiastic about teaching, effective communicator, accessible, component instructor, fair and respectful, and provider of adequate performance feedback".

The results indicated that according to the perceptions of the college students, teachers' personal characteristics and classroom management behaviors and teachers' instructional techniques were not the characteristics of effective teachers. However, this result differed from the results of the studies carried out by McGarity and Butts (1984), Sanders, Borko and Lockard (1993) and Wubbels, Tartwijk and Brekelmans (1995). They declared that the classroom management behavior of the teacher was one of the effective characteristics of the teacher. Witcher et al. (2003) realized this difference and explained the classroom management problems experienced by state school teachers. Since the sample of this study included only college teachers, students might not have perceived the classroom management behaviors as the effective teachers' characteristics. Additionally, the results of the study showed that application of student-centered methods in the class, possessing subject matter knowledge, being enthusiastic about teaching, and fair and respectful behaviors were the characteristics of effective teachers according to the perceptions of college students.

Korur (2001) carried out a quantitative study with 2177 students in three different regions with 3 cities from each region in Turkey. The purpose of the study was to find out the students' perceptions of the effects of teachers' characteristics on students' physics achievement, motivation and attitudes. The effective physics teachers' characteristics were also analyzed according to certain variables like region, grade level, and gender of the students. The main question of the study was "What are the effects of teachers' characteristics on students' achievement, motivation, and attitudes and do teachers' characteristics show any significant relation to certain variables?" One of the sub questions of this study was "What are the teachers' characteristics that mostly affect students' achievement, motivation and attitudes as perceived by students?" The population of the study included 300 high schools from 35 cities in 3 regions and approximately 250.000 students. The sample was collected by random sampling, and the data of the study was gathered from 2177 students from ninth to eleventh

grade in 25 high schools from 9 cities in 3 regions. The questionnaire used in this study included 142 characteristics, which were obtained from literature, interviews and the researcher.

At the beginning of the data analysis Korur (2001) initialized descriptive statistics in order to understand which teachers' characteristics mostly affected students' motivation, achievement and attitudes as perceived by students. For this purpose, a frequency distribution table was prepared. In terms of inferential statistics, at the beginning of testing, the missing data analysis was made for the students' answers on the questionnaire. In order to test the hypothesis, MANOVA was used. Finally, MRC was used for making the best prediction about the independent variables and to give evidence for one dependent variable. The effect size and validity and reliability analysis were present in this study. Participants filled in a five point Likert type scale related to physics teachers' characteristics affecting students' physics achievement. In this study, 65 physics teachers' characteristics were found as effective teachers' characteristics affecting students' physics achievement, motivation and attitudes. The number of students that perceived teachers' characteristics as the most effective in terms of students' physics achievement motivation and attitude was over 1300 students. The 65 characteristics were distributed into sub-categories with a factor analysis. These sub-categories were teachers' pedagogical knowledge, preparation for the lesson, teachers' general attitude, teachers' use of the class period and use of language, methods used in lecturing and assessment and concept based lecturing.

The most affective ten items for physics teachers' characteristics affecting students' motivation (PTCASM) according to the order of mean scores derived from the scores on the Likert Type scale of the questionnaire were:

1. Relating with some students, not with the whole class,
2. Lecturing reluctantly,
3. Easily answering students' questions related to physics,
4. Having a friendly attitude to students,
5. Coming to class prepared,
6. Using offensive language to the students,
7. Processing necessary knowledge of subject matter,

8. Talking about personal problems in the class,

9. Being trustworthy,

10. Preparing a practical environment for learning.

From the descriptive statistics part of this preliminary study of Korur (2001), the least effective characteristics according to students' perception of the PTCASM, physics teachers' characteristics affecting students' achievement (PTCASA) and physics teachers' characteristics affecting students' attitude (PTCASAT) were the teachers' gender, age, appearance and clothing style, possessing subject matter knowledge and only explaining the historical background of the subject matter.

The most effective teacher characteristics, on the other hand according to students' perception of the PTCASM, PTCASA and PTCASAT were teachers' classroom management skills, preparation for the lesson, possessing subject matter knowledge (such as being easily able to answer questions) and pedagogical knowledge. The items concluded as the most effective within those characteristics were 'to deal with some students, not with the whole class', 'to lecture reluctantly', 'to easily answer the students' questions related to physics', 'to use bad/unkind words', and 'to come to class prepared'.

The researcher also declared that physics teachers' characteristics affecting students' motivation, achievement and attitude supported the same results in terms of students' perceptions. The most and least effective characteristics were almost the same for the PTCASM, PTCASA and PTCASAT. Therefore, in the target population, students' physics teachers' characteristics have an effect on students' motivation, achievement, and attitudes. Moreover, physics teachers' characteristics perceived by the students had also some sub-categories, and the descriptive study related to them indicated that teachers' pedagogical knowledge, preparation for the lesson and personal characteristics are the most effective with regard to students' motivation, achievement and attitude as supported by the literature.

2.3 Current Theories of Students' Motivation

Motivation can be defined as "…an internal state that arouses, directs, and sustains students' behavior…" (Glynn & Koballa, 2006, p.25). Brophy (2004) also stated that students' motivation was embedded in "…students' subjective experiences, especially those connected to their willingness to engage in lessons and learning activities and their reasons for doing so..."(p.4). Brophy (2004) emphasized that the teachers were the center of effective teaching and outlined the motivation theories for teachers to initialize the effective teaching. These theories are intrinsic and extrinsic motivation, self determination, needs, goal orientation, and attribution (Tuan, Chin & Tsai, 2003; Brophy, 2004). In this thesis, based on Brophy's approach, these theories are utilized to support the theoretical background of the qualitative part. The motivation, as stated in Section 1.2, referred to the situated motivation and the increase or decrease in students' motivation with respect to the situational conditions, which were the physics teachers' characteristics displayed in the physics classes.

The teachers with effective teacher characteristics should implement the curriculum efficiently and instruct with the aim of developing capabilities that students will be able to use throughout their lives. In terms of meaningful learning and being a part of the lesson students should be able to explain the context in their own words (Brophy, 2000). For example, students could construct knowledge about a physical concept like force and motion by means of their experiences in daily life. This knowledge is incompatible with scientific rules. Their experiences confirmed that to maintain a motion there should be a force. The physics teacher would say directly the opposite. Therefore, the teachers should analyze the logical structure of a topic and identify students' prior knowledge that is required. They should then check whether the students had any misconceptions related to the subject. The teachers should not overload the students with too many details related to the concepts. In fact, Dzama (2006) confirmed that if the teachers are not qualified in motivational theories, and if the classes are large and if adequate teaching and learning materials are not available, then they are not able to motivate their students to learn science or physics. In

other words, students' types of learning styles are the outcomes of the limitations of their learning environment and not the result of students' unwillingness to assume responsibility for their learning.

2.3.1 Intrinsic and Extrinsic Motivation Theories

The motivation of students was usually described as intrinsic and extrinsic motivation. Intrinsic motivation is usually referred to as one's "willingness to engage in an activity" (Sweet & Guthrie, 1996). On the other hand, extrinsic motivation is used to refer to one's being supported to engage in an activity for a reasonable or predictable outcome. In fact, intrinsic and extrinsic motivation can also be seen as action-reaction process. Students usually carry out the activities for both reasons. They may enjoy a new experiment in science and research for it and they may construct and carry out the experiment with care. Moreover, they may aim to enter a project competition with that experiment to receive an award (Gagne & Deci, 2005; Glynn & Koballa, 2006; Sweet & Guthrie, 1996). When teachers gave extrinsic rewards to motivate the students such as offering a mark, the students were wholly engaged in classroom activities. In contrast, the intrinsically motivated students found the activities and tasks enjoyable and they naturally participated in in-class activities as a sense of making improvements in their learning (Brophy, 2004; Lin, McKeachie & Kim, 2001). Based on Brophy's motivational considerations Tuan et al. (2003) stated that teachers should construct a motivated learning task, and they should support students' confidence as learners both by connecting with students' intrinsic motivation and by motivating through extrinsic rewards. Brophy (2000) declared that "…teachers are likely to be the most successful when they think in terms of stretching students' minds by stimulating them and encouraging them to achieve as much as they can…" (p.32). Brophy (2000) suggested that effective teachers should state their purposes to engage the students in the concepts that are being taught. The activities and assignments given by the teachers are also able to increase the students' willingness to search for the concepts and the teachers can check their progress and provide help if necessary.

2.3.2 Theory of Self Determination

The self determination theory combines both intrinsic and extrinsic motivation with respect to students' performance and fulfillment (Deci & Ryan, 1985; Gagne & Deci, 2005). The students can dominate the chances to choose or decide how to behave or how to think regarding the events occurring in the classroom (Deci & Ryan, 1985). The self determination theory suggests that intrinsic and extrinsic motives differ in terms of these perspectives, but they both stand in contrast to lack of motivation. When students lack motivation there can also be a lack of intention and satisfaction and this lack of motivation results in a decrease in their achievement (Gagne & Deci, 2005; Sweet & Guthrie, 1996). Brophy (2000) suggested that effective teachers should ask questions immediately after they have taught the concepts. Students should be encouraged to participate in the lesson. When students have enough knowledge and confidence about the study skills they will be intrinsically motivated and they will become self determined people. In other words, teachers should find a way to motivate their students into learning how to learn instead of giving all the details of the concepts which would increase students' self determination.

Basically, there are three psychological needs, namely relatedness, competency and autonomy, that should be met to increase motivation related mostly to the self determination theory (Deci & Ryan, 1985). Relatedness is based on social interactions in the class. Effective teachers are those who can encourage their students to share their ideas with their class mates. The teachers should encourage students to ask questions without feeling humiliated. Teachers should also provide cooperative and collaborative learning activities to support students sharing ideas without fear. Competency is the main unit of the self determination theory (Sweet & Guthrie, 1996). The activities must not be too hard or too easy to sustain the student's intrinsic motivation. Under these circumstances, students will choose to engage in activities that permit them to experience a sense of competence, such as reading a book at a comfortable level of difficulty (Deci & Ryan, 1985; Gagne & Deci, 2005). Autonomy is another element of psychological need of the self determination theory. Students who chose to read are motivated to

read for their own sake. If students are motivated to read, they read in order to understand themselves and their world better. Extrinsic rewards, such as reading books for money, cause decreases in the extent to which students think that they have control in a given situation and in their intrinsic interest in the task. That is, the person giving the reward, a parent or a teacher, undermines the students' self perceptions about their autonomy (Sweet & Guthrie, 1996).

2.3.3 Need Theories and Goal Theories

The self determination theory is heavily based on Maslow's hierarchical theory. Maslow's theory explains the hierarchy of human needs under 8 levels. These needs in the order of priority are physiological, safety and security, belonginess and love, esteem, cognitive, aesthetic, self actualization and self transcendence needs. A self-actualized person could be characterized by being problem-focused, incorporating an ongoing freshness of appreciation of life, a concern about personal growth, and the ability to have experiences (Huitt, 2001). If the lower needs are not satisfied then higher needs might not even be recognized to motivate students' behavior. Maslow's hierarchy implies that, for example, if students come to school tired or hungry then they will not be able to concentrate on the activities or tasks in lessons. Moreover, if students feel anxious or rejected they will not overcome their learning difficulties and construct clear understandings. However, the behavior of students does not always follow the Maslow's Hierarchy. In some cases students will become so engrossed in a challenging activity that they forget about their hunger or personal problems. Therefore, the teachers should be aware of the students' lower and higher needs in order to motivate their students successfully (Brophy, 2004; Shirkey, 2003).

Teachers should establish well-structured interactions with their students by considering their needs as proposed by Maslow and their gender, race, culture, socio-economic status, handicapping conditions and all other individual differences. With the help of well planned classroom activities and management techniques, effective teachers should maintain students' engagement in the activities (Brophy 2000; 2004; Shirkey, 2003). Brophy (2000) also suggested that

the teachers should find the time to convey students' expectations. Effective teachers should deal with students' personal learning problems and needs instead of spending so much time on responding to behavior or management problems in the class. Before starting to lecture in the class the effective teachers should ensure that students know what they are being taught and why it is important for them to learn the subject matter, as proposed by Maslow's self actualized person.

Teachers should spend the maximum time when encouraging students to participate in activities during lessons. The interactions between the teacher and the students are crucial in terms of effective teaching and effective teachers should spend more time on interactive activities than extended lecture presentations (Brophy, 2000). In explaining the classroom interactions Brophy identified that the teachers should try to encourage their students to participate in the classroom discussions. Teachers could respond to the questions of their students and eventually students could also answer the questions of their class mates. All of these processes sustain students' thinking skills, the ability to develop explanations, and to construct alternative methods to find the solution to problems, and so on. Effective teachers should minimize activities such as fill-in the blank work sheets, multiple pages of science or mathematical computation problems or just memorizing facts. Instead, the teachers should integrate activities for conceptual understanding of knowledge with well-defined application of skills (Brophy, 2000; 2004; Tuan et al., 2003).

Regarding the considered need theories, most motivational theorists considered goals instead of needs. Brophy (2004) stated that the activities of humans depend on some goals. Teachers with effective teacher characteristics should engage the students into the lesson by making them aware of the content or objectives of the lesson. The learning should be a goal for every student in the class. When the students engaged in an activity with the goal of learning the lesson by reinforcing of the importance of learning and understanding the material, recognizing student effort, and avoiding student comparisons, teachers promote a mastery-learning environment. In contrast, when the teachers emphasize the importance of grades and recognize students for outperforming

their classmates, a performance oriented classroom is created that sometimes cause demotivation of students (Ames, 1992).

Classroom goal structures are those structures within the classroom that make different goals relevant to the student. The meaning that students make out of learning activities and the environment in which the learning takes place are the important characteristics of the classroom.

The goal theory emphasizes that mastery goal structures are more desirable because they foster more positive motivational outcomes for students. However, there is still some discussion in the literature concerning goal theory and the applications in the school that would suggest that teachers should work to implement mastery goal structures and encourage students to endorse mastery goals. The mastery goals rarely correlate with positive student motivational outcome variables, while performance goals frequently correlate with negative student outcomes such as cheating and self-handicapping. Likewise, the performance goals do not necessarily discourage adaptive behaviors or always foster demotivation in terms of students (Miller & Murdock, 2007). Therefore, teachers with effective teacher characteristics should develop the mastery goal structures for their students in order to motivate the students effectively.

2.3.4 Attribution Theory

Once the features of the self determination theory and needs and goal theory have been identified, the attribution theory can also provide a huge explanation for the students' motivation phenomenon. Teachers transfer the knowledge to the students and they help the students to organize it and find a way to recall it later. Throughout the learning process, the students are motivated through a kind of mental stimulation not behavior modification (Cunia, 2005).

Heider (1958) was the first to propose a psychological theory of attribution, but Weiner (1974) developed a theoretical framework for the theory. The theory proposed that every individual tried to explain success or failure of self and others by offering certain attributions (Hufton, Elliot & Illushin, 2002; Kelecioğlu, 1992). These attributions were either internal or external and were either under

control or not under control. If the students had an external attribution out of control, then the teachers could do nothing to help those students in a learning situation. On the other hand the students that attributed their success or failure to internal and controllable attributions would have better learning outcomes than those that attribute their success or failure to external sources such as home life, television violence and the media (Fives, 2003; Kelecioğlu, 1992). Students with higher ratings of self-esteem and with higher school achievement tend to attribute success to internal, stable, uncontrollable factors such as ability, while they contribute failure to either internal, unstable, controllable factors such as effort, or external, uncontrollable factors such as task difficulty. Therefore, teachers should assist the students to develop self-esteem by describing intended and expected learning outcomes that are required from the students (Huitt, 2001; Weiner, 1974; Wheatley, 2005). Brophy (2000) suggested that instead of standardized tests criteria effective teachers should identify the learning difficulties and provide feedback to the students exactly when it was needed. If students have a difficulty in understanding the subject matter, the figure or the solution to a problem the teachers should explain it in a different way.

2.4 The Role of the Characteristics of Teachers on Students' Motivation

The motivational theories gained importance in terms of explaining the role of the teachers' characteristics. Brophy (2004) suggested that creating class activities with supporting intrinsic motives would overcome inappropriate circumstances in terms of students' learning outcomes. Brophy indicated that when the teachers create an event which supports students' awareness of the topic that is being taught with a new conceptual model, the teachers immediately motivate their students. There should be the formation and continuation of a process of communication between the teacher and students and between students and students.

Effective teacher characteristics would foster effective teaching. Several studies related to effective physics and science teacher characteristics have analyzed teachers' characteristics in effective teaching in terms of the

constructivist approach. The students' motivation could be increased in the physics or science course when the teachers design activities, field trips or in class activities to enhance the method of inquiry, and to improve the interactions and discussions in the class as opposed to rote memorization (Gürses, Yalçın & Doğar, 2003). In fact, teachers should also have deep subject matter knowledge of physics to apply and transfer it into various tasks in the class. Usually physics courses are in the lecture format with a few laboratory sessions. Effective teachers should modify physics teaching by a process of transferring an adequate amount of knowledge, including experiments, to support their students' style of knowledge construction. In other words, students should learn how to construct scientific knowledge in physics courses and the teachers should promote their students' learning with various activities like doing experiments (Aiello-Nicosia & Sperandeo-Mineo, 2000; Sperandeo-Mineo, Fazio & Tarantino, 2006). These findings are supported by ARCS model of Keller (1983) for promoting students' motivation. First, teachers should modify their lessons to gain students' attention by using media or doing experiments. Second, they should make the content relevant to the level of students. Third, they should help students have confidence in their learning activities, so that finally students are satisfied in their learning outcomes in the form of entertainment or sense of achievement.

The studies related to the characteristics of teachers originated with teachers' effectiveness or mainly teachers' efficacy studies. Guskey (1984) gathered data from 117 intermediate and high school teachers to assess the influence of a positive change in instructional effectiveness on several effective characteristics of teachers. In his quantitative study 52 teachers participated in the workshop on Mastery Learning. Guskey found that teachers who became more effective in their teaching tended to accept increased responsibility for the learning outcomes of their students and tended to become more positive in their attitudes toward teaching. He also stated that the programs that were used to change the characteristics of teachers caused the learning outcomes of their students to change.

Kelly and Staver (2005) emphasized that the science teachers' professional development activities and the methods applied in the class were the two effective

characteristics in terms of affecting students' self-conceptualization and their motivation. Students' motivation in physical science lessons related to students' achievement and students' learning outcomes (Tuan & Chin, 2000; Tuan, Chin & Tsai, 2003). In this quantitative-qualitative study the authors stated that teachers' efforts to integrate science lessons into daily life situations were crucial to increase the students' motivation, especially listening skills. The teachers' who gave importance to laboratory work and meaningful learning activities provided a good opportunity for students to concentrate on science. In other words, the students' motivation can be improved directly by the teachers' willingness to construct teaching methods that support meaningful learning activities. In an exploratory study with 3 teachers, Taylor and Dana (2003) achieved similar results. The students' scientific understanding was related to both teachers' meaningful learning activities such as laboratory work and teachers' subject matter knowledge.

Barlia and Beeth (1999) declared similar results in their qualitative study to find out motivational factors related to students' engagement in science. The authors concluded that students became actively motivated when the teachers related the concepts in science to real life situations. Moreover, they stated that instructional strategies in science classes should be adapted to students' needs and awareness. Instructional strategies and teaching techniques were crucial in terms of teachers' role of motivation. In their study Çakmak and Ercan (2003) applied several interviews with 7 teachers and the results of the interviews were collected and summarized. The findings of the study suggested that teachers should apply different teaching techniques, and contacting and communicating skills to motivate the students. Moreover, Brophy (2000) emphasized that teachers were the major components in effective teaching to increase the students' motivation. Brophy suggested that teachers should find appropriate methods to motivate their students. Teachers should utilize an optimal program that is a mixture of instructional methods and learning outcomes.

Research studies and thesis related to effective teacher characteristics usually analyzed the effects of those characteristics on students' motivation to learn and students' achievement. Alkhayyatt (2000) designed a dissertation to

investigate students' perceptions of teaching characteristics of good teachers. Additionally, the researcher aimed to investigate the influence of those characteristics on student motivation to learn through observations and interviews. He designed a case study by precisely including ethical issues like developing consent forms to involve the classroom setting and writing the ideas and interactions to his study, definition of the case and interpretation of the interviews and observations parts. He involved only one teacher as the case teacher of the study. The major weakness of the study was that it was a single case study. Actually he tried to find out all the characteristics of a good teacher through just a single case study. In other words, he did not have the chance to compare his results or analyze different aspects of two good teachers. Moreover, Alkhayyatt (2000) selected the case teacher according to his relationship, beliefs of the school principal, views of the other teachers and the students in the school. The six students of the case teacher were also included into the study. Although the selection of the setting seemed to be sufficient, in terms of teachers' characteristics it was troublesome to choose the case teacher based only on the beliefs of the students and teachers. There are more accurate ways such as observing several teachers and interviewing their students to select the setting and the case teacher. Alkhayyatt (2000) developed consent forms to involve the classroom setting and to write the ideas and interactions to his study. The research questions reflected the aim of his study. He also derived the interview questions from those research questions. The interviews were carried out over seven weeks and they were taped. Alkhayyatt (2000) also conducted seven observations that were not taped. He observed the interactions between the case teacher and the students without interrelating to the class. Without taping the observations it would be impossible for him to review the interactions in the class again. Despite taking very detailed field-notes, he could not produce data triangulation. Therefore, there is a weakness in his study in terms of validation of the data. He declared the necessary limitations and delimitations of his study and they seemed to be ideal for the rest of the study. However, he did not mention a theoretical framework of his study. Alkhayyatt (2000) constructed a conceptual framework but he did not talk about a theory related to either motivation or good teachers'

characteristics. A qualitative study without a theory base would imply a difficulty to represent and discuss the findings of the study.

In the data analysis part, Alkhayyatt (2000) divided the data into themes and analyzed those themes for each research question. This structure was quite understandable. Moreover, it clarified the main points collected from both interviews and observations. He also developed codes for data analysis. There were six themes and 40 codes in the study and he also clearly expressed these processes in his study.

The findings of the study of Alkhayyatt (2000) showed that teachers' characteristics like enthusiasm, subject matter knowledge, and preparation for the lesson, use of examples, and use of experiments are the main characteristics of the teacher that influenced students' motivation to learn. Moreover, according to the students' perceptions teachers' characteristics like caring, humor in the class, organizing valuable activities, answering students' questions, and subject matter knowledge were the effective teacher characteristics regarding students' motivation to learn. Alkhayyatt (2000) did not consider the students' achievement. It would have been valuable if he had stated the relationship between students' motivation and students' achievement gains in the study.

There were limited discussions in this study. Furthermore, the findings of this study related to students' perceptions of teachers' characteristics and their effects on motivation were not discussed in terms of theories of motivation and teachers' characteristics. Therefore, Alkhayyatt (2000) could not generalize the results of the study.

2.5 Summary of Findings of the Reviewed Studies

1. The effects of teachers' characteristics either on students' achievement or motivation have been analyzed in many studies (Champagne & Hornig, 1987; Duruhan et al. 1990; Ergün and Duman, 1998; Fives, 2003; Güner, 1995; Klausmeier & Goodwin, 1975; McLaughlin et al., 1986; Özler, 1998; Shadid & Thompson, 2001). Most of those studies

did not analyze the effects of these characteristics in terms of a specified content area like physics, mathematics, science, and so on.

2. There were categories related to teachers' characteristics like teachers' classroom management behaviors, attitudes toward discipline, teaching strategies and the method that the teachers use in the class, teachers' personal characteristics, interpersonal relations, and teachers' subject matter knowledge (Fox & Peck, 1978; Gallagher & Tobin, 1987; McGarity & Butts, 1984; Ogden 1994; Powers, Nitcavic & Koerner, 1990; Richardson & Thomas, 1989; Rowan et al., 1997). These categories were suggested by the literature in terms of only the beliefs of teachers or students respectively. There was no research that combined teachers' and students' shared perceptions of characteristics in order to conclude whether they had a strong effect or not.
3. Effective teachers' characteristics have been analyzed in various lessons like science and mathematics in terms of students' outcomes. Students' outcomes are usually related to their abilities in learning and achievement. (Aydın, 1989; Ergün & Duman, 1998; Opdenakker & Damme, 2006). These studies evaluated students' outcomes by measuring them with quantitative scales or with limited observations. However, the effects of teachers' characteristics on students' learning outcomes depend largely on students' motivation. These studies paid little attention to the relationship between motivation and the achievement of the students.
4. In some of the review studies teachers' characteristics have also been stated to be effective. In these studies various research findings were gathered to explore the possible effects of teachers' characteristics on either students' motivation or their achievement (Çimer, 2007; Morgil & Yılmaz, 1999; Wayne & Youngs, 2003). The review studies were valuable in terms of finding out from which dimensions the characteristics should be studied. These studies definitely showed that teachers who possessed most of the effective characteristics should be analyzed in the actual classroom setting.

5. Physics teachers' effective characteristics like teachers' subject matter knowledge, preparation for class, and problem solving skills have usually been analyzed in terms of students' learning outcomes (Brekelmans et al., 1990; Gallagher & Tobin, 1987; McDermott, 1990; Wubbels et al., 1995). On the other hand, the characteristics like personal, attitudes toward discipline, and using technology in the class were not analyzed in terms of their effects on students' motivation and achievement.
6. The students' perceptions of effective teacher characteristics showed that physics teachers' characteristics had an effect on students' motivation and attitude (Korur, 2001). However teachers' perceptions of effective teachers' characteristics should also be taken into account in order to conclude shared perceptions of combined effective characteristics. Teachers' and students' perception might differ in some items related to the characteristics of teachers.
7. Student-teacher interactions are the main feature of the effects of teachers' characteristics on students' motivation. Teachers' interpersonal skills and interactional behavior were concluded as effective teachers' characteristics (Brekelmans et al., 1990; Klausmeier & Goodwin, 1975; McDermott, 1990; Ogden, 1994; Opdenakker, & Damme, 2006; Wright, 1984). These studies were based heavily on beliefs instead of direct observation or interviews. In fact, to explore an interpersonal or interactional behavior with a questionnaire was quite impractical.
8. A teacher regardless of her/his branch like mathematics, physics or science should be aware of his/her characteristics. The effective teacher was the one who possessed effective teacher characteristics, and those characteristics were related to students' achievement (Brunkhorst, 1992; Eryılmaz, & İlaslan, 1999; Korur, 2001; Lederman et al., 1994; Sanders et al., 1993; Witcher et al., 2003; Wubbels et al., 1995). The studies analyzing these roles and behaviors did not aim to explore the interactions between the teacher and students. Moreover, these studies

tried to analyze these roles by quantitative measures only. The main concern was to analyze the interaction between these behaviors or roles and the students' motivation through the use of qualitative analytic techniques at the end of a direct observation or an interview.

9. Teachers' characteristics have been analyzed qualitatively in the literature. These researches clarified the point related to in-class interactions between students' motivation and teachers' characteristics (Alkhayyatt, 2000; Barlia & Beeth 1999; Tuan, Chin & Tsai, 2003). Some of this research did not support their findings with theory. Moreover, some of the research used codes directly derived from limited observations. In those researches, the case teacher or teachers were selected through the authors' personal relations instead of appropriate criteria.

The literature review for teachers' characteristics is very detailed; actually it covers nearly the past 30 years in this subject area. The main points of this study were concluded and all of these points were carefully researched from the literature, and important concerns in the articles and books were gathered. Based on the review of the literature, there was a need to investigate how physics teachers possessing effective characteristics interact with the students' motivation in the classroom setting. Furthermore, based on this review, there was a need for research to clarify the points which are lacking and to accomplish some goals that are: (1) to survey the teachers' perceptions of teachers' characteristics affecting students' motivation with a questionnaire which covered almost all the important characteristics of teachers, (2) to determine the effective physics teacher characteristics by the shared perceptions of teachers and students, (3) to select two or more case teachers who possess many of those common characteristics, and (4) to investigate the interactions between the common characteristics of teachers and students' motivation in physics with a qualitative case study.

PART 1 - QUANTITATIVE PART OF THE STUDY

CHAPTER 3

METHODS

Within this section the description of the design of the quantitative part of the study is presented. The description of population and sample selection, design of the study, instruments, procedure, and data analysis of the quantitative part of the study are presented.

3.1 Population and Sample

The target population of this study covers all high school teachers with their students in Turkey. Since it is not feasible to select a representative sample from this population, it is more feasible to define an accessible population. The accessible population of the study is 337 public high schools from 39 cities in 3 regions; Black Sea, Mediterranean, and Central Anatolia, including 1011 high school physics teachers. This is the population for which the results of this study will be generalized.

The teachers in the sample of this study was chosen from the schools that were covered in my previous study, Korur (2001), since I proposed to combine the students' and teachers' perceptions of effects of physics teachers' characteristics on students' physics achievement and motivation. In my previous study, 9 cities from three different regions were selected as the sample. The cities were selected from the ones that can be easily reached by cargo or by post. The data were gathered from 2177 students from 25 public high schools in those cities. In this study the same schools were included in the sample again. The number of

teachers from 25 public high schools was not adequate in order to conclude the teachers' tendency on their perceptions of effective physics teacher characteristics. There are two or three physics teachers in each public high school. Therefore 50 physics teachers would not represent the accessible population. I would have to increase the number of schools to increase the number of teachers that I could reach, so I proposed to produce a representative sample.

The same three cities were selected for each region and they corresponded to almost 20 % of the number of cities in each region. An additional 70 schools were included for each city. All the schools were selected from public high schools since their curriculum was almost the same. The schools in each city were chosen by using a simple random method. Firstly, for each city the public schools were numbered from the University Entrance Examination catalog. Secondly, to produce a representative sample, all of the public schools were counted and at least 50 % of the schools for each city were included in the study. Thirdly, random numbers were created by computer and the schools labeled with those numbers were selected. As a final step, during the administration process I contacted the physics teachers and their willingness to complete the questionnaires was asked for. Therefore, it was planned to apply the questionnaire to the physics teachers in additional 33 public high schools in Ankara and an additional 37 schools from the other cities. The accessible population and the sample of the study are given in Table 3.1. The numbers were directly taken from the 2005-OSS catalog and data from Ministry of National Education.

Totally the sample of this study was 285 physics teachers from 95 public high schools, as indicated in Table 3.1. The number of physics teachers in the sample of the study was almost one third the number of those in the accessible population. It was presumed that three physics teachers worked in each school. The questionnaires were sent to the teachers and they sent them back by cargo. It was explained in the cargo packages that they could be photo-copied if there were more than three teachers. By the deadline, 63 schools had sent the questionnaire packages back. The other schools principals or vice principals were asked by phone to send the packages back and 8 schools' principal did so.

Table 3.1 Number of schools and teachers in the accessible population and in the sample with respect to the cities within each region

	Numbers in Accessible Population			Numbers in the Sample (Percent in Population)	
Regions	Public High Schools	Physics Teachers	Cities	Public High Schools Numbers (%)	Physics Teachers Numbers (%)
Central Anatolia (including 13 cities)	182	546	Ankara	40 (22.0)	120* (22.0)
			Konya	10 (5.5)	30 (5.5)
			Niğde	5 (2.7)	15 (2.7)
Mediterranean (including 8 cities)	74	222	Adana	6 (8.1)	18 (8.1)
			Antalya	12 (16.2)	36 (16.2)
			Hatay	4 (5.4)	12 (5.4)
Black Sea (including 18 cities)	81	243	Samsun	9 (11.1)	27 (11.1)
			Trabzon	6 (7.4)	18 (7.4)
			Ordu	3 (3.7)	9 (3.7)
Total	337	1011		95 (28.2)	285 (28.2)

* The number of physics teachers was derived from the number of schools by considering there was an average number of three in each school.

There were actually 230 data and 16 of them were partly empty or badly filled in. The percentage of return of the questionnaires was 75.1 %. Therefore from 71 different schools, given in Appendix A, totally 214 physics teachers' data were used in the analysis of the quantitative part of the study. The name of the region, cities and the number of teachers included in the study are given in Table 3.2.

Table 3.2 shows that the highest number of physics teachers who sent back the questionnaire was from Ankara. The questionnaires were sent back by the physics teachers in Hatay, Ordu, and Trabzon with the number that I sent. In the other cities some of the schools did not sent them back even if I contacted the teachers or vice principals of those schools more than twice.

Table 3.2 The number of teachers administered the questionnaires with respect to cities in each geographical region

Geographical Region	Cities	Number of Schools (in the sample)	Number of Schools (sent back)	Number of Teachers filled in the Questionnaires	
				city	region
Central Anatolia	Ankara	40	26 (36.62 %)	80 (37.38 %)	114 (53 %)
	Konya	10	8 (11.27 %)	27 (12.62 %)	
	Niğde	5	4 (5.63 %)	7 (3.27 %)	
Mediterranean	Adana	6	5 (7.04 %)	11 (5.15 %)	53 (24 %)
	Antalya	12	9 (12.68 %)	32 (14.95 %)	
	Hatay	4	4 (5.63 %)	10 (4.67 %)	
Black Sea	Ordu	3	3 (4.23 %)	6 (2.80 %)	47 (21 %)
	Samsun	9	6 (8.45 %)	25 (11.68 %)	
	Trabzon	6	6 (8.45 %)	16 (7.48 %)	
	Total	95	71 (100 %)	214 (100 %)	214 (100 %)

The gender distribution of the 214 physics teachers is 76 (36 %) female and 138 (64 %) male. Figure 3.1 indicates the years of experience in teaching of those teachers.

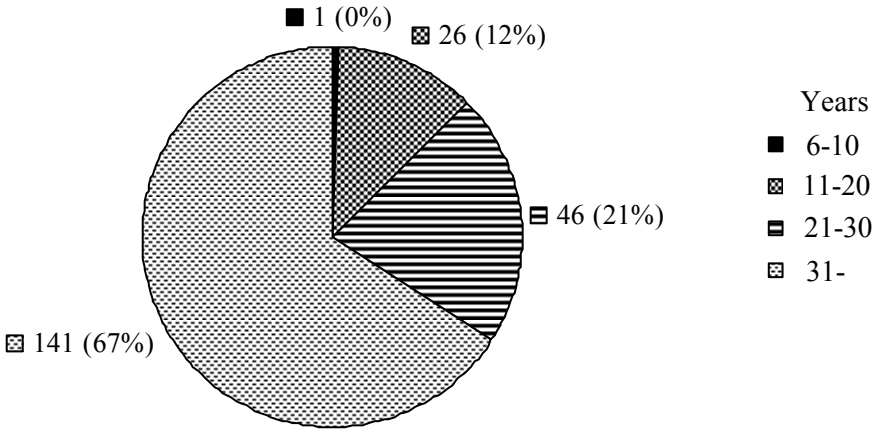


Figure 3.1 The Years of Experience in Teaching of the Teachers

As can be seen in Figure 3.1, more than two-thirds of the teachers who were included in the analysis of this study had more than 10 years teaching experience. Additionally, Figure 3.2 indicates the faculty that the teachers graduated from.

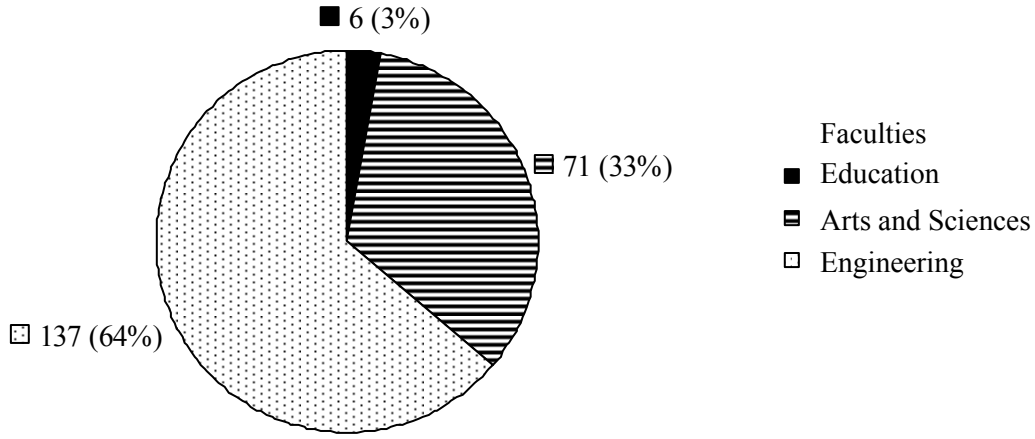


Figure 3.2 Faculties that the Teachers Graduated from

Figure 3.2 indicates that most of the teachers graduated from educational faculties. There was a remarkable difference between the numbers of teachers who graduated from educational and science faculties and those who graduated from engineering faculties.

3.2 Data Collection Instrument

The previous quantitative study of Korur (2001) presented in Section 2.5 was the basis of the quantitative part of my thesis, especially in the data collection process. The questionnaire in that study was named by Korur (2001) as "The Effects of Teachers' Characteristics on High School Students' Physics Achievement, Attitude and Motivation Questionnaire" (ETCSPAAM). It consisted of 142 items and 20 demographic questions related to students. The ETCSPAAM consisted of three five-point Likert type scales including students' achievement, attitudes and motivation. In other words, the students' perceptions of effective teacher characteristics were assessed in terms of the students'

achievement, attitudes and motivation, respectively. However, in the results of the descriptive analysis of Korur (2001) the variance, mean and standard deviations for physics teachers' characteristics affecting students' achievement and physics teachers' characteristics affecting students' attitude implied approximately same values. Therefore, for the quantitative part of my thesis I used the same questionnaire with a two-dimensional five-point Likert type scale. The first dimension corresponded to teachers' perceptions of physics teachers' characteristics affecting students' achievement (TACH). The second one related to teachers' perceptions of physics teachers' characteristics affecting students' motivation (TMOT). The items, even without changing their numbers, were taken directly from the previous questionnaire, but the demographic questions were revised and adapted to teachers. Therefore, the name of the revised questionnaire was "The Effects of Teachers' Characteristics on High School Students' Physics Achievement and Motivation Questionnaire" (ETAM), given in Appendix B.

Finally, there was only one instrument in the quantitative part of my thesis. The ETAM totally involved 142 items corresponding to the teachers' characteristics and 6 demographic questions of teachers. I intended to gather the perceptions of teachers for the effects of physics teachers' characteristics on students' achievement and motivation by the help of the ETAM. The items in the ETAM are described in the Table 3.3.

Table 3.3 Items in the ETAM

Items	Type of Items	No. of Items
Gender	Multiple choice	1
Age	Multiple choice	1
Level of Education	Multiple choice	1
Years of Experience in Teaching	Multiple choice	1
University that the Teachers Graduated from	Fill in the Blank	1
Faculty that the Teachers Graduated from	Multiple choice	1
TMOT	Multiple choice	142
TACH	Multiple choice	142

The questionnaire was designed so the teachers could read the items and put a tick into the box next to the items. There was not a separate answer sheet for the items. In the five-point Likert type scale 1 corresponded to ‘decrease the most’, 2 ‘decrease’, 3 ‘no effect’, 4 ‘increase’, and 5 ‘increase the most’. Therefore, the maximum score for the TMOT and TACH was 710. The higher score for the TMOT and TACH shows that a higher number of physics teachers perceived that the characteristics of physics teachers affected students’ motivation and achievement respectively.

The previous questionnaire, the ETCSPAAM, was evaluated by validity and reliability issues. The face validity and content validity issues were carried out. The reliability analyses were also carried out. The results of the reliability analyses showed that some of the items’ corrected correlation was negative and that those items represented an opposite tendency in the scale. Therefore, for both motivation and achievement, the items number 7, 31, 36, 43, 53, 74, 75, 76, 78, 83, 84, 89, 92, 98, 100, 101, 102, 103, 104, 108, 110, 111, 112, 113, 114, 117, 118, 119, 121, 122, 131, 137 and 139 were recoded as 1 for 5, 2 for 4, 3 for 3, 4 for 2 and 5 for 1. The results of the reliability analysis indicated that α= .9541 for motivation and α=.9517 for achievement. In conclusion, the ETAM was a valid and reliable questionnaire. The questionnaire was administered to the teachers in the sample of this thesis.

3.3 Procedure

At the beginning, I carried out a detailed literature search. In fact, the literature was searched systematically between the years 2005 and 2007. For the literature review, first the key terms were determined and the list of keywords was given in the table in Appendix C. By the help of these keywords Dissertation Abstracts International (DAI) and Educational Resources Information Center (ERIC) were searched from their internet web sites. Moreover Social Science Citation Index (SSCI) and Science Citation Index (SCI) were researched from the Web of Science catalog in METU library by computers. The MS and PhD thesis published in Turkey were researched from YOK. The Turkish journals like

Çağdaş Eğitim Dergisi, Milli Eğitim Dergisi, Eğitim Araştırmaları Dergisi, Eğitim Bilimleri ve Uygulama Dergisi, Türk Eğitim Bilimleri Uygulama Dergisi, Hacettepe Eğitim Fakültesi Dergisi, TOJET and TUSED were researched. The print-outs of obtainable full texts of articles were taken from METU library, the library of Bilkent University, and TUBİTAK Ulakbim. Periodicals like Eğitim ve Bilim and Öğretmen Dünyası cannot be reached by computer and they were researched manually. All the periodicals and related books were determined and photocopies and print-outs of obtainable documents were gathered. Articles were organized in terms of year and alphabetical order. In case of new recent articles on this topic the researcher continuously checked and followed the literature by regularly maintaining the research on the Internet and in the libraries.

The design used in the study was a cross sectional survey that is usually used to "collect information from a sample that has been drawn from a predetermined population" (Fraenkel & Wallen, 1996; p 368). Moreover, the data is collected at just one point in time, even if the time it takes to collect all of the data may take a few weeks or more. The participants to be surveyed should be selected randomly if possible. However, researchers should ensure that the subjects they intend to question possess the information the researcher wants to obtain and that they are willing to answer these questions (Fraenkel & Wallen, 1996).

The cross sectional survey design was initialized in order to find the answers of the first and second research questions of this thesis. The selection of the sample was previously discussed in Section 3.1. I aimed to recognize a general tendency of teachers on the physics teachers' characteristics affecting students' motivation and achievement. Therefore, a questionnaire was prepared with the process stated in Section 3.2. The students' perceptions of the characteristics of effective high school physics teacher in terms of students' motivation, achievement and attitude were gathered by Korur (2001). By combining the data from the study of Korur and from this study, I determined the teachers' and students' shared perceptions of effective teacher characteristics that a physics teacher should possess.

The questionnaires were designed by the researcher. In order to make the answering process easy for the teachers and to decrease the evaluation mistakes the items and the answering boxes were given on the same sheet. The questionnaire was altogether 6 pages and they were copied and sorted by the researcher for 285 teachers in the sample of the study.

To administer the questionnaires to the teachers in all public schools stated in Appendix A, it was necessary to get permission from the Ministry of National Education, since the school principals asked for the permission document. For this purpose, firstly, the researcher contacted the head of the SSME department and Faculty of Education and got initial permission for the study and secondly he contacted the presidency of METU to receive legal permission for the study. Thirdly, with this legal permission the researcher contacted the department of Research Planning and Coordinating Committee of the Ministry of National Education and got a permission document (see Appendix D) as that ensured that all the schools in Turkey would administer the questionnaire. Finally, a cover page (see Appendix E) was taken from the Dean of the Faculty of Education, since the official paper from Ministry of Education was a general permission paper which was not directly to the principals of the schools. It was approved from the presidency of METU and written directly to the principals of the schools. Actually, all these procedure took more than two months.

All the school principals and vice principals were called by phone as stated in Section 3.1, in order to assist in the application of the measuring tool since it takes a lot of time to go to every city and apply the tool one by one by the researcher. I talked with the physics teachers of some schools in the sample to complete and sent the questionnaires back. These processes of administering the questionnaires and sending them back were completed within four months.

The questionnaires were sent in the form of cargo packages for every school in the sample that contained all possible detailed items like a questionnaire application instruction guide (see Appendix F), a sample questionnaire, the Ministry of National Education permission document, METU Faculty of Education cover page, school list (see Appendix A), and three questionnaires assuming in every school there were three physics teachers within the sample of

the study. The packages also contained a bag from the cargo company in order for the questionnaires to be sent back.

Finally, I entered the data of all the obtained questionnaires by hand and checked the data twice for possible mistakes. Then the variables were formed and statistical analyses were done by using SPSS and MS-Excel programs. This process took almost two months. The photocopy, cargo, communication and all of the other expenses like recording materials and official expenses were paid for by the researcher.

3.4 Analysis of Data

At the beginning of the analysis of the data, the missing data analysis was undertaken for the teachers' answers on the ETAM. In the questionnaire, some of the items were not filled in by the teachers in five-point Likert type scale rather than in the demographic questions. Actually, in the descriptive statistics the percentage of the missing items was calculated and it was found that the percentage was below 5%. Therefore, all the missing data for items were directly replaced with the mean of the series.

The quantitative analysis which is to calculate descriptive statistics for the appropriate variables were initialized in order to understand which teachers' characteristics mostly affect students' achievement and motivation. The data were gathered by direct questioning of teachers with a questionnaire. Then, frequency distribution tables were prepared according to the tendency of teachers' answers in a five-point Likert type scale. Therefore, in order to perfectly understand which characteristics of physics teachers affected students' motivation and achievement more, a mean score table was prepared. Mean, median, mode, kurtosis and frequencies were calculated for determining the tendency of teachers on the effect of physics teachers' characteristics on students' physics achievement questionnaire. Factor analysis was also used to categorize the teachers' characteristics and to compare these categories with the findings from the literature. These categories are also crucial for the qualitative part of this study.

3.5 Assumptions and Limitations

The assumptions and the limitations of my thesis are considered as follows.

1. The quantitative part of the study is limited to the accessible population considered in Section 3.1.
2. Teachers' participation in terms of objectivity and obligation is not guaranteed.
3. To all schools the questionnaires were administered by cargo. The teachers were informed with an application instruction guide. However teachers may still have had some trouble in relation to filling in the questionnaire and handling the items in it.

CHAPTER 4

RESULTS

The quantitative results of this thesis included two main parts. The first part was the teachers' perceptions of effective teacher characteristics that mostly affect students' motivation and achievement. In this part the data gathered from the ETAM were used to identify the characteristics of effective teachers affecting students' motivation and achievement as perceived by physics teachers. In the second part, the characteristics of effective physics teacher as perceived by students and teachers were matched to determine the effective physics teacher characteristics. The effective physics teacher characteristics were utilized in the selection of the case teachers for the qualitative part of this thesis. Moreover they are a base for the categories of the codes in the qualitative data analysis.

4.1 The Perceptions of Physics Teachers on Teachers' Characteristics that mostly affect Students' Motivation and Achievement

The first research question of this study aimed to explore the teachers' perceptions of effective physics teacher characteristics. For this purpose, descriptive statistics in terms of teachers' answers to the ETAM were utilized to conclude the frequencies and respective percentage of the data of the teachers' perceptions of effective teacher characteristics that mostly affect the students' physics motivation and achievement.

There were two main parts in the five-point Likert type scale which were the TMOT and TACH. The answers of the teachers to both parts were turned into scores as stated in Section 3.2. Those scores were added within the TMOT and the TACH for the teachers. Then all teachers had two scores, one for each of the two parts. The scores could range from 0 to 710 in which higher scores represented the

students' motivation and achievement mostly affected by teachers' characteristics as perceived by physics teachers. Finally I calculated a mean score for the scores of the TMOT and the TACH. Descriptive statistics of the ETAM in terms of its parts are categorized and presented in Table 4.1.

Table 4.1 Descriptive Statistics for the TMOT and TACH

Part of the Questionnaire	N	Mean	Median	Mode	S.D	Skewness	Kurtosis
TMOT	214	568.3	567.5	560	33.7	-0.119	1.567
TACH	214	555.7	554.0	534	36.8	0.215	0.693

The mean scores for the TMOT and TACH showed that the characteristics of physics teachers affected students' motivation much more than students' achievement as perceived by the teachers. The students' perceptions were slightly different in the previous study carried out by Korur (2001). The characteristics of physics teachers affected students' motivation and achievement as perceived by students, but the mean scores were low. The corresponding mean scores for the TMOT and TACH were 506.9 and 508.0 respectively in the study of Korur (2001). Therefore, mean scores of physics teacher characteristics affecting students' motivation and achievement as perceived by the teachers are higher than those as perceived by the students.

The mode values for the TMOT and TACH showed that students' motivation and achievement scores had different most frequently occurring values in the distribution. The standard deviation of the distribution was not high. The mode and standard deviation values altogether showed that most of the teachers scored almost the same values. The skewness and kurtosis for the TMOT and for the TACH could be accepted that the distribution was approximately normal. In Figure 4.1 and Figure 4.2 the histograms with normal curves related to the TMOT and TACH are given respectively. As can be seen from Figure 4.1 and Figure 4.2, the distributions were approximately normal as supported by the skewness and kurtosis values.

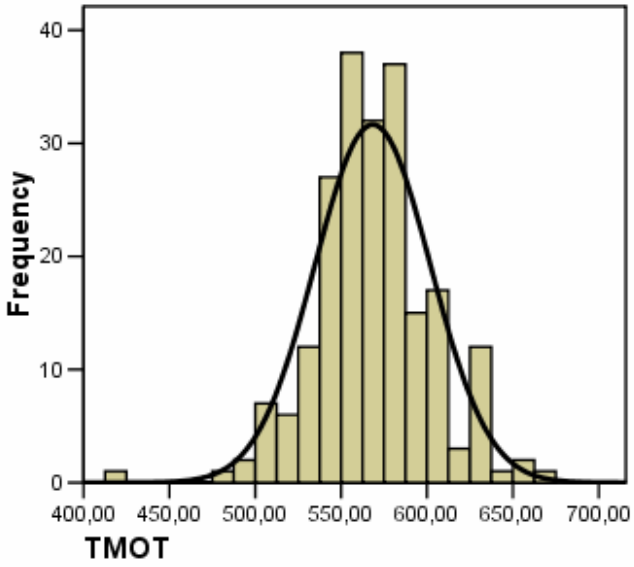


Figure 4.1 Histogram of teachers' scores for the TMOT

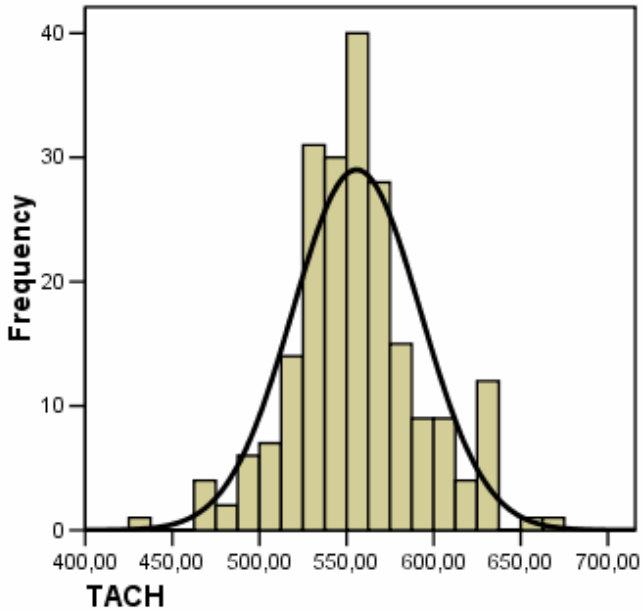


Figure 4.2 Histogram of teachers' scores for the TACH

As stated in Section 3.3, the five-point Likert type scale was utilized for the questionnaire. The number of 214 physics teachers was classified according to tendency in the scales from 1 to 5. The descriptive statistics of the data gathered

from the teachers' questionnaire just gave a general tendency and percentages of the teachers who chose the items. The table for item means classified which items mostly affect students' motivation and achievement. For this purpose, the scale from 1 to 5 was recoded as 3 for "0", 2 and 4 for "1", and 1 and 5 for "2". All of the mean scores of the items for the TMOT and TACH are given in a table in Appendix G. The item numbers above the mean score 1 were 101, 63, 36, 98, 102, 130, 29, 9, 131, 104, 108, 60, 28, 100, 31, 78, 132, 37, 75, 18, 106, 70, 67, 10, 34, 47, 7, 25, 59, 71, 39, 72, 129, 121, 120, 46, 44, 45, 30, 61, 11, 124, 22, 42, 2, 20, 4, 1, 113, 135, 68, 69, 126, 6, 12, 50, 55, 13, 27, 123, 96, 116, 133, 49, 14, 105, 74, 125, 141, 23, 19, 51, 33, 64, 136, 54, 128, 40, 26, 35, 92, 142, 87, 76, 41, 93, 122, 97, 38, 8, 48, 81, 107, 53, 62, 103, 16, 115, 66, 127, 117, 32, 94, 5, 91, 138 and 86 in descending order of the mean scores for the TMOT.

The item numbers above the mean score 1 for TACH were listed in descending order as follows; 18, 101, 4, 36, 9, 1, 63, 60, 102, 2, 19, 98, 131, 39, 7, 34, 25, 67, 78, 51, 130, 37, 40, 75, 41, 27, 20, 108, 61, 53, 59, 6, 104, 49, 31, 141, 48, 47, 68, 106, 113, 81, 87, 71, 100, 35, 124, 10, 72, 62, 21, 50, 80, 70, 11, 132, 116, 22, 129, 123, 121, 55, 92, 120, 69, 46, 86, 91, 64, 32, 66, 29, 14, 79, 105, 73, 44, 23, 135, 13, 58, 8, 54, 115, 45 and 133.

The mean score was determined for each item in the ETAM. The mean score 1 was a critical point for the physics teachers' characteristics affecting students' achievement. In other words, according to the mean score, the items above the mean score 1 was chosen since those items affected students' achievement the most.

The item means for motivation and achievement were not the same. In other words, the characteristics of physics teachers that mostly affected students' motivation were slightly different than those which mostly affected students' achievement. The item means for the TMOT and those for the TACH were analyzed together and there were five matched items within the first 10 items. The most important characteristics of physics teacher affecting students' motivation and achievement as perceived by teachers have been summarized in Table 4.2.

In Table 4.2, items 36, 98, 101, 102, 104 and 131 were the recoded ones; hence these items had a decreasing effect on students' motivation and achievement as perceived by physics teachers.

Table 4.2 The most effective items for the TMOT and the TACH

Characteristics for the TMOT	Characteristics for the TACH
1. Answering students' questions related to physics easily. (9)*	
2. Lecturing reluctantly. (36)	
3. Making the physics lesson interesting by giving examples from daily life. (63)	
4. Using offensive language to students. (101)	
5. Getting angry with students' faults, and shouting at or hitting the students that are disturbing the classroom atmosphere. (102)	
6. Knowing all students and calling them by their names. (29)	6. Possessing necessary knowledge of subject matter. (1)
7. Humiliating students in front of their friends with the aim of giving punishment. (98)	7. Giving lectures with appropriate details. (2)
8. Giving low grades for the aim of constructing discipline (threatening students with low grades). (104)	8. Possessing necessary mathematical and geometrical background related to physics. (4)
9. Being efficiently motivating. (130)	9. Coming to the lesson prepared. (18)
10. Being hard-hearted, intolerant and tedious. (131)	10. Making use of the physics laboratory for lessons. (60)

* Descending order with respect to the numbers in brackets that denotes the item numbers in the ETAM

Table 4.2 indicates that the items related to teachers' characteristics like possessing subject matter knowledge, classroom management, enthusiasm for teaching and meaningful learning activities affected the students' motivation and achievement mostly as perceived by teachers. On the other hand, the teachers'

personal characteristics and teachers' characteristics related to attitude toward discipline in the class affected students' motivation more than their achievement as perceived by teachers. Moreover Table 4.2 indicated that teachers' characteristics related to transferring the subject matter knowledge to the students like using the laboratory, giving lectures with appropriate details affected students' achievement more than their motivation as perceived by teachers.

4.2 Teachers' and Students' Shared Perceptions of Effective Physics Teacher Characteristics

The mean scores of each item for the TMOT and TACH in this study and the mean scores of each item for the corresponding parts in the study of Korur (2001), were analyzed together to conclude the common effective physics teacher characteristics. Firstly, the mean scores for each item both for the TMOT and the TACH were listed. Secondly, each scores for items for motivation and achievement was added separately and the final scores for each item were calculated. Thirdly, the final scores were ordered for the TMOT and the TACH separately. The cut off point for the final scores was specified as 2.20. A total score of 2.00 (1 for student mean and 1 for teacher mean) would indicate that the teachers and students perceive a particular item as having an effect, albeit a weak one, on students' motivation or achievement. However, it was aimed in this study to find out which items mostly affect students' motivation and achievement. Therefore, a total item mean of 2.20 (1.1 for student mean and 1.1 for teacher mean) was chosen to indicate strong effect. Moreover, the common characteristics derived in this part of the study were also used in the qualitative part of the study. The interaction between a teacher possessing those characteristics and students' motivation was analyzed. One of the main reasons to set the cut off point to 2.20 was that the number of characteristics should be reasonable to analyze the interaction in the qualitative part of this study. If I took the cut off point as 2.00 there would be more than 50 characteristics that I could have difficulty in handling during the qualitative data collection and data analysis processes.

There were 57 items above the total mean score 2.20 for the TMOT and 46 items for the TACH. Therefore, the final scores for each item were listed in descending order for both the TMOT and TACH. Then, the items were matched from both parts and their mean scores were added. The combined items and their respective mean scores are given in Table 4.3.

Table 4.3 The matched mean scores from the TMOT and TACH

	TMOT			TACH		
Item No.*	Mean Scores (Teachers)	Mean Scores (Students)	Total	Mean Scores (Teachers)	Mean Scores (Students)	Total
001	1.24	1.25	2.49	1.35	1.27	2.62
002	1.25	1.17	2.42	1.32	1.30	2.62
004	1.24	1.07	2.32	1.40	1.16	2.56
007	1.33	1.22	2.55	1.27	1,12	2,39
009	1,46	1,34	2,80	1,37	1,39	2,76
018	1.37	1.29	2.66	1.51	1.37	2.88
020	1.25	1.10	2.35	1.23	1.15	2.38
022	1.26	1.15	2.41	1.12	1.16	2.28
023	1.15	1.16	2.32	1.04	1.24	2.28
025	1.31	1.20	2.52	1.27	1.27	2.53
031	1.41	1.42	2.83	1.21	1.33	2.54
034	1.34	1.13	2.47	1.27	1.20	2.46
036	1.56	1.38	2.94	1.37	1.37	2.74
037	1.38	1.19	2.57	1.24	1.20	2.44
039	1.31	1.15	2.46	1.28	1.18	2.47
040	1.13	1.20	2.33	1.23	1.30	2.53
041	1.10	1.12	2.22	1.23	1.20	2.43
047	1.34	1.16	2.49	1.17	1.28	2.45
050	1.22	1.11	2.33	1.14	1.12	2.27
051	1.14	1.07	2.21	1.25	1.16	2.42
060	1.43	1.10	2.53	1.35	1.13	2.47
061	1.28	1.05	2.32	1.23	1.02	2.25
063	1.59	1.19	2.77	1.35	1.11	2.46
067	1.36	1.02	2.38	1.27	1.02	2.29
070	1.36	1.10	2.47	1.13	1.09	2.21
071	1.31	1.18	2.49	1.16	1.18	2.35
072	1.31	1.05	2.36	1.15	1.05	2.20
078	1.40	1.09	2.49	1.26	1.04	2.30
087	1.10	1.13	2.23	1.16	1.15	2.32
098	1.55	1.13	2.68	1.31	1.09	2.41
100	1.42	1.16	2.58	1.16	1.14	2.30
101	1.59	1.28	2.87	1.46	1.23	2.69

Table 4.3 (continued)

Item No.*	TMOT Mean Scores (Teachers)	TMOT Mean Scores (Students)	TMOT Total	TACH Mean Scores (Teachers)	TACH Mean Scores (Students)	TACH Total
102	1.55	1.13	2.68	1.35	1.04	2.38
104	1.44	1.16	2.60	1.22	1.10	2.32
108	1.44	1.14	2.58	1.23	1.08	2.31
130	1.49	1.14	2.63	1.24	1.08	2.32
131	1.46	1.15	2.61	1.29	1.08	2.37
141	1.16	1.04	2.21	1.19	1.07	2.26

* Descending order with respect to the item numbers in the questionnaire

The rest of the items, except the 38 items presented in Table 4.3, had a mean score below 2.20 for only the TMOT or for only the TACH. Therefore, those items were not matched. The item numbers in Table 4.3 denoted the numbers in the questionnaire. Until then the combined items were determined as 38 common effective physics teacher characteristics for this study.

The factor analyses were carried out by principal component analysis as extraction method and varimax with Kaiser Normalization as rotation method including these 38 items for motivation data. The reason for choosing the motivation data to conclude the categories was that the physics teacher characteristics affecting students' motivation were the main concern of the qualitative part of this study.

Table 4.4 Factor analysis results for the motivation data

Item No.	Factors 1	2	3	4	5	6	7	8	Communalities
60	0.789								0.715
72	0.718								0.564
61	0.592								0.608
63	0.532								0.471
22	0.491								0.528
34	0.344								0.526
104		0.729							0.589
100		0.710							0.630
102		0.699							0.605

Table 4.4 (continued)

Item No.	Factors								Communalities
	1	2	3	4	5	6	7	8	
101		0.682							0.597
108		0.658							0.622
98		0.634							0.614
71			0.729						0.725
67			0.701						0.647
70			0.538						0.603
40				0.747					0.682
41				0.691					0.629
51				0.659					0.569
141				0.603					0.491
47				0.505					0.572
87				0.379					0.398
4					0.729				0.571
1					0.701				0.519
2					0.644				0.503
18					0.583				0.568
9					0.551				0.476
37						0.572			0.511
39						0.454			0.438
31						0.411			0.387
130						0.317			0.396
36							0.674		0.583
20							0.625		0.586
50							0.593		0.503
23							0.456		0.521
25							0.382		0.426
7								0.728	0.611
78								0.597	0.506
131								0.479	0.423
Eigen-values	8,263	3,409	2,308	1,704	1,429	1,325	1,260	1,187	

There were 8 factors with eigen values of 1.0 or higher extracted by the SPSS program. Totally 54.958 % of the variance was accounted for those factors. The first eight were extracted for analysis because, under the extraction options, SPSS was told to extract only factors.

The values in the communalities column in Table 4.4 indicate the proportion of variance of each item that can be explained by the retained factors. The communalities tended to be moderately high, only three of the 38 items had communality values that were lower than 0.40. The item numbers 31, 87, and 131 had low communality values, but they were not excluded from the interpretation since they loaded to the factors that they meaningfully explained them. With respect to the communality values in Table 4.4, it can be stated that most of the characteristics were well represented in new categories formed by the factors.

The rotated component matrix in Table 4.4 indicates that all of the loadings for the second factor are above 0.6 which is usually considered to be high. The factor loadings also show that the first two or three items for each factor are high. With respect to Item 25, 34, 87, and 130 were not explained meaningfully by those factors that they loaded. The four items were not taken out from the rest of the analysis since they made the explanation of that factor easy even if their loadings were a little below 0.40.

Finally, the factors in the analysis corresponded to the categories of effective physics teacher characteristics; and the items corresponded to the effective teacher characteristics. Therefore, there are eight categories related to the 38 effective teacher characteristics. In order to name the categories I followed some steps. For example, the characteristics with item numbers 60, 72, 61, 63, 34 and 22 are associated with the first category, in the descending order of factor loadings. Firstly, I listed all of the six characteristics corresponding to those item numbers. Secondly, I analyzed the similarities of those characteristics. Then I realized that those characteristics were mostly related to the activities that the physics teachers did in order to make the lesson meaningful. Finally, the category was named by the researcher by taking into consideration words derived from the literature and with respect to the views of experts. The name of the category was concluded to be “Activities for Meaningful Learning”. The other categories were named with the same process and the words used in the naming of categories were carefully selected by the researcher. The names of the all categories with respect to the item numbers in the descending order of factor loadings are given in Table 4.5.

Table 4.5 Name of the categories and the items within each category

Cat. No.	Teachers' Characteristics Category	Total No. of Item	Item Number
1	Possessing and Transferring Subject Matter Knowledge	5	4, 1, 2, 18, 9
2	Knowledge of Profession and Teaching Techniques	6	40, 41, 51, 141, 47, 87
3	Using Technology in the Class	3	71, 67, 70
4	Enthusiasm for Teaching	5	36, 20, 23, 25, 50
5	Activities for Meaningful Learning	6	60, 72, 61, 63, 34, 22
6	Classroom Management	4	37, 39, 31, 130
7	Personal Characteristics	3	7, 78, 131
8	Attitude Toward Discipline in the Class	6	104, 100, 102, 101, 108, 98

A similar factor analysis was carried out for the achievement data. There were again eight factors extracted by the computer. Totally, 56.210 % of the variance was accounted for those factors. The communalities from this analysis were relatively higher than those from the analysis of the motivation data. In the analysis of the achievement data two items were loaded to different factors. The item number 72 was loaded to the second factor with the item numbers 67, 70, and 71. The item number 36 was loaded to the eighth factor with the item numbers 7, 78, and 131. The characteristics corresponding to those item numbers were carefully analyzed and it was concluded that those items were meaningfully explained in the factors loaded for the motivation data, see Table 4.5. The effective physics teacher characteristics are listed in Table 4.6 with respect to the categories that were determined at the end of the factor analysis.

The effective physics teacher characteristics were mostly loaded to the categories entitled to 'knowledge of profession and teaching techniques', 'activities for meaningful learning', and 'attitude toward discipline in the class'. There were 6 characteristics within each of these categories, see in Table 4.6.

Table 4.6 The 38 effective teacher characteristics and their categories

No.	The Category/Effective Teacher Characteristics
I	Possessing and Transferring Subject Matter Knowledge
1.	Possessing necessary knowledge of subject matter. (1)*
2.	Giving the lecture with appropriate details. (2)
3.	Possessing necessary mathematical and geometrical background related to physics. (4)
4.	Answering students' questions related to physics easily. (9)
5.	Coming to the lesson prepared.(18)
II	Knowledge of Profession and Teaching Techniques
6.	Being an experienced teacher. (141)
7.	Taking the questions of the students into consideration and repeating the subject matter that wasn't understood by students.(40)
8.	Explaining the subject matter with new examples when students face learning difficulties. (41)
9.	Giving examples from simple to complex. (51)
10.	Preparing exam questions as to be understood and answered by all the students. (87)
11.	Solving problems in lessons, which are similar to the university entrance examination questions. (47)
III	Using Technology in the Classroom
12.	Making use of materials like overhead projectors or slide shows as well as the chalkboard. (67)
13.	Making use of film and video while lecturing. (70)
14.	Making use of computer packages related to the subject matter. (71)
IV	Enthusiasm for Teaching
15.	Adjusting the subject matter according to students' needs and interests. (20)
16.	Seeking and trying to find out the answers to the questions that the teacher doesn't know. (23)
17.	Preparing a suitable medium for learning in the class. (25)
18.	Encouraging students to ask questions such as how?, why?, ...then what happens? (50)
19.	Lecturing reluctantly. (36)

Table 4.6 (continued)

No.	The Category/Effective Teacher Characteristics
V	Activities for Meaningful Learning
20.	During the class session, introducing some concrete equipments related to the concepts. (72)
21.	Making use of the physics laboratory for lessons. (60)
22.	Doing demo experiments in the class. (61)
23.	Making the physics lesson interesting by giving examples from daily life. (63)
24.	Following new trends in his/her job and transferring them to the students. (22)
25.	Asking questions to the students to enhance the active participation. (34)
VI	Classroom Management
26.	Keeping students' interests alive during the whole lesson. (37)
27.	Using proper, understandable and fluent language during the lesson. (39)
28.	Being able to motivate the students efficiently. (130)
29.	Being interested in some students more than the whole class. (31)
VII	Personal Characteristics
30.	Considering his/her own personal problems. (7)
31.	Having fed up and tired behavior. (78)
32.	Being hard-hearted, intolerant and tedious. (131)
VIII	Attitude toward Discipline in the Class
33.	Humiliating students in front of their friends with the aim of giving punishments. (98)
34.	Shouting at students. (100)
35.	Using offensive language to students. (101)
36.	Getting angry with students' faults, and shouting at or hitting the students who are disturbing the classroom atmosphere. (102)
37.	Giving low grades for the aim of constructing discipline (threatening students with low grades). (104)
38.	Giving punishments to the whole class because of a fault of only one student. (108)

* The numbers in brackets denotes the item number in the questionnaire

The frequency table with respect to the categories was prepared after they had been identified. The frequency distribution and related percentages of the eight categories according to the motivation data of the teachers are given in Table 4.7.

Table 4.7 The TMOT Frequency and Percentage Distributions

Scale	1	2	3	4	5
Cat. No.	freq. (%)	freq. (%)	freq. (%)	freq. (%)	freq. (%)
1	0.4 (0.2)	0.6 (0.3)	15.0 (7.0)	117.0 (54.7)	81.0 (37.8)
2	0 (0)	2.0 (0.9)	24.0 (11.2)	129.0 (60.3)	59.0 (27.6)
3	0.3 (0.1)	0.7 (0.3)	13.0 (6.1)	114.0 (53.4)	86.0 (40.2)
4	1.0 (0.5)	2.0 (0.9)	15.0 (7.0)	118.0 (55.2)	78.0 (36.4)
5	0 (0)	0.5 (0.2)	9.0 (4.2)	117.0 (54.7)	87.5 (40.9)
6	0.5 (0.2)	3.5 (1.6)	5.0 (2.4)	115.0 (53.7)	90.0 (42.1)
7	3.3 (1.5)	5.7 (2.7)	8.3 (3.9)	106.7 (49.8)	90.0 (42.1)
8	0.8 (0.4)	4.0 (1.9)	7.0 (3.3)	89.5 (41.7)	112.7 (52.7)
Total	0.8 (0.4)	2.4 (1.1)	12.0 (5.6)	113.3 (53.0)	85.5 (39.9)

N=214

The frequencies in Table 4.7 indicate that the physics teacher characteristics affecting students' motivation had an effect as perceived by the teachers. With respect to the categories, almost all the teachers perceived that students' motivation was affected or mostly affected from by the categories of characteristics. Less than 10 % of the teachers perceived that the teachers' characteristics had no effect or a minimal effect.

4.3 Summary of the Results for Students' and Teachers' Perceptions

The previous study of Korur (2001) was related to students' perceptions on physics teachers' characteristics affecting students' motivation, achievement and

attitude. The results of this study are mainly based on teachers' perceptions on physics teachers' characteristics affecting students' motivation.

The first five items which had the highest means and the last five items which had the lowest means were matched for both the students' and teachers' perceptions. The most and the least effective physics teacher characteristics affecting students' motivation as perceived by the teachers and students are presented in Table 4.8.

Table 4.8 Students' and teachers' perceptions of the most and the least effective teacher characteristics

STUDENTS' PERCEPTIONS	Item Mean*	TEACHERS' PERCEPTIONS	Item Mean
The most effective teacher characteristics			
31**. Being interested in some students more than the whole class	1.42	63. Making the physics lesson interesting by giving examples from daily life	1.59
9. Answering students' questions related to physics easily	1.34	101. Using offensive language to students	1.59
36. Lecturing reluctantly	1.38	36. Lecturing reluctantly	1.56
12. Having a friendly attitude to students	1.34	98. Humiliating students in front of their friends with the aim of giving punishments	1.55
18. Coming to the lesson prepared	1.29	102. Getting angry with students' faults, and shouting at or hitting the students that are disturbing the classroom atmosphere	1.55
The least effective teacher characteristics			
139. Elderly teachers	0.69	139. Elderly teachers	0.42
118. Appearing rich	0.63	118. Appearing rich	0.34
119. Appearing poor	0.60	112. Being physically handicapped	0.34
111. Female Teachers	0.61	111. Female Teachers	0.10
110. Male teachers	0.61	110. Male teachers	0.08

* The characteristics are listed in the descending order of item means

** The numbers denote the item numbers in the questionnaire

The least effective physics teacher characteristics were almost all matched for both students' and teachers' perceptions as Table 4.8 represents. It was understood that the teachers' physical appearance and gender had almost no effect on students' motivation as perceived by the students and the teachers.

The most effective physics teacher characteristics were not matched with the exception of one characteristic. Table 4.8 indicates that physics teachers' characteristics affecting students' motivation are important in terms of mostly teachers' subject matter knowledge and enthusiasm as perceived by students. On the other hand, the teachers' perceptions emphasized that the effective physics teacher characteristics like attitude toward discipline and activities for meaningful learning were important. According to the findings and results of both studies the following statements can be made;

1. The mean scores and the frequency tables for the physics teachers' characteristics affecting students' motivation variable from both studies (PTCASM for previous study, TMOT for this study in Section 4.1) showed that teachers' perceived the teachers' characteristics were more effective on students' motivation than students' did.
2. With respect to the mean scores discussed in Section 4.1, the physics teachers' characteristics affected students' achievement more than students' motivation as perceived by the teachers. The students perceived that they were affected by the characteristics of teachers in the same proportion for achievement and motivation.
3. With respect to the common effective physics teacher characteristics that were shown in Table 4.8, the most effective teachers' characteristics affecting students' motivation were 'lecturing reluctantly', 'using offensive language to students', 'being interested in some students more than the whole class', 'answering students' questions related to physics easily', 'making the physics lesson interesting by giving examples from daily life'. The second and third characteristics were the ones that affect students' motivation negatively.
4. The least effective five characteristics for students' motivation, in Table 4.8, were almost all matched for both teachers and students.

5. The effective physics teacher characteristics can be analyzed under eight main categories. According to the perceptions of teachers and students the effective teacher characteristics categories were important in terms of students' motivation.
6. The categories of effective teachers' characteristics in this study showed that there were 8 categories of characteristics as perceived by the teachers, but there were 10 categories of characteristics as perceived by the students in the study of Korur (2001). In both studies the teachers' 'subject matter knowledge' and 'personal characteristics' were the two categories that mostly affect the students' motivation.
7. The frequency tables showed that there were no moderately effective categories in this study and all of the categories had a strong effect on the students' motivation as perceived by the teachers. However, the characteristics underlying the two categories of 'classroom management' and 'attitudes toward discipline' moderately affected the students' motivation as perceived by the students in the study of Korur (2001).

According to the findings from the quantitative part of the study the teachers' characteristics affected the students' motivation. The descriptive results could not identify the interactions between students' motivation and those characteristics. The qualitative "Findings, Results and Discussions" chapter of this thesis identified those interactions.

CHAPTER 5

DISCUSSION AND CONCLUSIONS

The quantitative part of this study was carried out to construct a base to answer the first and the second research questions of this study. In order to achieve these aims, at first effective teachers' characteristics as perceived by teachers were identified. Then the common effective physics teacher characteristics as perceived by students and teachers were defined. Finally, the students' and teachers' perceptions were compared to identify similar or different findings from both studies. To finalize these goals, in the following sections, firstly discussions of the results and then conclusions are given. The limitations and validity considerations have been considered for the study. All related implications and recommendations for further research have been discussed at the end of the second part of the thesis together with those from the qualitative part of the study.

5.1 Discussions of the Results

Teachers' characteristics are important for students' motivation in terms of physics teachers. There are categories related to teachers' characteristics like teachers' classroom management behaviors, attitude toward discipline, subject matter knowledge, preparation for the lesson, teaching strategies and the method that the teachers use in the class, teachers' personal characteristics, interpersonal relations, and teachers' subject matter knowledge (Fox & Peck, 1978; Gallagher & Tobin, 1987; Lederman et al., 1994; McGarity & Butts, 1984; Ogden, 1994; Powers, Nitcavic & Koerner, 1990; Richardson & Thomas, 1989; Rowan et al., 1997; Sanders et al., 1993). The general outcome of this research is supported by the most of the results of the previous ones. In this study the common effective

physics teacher characteristics that are defined by teachers' and students' shared perceptions show that there are eight categories related to these characteristics. The names of the categories were mostly directly derived from the previous studies. The categories had an effect on students' motivation and achievement in this study.

Teachers' perceptions on effects of teachers' characteristics showed that teachers' pedagogical knowledge, subject matter knowledge and classroom management behaviors affected students' motivation and achievement (Eryılmaz, & İlaslan, 1999; Lawrenz, 1975; Lederman et al., 1994). However, the teachers' personal characteristics and classroom management behaviors were not considered as effective characteristics of teachers as perceived by college students in the study of Witcher and Onwuegbuzie (1999). On the other hand, this thesis was carried out only in public high schools in Turkey. The results indicate that the teachers' characteristics like 'lecturing reluctantly', 'answering students' questions related to physics easily', 'using offensive language to students' have been found to be effective in terms of both students' achievement and motivation. The characteristics like 'being interested in some students more than the whole class', 'making the physics lesson interesting by giving examples from daily life' mostly affected students' motivation, and the characteristics like 'giving the lecture with appropriate details' and 'coming to the lesson prepared' mostly affected students' achievement as perceived by teachers and students.

There are many characteristics of effective teachers which have been considered in the literature. The results of the studies of Opdenakker and Damme (2006) and Fives (2003) concluded that teachers' teaching style and classroom management skills support the students' learning process. The teachers' characteristics studies suggested similar results in Turkey (Aydın, 1989; Duruhan et al. 1990; Ergün & Duman, 1998; Güner, 1995; Özler, 1998). Teachers' and students' shared perceptions showed that in addition to the considered two characteristics there are six additional categories of physics teachers' characteristics which are effective in students' motivation and achievement in this thesis. Moreover, the results of this study both clarify and organize the most effective characteristics into categories.

The students' perceptions of effective teacher characteristics showed that physics teachers' characteristics had an effect on students' motivation and achievement (Korur, 2001). In fact, this thesis also proved that teachers possessing effective teacher characteristics affect students' motivation and achievement as perceived by teachers. Moreover there are common characteristics derived from students' and teachers' shared perceptions. These characteristics have been combined under the categories of effective teacher characteristics.

The perceptions of the students indicated that teachers' personal characteristics and classroom management behaviors and teachers' instructional techniques were not the characteristics of effective teachers in colleges (Witcher et al., 2003). However, this result differed from the results of the studies for the public schools (Mc Garity & Butts, 1984; Sanders et al., 1993; Wubbels et al., 1995). The difference between the studies could be caused mainly by the difference between the structures of their samples. In this study the sample covered the public high schools in Turkey and the findings show that the classroom management behaviors and teachers' possessing and transferring knowledge of subject matter are important categories that include effective physics teacher characteristics.

The characteristics of teachers that affect students' motivation and achievement have been stated in the results of previous studies. Those studies included the tendency of only teachers or only the students (Aydın, 1989; Duruhan et al., 1990; Eryılmaz & İlaslan, 1999; Gallagher & Tobin, 1987; McDermott, 1990). Similar characteristics such as the use of different methods of teaching have also been supported by the results of this study. Moreover, the common characteristics were derived from both students' and teachers' perspectives, so the characteristics have been better defined by this study than in the previous studies.

A similar study designed by Alkhayyatt (2000) showed that teachers' characteristics like 'enthusiasm', 'humor in the class', 'organizing valuable activities', 'answering students' questions', 'subject matter knowledge', 'preparation for the lesson', 'use of examples', and 'use of experiments' were the main characteristics of the teacher that influenced students' motivation to learn. In

this study there were 38 effective teacher characteristics including all of the characteristics considered by Alkhayyatt (2000), and those characteristics were found to be effective regarding the students' motivation as perceived by teachers and students. The interaction between the characteristics and students' motivation has been further discussed at the end of the qualitative part of this thesis.

5.2 Conclusions

Since the sample was a large randomized and stratified one, there is no limitation regarding the ability of this study to be generalized to the accessible population. Therefore, the conclusions presented below can be easily adjusted to a defined target population.

Physics teachers' characteristics have an effect on students' motivation and achievement as perceived by teachers in the target population. 'Answering students' questions related to physics easily', 'lecturing reluctantly', 'making the physics lesson interesting by giving examples from daily life', 'using offensive language to students', 'getting angry with students' faults, and shouting at or hitting the students that are disturbing the classroom atmosphere' are the five characteristics that strongly affect, negatively or positively, both students' motivation and achievement in physics. The second, third and fifth characteristics had a negative effect on students' motivation and achievement. All of the five characteristics supported the categories of the physics teacher characteristics which are 'possessing and transferring the subject matter knowledge', 'classroom management', 'enthusiasm for teaching', and 'activities for meaningful learning'. Therefore, physics teachers may believe that if they have enough subject matter knowledge and can transfer this knowledge by providing meaningful learning activities or by using laboratories they will be able to motivate their students in the lesson and increase their achievement. On the other hand, the gender of the physics teachers, their physical appearance, and being elderly were the least effective teachers' characteristics in terms of students' motivation.

The perceptions of teachers and students are the almost the same in terms of effective physics teachers characteristics. There are 38 common effective

teacher characteristics under eight categories in terms of students' motivation and achievement as perceived by teachers and students. These categories are 'possessing and transferring subject matter knowledge', 'knowledge of profession and teaching techniques', 'using technology in the classroom', 'enthusiasm for teaching', 'activities for meaningful learning', 'classroom management', 'personal characteristics', and 'attitude toward discipline in the class'. Therefore teachers and students conclude that physics teachers who possess most of the considered effective characteristics have a strong effect on students' motivation and achievement in physics lesson. Moreover physics teachers' characteristics are important in terms of students' motivation and achievement as perceived by teachers more than that as perceived by students. In this study, teachers indicated that those categories were important in students' motivation and achievement. The categories of characteristics were the base for the effective teachers' characteristics that can be implemented and manipulated by them during physics lessons. The teachers' subject matter knowledge and their personal characteristics are the two categories that mostly affect the students' motivation as perceived by students and teachers.

5.3 Internal Validity of the Study

There are various possible threats that most of the studies suffer from. The internal validity of the study refers to the degree to which extraneous variables may influence the results of research. Possible intimidation to internal validity and the methods used to cope with them were discussed in this section.

There are four main threats to internal validity in survey research: mortality, location, instrumentation, and instrument decay. The mortality threat arises in longitudinal studies unless all of the data on "lost" subjects are deleted, in which the problem becomes one of appropriate generalization. For this study, the threat was prevented by conducting missing data analysis. The questionnaire was administered to 285 physics teachers, but 230 of received and sent back the questionnaire. During the data entering process 16 of them were eliminated because of lack of an enormous amount of data. 214 physics teachers' data were

included to the study. There was a very little amount of missing data and the variables that contained missing values were directly replaced with the mean of series.

The location and instrumentation threat can occur if the collection of data is carried out in places that may affect responses and they would be the most important threats for this study since during the administration process the researcher was not present in many of the schools. However, for some of the schools the principals and for the others the physics teachers were called by phone systematically to explain the needs and the structure of the questionnaire. For teachers who administered the test, a detailed questionnaire application guide was prepared. For some of the schools in Ankara, the researcher applied the questionnaire to the teachers to check and identify any possible problems in the application instruction guide and in the other parts of the questionnaire. Therefore, in all schools the teachers filled in the questionnaire under similar conditions, and limited time.

Instrument decay can occur in interview surveys if the interviewers get tired or are rushed. This threat had the least effect for this study since the data was gathered by a questionnaire rather than interviewing. The interviewing process was just a small portion of this study and related to the format of the questionnaire and to answer the demographic questions. There were no interviews during the application of the questionnaires. Confidentiality threat, which is the possibility of somebody reaching and assessing the data other than the researcher, was also avoided by not including teachers' names in the questionnaire.

5.4 External Validity

The amount of control that a sample of a study represents the population of interest is called population generalizability (Fraenkel & Wallen, 1996, p107). In this study the accessible population was the all high school physics teachers in 337 public high schools from 39 cities in 3 regions; Black Sea, Mediterranean, and Central Anatolia. The sample of this study was randomly selected from the accessible population, so the population generalizability was

high. The results and conclusions established can easily be generalized to the target population, in the quantitative part of this study. The physics teachers who worked in the public high schools were selected for this study in which the procedure was made it clear every part of the data collection and analysis.

The definition of ecological generalizability is the amount of control that results of a study can be extended to new settings or situations (Fraenkel & Wallen, 1996, p.109). For this study, testing procedure took place in ordinary classrooms during regular class time. There were possibly no remarkable differences among the environmental conditions. It is believed that other public high schools have similar settings and conditions. Therefore, the results may be generalized to public high schools that have similar setting and conditions to the study.

PART 2 - QUALITATIVE PART OF THE STUDY

CHAPTER 6

METHODOLOGY

In this chapter the research design and its features which were used for the qualitative part of the study have been summarized. Firstly, I constructed the theoretical framework of the qualitative part of my thesis. Secondly, I described the case study methodology. Thirdly, I defined the selection of the case teachers. Then I gave a description of field entry, data collection strategies and main points for the data analysis. Next, I described the researchers' role and the potential ethical issues for this study. Finally, I discussed the strengths and limitations of the qualitative part of the thesis.

6.1 Theoretical Framework of the Study

The current theories for motivation have been explained in Section 2.3. In this part of the study, the effective physics teacher characteristics and effects of them on students' motivation and the theories that they stand for have been analyzed. A theory is one of the crucial parts of the case studies in order to structure a study (Yin, 2003). The theoretical framework of a case study is to focus on the main literature and it identifies the topic that the researcher looks for and various features of the topic that form the base of the processes of case study (Meriam, 1998). In other words a theoretical framework of a study is not a general literature review but a focused literature study that includes the research problem, supporting the data collection and most crucially to generalizing the findings to the theories (Creswell, 1994; Meriam, 1998; Yin, 2003). The third research

question of my thesis was designed to find out how effective physics teachers' common characteristics, from students' and teachers' shared perceptions, interacted with students' motivation in physics. Even if the common effective characteristics were directly gathered from the quantitative part of the thesis, the effects of those characteristics on students' motivation can be based on some theories. In fact, the theoretical framework provided me with a detailed structure of the theories and the body of literature related to students' motivation and effective teacher characteristics and the relationship between them.

Motivational theorists aim to find out the answer to the questions of what does motivate students. The different theories of motivation provide various perspectives to increase the students' motivation and increase their achievement. Motivational sources may differ for one student to the other even if all students may be motivated to perform a task (McManic, 2004). The early theories of motivation and the current theories of motivation explain these sources for different aspects of students' learning. During the preparation of the ETAM, most of the characteristics were directly taken from literature but some of the characteristics were written by the researcher by taking into consideration the views of experts in this research area with regard to Turkish Educational System. The 38 effective physics teacher characteristics were not derived from a single theory. I could not eliminate any characteristics since they were perceived as effective by teachers and students and they were the main concern of the interactions for students' motivation. The theoretical framework of this study is intrinsic with motivational theories and the effective teacher characteristics. It could be problematic in such that one characteristic could not be matched with only one theory; however I tried to match the characteristics with the most appropriate theory.

The situated motivation theory was one of the primary theories of this study. It points out that motivation is highly personalized. The theory states that interest is important motivationally since attention, persistence and the use of knowledge are structured by interest. If a student has an interest in the subject matter he or she can use appropriate learning strategies to process text. The interest is characterized by concentration and engagement, and it occurs spontaneously (McManic, 2004). The

students' motivation considered in this thesis was related to situated motivation. The effective physics teacher characteristics were analyzed within the motivational theories and the students' motivation interacted with this was situated motivation. I have tried to link all of the 38 effective physics teacher characteristics to a motivational theory in Figure 6.1. Seven theories have been combined to explain the effective teacher characteristics in this study. In fact, these theories cannot explain all of the 38 characteristics. The ones that have not been explained by the theories were either constructed with respect to expert views, or they were constructed with respect to Turkish Educational System in the public schools.

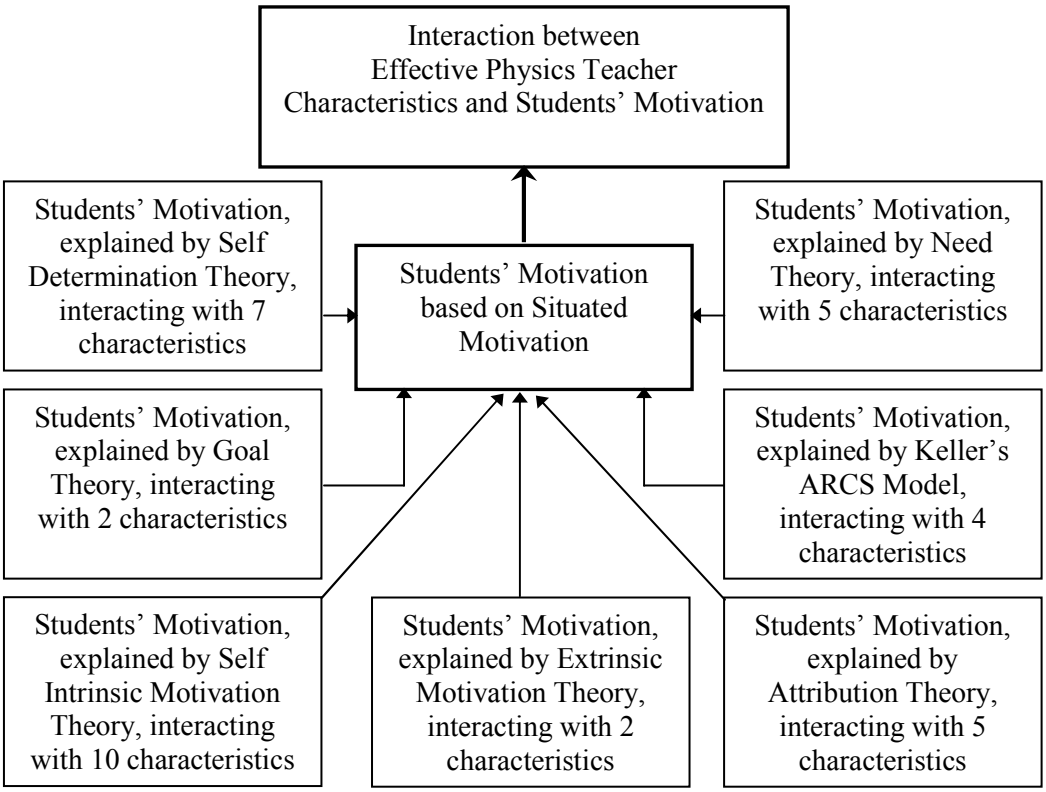


Figure 6.1 Motivational theories used in this study

The theoretical background of this thesis was prepared in the light of all the considered theories, models and research findings. The main points derived from the theoretical background were used as the codes in the data analysis and to analyze the interaction between students' motivation and the 38 common

characteristics of effective teachers concluded from the first part of this study. The relationships between the theory and those characteristics are presented in Table 6.1.

Table 6.1 represents most of the effective teacher characteristics derived from the first part of this study and based on one or more theories in terms of students' motivation. The implications for motivating the students represent the teachers' characteristics and behaviors. The expected aspects of students' motivation represent the possible students' motivational outcomes. Three effective teacher characteristics which were 'being an experienced teacher', 'using proper, understandable and fluent language during the lesson' and 'doing demo experiments in the class' could not be based on a theory. These characteristics were either very general characteristics that could be explained by more than theory or they were written by the researcher according to expert views. The categories were obtained in the quantitative part of the study. The category numbers given in Table 6.1 denotes the numbers of the categories presented in Section 4.2. The theories are discussed for each category in the respective sections of the "Results" chapter.

6.2 The Case Study Methodology

Qualitative research covers several research strategies that share certain characteristics (Bogdan & Biklen, 1998). Naturalistic, ethnographic, subjective, ethnomethodological, phenomenological, grounded theory, post-positivist, case study, action research and participatory; all are considered in the qualitative paradigm (Bogdan & Biklen, 1998; Patton, 1987). Within these different approaches the basic and generic qualitative study, ethnography, phenomenology, grounded theory and the case study are commonly used in educational researches (Merriam, 1998).

The case study design allows the researchers to understand processes involved in the study thoroughly (Merriam, 1998). Merriam also stated that the boundaries of the case studies are drawn by concepts, models, theories, and educational psychology. In fact, case studies have been used for years.

Table 6.1 The 38 common effective physics teacher characteristics embedded in the theoretical framework.

THEORETICAL FRAMEWORK			FIRST PART OF THIS STUDY	
Theory	Implications for Motivating the Students	Expected Aspects of Students' Motivation	Cat.	The 38 Effective Physics Teacher Characteristics
Intrinsic	▪ Check the progress of their students' learning ▪ Improving students' thinking skills ▪ Responding to the questions of their students ▪ Encouraging students to research ▪ Making students' enjoy the task & voluntarily participate ▪ Encouraging students to participate ▪ Encouraging students to study ▪ Encouraging students to ask 'how' and 'why' questions ▪ Encouraging students to share their ideas ▪ Designing activities by considering students' levels ▪ Enthusiastic about teaching ▪ Being on time for the lesson ▪ Well planned classroom activities	▪ Willingness to research ▪ Willingness to study ▪ Willingness to ask more ▪ Increase in interest ▪ Being curious ▪ Increase in self actualization ▪ Willingness to participate ▪ Having attention ▪ Fun/enjoyment	I I IV IV III III III V V V	▪ Possessing necessary knowledge of subject matter. ▪ Possessing necessary mathematical and geometrical background related to physics. ▪ Seeking and trying to find out the answers to questions that the teacher doesn't know. ▪ Lecturing reluctantly. ▪ Making use of materials like overhead projectors or slide shows as well as the chalkboard. ▪ Making use of film and video while lecturing. ▪ Making use of computer packages related to the subject matter. ▪ During the class session, introducing some concrete equipment related to the concepts. ▪ Making use of the physics laboratory for lessons. ▪ Making the physics lesson interesting by giving examples from daily life.
Extrinsic	▪ Offering mark	▪ Being uninterested ▪ Being unconcerned	VIII VIII	▪ Giving low grades with the aim of constructing discipline (threatening students with low grades) (-) ▪ Giving punishments to the whole class because of a fault of only one student. (-)

Table 6.1 (continued)

THEORETICAL FRAMEWORK			FIRST PART OF THIS STUDY	
Theory	Implications for Motivating the Students	Expected Aspects of Students' Motivation	Cat.	The 38 Effective Physics Teacher Characteristics
Self Determination Theory	▪ Avoiding overloading students with details ▪ Avoiding confusing students' minds ▪ Encouraging cooperative and collaborative learning activities (relatedness) ▪ Providing study skills ▪ Encouraging students to ask questions without humiliation ▪ Using time efficiently ▪ Providing feedback /help ▪ Explaining in a different way ▪ Listening and responding to the students' questions	▪ Increase in interest ▪ Increase in self determination ▪ Asking questions without humiliation (relatedness) ▪ Willingness to share ideas and views (relatedness) ▪ Willingness to do by themselves (autonomy) ▪ Engage in activities (competency) ▪ Being uninterested ▪ Being unconcerned ▪ Decrease in self determination	I II II IV V VII VII	▪ Answering the students questions related to physics easily ▪ Taking the questions of the students into consideration and repeating the subject matter that wasn't understood by students. ▪ Explaining the subject matter with new examples when students face learning difficulties. ▪ Encouraging students to ask questions such as 'how?, why?,… then what happens?' ▪ Considering his/her own personal problems. (-) ▪ Being hard-hearted, intolerant and tedious. (-) ▪ Having fed up and tired behavior. (-)
Attribution Theory	▪ Developing self esteem ▪ Describing intended and expected learning outcomes ▪ Providing problem solving strategies (organizing the knowledge) ▪ Task difficulty ▪ Allowing nagging criticism ▪ Shouting at the students ▪ Allowing demotivating practices	▪ Paying attention ▪ Recalling the knowledge ▪ Increase in self confidence ▪ Working on an example ▪ Feeling satisfied ▪ Feeling rejected ▪ Feeling anxious ▪ Being uninterested ▪ Being unconcerned	II VIII VIII VIII VI	▪ Preparing exam questions as to be understood and answered by all the students. ▪ Using offensive language to students. (-) ▪ Getting angry with students' faults, and shouting at or hitting the students who are disturbing the classroom atmosphere. (-) ▪ Shouting at students. (-) ▪ Being interested in some students more than the whole class (-)

Table 6.1 (continued)

THEORETICAL FRAMEWORK				FIRST PART OF THIS STUDY
Theory	Implications for Motivating the Students	Expected Aspects of Students' Motivation	Cat.	The 38 Effective Physics Teacher Characteristics
Goal Theory	▪ Recognizing student effort ▪ Avoiding comparison of students ▪ Creating a competitive classroom climate ▪ Explaining the objectives of the lesson ▪ Allowing demotivating practices	▪ Increase in interest ▪ Having attention ▪ Feeling rejected ▪ Feeling anxious ▪ Being unconcerned	V VIII	▪ Following new trends in his/her job and transferring them to the students. ▪ Humiliating students in front of their friends with the aim of giving punishments. (-)
Keller's ARCS Model	▪ Gaining students' attention by doing experiments or using media ▪ Sustaining curiosity ▪ Adjusting the content to the students' level ▪ Providing feedback ▪ Using statements giving recognition and credit to learners-using reinforcement	▪ Fun/enjoyment ▪ Feeling satisfied ▪ Increase in interest ▪ Paying attention ▪ Engaging in an activity ▪ Engaging in doing experiment ▪ Working on an example ▪ Construction of knowledge-entertaining process	VI VI IV V	▪ Keeping students' interests alive during the whole lesson ▪ Being able to motivate the students efficiently ▪ Preparing a suitable medium for learning in the class ▪ Asking questions to the students to enhance the active participation.

Table 6.1 (continued)

THEORETICAL FRAMEWORK				FIRST PART OF THIS STUDY
Theory	Implications for Motivating the Students	Expected Aspects of Students' Motivation	Cat.	The 38 Effective Physics Teacher Characteristics
Need Theory	▪ Allowing mostly the same students to participate ▪ Spending too much time on management problems ▪ Maintaining students' engagement ▪ Finding time to convey students' personal learning problems ▪ Identifying learning difficulty ▪ Providing new examples ▪ Minimizing the number of the fill in the blank or multiple choice worksheets ▪ Feeling anxious or rejected ▪ Explaining the objectives of the lesson ▪ Finding time to convey students' personal learning problems	▪ Interacting with teacher ▪ Willingness to share ideas/views ▪ Increase in respect to teacher ▪ Considering about students' personal problems ▪ Willingness to answer ▪ Increase in interest ▪ Increase in attention ▪ Working on an example ▪ Feeling anxious ▪ Feeling rejected	I I II II IV	▪ Giving the lecture with appropriate details. ▪ Coming to the lesson prepared. ▪ Giving examples from simple to complex. ▪ Solving problems in lessons, which are similar to the university entrance examination questions. ▪ Adjusting the subject matter according to students' needs and interests.

Case study research has been defined as to select one or multiple cases related to the actions or phenomenon within real life in order to gather an essential amount of data to understand various procedures related to the research problem (Merriam, 1998). The other definitions offered similar explanations. The cases are usually selected from their own surroundings and are usually considered to represent their own society, institutions or social groups. The research is also carried out in the original settings in order to collect data efficiently. Moreover, if the researcher is interested in stating the community or context of the study, the case study is an appropriate design for analyzing the process (Creswell, 2003; Meriam, 1998).

Multiple case studies have an advantage over single case studies in terms of generalizability of the findings (Meriam, 1998; Yin, 2003). In fact, conducting more than one case is "…a common strategy for enhancing the external validity or generalizability of your findings…" (Meriam, 1998, p.40). Yin (2003) analyzed the case study designs as single or multiple-case and analyzed them under holistic or embedded features. Finally, he proposed four types of designs for case studies. These are single case-holistic, single case embedded, multiple case-holistic, and multiple case-embedded designs (Yin, 2003). The key feature of multiple case-holistic design is to put the investigation of the multiple cases into standard instruments to collect data separately from the cases related to the same research problem, and then to compare the results of the findings from those cases (Yin, 2003). It is important that the cases should be similar, for example two organizations or two teachers, and the aim of data collection, the instruments and the type of data analysis should be the same. Otherwise, researchers would neither be able to integrate nor compare the findings from multiple cases and they would not be able to generalize the findings to the theory (Yıldırım & Şimşek, 2000).

In the quantitative part of my thesis I depicted the 8 categories, including 38 characteristics of effective teachers that affected students' motivation. These characteristics were concluded to be 27 which affected students' motivation positively and 11 which affected students' motivation negatively. Then two case teachers possessing these characteristics were selected. In fact, one of two case teachers exhibited most of the positive characteristics and the other one exhibited

most of the negative characteristics. I needed to select at least two case teachers since it would be impractical to try to investigate all the characteristics for just one case teacher. The data were collected from both teachers with the same types of measuring tools such as observation checklists or interview forms. The data were analyzed with similar analytic techniques. The findings from the data analysis of both teachers were compared and generalized to the theory simultaneously. Therefore, the design of the qualitative part of this thesis was a multi case-holistic design (Bogdan & Biklen, 1998; Yin, 2003).

The case study that was used in this thesis included open ended and structured interviews and observations of both the teachers and their students. The insights gained from those observations of regular class sessions in two public schools and interviews with teachers and a small sub-sample of students were used to answer the questions "How do the teachers possessing effective characteristics interact with students in terms of motivation and achievement in physics?" and "How do physics teachers use those characteristics to motivate students?" The characteristics of effective teachers were described and at the same time the teachers who have effective characteristics were observed in class activities to find out how effective physics teachers' characteristics are interrelated with students' achievement and motivation. The visual model of the design of this thesis, including the relationship between the quantitative and qualitative parts of this thesis, is presented in Figure 6.2.

In Figure 6.2, the students' perceptions and teachers' perceptions of the effects of teachers' characteristics on students' physics motivation have been analyzed by descriptive statistics to identify the effective physics teacher characteristics and their categories. In order to determine the categories I conducted factor analysis. I developed two additional questionnaires, 'effective teacher identification questionnaire' (ETIQ) and 'effective teacher identification online questionnaire' (ETIQST). The analysis of the questionnaire results was supported by informal interviews with teachers and their students to select the two case physics teachers. The video recordings, field notes taken during the observations, the focused interviews with teachers and their students, and open ended interviews with them were formed the qualitative data. The characteristics

were analyzed as the codes, and the categories of the characteristics were defined as the categories of the codes. The qualitative data was labeled according to the categories and codes. For each category a single case analysis has been applied for the teachers. Then the results of the case analysis were compared and contrasted within the same category, as the nature of the cross-case analysis. There is a parallel relation between the categories of the characteristics, the codes, and the theoretical framework in this study. The theory part was also used to make true interpretations during the analysis. At the end of the qualitative analysis in Figure 6.2, the results should indicate the interactions between the effective physics teacher characteristics and the students' motivation in physics classes.

6.3 The Criteria to Select the Physics Teachers

In terms of the selection of the case Meriam (1998) stated that researchers should "… establish the criteria that will guide case selection and then select a case that meets those criteria…" (p.65). Meriam also suggested that for multi case studies the best way again would be to select several cases with respect to relevant criteria. Therefore, in the qualitative part of the thesis the results from 'Part 1' were initialized to prepare a questionnaire as criteria to select the case teachers. In fact, there is not a strict sampling logic in qualitative studies. However, Yin (2003) suggested that to enrich the data in terms of generalizability and to strengthen the validity of the results, the replication strategy could also be included instead of sampling logic. The replication strategy was defined as the results from one setting of a qualitative study also being comparable with the results from another setting. The cases should also be carefully selected to predict contrasting results but for predictable reasons (Miles & Huberman, 1994; Yin, 2003). In this thesis, the criteria for selecting the case teachers were used to obtain comparable and contrasting results from them. In fact, the case teachers should possess most of the effective physics teacher characteristics, whether negative or positive, derived from the quantitative part of the study and apply them in the classroom. Therefore, the following instruments and measures were used to form the criteria with which to select the case teachers of this study.

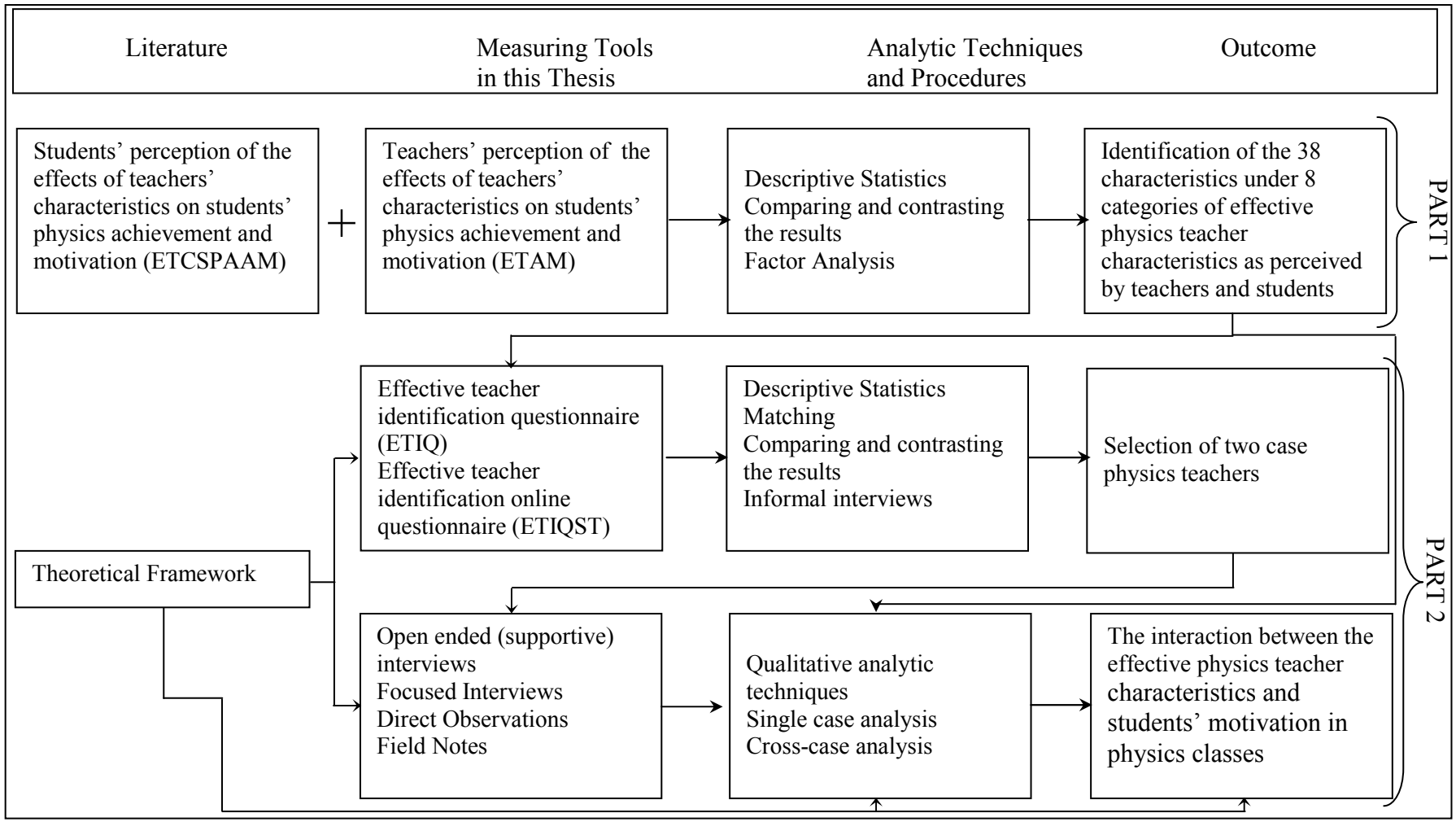


Figure 6.2 The relationship between measuring tools, the analytic techniques, and expected outcome of the study

6.3.1 Effective Teacher Identification Questionnaire (ETIQ) for Teachers

The shared perceptions of physics teachers and their students showed that there were 8 categories of effective physics teacher characteristics including 38 characteristics of which 27 have positive effects and 11 have negative effects on students' motivation. Therefore, in order to identify whether the teachers possess these characteristics and to find out how often they apply them in the classroom setting, the ETIQ was administered to the teachers in Ankara. The ETIQ, given in Appendix H, was the revised form of the ETAM that was used in the first part of this study. The items were exactly the same but the sentences or phrases were changed to first person singular pronouns in order to identify the teachers who possess those items of characteristics. For example, one item in the ETAM was "possessing necessary knowledge of subject matter". The same item was revised to "I possess necessary knowledge of subject matter". The ETIQ consisted of two parts for each item. The first part included a five-point Likert type scale. Within the second part, I required the teachers to give an example from their experiences in the classroom setting to support their answers with a follow-up open-ended question. The 38 items were differentiated as positive and negative. Teachers' scores on the five-point Likert type scale of the ETIQ were added for each item. The items on the scale were scored as 'yes/always' to 4, 'very often' to 3, 'often' to 2, 'rarely' to 1 and 'no/never' to 0. The answers of those teachers to the ETIQ for the negative items were recoded and their examples for those items were carefully analyzed. Therefore the maximum score for the positive items was 108 and that for the negative items was 44.

I administered the ETIQ to two physics teachers, two Turkish teachers, and two M.S. students to test the clarity of the questions and discover how well it could address the issue. Based on their comments, some of the questions were revised. The final form of the ETIQ was administered to 80 physics teachers in 26 public schools in Ankara. These schools were the sample of the quantitative part of the study. In other words, the teachers who filled in the ETAM questionnaire in the 26 schools also received the ETIQ. However, only 51 teachers returned the questionnaires from 17 of those schools. The teachers in some schools indicated

that they did not want to participate in the study and in the other schools some of the teachers were not available. Teachers were asked to fill in a five-point Likert type scale and support their answers with examples from some of their applications in class activities. After I had collected the questionnaire, teachers' answers and examples were analyzed. Almost half of the teachers did not fill in the example parts of the questionnaire.

Firstly, I contacted the 51 teachers who had completed the ETIQ to explain the aim of the study, time duration, teachers' role, researcher's role, and for what aim the findings would be used for. Then the teachers were asked for their voluntary participation in the informal interviews. After this stage, 33 teachers voluntarily participated in the interviews. The other 18 teachers refused to do the interviews since they did not want to take part in the continuing process of the study. During the interviews, the teachers were asked about the examples that they had written in the questionnaire. The teachers who partially or fully filled in the example part of the questionnaire were asked how they would apply these examples and how often. On the other hand, the teachers who did not write any examples in the questionnaire were also asked the reason why they did not give any responses to the open-ended parts of the items. The reason was to understand whether these teachers really possessed these characteristics and whether they frequently used them in the class or not. During the interviews I observed teachers' enthusiasm and willingness to participate in the rest of the study. I also contacted the principals and vice principals of the schools where those teachers worked in order to gather their views related to the teachers regarding those characteristics. They also guided me in the selection process of the case teachers. I listed all of the 33 physics teachers and included all detailed notes taken during the informal interviews with the teachers and the principals to identify that they really possessed the characteristics as they declared. The results of the ETIQ have been presented in the following section, see Section 6.4.

6.3.2. Effective Teacher Identification Online Questionnaire (ETIQST) for Students

The ETIQST, during the period of the application of ETIQ, could also be completed on the Internet if desired. The site was active for almost one year (from April, 2006 till January, 2007). The ETIQST, given in Appendix I, was developed by the researcher and a web page design expert. The researcher asked 20 students and three M.S. students about the clarity of the questions and how well it could address the issue. Based on their comments, the questions were revised.

The format of the ETIQST was the same as the ETIQ but the items were revised to ask students' perspectives related to their physics teachers' characteristics. The main aim of the ETIQST was to make sure that none of the physics teachers, particularly those in Ankara, were ignored. The questionnaire also helped students freely fill in anything and everything about their physics teachers, since when interviewed they hesitated to speak openly. The link to the ETIQST can be found on two important web pages that the students often navigate to, "www.onlinefizik.com" and "www.lisefizik.com". The web address of the questionnaire was also distributed by hand to the students in the schools where the teachers were included in the informal interviews, in Ankara. I sent the web address to my students so that they could pass it on to their friends in public schools in Ankara. The online questionnaire was the best way to reach a large number of students from different public high schools and to collect information related to their physics teachers. A total of 1337 students filled in the questionnaire within the time duration that the ETIQST was active, and 205 of them were from Ankara. The scaling of the five-point Likert type scale of the ETIQST, and the maximum scores of the positive and negative items were the similar to the ETIQ, as has been mentioned in Section 6.3.1.

The results of this questionnaire were periodically analyzed and student's responses were evaluated. The results of the ETIQST have been presented in the following section, see Section 6.4. The names of the teachers or the students were not required to be filled in but the email addresses of the students were asked for. For the cases that the researcher wanted to contact the teachers, he sent an email

to the students to take the names of the teacher and the school. Identifying students' opinions and perceptions about the characteristics of their teachers by means of this online questionnaire helped to select 7 physics teachers possessing effective physics teacher characteristics. However, three of them did not want to participate in the study. The final four teachers were administered with the ETIQ later. Similar informal interviews were also carried out with those teachers. Finally the rest of the analysis were prolonged with totally 37 teachers, 33 of whom were included at the end of the analysis of the ETIQ and the rest were included at the end of the analysis of the ETIQST.

Additionally, I collected the names of three teachers who were thought to be effective, from my colleagues. I contacted those teachers, but they were teaching in different types of schools like technical and Anatolian high schools. Since the second part of this thesis utilizes a multi case study the cases would have differed. Moreover the first part of the study is based on the physics teachers working in public high schools. Therefore, selecting the case teachers from different schools would prevent the drawing of conclusions from both parts. As a result I also eliminated those teachers.

6.4 Selection of the Case Teachers

The results of the ETIQ and ETIQST were analyzed simultaneously during the data analysis process. The results of the ETIQST enhanced my sample of teachers to select the case teachers of the qualitative part of the study. The students' scores for their teachers from the ETIQST and the respective physics teachers' scores from the ETIQ are presented in Table 6.2.

Table 6.2 indicates that the most of the items were not considered by the students carefully since their scores on the negative items were too high. I contacted the students and I learned the names of the teachers and the schools they worked at. Then the 7 teachers, presented in Table 6.2, completed the ETIQ and the difference between the results of ETIQ and the ETIQST showed that if the students thought that the teacher had effective characteristics and if they liked him/her they scored higher.

Table 6.2 The students' and teachers' scores from the ETIQST and the ETIQ respectively

Teacher	Students' Scores in the ETIQST		Teachers' Scores in the ETIQ	
	Scores on the Positive Items	Scores on the Negative Items	Scores on the Positive Items	Scores on the Negative Items
Teacher A	34	24	75	10
Teacher B	60	43	66	7
Teacher C	85	33	70	6
Teacher D	88	43	68	6
Teacher E	108	44	67	11
Teacher F	76	44	61	10
Teacher G	107	41	62	14

Table 6.2 also indicates that if the students thought that the teacher did not possess effective teacher characteristics and if the students did not like him/her they scored very low. At this point I should emphasize that Teacher B, Teacher D and Teacher E did not want to take part in the rest of this study so they were eliminated. Teachers' scores and students' scores are quite different from each other, see in Table 6.2. The ETIQST was helpful when selecting 7 new teachers with respect to students' views, additional to the previous 33 teachers determined in Section 6.3.1. However, it was not totally reliable since students' scores were extremely high for both negative and positive characteristics. Therefore I concluded to use the teachers' scores from the ETIQ for Teachers A, C, F and G and these scores were embedded into the scores of the 33 teachers. Total number of teachers was 37 and these are given in Table 6.3.

The items in the ETIQ were evaluated with respect to the five-point Likert type scale, given in Section 6.3.1. The teachers having a higher score from the ETIQ in Table 6.3 indicated that they possessed the effective teacher characteristics and they frequently applied them in their classes. The higher scores on the positive items indicated that they possessed and applied mostly the positive items and those on the negative items represented that they possessed and applied

mostly the negative items in their classroom experiences. Table 6.3 gave me detailed knowledge about those teachers. I contacted all those teachers and I initialized informal interviews to identify whether they really possessed those characteristics and they frequently used those characteristics in the classroom. There are two groups of teachers in Table 6.3. The first group of teachers obtained lower scores and the second group obtained higher scores from the questionnaire. The informal interviews, the findings from the ETIQ and ETIQST provided an appropriate amount of data to select the teachers from both groups. Therefore, a total of 10 physics teachers were selected, 5 for each group, and they were included in the preliminary part of the qualitative study.

Table 6.3 The scores of the teachers in the ETIQ

No.	Teacher	Scores on Positive Items	Scores on Negative Items
1	Teacher 5	93	5
2	Teacher 1*	92	1
3	Teacher 6	91	0
4	Teacher 4**	87	12
5	Teacher 7**	83	2
6	Teacher 8	82	15
7	Teacher 9	79	7
8	Teacher 10**	79	6
9	Teacher 11	79	3
10	Teacher 12	79	3
11	Teacher 3**	77	6
12	Teacher A	75	10
13	Teacher 13	74	9
14	Teacher 14	71	10
15	Teacher 15	71	7
16	Teacher 16	70	6
17	Teacher C	70	6
18	Teacher 17	68	12
19	Teacher 18	68	10
20	Teacher 19	68	10
21	Teacher 20	68	7
22	Teacher 21	63	23
23	Teacher 22	62	1
24	Teacher G	62	14

Table 6.3 (continued)

No.	Teacher	Scores on Positive Items	Scores on Negative Items
25	Teacher 23	61	13
26	Teacher F	61	10
27	Teacher 24**	60	9
28	Teacher 25**	59	17
29	Teacher 26	59	13
30	Teacher 27	58	11
31	Teacher 28**	57	11
32	Teacher 29	55	15
33	Teacher 30	53	11
34	Teacher 31**	52	11
35	Teacher 2*	47	16
36	Teacher 32	40	21
37	Teacher 33	36	1

* represent the teachers selected as the case teachers for the qualitative part of this study

** represents the other 8 physics teachers selected

The students' views were also evaluated in terms of effective teacher characteristics. I conducted informal interviews with the students of those 10 physics teachers, presented in Table 6.3. The major aim of those interviews was again to confirm whether their teachers were using the effective teacher characteristics frequently during the class sessions. They were also asked about the features of classroom interactions. They usually declared what the teachers and principals stated in terms of their teachers' characteristics and they stated that those characteristics affected their motivation. The informal interviews with students were very helpful and they provided in-depth data to cover the gaps in the previous data obtained through the interviews with the teachers.

These teachers were again reminded that participation was voluntary. The general details of the study, such as the aim, function, and their roles were explained to the teachers and to their students. The teachers were observed in two class hours (block or separate) for two weeks. The aim of these observations was again related to the selection of the case teachers. In other words, those teachers were observed to decide whether or not they applied most of the 38 effective

physics teacher characteristics in class activities and whether the interactions in the class provided the necessary data to enable me to generalize the findings to the theory. Moreover, the findings from ETIQ and ETIQST were also proved by means of these observations. These 10 teachers were evaluated with respect to the classroom observation notes. In the light of all data collected from the teachers, principals, students and classroom observations two teachers were selected from the 10 physics teachers. One of the two applied most of the positive characteristics in the class sessions and her approach to the study was very positive. She allowed me to make audio and video recordings. The other one applied most of the negative characteristics in the class sessions and her approach to the study was also very positive. She allowed me to make audio recording during interviews, but she did not allow making video recordings. Since the observation period covered almost one and a half semester the teachers' attitude to the observations and their willingness to share their lessons with me was crucial for me. The other 8 teachers applied the classroom interactions and applied almost the same effective characteristics as the selected ones. For example, I observed and the teachers declared that they did not do experiments in the physics lessons. They stated that they could not find time for laboratory sessions or even that they did not know how to carry out an experiment for most of the concepts in physics. Most of the teachers' initial attitudes toward the study were quite positive. However, because 8 of the teachers indicated at the end of the two week observation period that they would find it difficult, for various reasons, to participate in such a long study they were eliminated. Therefore, the two teachers chosen were selected on the basis of the ETIQ test, observations, informal interviews with two of them and their students, and their willingness participate.

6.5 Two Case Physics Teachers

In the preliminary part of the qualitative study, I gained a detailed understanding of the class activities and the effects of teachers' characteristics on students' motivation from two physics teachers rather than the other eight. The selected two teachers were from different schools. The criteria used to select the

teachers proved that Teacher 1 applied the positive items of effective teacher characteristics more than negative ones. However, Teacher 2 applied some of the negative items of the characteristics more than the positive ones. I carried out initial observations for different grade levels of these two physics teachers. The teachers' interactions with the tenth grade students seemed more interesting. The teachers' willingness to teach in tenth grades was more than those in ninth and eleventh grades. In fact, the eleventh grade students did not have enough concentration on the subject matter because of the university entrance examination. There were only two lessons per week and the concepts of physics were related to introductory physics for the ninth grade students. Therefore, investigating the effects of teacher characteristics in those grade levels would not have provided me with an appropriate amount of data. Moreover, the classroom discussions and interactions in the classes for these grades would be less than those for tenth grade. Therefore for both Teacher 1 and Teacher 2, I decided to carry out the research with their tenth grade classes.

6.5.1 Teacher 1

Teacher 1 was a physics teacher and a vice principal in a public high school in Ankara. I firstly met her during the first administration of the ETIQ (April, 2006). Teacher 1 declared that she could fill in the questionnaire within a couple of weeks. After I had collected all of the questionnaires from all the schools I started to evaluate them. The answers of Teacher 1 to the ETIQ seemed very fair and some of her answers were quite interesting. For example, she declared that she frequently used daily life examples and media in her class sessions. She got the highest mark from the evaluation of the ETIQ and she directly supported every answer with a suitable example that she used in her lessons. When I started the informal interviews I was eager to talk to her.

At our second meeting (April, 2006), I tried to understand whether she really had effective characteristics or not, and whether she utilized them to motivate her students. During the interview she seemed very interested in the study (April 26, 2006). She supported and exemplified each answer that she gave

to the ETIQ. She stated her willingness to be a part of this thesis and she said "…perhaps I will be able to learn things from the findings of this research that will improve my teaching…" (Teacher 1, informal interview, April 26, 2006). She complained about the lack of experiment tools at the school and she proposed that the items of effective teacher characteristics related to laboratory sessions would be impossible to be a part of my criteria of analysis. Teacher 1 stated that she attempted to do all sorts of activities to improve the meaningful learning of the students. She also affirmed that she would share her yearly and daily plans. Moreover she was the only teacher who gave permission for the video recording during the observations. She seemed very enthusiastic about teaching physics. Teacher 1 proclaimed that physics was the one of the hardest branches of science and the physics teachers should find suitable ways to make it understandable and meaningful for the students.

I also collected some demographic questions about her. She was 35 years old and she had graduated from the education faculty of a Turkish University 13 years earlier. She had been working in this school for 9 years. She was the physics teacher of the 9^{th} and 10^{th} grades. She was one of the vice principals of the school and she did not teach any subjects other than physics. Teacher 1 shared her room phone and mobile phone numbers and her e-mail address with me so that I would be able to contact her easily about matters related to the study.

On the same day as the interview with Teacher 1, I also conducted another informal interview with two students of hers. They were 10^{th} grade students and they both stated they had hated physics before Teacher 1 had begun to teach them. The students said "…Teacher 1 makes us love physics…" (Two students of Teacher 1, informal interview, April 26, 2006). They declared that she had enough subject matter knowledge and she could easily transfer this knowledge to the students. They stated that Teacher 1 always came to the class prepared. They said she conducted demo experiments and she gave daily life examples to make the concepts meaningful. The students also supported my observation results by stating that Teacher 1 was very enthusiastic about teaching. Finally they said that she seemed the only authority in the class, but that she always encouraged class discussions and student-student and teacher-student interactions in the class. I

asked the students whether their teachers applied the examples that she gave in the ETIQ, as she stated. They agreed with her and they supported almost all of her answers. According to all the data I gathered for Teacher 1, I concluded that she possessed most of the positive items of effective physics teacher characteristics and she applied them frequently in the class during classroom discussions and interactions with the students.

6.5.2 Teacher 2

The second case teacher of this study was Teacher 2 who was a physics teacher in another public high school in Ankara. The teacher was selected since the data collected, presented in Section 6.5, proved that Teacher 2 possessed some of the negative characteristics of effective teachers and she applied those characteristics frequently in the class. Teacher 2 was very important in terms of this thesis since she got the lowest mark from the evaluation of the ETIQ. The comparison of the findings from both case studies would provide insights into how teachers' characteristics affected students' motivation positively and/or negatively. I firstly met her during the administration process of ETIQ (April, 2006). At this first meeting she stated that she had difficulty dealing with researchers since in previous years a couple of researchers had come and they had wanted to study with her. She stated that she agreed to take part in these kinds of studies although she felt some of the studies in the past had been a waste of time. However, she agreed to be a part of this study and she declared that she would try to do her best for this study.

In the evaluation process of the answers of Teacher 2 on the ETIQ, it was interesting that she directly supported every answer with an example that she used in her lessons. Interestingly for a few items she selected "sometimes" or "never" in the Likert scale. However, for those items she wrote in the open ended section parts of the items fascinating examples of in-class activities that contradicted her answers. In our second meeting I conducted an informal interview with her and asked the reason why she had done this. Teacher 2 stated that she had written the examples of those questions with respect to ideal cases rather than for her lessons

(Teacher 2, informal interview, May 5, 2006). In these interviews she stated that some of her answers also related to ideal teachers that possessed all of the effective characteristics affecting students' motivation. For example, Teacher 2 also indicated that she did not know how to carry out the experiments for most of the concepts in physics. However, she wrote many sample experiments related to physical concepts in the ETIQ. Teacher 2 stated that her performance was mostly related to the performance of the students. Teacher 2 was 40 years old and she had graduated from an education faculty of a Turkish University 18 years earlier and she had been working in this school for 5 years. She was the physics teacher of the 10^{th} and 11^{th} grades. She did not have any other responsibilities in the school. However she complained that she had to teach two other subjects in the school other than physics which were ethics and tourism.

During the informal interviews with four students of hers, they supported or opposed some of her answers. Students declared that Teacher 2 had enough subject matter knowledge. She usually did not seem enthusiastic about teaching but she tried to motivate all of the students in the class (Four students of Teacher 2, informal interviews, May 5, 2006). Students indicated that Teacher 2 gave the examples related to subject matter from simple to complex. They supported the answer of Teacher 2 as they stated that they did not do any experiments in physics. The students also stated that the teacher shouted at the students who did not concentrate on the lesson. In fact, Teacher 2 also accepted that she did this. Students indicated that she was the only authority in the class and it was quite hard to find time to have class discussions in her lessons. On the other hand, Teacher 2 claimed that she usually encouraged classroom discussions in the class. According to the data gathered from these procedures I concluded that Teacher 2 possessed some effective teacher characteristics embedded in positive items but mainly she possessed the negative characteristics and she applied them in the class frequently.

Teacher 2 shared her phone number and e-mail address with me in order for me to contact her easily. However she did not give permission for audio or video recordings during the observations. This is a weakness of this study. The

procedures used to compensate for this weakness have been explained in the following sections.

6.6 Field Entry

The two case teachers of this study were both public high school teachers. I was not acquainted with them before the study. I met them when I started to administer the ETIQ. The first field entry was not easy. In fact, carrying out the researches in public schools meant that I needed to follow procedures. To carry out the case study in those two public schools I first informed the head of SSME department and Faculty of Education. I got initial permission for the study and then I contacted the Graduate School of Natural and Applied Sciences. The study was analyzed by the members of the committee in the institute who accepted the study and wrote to the presidency of METU to obtain legal permission for the study. Then the presidency wrote for the final permission for the study to the Research Planning and Coordinating Committee of the Ministry of National Education. The study was analyzed there in terms of appropriateness, aim, ethics and other issues. Finally, I obtained a official permission document after two months, see Appendix J.

The school principals were informed about the study and they asked to see the permission document. When I had been granted their permission, I informed the teachers again about the study in writing, see Appendix K. I got their permission and the first entry to the field took place during the initial observations in the preliminary part of the qualitative study. I contacted and informed the teachers before the field entry by phone. They agreed to meet with me at the time I suggested and the second entry to the field with Teacher 1 was on September 23, 2006 and with Teacher 2 on September 22, 2006. I gave the final form of the permission paper given by the ministry to the teachers. They had agreed to be the part of the study so this paper was just a tool to fulfill legal requirements. At the beginning of the fall semester of the 2006-2007 academic years, I started the observations with the two case physics teachers.

The grade levels of the students that I observed were the same. The students that I observed were also informed about the study. At the beginning of the field entry I explained to the teachers and the students that any kind of participation was completely voluntary. I stated that they could withdraw without penalty at any time. I declared any notes, audio tapes and videotapes that I took from the interviews and observations would be kept confidential and pseudonyms or numbers would be used instead of their names to keep their identities secret. Since I had observed both teachers twice in two weeks during the selection of the case, the formal observations and interviews started one week later, for Teacher 1 on October 5, 2006 and for Teacher 2 on October 4, 2006.

6.7 Data Collection Instruments

The methods of data collection and generation used in qualitative research are strictly different from those in quantitative research. Qualitative research includes deductions from the data gathered through various types of data collections and the researcher reaches conclusions from the data with categories, codes, impressions, ideas, and concerns (Patton, 1987). There are two main premises to consider when collecting data in qualitative studies. Firstly, the researchers should indicate the parameters for the data collection and they should also recognize the types of data to be collected. Most of the studies involve multiple data collection procedures like observations, interviews, documents and audio-visual sources (Creswell, 1994). Yin (2003) also added archival records and physical artifacts to these sources of evidence. Yin (2003) suggested that "no single source has a complete advantage over all the others. In fact, the various sources are highly complementary, and a good case study will therefore want to use as many sources as possible…" (p.85).

Using multiple sources of evidence is crucial for comparing the findings from the different sources in order to understand the events that the researcher has studied (Bogdan & Biklen, 1998). If the researcher has used data triangulation, which is one of the major strategies for reaching a conclusion in qualitative data

collection as stated by Patton (1987), the events and facts of the case study are sustained by more than one source of evidence (Yin, 2003).

The third research question of this thesis was related to interaction between the effective physics teacher characteristics, from students' and teachers' shared perceptions, and students' motivation. Therefore, the interactions of the teachers with their students in the class activities and effects of the teacher possessed effective characteristics on students' motivation were to be evaluated qualitatively during the class sessions. The data collection instruments for the qualitative part of this thesis are open ended and focused interviews, direct observations, descriptive field notes and visual recordings.

In the qualitative data collection of my thesis I utilized two types of interviews. The informal open-ended interviews were focused mostly on students to find answers regarding the facts of a situation or their opinions on events which had occurred in the class during the observations (Yin, 2003). These interviews could also be described as follow-up interviews to support my field notes and observations. Open ended interviews are accepted as the crucial way to collect data and analyze them in a well-organized conductive way (Bogdan & Biklen, 1998). When I was faced with an unusual interaction between students and the teacher, I immediately used open ended interviews with those students or the teacher during the break. Informal interview data consisted of my jotting down notes and memos from casual conversations between me and individuals or small groups that took place during class and after class.

The focused interviews that were also open ended in nature were used to interview the participants for a short period of time by following a certain set of questions derived from the study. Well informed participants and clearly stated questions help researchers to gain a large amount of appropriate data by means of focused interviews (Bogdan & Biklen, 1998; Yin, 2003). I applied the focused interviews to Teacher 1 and Teacher 2 once in the middle of the spring semester. Their students were also interviewed on the same day.

Teacher 1 and Teacher 2 were interviewed with Interview Protocol of Teacher 1, given in Appendix L, and Interview Protocol of Teacher 2, given in Appendix M, respectively. Both protocols included the same 23 questions derived

from the quantitative part of this thesis, including 38 effective physics teacher characteristics, and from the theories. If I asked the effects of each characteristic on students' motivation as a separate question, it would take too much time. For this reason I combined some of the characteristics and asked as a single question. Since both interviews were carried out at the end of the observations, I added some additional sub-questions derived from my observations related to the teachers' behaviors and interactions in the class. Both interviews were designed to find an answer to the third research question of this thesis and to support the data gathered from the observations related to the teachers. Therefore, the main questions for both protocols were the same, but the sub-questions derived from the observations were different.

The interview with Teacher 1 was carried out in her office in the school. She seemed relaxed in her answers. The entire interview with her was audio-taped. A very detailed knowledge about her characteristics and their interactions with students' motivation was gathered during the interview. For this reason the transcribed raw data of the interview were longer than the other interviews.

The interview with Teacher 2 was carried out in the staff room of the school. She did not pay enough attention to the questions, but I tried to ask all of them. She ignored some of the sub-questions. I contacted her twice to arrange the interview, but she did not accept because of lack of time. On my third attempt she agreed to do it but stated she only had 25 minutes to complete it in.

In the students' interviews Interview Protocol of Students, given in Appendix N, was applied to the students of Teacher 1 and Teacher 2. The same 23 questions, without adding the sub-questions from the observational data, were asked to the students. The questions were revised by taking into account that they would be asked to the students. However, the questions were designed with respect to the group that would be applied. The questions were also aimed at finding an answer to the third research question of this thesis. The teacher and student version of the protocols also included the demographic questions for the teachers and their students respectively. The interviews were conducted with five students of Teacher 1 and two students of Teacher 2. The students were interviewed as a group.

The selection of the students for the interviews was based on my observations and their grades from the physics exams. I tried to include students who were a part of the classroom discussions and had a good interaction with the teacher and also those who stayed passive during the lesson. The students participated in the interviews voluntarily. For example, I decided to choose six students from Teacher 1, but one of them did not want to be the part of the study. All of the interviews were completed in 30 to 45 minutes. The interviews were audio-taped and they were transcribed within two weeks. Since the students were in the form of groups I tried to collect their ideas one by one from all of them. As a group they felt more relaxed and I let them freely explain what they thought.

The direct observations are the main part of the data collection process in my thesis. The results of the quantitative part of this study illustrated that there are 38 items of eight effective physics teachers' characteristics according to the shared perceptions of the teachers and the students. Moreover, all of these effective characteristics are supported as effective in terms of students' motivation by the theoretical base of the qualitative part. Therefore I designed an Effective Physics Teachers' Characteristics Classroom Observation Checklist (TOFRM), given in Appendix O. The main reason for designing and using a checklist was to keep records properly during the observations and to concentrate on similar characteristics for the two case teachers during the observations. The observations focused on both students' and teachers' in-class activities and both teachers' observable characteristics and their interaction with the students' motivation. The items in the checklist were revised during the data collection process.

I observed the class of Teacher 1 once a week for 11 weeks. The physical setting and physical descriptions of the classroom are given in Appendix P. The class hours were blocked hours, that is, one 80-minute period instead of two separate 40-minute periods, so my observations continued throughout each 80 minutes. I wrote my field notes for every 10 minutes by dividing the total class hour into eight sections. I recorded five of these observations on video tape. For the lessons that I could not use video-recording I took descriptive field notes and tried to write down everything that I collected from the interactions, speech, writings, students' behaviors, teachers' behaviors and what had occurred in the

classroom (Bogdan & Biklen, 1998). On the other hand, Teacher 2 did not give permission for video-recording. I tried to document all of the actions in the class in the descriptive field notes and I tried to support my observations with the follow-up open ended interviews with Teacher 2 and her students. I observed Teacher 2 once a week through mostly two class hours for 10 weeks. The field notes for the class sessions of Teacher 2 were taken every 10 minutes. To increase the reliability of evidence for observational data and to decrease the subjectivity threat, it is useful to observe the lesson of the case teacher with multiple observers (Yin, 2003). Therefore, a second observer observed Teacher 2 for two of those weeks and his field notes have been embedded into mine. The second observer was also a physics teacher and he knew about the nature of qualitative methods, especially data collection through observation. He was also informed by me about Teacher 2 and her class and the possible events that he could face during the data collection. He collected the observation notes by TOFRM, to standardize the data collection process. The physical setting and physical descriptions of the classroom of Teacher 2 are given in Appendix R.

During the observations of both teachers, I wrote field notes in a sequential manner by initializing TOFRM. I avoided talking to Teacher 1, Teacher 2 or their students in order to feel free to observe and write down my notes. In all of the observations I sat at the back of the class in order not to disturb any kind of interaction or affect the students' concentration negatively. I specifically focused on the observable characteristics of effective physics teachers, teachers' interactions with the students, and students' interactions with themselves and how effective physics teachers' characteristics and students' motivation affected each other in the class. The timetable for the data collection for Teacher 1 and Teacher 2 are given in Appendix S.

6.8 Strategies for Handling the Qualitative Data

The collected data from the sources of evidence defined in Section 6.7 are analyzed with respect to various strategies. Categories and the codes of the data and the data analyses are mentioned in this part of the thesis.

6.8.1 Categories of the Data

The categories in the data analysis of qualitative study are the crucial elements especially to capture recurring patterns in the data (Merriam, 1998). The themes or categories can be the concepts or theories that come out from the data of the study (Bogdan & Biklen, 1998; Meriam, 1998). Therefore, the initial categories of my study are directly derived from the quantitative part of this study.

The researcher decided that the categories of the codes would be the eight categories of effective physics teacher characteristics. Moreover, it was decided to use some of the 38 effective physics teacher characteristics under the eight categories as codes. These categories and characteristics are presented in Section 4.2. The analysis of both the ETIQ and the informal interviews showed that the teachers did not use ten of the characteristics frequently in the class. It would be hard to analyze these characteristics by qualitative analytic techniques. Therefore, I eliminated these ten characteristics from further qualitative data analysis. These ten characteristics were 'being an experienced teacher'; 'adjusting the subject matter according to students' needs and interests'; 'making use of the physics laboratory for the lesson'; 'doing demo experiments in the class'; 'following new trends in his/her job and transferring them to the students'; 'using proper, understandable and fluent language during the lesson'; 'using offensive language to the students'; 'making use of materials like overhead projectors or slide shows as well as chalkboard'; 'making use of film and video while lecturing'; and 'making use of computer packages related to the subject matter'. When I eliminated these characteristics, one category was also eliminated because three eliminated items belonged to this category. This category was 'using technology in the class'. Therefore, the rest of the analysis was carried out with 7 categories.

6.8.2 Codes of the Data

Codes that are certain words, phrases, patterns of behavior and events, give the researchers ideas for analyzing the data (Bogdan & Biklen, 1998). The researcher can develop coding categories, themes and segments to connect the

codes to them (Creswell, 1994). Meriam (1998) suggested two sections to begin the coding which are "…identifying information about the data and interpretive constructs related to analysis…" (p.164).

In my thesis, I started to think about the codes of the data at the end of the quantitative part of the study. While collecting the data I was familiar with the teachers' characteristics and teachers' characteristics theory. The theoretical framework of this study, see Table 6.1, offered behaviors, actions or interactive activities for both the teachers and the students that could be used as the codes in order to analyze the data. In the light of the theoretical framework of the study I defined the codes that would be the predefined codes before I started to analyze the data.

During the data collection process I refined my knowledge and I tried to configure the codes in my mind. I read the transcripts of the interviews with Teacher 1 and with the students of Teacher 1 and the initial field notes which had been gathered from the observations of the lessons of Teacher 1 and Teacher 2. Finally the codes were revised. The codes for students were coded with 'S' as the initial letter and for teachers they were coded with 'T' as the initial letter. The codes that represented the students' behaviors or actions are represented in Table 6.4.

The codes in Table 6.4 represent the motivation of the students based on the situated motivation theory. Identifying the specific codes was more challenging work for me than identifying the general codes. The specific codes for the teacher behavior were initialized to measure only a defined category of teachers' effective characteristics. At first the theoretical framework was carefully read for more than five times to determine which characteristics or behavior of the teacher was based on which theory. Then I combined all the codes derived from the theory and the transcripts to determine the specific codes for each teacher characteristic. Finally, by considering Table 6.1 and the transcripts of the interviews and initial field notes, I separated them into categories. All this work was needed since some of the effective physics teacher characteristics could not be measured or observed by a single code. On the other hand, a few characteristics could directly be measured by analytic techniques so I used those characteristics directly as the codes.

Table 6.4 List of the general codes for students behaviors.

	Behavior/Action/Interaction	Code
	willingness to do things by themselves	SDT
	feeling anxious	SA
	feeling rejected	SR
	willingness to answer/solve	SWA
	explaining the concepts in their own words	SEOW
	willingness to participate	SWP
	asking questions without feeling humiliation	SQH
	working together	SWT
	willingness to share ideas/views	SWSI
	interacting with the teacher	SINT
	being concerned/interested	SCI
	being unconcerned/uninterested	SUCI
Students	being curious	SC
	having fun/enjoyment	SFE
	recalling the knowledge	SRK
	being aware of the concepts	SAC
	paying attention	SHA
	working on an example	SWE
	unable to construct clear understandings	SUCU
	willingness to ask	SAM
	willingness to search	SWS
	engaging in learning	SEL
	making a noise	SMN
	being tired/fed up	STF
	coming to the lesson prepared	SCP
	causing disruptions	SUD

For the effective physics teacher characteristics exhibited by the two case teachers, I constructed a table that represented the categories, characteristics and the specific codes together, which is presented in Table 6.5.

Table 6.5 List of characteristics and the specific codes with respect to each category of effective teacher characteristics.

Characteristics	Behavior/Action/Interaction	Code
Category I. Possessing and Transferring the Subject Matter Knowledge		
Possessing necessary knowledge of subject matter	Implementing the curriculum efficiently (covered the other codes within this category)	TIC
Giving lectures with appropriate details	Providing study skills	TSS
	Avoiding confusing students' minds	TMS
	Avoiding overloading students with details	TOD
Possessing necessary mathematical and geometrical background related to physics	Providing proper links between mathematics and physics	TMP
Answering students' questions related to physics	Answering easily	TRQ
	Having difficulty answering questions	TDA
Coming to the lesson prepared	Willingness to search (teacher)	TWIS
	Fluent presentation without hesitating	TFP
	Depending on notes too much	TDN
Category II. Knowledge of Profession and Teaching Techniques		
Taking the questions of the students into consideration and repeating the subject matter that wasn't understood by students	Repeating the subjects in a different way	TRS
	Repeating the previous lesson	TRP
Explaining the subject matter with new examples when students face learning difficulties	Identifying learning difficulty	TILT
	Explaining the subject matter with new examples	TES
Giving examples from simple to complex	Providing problem solving strategies	TPSS
	Providing help	TPH
	Providing feedback	TPF

Table 6.5 (continued)

Characteristics	Behavior/Action/Interaction	Code
Preparing exam questions as to be understood and answered by all the students	Asking understandable questions	TEQ
	Exam questions reflected the covered content	TEC
Solving problems in lessons, which are similar to university entrance examination questions	Minimizing the number of multiple choice tests	TMC
	Administering multiple choice test	TAMC
Category III. Enthusiasm for Teaching		
Seeking and trying to find out the answers to the questions that the teacher doesn't know	Honestly confessing not to know	THC
	Improving students' thinking skills	TSTS
Preparing a suitable medium for learning in the class	Gaining students' attention	TAT
	Adjusting the content to students' level	TAC
	Using statements giving recognition and credit	TUSR
Encouraging students to ask questions such as how?, why?, ...then what happens?	Encouraging students to ask	TESQ
	Encouraging students to research	TESE
Lecturing reluctantly	Enthusiastic about teaching	TET
	Being on time for the lesson	TBTL
	Teaching reluctantly	TTR
Category IV. Activities for Meaningful Learning		
During the class session, introducing some concrete equipment related to the concepts	Bringing in objects related to the content	TCEC
Making the physics lesson interesting by giving examples from daily life	Providing links between prior and new knowledge.	TPPN
	Providing links between real life and concepts	TRC
	Providing scientific truths (overcoming misconceptions)	TPST

Table 6.5 (continued)

Characteristics	Behavior/Action/Interaction	Code
Asking questions to the students to enhance active participation	Encouraging students to participate	TEP
	Encouraging students to ask questions without feeling humiliation	THE
Category V. Classroom Management		
Keeping students' interests alive during the whole lesson	Providing continuous communication	TPCC
	Providing well structured activities/role plays	TAR
	Avoiding activities which are too hard/too easy	TAA
Being able to motivate the students efficiently	Providing daily goals and objectives	TGO
	Providing intended and expected learning outcomes	TIEL
	Sustaining curiosity	TSC
	Adjusting the tone of voice	TTV
Being interested in some students more than the whole class	Allowing mostly the same students to participate	TSSP
	Spending too much time on management problems	TSMP
	Using time efficiently	TUTE
Category VI. Personal Characteristics		
Considering about his/her own personal problems	Talking about his/her problems	TCD
Having fed up and tired behavior	Fed up and tired behavior	TTB
	Presenting boring activities	TBW
Being hard-hearted, intolerant and tedious	Hard-hearted, intolerant and tedious	TTFI

Table 6.5 (continued)

Characteristics	Behavior/Action/Interaction	Code
Category VII. Attitude Toward Discipline in the Class		
Humiliating students in front of their friends with the aim of giving punishments	Humiliating students	TNC
Shouting at students	Shouting	TS
Getting angry with students' mistakes, and shouting at or hitting students who are disturbing the classroom atmosphere	Getting angry Hitting Warning the students	TGA THIT TWS
Giving punishments to the whole class because of a fault of only one student	Giving punishments	TGP
Giving low grades for the aim of constructing discipline (threatening students with low grades)	Offering marks	TOM

To summarize, all of the analysis in the qualitative part of this thesis was completed with 7 categories, 28 characteristics, and 84 codes of characteristics for both students and teachers as presented in Tables 6.4 and 6.5.

After the tables were constructed, I started to label the raw data with the categories and characteristics. I used different colored pens for different categories and respective codes. Therefore, the interview transcriptions, field notes, transcriptions of observations in video-tapes were classified and grouped with respect to those codes.

6.8.3 Data Analysis

Data analysis is a very complicated and arduous process of qualitative studies. When the researchers arrange their transcribed data and other material and start to analyze them it gives the impression that the analysis will never end (Bogdan & Biklen, 1998). In fact, it is related to the nature of the qualitative study. The main considerations are the people and their interactive or linked

activities. Therefore, data collection and data analysis processes include very difficult stages like reading, rethinking and rewriting; and these stages "…do not occur in a vacuum and they often occur simultaneously…" (Meloy, 1994, p.68).

As I indicated in the time table in Appendix S, I finished all of the data collection process in the first week of April, 2007. I transcribed the interviews and I organized the field notes on the computer afterwards. I transcribed the interview data verbatim in order not to lose any valuable information during the data analysis. Firstly, I read all of the data and watched the observations videos. Second, I analyzed the first interview of Teacher 1 by considering what the content was all about. Third, I defined the codes and I made a list of all the topics by constructing categories. I grouped the codes under my predefined categories. I created the abbreviations for the codes that I would use throughout the coding process. Then I completed a preliminary analysis of the transcribed data of the interview with Teacher 1 and with her students, and the first observation field notes of the lesson of Teacher 1. Finally, I revised my codes when I started to implement a thorough analysis. This systematic process of data analysis was offered by Creswell (1994).

The data collection process included multiple sources of evidence for both Teacher 1 and Teacher 2. For Teacher 1, I had the data of interviews with her, and her students, field notes and video recordings from her lessons. For Teacher 2, the data included the transcripts of the interviews with her and her students and field notes taken during her lessons. The strategies of handling reliable and valid data have been discussed in the next section. I analyzed the data for each case teacher separately with respect to the categories as a single case and then I compared the results from both case teachers. Finally, the data for both teachers were compared and contrasted in order to determine the effects of the effective physics teacher characteristics on students' motivation from two different perspectives. Each category of codes corresponds to an effective characteristic, so the categories were also combined for two case teachers. I was able to synthesize the data within each category to draw a strong conclusion about the interactions between students and teachers who possessed effective characteristics. The data and findings from the study were also analyzed by one peer examiner, who was a physics teacher and he

knows about the nature of the qualitative study. The peer examiner read and coded all of the raw data for both teachers and he gave me comments on my data analysis part, interpretations and conclusions. As the main feature of the cross case analysis the general explanations and interpretations that were matched from two case teachers strengthened my findings even further (Meriam, 1998; Yin, 2003).

6.9 Validity and Reliability Issues of the Qualitative Part

Qualitative studies most commonly involve four tests to establish a quality of the data represented wholly by a logical set of statements: construct, internal, external validity, and reliability (Yin, 2003). Apart from the design or type of the study these tests are crucial, in terms of the main parts of any quantitative study such as data collection, analysis, and interpretation (Meriam, 1998).

The construct validity has been defined by Yin (2003) as "…establishing correct operational measures for the concepts…" (p.34). To do this, I used multiple sources of evidence: interviews, field notes, direct observations and video-tapes. Teacher 2 did not permit video recording in her lessons so I used a second observer in order to decrease the potential subjectivity effect. During the data collection process the second observer was well informed about the setting, the teacher and possible conclusion of the observations. During this process, I also analyzed my research question and my aim every time and I determined my topics and if I realized that some points remained unmeasured I immediately concentrated on those points during my data collection process. During the data collection process I constantly designed follow-up open ended interviews with the students in the class to cross-check and validate my data from the observations.

Internal validity is usually derived from the data analysis part of the study (Yin, 2003). I triangulated the data from the interviews, observations and field notes. The data collected from two case teachers were triangulated by various perspectives like other teachers, students and the teachers themselves. The transcripts of interviews and field notes were returned to the participants for further revisions and confirmation. Moreover I wrote possible findings and

interpretations from my observations and field notes and shared them with the participants. They also suggested some revisions and prevented me over-interpreting. The participants signed the raw data and initial findings report in order for them to be used in my thesis with proper changes. The data and results of the study were also analyzed by one peer examiner to ensure correct true interpretations. The observations for both teachers took place during the entire fall semester. For Teacher 1, the observations were also carried out through the first half of the spring semester. These long term observations increased the internal validity of the findings. In all parts of the data collection and data analysis I took into account the theoretical base of this study and I tried to clarify my assumptions in order to increase the internal validity.

External validity is the factor that would affect the credibility of the study and it is mostly related to the generalizability of the findings to the theory (Meriam, 1998; Yin, 2003). Since I applied a multi-case design I tried to select the two teachers that would exhibit comparable and contrasting effective teachers' characteristics. Moreover, the case teachers were selected after thorough quantitative work to represent the physics teachers possessing effective teacher characteristics that affect students' motivation both negatively and positively. The replication strategy was used to compare the results from the first teacher with the results from the second one. The theoretical base of this study was also tested with the replicated findings.

The reliability in case studies is mostly related to whether or not another researcher doing the same case study with the same procedures, without replicating, would reach the same conclusions (Yin, 2003). In order to increase the reliability of this case study I did not write a case study protocol report as suggested by Yin (2003) but I attempted to make all the processes, procedures and steps of the qualitative part of my thesis as clear as possible for further researchers. The translations of the Turkish texts have been examined by two English teachers, one of whom is British, to test the reliability of my translations. All sorts of triangulation methods that I have used to control the internal validity will also strengthen the reliability of this thesis.

6.10 Researcher's Role and Potential Ethical Issues

Gaining entry to a research site, personal interests about the research topic, identification of biases and values and ethical issues are the elements of the researchers' role (Creswell, 2003). As a physics teacher, I am aware of the problems faced with in physics teaching and the learning process. I am acquainted with the reactions, perceptions and feelings of the students related to teachers' characteristics. Furthermore, through interviews, observations, and research journals, I hope to enrich my knowledge about effective physics teacher characteristics and the effects of teachers' characteristics on students' achievement and motivation. This study will enhance my experience related to physics teaching and the learning process, teachers' professional development, preparation for teaching physics, and how to gauge a student's level of reflective thinking. The study will also influence and inform my own teaching practice for future courses in physics, and hopefully inform physics teachers in Turkey.

There is not a strict strategy to get permission to gain access to the research field (Bogdan & Biklen, 1998). For this study, to apply the questionnaire, to interview with students and teachers and to observe the class sessions in all public schools in the sample of the study, it was absolutely necessary to get permission from the Ministry of National Education. The Research Planning and Coordinating Committee of the Ministry of National Education reviews proposals, instruments, and checks that the proposed research includes proper informed consent and ensures the safety of the students and teachers involved. They inform the researchers about any possible difficulties and risks that the researchers could face within the research site. To apply the questionnaire and the study, a legal permission paper signed by the Minister of National Education was given. For this part of the study, the school principals and teachers in Ankara were informed directly by the researcher. In my past experience, all of the school principals and teachers tried to help as much as they could.

At every stage of the data collection, the researcher was honest with the participants. The study was not disruptive since the design of the study was carried out in regular class hours. The researcher did not change the class hour or

routine curriculum. There was no control or experimental groups and no excessive demands or requirements. The interviews were carried out when teachers and students were off. I did not ask them any questions that would discourage them from answering. During the observations I stayed passive and I did not interact with any part of the class discussions or activities. The participants were informed about what the findings would be used for. The selection of the sample procedure was explained to the participants in case they wondered why they had been chosen. I indicated to them that I would give a brief report related to the results of the study on account of the fact that school principals or physics teachers would wonder about the results at the end of the study.

Subjects enter research projects voluntarily, understanding the nature of the study and the dangers and obligations that are involved. Subjects are not exposed to risks that are greater than gains they might derive. In terms of ethical issues, the researcher should be aware of the participants, mainly teachers and especially students enter the research project voluntarily. Moreover, participants should understand the nature of the study. The names of the students and teachers should be kept secret and the names should not be mentioned in any part of the study without they were informed. Furthermore, ensuring the participant has sufficient time might be another ethical concern. The researcher should observe more than one class period and if the number of observation increased the students' reflections might be more reliable. Especially observation of the same teachers in any school may not be too easy because of very busy schedules of those teachers and this limits observation.

6.11 Strengths and Limitations of the Study

The qualitative part of this thesis differed from the other qualitative studies in terms of selecting the case teachers. Selecting the case teachers in this case study was not carried out with a convenience sampling. The case teachers represented the physics teachers who possessed effective physics teacher characteristics. This feature of my qualitative analysis strengthened the quality of the qualitative data as well as the external validity of the study.

The observations and interviews were spread through two semester of educational year. I had the chance to observe both case teachers more than ten times. The long term data collection process provided me with detailed data in terms of my aim. I tried to cover whole resources in and outside of Turkey within a two year period to construct a well structured theoretical framework for the qualitative part of this study. The theoretical base of this study would guide me to concentrate on what to look for during the data collection and data analysis. Moreover, the strength of the qualitative part of this thesis was that I triangulated the data with multiple sources of evidence. I also wrote a draft report related to the findings from interviews and observations and I let the participants read it. They accepted and signed what I had reached as a conclusion after the data collection process. The case study protocol would also help the researchers relate with the same field in further researches.

There were some limitations related to the qualitative part of this thesis. The participants were limited to the two physics teachers and seven of their students in two public high schools in Ankara during the fall and mid spring semesters, 2007. One of the limitations in my data presentation was that the translations of Turkish texts of the field notes and interviews were limited to my translations. The English teachers that helped me in the proof reading process also worked on the translations to minimize possible translation mistakes. On the other hand, the main limitation occurred from the data analysis part. The data collected from all sources of evidence were coded by a single coder. I required some experience as a researcher in this field, since this was my first attempt to carry out a case study. However I consulted my peer examiner and my doctoral supervisor and committee in every part of the data collection and data analysis. I shared my opinions and research methodologies with them and I desired to learn the features of qualitative study and I tried to find the reference books that they suggested. The eleven years of my experience in physics teaching strengthened me in dealing with the classroom activities, contacting the teachers and the principals, and being a part of the classroom actions during the data collection.

CHAPTER 7

FINDINGS, RESULTS AND DISCUSSIONS

The qualitative data collected from the two case teachers were analyzed with qualitative analytic techniques. There were eight predefined categories with the 38 characteristics of physics teachers. However, the initial analysis of the categories and the codes of the qualitative part of this thesis, see Section 6.8, decreased the number of categories to 7 and the number of effective teacher characteristics to 28. The codes listed in Table 6.4 and Table 6.5 were used to analyze the entire field notes and video recordings from the observations and interviews. The peer examiner also used the same coding list to label the data.

The in-class interactions between students and teachers were determined mostly from the in-class observations. Therefore the data gathered from the observations were the main concern for the analysis of the study. The interview data with Teacher 1, Teacher 2 and five students of Teacher 1 (ST1), and two students of Teacher 2 (ST2) were used to support the results from the observations. Within each category, I have firstly discussed the interview findings. Secondly I stated the observation results derived from the category. Finally I have discussed the theoretical framework related to the characteristics in the category. The analysis within categories was carried out for each of the effective physics teacher characteristics. A summary of the results was used to conclude the interaction between effective physics teacher characteristics and students' motivation for Teacher 1 and Teacher 2 respectively. Finally, as in the nature of the cross case analysis, all the results of both teachers were compared and contrasted. All of the processes of the data analysis are given in Figure 7.1.

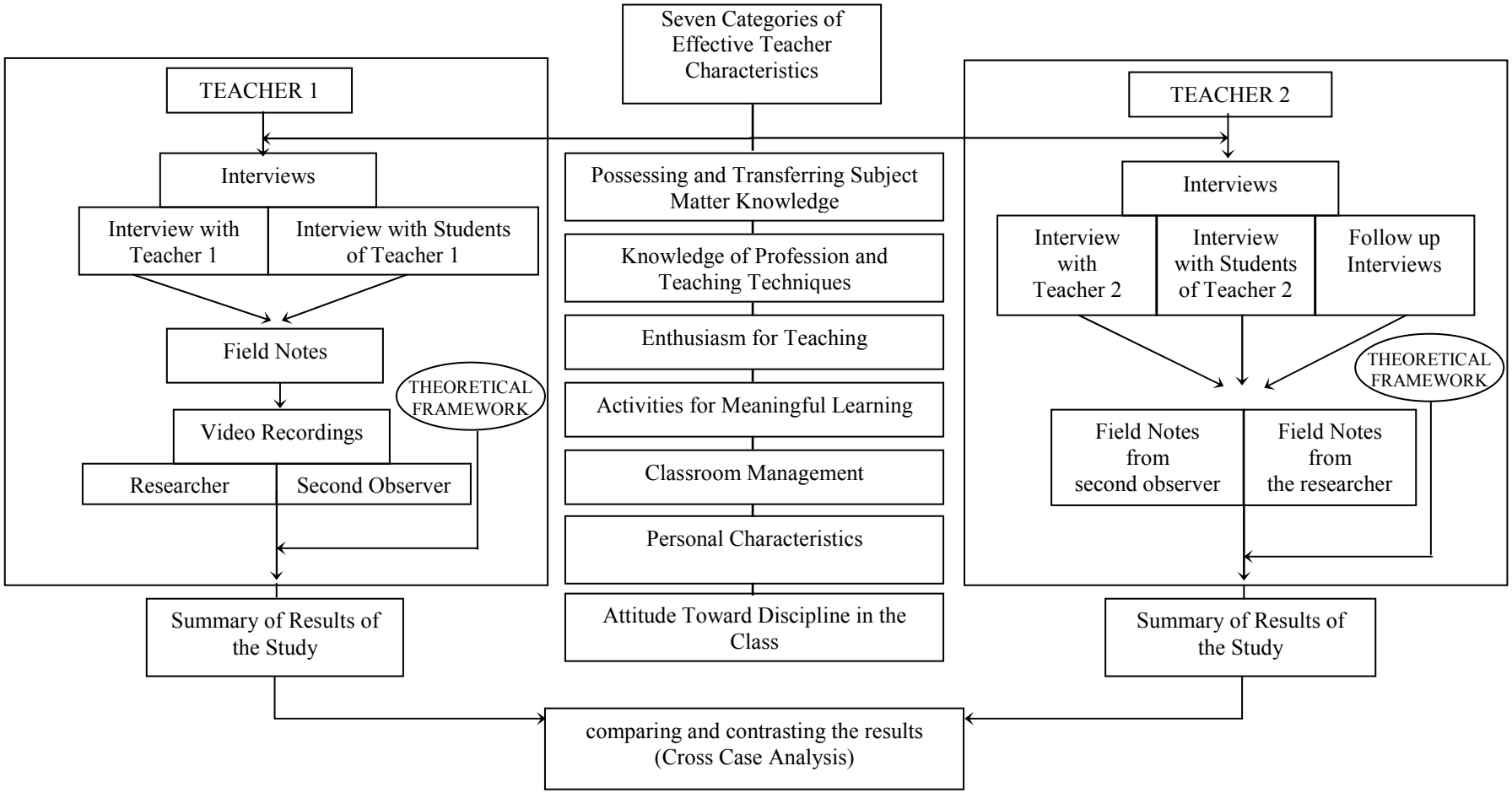


Figure 7.1 The process of the data analysis

All of the raw data given in Appendix T were analyzed for both Teacher 1 and Teacher 2. The passages in the raw data were carefully identified and they were labeled with their respective specific codes for each of the category. The field notes and transcribed part of the video recordings were coded and the frequencies of codes with respect to the categories are given in Table 7.1 and Table 7.2 for Teacher 1 and Teacher 2, respectively. The same coding process was also carried out by the peer examiner. The number of each of the occurrences in the raw data labeled by me and the peer examiner was almost the same. Furthermore, the total of the occurrences for each code and the category overall total were almost the same. Therefore, during the qualitative data analysis, I concluded to use my own scores in the 'total' and 'category total' columns in Table 7.1 and Table 7.2.

During the analysis the main concern was to conclude the interaction of effective physics teacher characteristics on students' motivation. As was stated in Section 6.5, Teacher 1 was selected since she applied most of the positive effective teacher characteristics and Teacher 2 was selected since she applied most of the negative characteristics. Therefore, coding the raw data was a challenging process in such that one of the characteristics or behaviors displayed by Teacher 1, could be oppositely displayed by Teacher 2. In such cases it was very difficult to handle new codes so instead the number of occurrence for the same code was written with a '-' sign representing that the characteristics or the action had been displayed negatively. For example, the code TOD represents 'giving the lecture with appropriate details' with four occurrences in the 10^{th} week of observation of Teacher 1, see in Table 7.1. The same code had '1-' occurrences, meanly Teacher 1 did not give the lecture with appropriate details for once in the same week. This is not the situation for all of the codes, but for some of them it is the case. The total of the number of codes and the category total are written separately for the positive and negative codes in Table 7.1 and Table 7.2. They were not added in order to make the interpretations of the results meaningful, since sometimes Teacher 1 exhibited a characteristic represented by a negative code or Teacher 2 exhibited a characteristic represented by a positive code.

Table 7.1 Frequency of the characteristics, behaviors and actions in the lesson of Teacher 1

Category	Characteristics/behavior/ action	code	Observation Weeks (1 hour for the first and second weeks, 2 hours for the others)												Cat. Total
			1	2	3	4	5	6	7	8	9	10	11	Total	
Possessing and Transferring the Subject Matter Knowledge	Implementing the curriculum efficiently	TIC							3	3	2		1	9	85 1-
	providing study skills	TSS				2	1						3	6	
	avoiding confusing students' minds	TMS	3	1	8	1		1	3				1	18	
	giving the lecture with appropriate details	TOD							4	5	7	4 1-*	1	21 1-	
	links between mathematics and physics	TMP	2		6					3	1			12	
	answering questions easily	TRQ				2						1	1	4	
	difficulty in answering questions	TDA												0	
	willingness to search to improve herself	TWIS	2	1			1							4	
	fluent presentation without hesitating	TFP			2	2	1		2	1	1	1	1	11	
	depending on notes too much	TDN												0	
Knowledge of Profession and Teaching Techniques	repeating the subjects in a different way	TRS		1		2								3	82
	repeating the previous lesson	TRP	1	1	2	1	1		1	2	2	1		12	
	identifying learning difficulty	TILT	1		2	5	1		3	1	2	1		16	
	explaining with new examples	TES			2	3	1			1	1	2		10	
	providing problem solving strategies	TPSS				2					5	2	2	11	
	providing help	TPH	2		4	1		3				2	4	16	
	providing feedback	TPF		1	2		1		1	1	3	1		10	
	asking understandable questions	TEQ												0	
	exam questions reflected covered content	TEC												0	
	minimizing the number of multiple choice tests	TMC												0	
	administering multiple choice test	TAMC				1	1	1				1		4	

Table 7.1 (continued)

Category	Characteristics/behavior/ action	code	Observation Weeks (1 hour for the first and second weeks, 2 hours for the others)												Cat. Total
			1	2	3	4	5	6	7	8	9	10	11	Total	
Enthusiasm for Teaching	honestly confessing not to know	THC					1							1	65
	improving students' thinking skills	TSTS			2	3	2		1		1			9	
	gaining students' attention	TAT	1		5	1	1	1					1	10	
	adjusting the content to students' level	TAC						1	1		1	1	1	5	
	using statements giving recognition and credit	TUSR			3	3	1		1	2		2		12	
	encouraging students to ask how?, why?	TESQ	1											1	
	encouraging students to research	TESE						1			2			3	
	enthusiastic about teaching	TET	1	1	1	2	1	2	1	1	1	2		13	
	being on time for the lesson	TBTL		1	2	1	1	1	1	1	1	1	1	11	
	teaching reluctantly	TTR												0	
Activities for Meaningful Learning	introducing some equipment related to the concepts	TCEC												0	116
	links between prior and new knowledge	TPPN	2	1	6	1				1	1	1	2	15	
	links between real life and concepts	TRC		5	4	3			1	1	4	1		19	
	providing scientific truths (overcoming misconceptions)	TPST	1		1	3			2	1	8	2		18	
	encouraging students to participate	TEP	4	3	6	6	7		5	9	8	7	8	63	
	encouraging students to ask questions without humiliation	TEH			1									1	

Table 7.1 (continued)

Category	Characteristics/behavior/ action	code	Observation Weeks (1 hour for the first and second weeks, 2 hours for the others)												Cat. Total
			1	2	3	4	5	6	7	8	9	10	11	Total	
Classroom Management	providing continuous communication	TPCC			2	1	1				1	1	3	9	38
	well structured activities/role plays	TAR			3	4			1	3				11	
	avoiding activities too hard/too easy	TAA												0	
	the daily goals and objectives	TGO												0	
	intended and expected learning outcomes	TIEL			1									1	
	sustaining curiosity	TSC		1		1				3				5	
	adjusting the tone of voice	TTV			1	1	2		3	3	2			12	
	allowing mostly the same students to participate	TSSP												0	
	spending too much time on management problems	TSMP												0	
	using time efficiently	TUTE												0	
Personal Characteristics	considering his/her own personal problems	TCD												0	0
	having fed up and tired behavior	TTB												0	
	allowing boring work	TBW												0	
	being hard-hearted, intolerant and tedious	TTFI												0	

Table 7.1 (continued)

Category	Characteristics/behavior/ action	code	Observation Weeks (1 hour for the first and second weeks, 2 hours for the others)												Cat. Total
			1	2	3	4	5	6	7	8	9	10	11	Total	
Attitude Toward Discipline in the Class	humiliating students	TNC												0	23
	shouting at students	TS												0	
	getting angry	TGA												0	
	hitting	THIT												0	
	warning the students	TWS			3	2	2		3	3	3	4	2	22	
	giving punishment to whole class because of a fault of only one student	TGP												0	
	offering a mark	TOM					1							1	

* (-) denotes that the teacher applied the corresponding characteristics, behavior or action negatively.

Table 7.2 Frequency of the characteristics, behaviors and actions in the lesson of Teacher 2

Category	Characteristics/behavior/ action	Code	Observation Weeks (1 hour for the 1st, 3rd, and 5th weeks, 2 hours for the others)										Total	Cat. Total
			1	2	3	4	5	6	7	8	9	10		
Possessing and Transferring the Subject Matter Knowledge	Implementing the curriculum efficiently	TIC					1			1		2	4	36 7-
												1-*	1-	
	providing study skills	TSS		1				1		2		1	5	
	avoiding confusing students' minds	TMS							1			1	2	
	giving the lecture with appropriate details	TOD	1	2			1						4	
										1-		3-	4-	
	links between mathematics and physics	TMP		2			2						4	
				1-						1-			2-	
	answering questions easily	TRQ			1	1			1				3	
	difficulty in answering questions	TDA	2	2									4	
	willingness to search to improve herself	TWIS											0	
	fluent presentation without hesitating	TFP			1		1						2	
	depending on notes too much	TDN		1			1	3		3			8	
Knowledge of Profession and Teaching Techniques	repeating the subjects in a different way	TRS	2						1			1	4	50 1-
	repeating the previous lesson	TRP									1		1	
	identifying learning difficulty	TILT			2	1				2	1		7	
	explaining with new examples	TES		1	2				1	1	1		6	
	providing problem solving strategies	TPSS									1		1	
												1-	1-	
	providing help	TPH	1	1	2	2		1					7	
	providing feedback	TPF	4	3	2	1		4		3	1	1	19	
	asking understandable questions	TEQ				1							1	
	exam questions reflected covered content	TEC											0	
	minimizing the number of multiple choice tests	TMC											0	
	administering multiple choice test	TAMC		1	2					1			4	

Table 7.2 (continued)

Category	Characteristics/behavior/ action	Code	Observation Weeks (1 hour for the 1st, 3rd, and 5th weeks, 2 hours for the others)										Total	Cat. Total
			1	2	3	4	5	6	7	8	9	10		
Enthusiasm for Teaching	honestly confessing not to know	THC		1									1	18 9-
	improving students' thinking skills	TSTS											0	
	gaining students' attention	TAT					2					1	3	
	adjusting the content to students' level	TAC								1-	1-		2-	
	using statements giving recognition and credit	TUSR				1			1				2	
	encouraging students to ask how?, why?	TESQ									1		1	
	encouraging students to research	TESE				1							1	
	enthusiastic about teaching	TET											0	
	being on time for the lesson	TBTL		2-	1-	1-		1 1-		1-		1-	3 7-	
	teaching reluctantly	TTR		3	1		1	1	1				7	
Activities for Meaningful Learning	introducing some equipment related to the concepts	TCEC			1								1	43 3-
	links between prior and new knowledge	TPPN					3		1	1	1		6	
	links between real life and concepts	TRC								3	5	1 2-	9 2-	
	providing scientific truths (overcoming misconceptions)	TPST		1						1	1-		3 1-	
	encouraging students to participate	TEP	1	3	2	3	3	4	4	1	1		22	
	encouraging students to ask questions without humiliation	TEH			1				1				2	

Table 7.2 (continued)

Category	Characteristics/behavior/ action	Code	Observation Weeks (1 hour for the 1st, 3rd, and 5th weeks, 2 hours for the others)										Total	Cat. Total
			1	2	3	4	5	6	7	8	9	10		
Classroom Management	providing continuous communication	TPCC	1			1	1						3	12 1-
	well structured activities/role plays	TAR											0	
	avoiding activities too hard/too easy	TAA							1				1	
	the daily goals and objectives	TGO											0	
	intended and expected learning outcomes	TIEL							1-				1-	
	sustaining curiosity	TSC	1			1							2	
	adjusting the tone of voice	TTV	1										1	
	allowing mostly the same students to participate	TSSP											0	
	spending too much time on management problems	TSMP		1				1	1	1			4	
	using time efficiently	TUTE	1										1	
Personal Characteristics	considering his/her own personal problems	TCD				1			2		1		4	9
	having fed up and tired behavior	TTB				1		1			1		3	
	allowing boring work	TBW									1		1	
	being hard-hearted, intolerant and tedious	TTFI								1			1	

Table 7.2 (continued)

Category	Characteristics/behavior/ action	Code	Observation Weeks (1 hour for the 1st, 3rd, and 5th weeks, 2 hours for the others)										Total	Cat. Total
			1	2	3	4	5	6	7	8	9	10		
Attitude Toward Discipline in the Class	humiliating students	TNC	1	3	1	1			2	1	1	2	12	45
	shouting at students	TS		1	2	2	5			1	1		12	
	getting angry	TGA			1			1			1	1	4	
	hitting	THIT										1	1	
	warning the students	TWS	2		1	1	1	1	5	2	2	1	16	
	giving punishment to whole class because of a fault of only one student	TGP											0	
	offering a mark	TOM					0						0	

* (-) denotes that the teacher applied the corresponding characteristics, behavior or action negatively.

Table 7.1 and Table 7.2 demonstrate the number of the codes for each of the characteristics with respect to each observation week. As I indicated in Section 6.7, Teacher 1 and Teacher 2 were observed by 11 weeks and 10 weeks, respectively. For Teacher 2, the observations in the 8th and 9th weeks were carried out by two observers one of whom was the researcher and the other one was the second observer. For Teacher 1, the observations were carried out for one hour for the first and second weeks; and first, third and fifth weeks for Teacher 2. For the other weeks the observations were carried out for two hours.

Table 7.1 demonstrates that the most frequently occurring code, 63 times, for Teacher 1 was 'encouraging students to participate' (TEP). In this table, codes for which no score had been achieved at the end of the 11 week observation cycle have been left blank. On the other hand, Table 7.2 shows that the most frequently occurring code, 22 times, for Teacher 2 was also 'encouraging students to participate' (TEP). The frequency scores in Table 7.2 included more "0" scores because I did not observe the characteristics related to these codes during my observations, despite the fact that I carried out as many observations with Teacher 2 as with Teacher 1. I concluded that whether the teacher applied most of the positive characteristics, Teacher 1, or she applied most of the negative characteristics, Teacher 2, they encourage students to participate. However, Teacher 1 displayed this characteristic much more frequently than Teacher 2.

Table 7.1 indicates that the codes TDA, TDN, TEQ, TEC, TMC, TTR, TCEC, TAA, TGO, TSSP, TSMP, TUTE, TCD, TTB, TBW, TTFI, TNC, TS, TGA, THIT, and TGP had zero occurrences for Teacher 1. These codes mostly covered the negative effective physics teacher characteristics. Table 7.2 indicates that TWIS, TEC, TMC, TSTS, TET, TAR, TGO, TSSP, TGP, and TOM had zero occurrences. These codes mostly covered the positive characteristics. The number of observed codes for Teacher 2 was more than Teacher 1, since Teacher 2 displayed some of the positive characteristics, but Teacher 1 did not display any of the negative characteristics during the observation period. The detailed analysis of the codes and the representing characteristics are given in the following sections.

In the class of a physics teacher possessing mostly the positive effective teacher characteristics Table 7.1 indicates that for such a teacher being an effective teacher is one for whom the use of activities for meaningful learning carried importance. This was the most frequently observed category with 116 occurrences. At the same time, the possession of positive effective teacher characteristics does not seem to be affected by personal characteristics since the frequency for this category was zero.

In the class of a physics teacher possessing mostly the negative effective teacher characteristics Table 7.2 indicates that for such a teacher being an effective teacher is one for whom the knowledge of profession and teaching techniques is of most importance. This was the most frequently observed category with 50 occurrences. Teacher 2 displayed also the characteristics related to the 'attitudes toward discipline in the class', with 45 occurrences. This category included mostly the negative characteristics. These results were also proof of my teacher selection in that I choose Teacher 2 to observe the interaction between most of the negative characteristics she displayed and students' motivation. At the same time, the possession of mostly negative effective teacher characteristics does not seem to be affected by 'personal characteristics' since the score of occurrences for this category was 9.

The analysis of each category and the results with respect to the effective physics teacher characteristics belongs to that category has been analyzed under separate titles. Within the analysis, especially in the excerpts from the interviews, the students' names were replaced with numbers, to keep their identities secret. For example, S1-1 denotes the first student of Teacher 1 and S2-1 denotes the first student of Teacher 2. The names in the raw data were coded with respect to these numbers. The process was handled with care by concerning that the name of a student was changed with the same number for each time. The interviews were carried out with five students of Teacher 1 (ST1) who were S1-1, S1-2, S1-3, S1-4 and S1-5; and two students of Teacher 2 (ST2) who were S2-1 and S2-2.

7.1 Possessing and Transferring the Subject Matter Knowledge

This category included five effective physics teacher characteristics which were ‘possessing necessary knowledge of subject matter’, ‘giving the lecture with appropriate details’, ‘possessing necessary mathematical and geometrical background related to physics’, ‘answering students’ questions related to physics easily’, and ‘coming to the lesson prepared’. I have given, in the remainder of this section, the findings from each case teacher individually at first, and then a cross-case analysis has been presented.

7.1.1 Interactions between the Students’ Motivation and the Characteristics of Teacher 1 in Category 1

The total frequencies for the most frequently occurring codes for each of these characteristics were added up for Teacher 1 in this category and these are presented in Table 7.3.

Table 7.3 The frequency of the observed codes for the characteristics in Category 1 for Teacher 1

Effective Teacher Characteristics	Code(s)	Freq.	Total Freq.
Possessing necessary knowledge of subject matter	TIC	9	9
Giving the lecture with appropriate details	TSS	6	
	TMS	18	45
	TOD	21 (1-)	(1-)
Possessing necessary mathematical and geometrical background related to physics	TMP	12	12
Answering students’ questions related to physics easily	TRQ	4	4
	TDA	0	
Coming to the lesson prepared	TWIS	4	
	TFP	11	15
	TDN	0	

At the beginning of the analysis I wanted to emphasize that the first characteristic ‘possessing necessary knowledge of subject matter’ was a general characteristic that was not only related to the code ‘implementing the curriculum

carefully' (TIC) but was also a general characteristic in that its effect was derived from the other observed characteristics. This characteristic was not often observed, with 9 occurrences, but a conclusion could be reached regarding it through the analysis of the other characteristics in the category. Within this category, as presented in Table 7.3, the most frequently observed characteristic for Teacher 1, with 45 occurrences, was 'giving the lecture with appropriate details'. The next most frequent characteristic was 'coming to the lesson prepared' with 15 occurrences and the next one 'possessing necessary mathematical and geometrical background', with 12 occurrences. The least frequently observed characteristics in this category was 'answering students' questions related to physics easily' with four occurrences. Due to the fact that there was a noticeable difference between the frequencies of the characteristics I observed, I have based my analysis mainly on the characteristics that I most frequently observed, which are "giving the lecture with appropriate details", "possessing necessary mathematical and geometrical background related to physics" and "coming to the lesson prepared".

According to the quantitative part of this study the most effective physics teacher characteristics, as perceived by both teachers and students (see Section 4.1), was 'answering students' questions related to physics easily'. As a result, I expected to observe the interaction between this characteristic and the students' motivation. However, I only witnessed four occurrences of the students' willingness to ask questions (SWA) throughout the entire 11 weeks. When the students did not ask as many questions as would allow the teacher to present the possession (or lack thereof) of this particular characteristic, the teacher did not have anything to answer. The following excerpt from the interviews with ST1 indicates that the students' did not feel the need to ask questions and they expected the cause and effect and the consequences of a physical event to be explained by their teacher since they considered that Teacher 1 would explain everything and so they did not need to ask.

> …R: How and why is your motivation affected when your teacher prepares a base for you to be able to ask questions?
> S1-4: She prepares it.
> R: So why don't you ask?
> S1-4: We do but not much.
> R: I can't understand if you are motivated or not because of this.
> S1-2: Maybe at that moment we think we understand.

> S1-3: We understand at the time but then we go home and when I can't solve a question I realize that in fact I haven't fully understood.
> R: In that case why don't you ask as soon as the lesson begins?
> S1-4: We don't do that but when our teacher is free we go and ask her if we have anything we don't understand. Actually it's to do with the teacher. She always explains so actively and well that this makes us passive in the lesson as we think that the teacher will ask us questions anyway…(p.24)

In the interview with Teacher 1, she confirmed both my observations in the classroom and the students' comments by complaining that the students were not willing to ask questions. She stated that she repeated the concepts more than twice. She complained about the number of student in the class and she said she stopped repeating when students said "OK, it is clear" or "…we understand…" The following passage taken from the interview with Teacher 1 explains the situation.

> …R: "How is the motivation of a student affected when you repeat a subject that has been shown by the students' questions not to have been understood?"
> Teacher 1: "It increases of course. However, this class is very crowded. If they ask me once then I explain again…. When the student says "OK Miss" or "I understand Miss" then I go on with the lesson. If that student or another student or the whole class ask me again then I explain again"…(p.5)

Teacher 1 thought that the in-class interaction between students and their class mates sometimes prevented the students from asking questions. The following excerpt from answer of Teacher 1 to the same questions explains this situation.

> …The environment in the classroom sometimes prevents students asking questions. For example questions like "Are you that clever?" Or "Haven't you got it yet?" from their classmates prevent these students from asking me questions. Regarding this they behave very cruelly to each other. But I tell them that I can spend longer on the answer to a problem. I say that I can offer every opportunity for them to understand…(p.5)

During my observations I observed that Teacher 1 behaved as she had stated. The following excerpt from my field notes explains the situation.

> …A student in the front row asked what $\vec{M}_1 + \vec{M}_2 = \vec{M}_T$ meant. The teacher immediately repeated the information. To find out which points the student asking had understood she asked a few questions. Then she explained again.
> Student said: "I understand Miss"
> The teacher looked at her lesson notes for a short time and then carried on explaining…(pp.61-62)

The students did not ask any questions out of subject or more complex than Teacher 1 was able to answer during my observations. They usually asked

questions related to what she had explained or what they had not understood during the problem solving. Teacher 1 did not have any difficulty in answering these questions. She repeated the concepts with a different perspective. If the students asked questions related to the solution of a problem she suggested a new method to solve the problem or she repeated the solution by simplifying the interpretations.

> …S1-10: "Why did we put the resultant force upwards?" he asked.
> Teacher 1: "What do you think?" she asked. Upon seeing that the student was quiet she smiled and said looking at the student.
> Teacher 1: "OK. Now there must be a force which opposes all the forces pointing downwards and this force must be facing in the opposite direction"
> Student says: "OK. I've got it."…(p.62)

The self determination theory implies that encouraging students to ask questions increases students' motivation. When the teacher listens and responds to the students' questions, their motivation increases since their willingness to share ideas and views increases. According to this theory, when a teacher immediately answers the questions of the students they become motivated to learn. However, Teacher 2 complained that the interactions among students caused them to stay passive and even if she tried to create an encouraging medium for the students to ask, they did not pose questions, and therefore did not encourage the teacher by asking her questions. In the light of the above discussions, it is possible to argue that the interaction between this characteristic and students' motivation depended on some external factors like students being humiliated by their classmates in the crowded classes.

In contrast to the characteristic analyzed above, the most frequently observed effective teacher characteristic for this category was 'giving the lecture with appropriate details'. At first, it seemed quite challenging to determine which details are appropriate and which are not. In particular, the students' levels and needs become important at this point. The following excerpts taken from the interviews with ST1 and Teacher 1 illustrate this situation.

> …R: "How is your motivation affected when the teacher gives the subject matter with appropriate details?"
> S1-1: "It is affected positively. She should give as much as we can understand. Too many details confuse us and our motivation decreases".
> S1-2: "If we relate with the details too much then we move far away from the subject. She shouldn't give too many details"…(p.22)

> …R: "How is the students' motivation affected when you give the subject matter with appropriate details?"
> Teacher 1: "…I give as much as students' could understand. If I teach too detailed knowledge to them, I mean if I covered the concepts inappropriate to their level then their interest to the lesson decreased and they could not learn."…(p.2)

The ST1 thought that there should not be too many details in the physics lesson. Teacher 1 emphasized that lecturing with appropriate details was the main part of subject matter knowledge. Teacher 1 stated that she gave the appropriate details as much as students understood. She indicated that she avoided giving the moment of inertia concept in the 10^{th} grade. Teacher 1 thought that the students' grade levels were important in terms of adjusting the appropriate details, so she said she took the students' interest and their levels into consideration and students became more interested in the subject. Teacher 1 also explained this situation within the answer of another interview question.

> …R: "I've noticed during my observations that you prepare a base to enable the students to ask you questions. How do you think this method affects the students' motivation?"
> Teacher 1: "….Well, I don't really like giving a lot of details. When I teach I try to do it without going into too many details. They don't need details that are not appropriate to their level …when I go into too much detail the students get bogged down in it and move away from the topic. This affects their motivation negatively. I also don't want to give them a lot of information that they won't be able to use. I teach them what will be most useful to them. For instance, I didn't teach them moment of inertia in the equilibrium concept because it's not suitable for their level because they haven't done the subjects related to rotational energy yet"…(p.10)

Teacher 1 declared that she offered revision for the students to understand whether they had studied at home. She indicated that the revision process also helped her to understand the levels of the students. Teacher 1 also explained this situation within the answer of another interview question.

> …R: "How and why is the motivation of your students affected when you manage to keep their interest awake throughout the whole lesson? How do you do this?"
> Teacher 1: "I begin every lesson with revision of the previous lesson until I feel that the students are ready for this lesson. I usually go on with this revision for no more than 15 minutes. I don't really feel that they do much preparation at home… but at least it helps me to understand their level … I see that my students are interested when I do this revision. I let them speak. When they are interested sharing increases"… (p. 11-12)

During the analysis of the video recordings and the field notes I observed that Teacher 1 gave proper knowledge of physics by considering the students' level in physics and mathematics. She presented equations from trigonometry and geometry as a part of her lesson and she explained them appropriate to the level of

10th grade. In order to understand the students' level she implemented some revision at the beginning of lessons that I observed. She did this through the following steps:

1. She told the students to close their notebooks.
2. She asked them questions related to the main concepts of the previous lessons.
3. She tried to encourage all the students to participate in the discussions.
4. Sometimes she nominated some students whom she thought were low-motivated and tried to find out whatever they knew about the concepts.

During the revision process all of the students looked at the teacher. Most of the students tried to share their ideas. Some of the students discussed the questions in the revision with their classmates. Most of the students were putting their hands up and showed willingness to participate in the revision. The following excerpt from my field notes identifies the situation.

> …S1-13: "A point, a length of the arrow...and a direction..." said the student.
> Teacher 1: "When we say the length of the arrow this expresses magnitude", said the teacher.
> Teacher 1: "What else?", said the teacher to another student. As she asks each student she goes to within 1-1.5 meters of them. She is constantly on the move in the classroom... The student she has asked cannot answer the question. However, the other students are not talking but are raising their hands. The students are trying to participate.
> Teacher 1: "You tell me what your friend has missed" she says to one of the students who has raised his hand.
> S1-9: "Is it pointing direction, Miss?", he asks.
> Teacher 1: "Yes, to draw a vector we need a direction, size, length of the arrow and a pointing direction" she said…(p.46).

In general, all of the events occurred like this during the revision and the other revision processes included the same events. The revision process did not take too long, about 10-15 minutes. During the revision process teacher was calm and she was able to have eye contact with every student. She carried out the lessons according to the 10th grades physics curriculum determined by the Ministry of National Education. She gave the chance to the students to participate in the discussions during the revision. In other words, she tried to ascertain the students' levels of understanding and if she identified a learning difficulty she explained it. The following excerpt from my video recordings explained the situation during the revision within another day.

> …Teacher 1: "What is weight?" she asked…
> Teacher 1: "OK. What is its unit?" she asked.
> S1-1: "Gram" he said.
> Teacher 1: "Gram ?!" she looked at the students by smiling and she shook her head from side to side to indicate that it was wrong. The behavior of the teacher was as if she realized that the students knew the correct answer. She waited for a while.
> S1-1: "Excuse me miss, it is Newton" he said. The teacher nodded and she repeated the definition of the weight and its units again. All of the students were following her with their faces and they listened to her explanations intently…(p.82)

According to the observations Teacher 1 possessed subject matter knowledge and she believed that subject matter knowledge had an effect on students' motivation. She tried to keep the students' interests alive during all the lessons that I observed. There was no lack of communication between Teacher 1 and her students during my observations. The teacher was talking while she walked around the desks and the students were following her by turning their heads and trying to understand what she was explaining. The students' concentration was always on the board when she explained subjects. The following steps from an in-class activity show how Teacher 1 generally applied the process of transferring the subject matter knowledge after she had provided revision:

1. She provided the goals or objectives of the lesson.

> …Teacher 1: "…Yes, I showed you adding and subtracting processes for vectors, but I didn't show you to add more than two vectors…" she said…(p.46)

2. She wrote down the names of the concepts and explained them briefly. The students were concerned with what the teacher did and they were interested in the subject.

> …In capital letters she wrote "arrow-tail method" on the board. In relation to this method she drew 4 vectors on the board. She explained the steps to be taken in order to find the total of the vectors. All of the students were listening to the teacher intently. The students were constantly looking at the board and then the teacher as if they wanted to write down every word that came out of her mouth…(p.46)

3. When the teacher finished the explanation she asked about an appropriate detail to the students.

> …Teacher 1: "So tell me what would happen if I added these up in a different order?" she asked… (p.46)

4. In this case the teacher ascertained the level of knowledge of the students and she adjusted the level of the concept with respect to their levels.

> …During this lesson and the other lessons in which she lectured, I observed that all of the students listened to her carefully, followed her with their eyes and immediately after she had explained they took notes…(p. 46)

5. If the student answered correctly she explained a little further and she started to solve the examples. If the student could not answer then she provided help to the student or she gave a feedback or clue. For this purpose, she communicated with the students and tried to find out what were the points that were not understood clearly by the students.

6. She also provided an example to the students and this example was suitable for the students' level.

> …She asked for a student to come to the board and to add the vectors in a different order. The student added the vector in a different order but he made a mistake in drawing the direction of the vector.
> Teacher 1: "Now, the thing that you all pay attention to is this. When the vectors were changed in their place you should be careful about the magnitude and the direction of the vector..." she said and "…make the direction of this vector correct"…she emphasized. The student made it correct and sat…The teacher wrote a new example similar to the previous one… "All of you solve it in your notebooks"…she said...(p.47)

7. The students were interested in the subject and they tried to solve the examples which were directly related to the subject. There was no noise in the class.

> …Teacher 1: "Who wants to solve the question?" she asked. Almost all of the students raised their hands. The teacher nominated one student from the front desks. The student drew the vectors carefully and solved the example…(p.47)

8. Finally she revised some important points regarding the solution of the example. She never let the students confuse the concepts and gave immediate feedback.

In physics lessons, identifying the units, scientific notations, like vector notations, and mathematical interpretations such as drawing a graph are appropriate details in order to learn physics meaningfully. Units are important since the students can draw the equation from the units and they can indicate which unit is related to the concept. The scientific notations and mathematical interpretations are important, since physics is mainly based on vector and scalar notations and graphical interpretations. The findings from the field notes support the fact that Teacher 1 gave importance to identifying units during the problem solving process. She did not base her lesson completely on the details but instead

gave them as a part of physics and usually students seemed to accept every appropriate detail as part of physics. The following excerpt from my video recordings indicates that the students' interest increased when the teacher linked the appropriate details with problem solving in physics:

> …Teacher 1: "At first show all of the forces acting on the system. Then show all the forces acting on the objects individually." She makes the students draw those forces on the board. One of the students on the board did not show the arrow of one of the forces. The teacher…warned him to correct it…She carried out the same process for a different system…The drawings of the teacher were quite fine and while drawing she warned the students to draw the objects on the system properly. All of the students were interested in the subject; they all followed intently what the teacher was doing. They also took notes during her presentation... The subjects were appropriate to the 10^{th} grade physics curriculum... During her presentation the students also participated in the discussion by saying "yes…", "there is…", "yes, it applies…" from where they were sitting…The students followed the teacher without being interested in anything else…(p.84).

With respect to my field notes the following passage supports the same situations.

> …After she had got the students to write down the definitions she wrote the equations and the units related to them on the board…Actually, even as the teacher was writing the units, the majority of the class was saying them before she had even written them.…(p.77).
> …Teacher 1: "Yes, especially if the displacement is negative that means it is opposite to the direction that we choose as positive" she said. During this explanation the students paid attention to the lesson…(p.74).

The need theory states that when a teacher adjusts the details to students' levels the students' willingness to participate increases. Moreover, the theory proposes that avoiding overloading students with details increases both their attention and their interest. This theory suggests that students become self actualized when the teacher identifies the learning difficulties of the students and finds time to convey students' learning problems. I observed that the students of Teacher 1 became self actualized since Teacher 1 emphasized the details as a part of the lesson and she gave them as a natural part of the physics lesson. She repeated the previous lesson to identify their lack of knowledge and to prepare them for the new concepts. The students became engaged in learning physics throughout my observations, by participating, listening, discussing, working together and so on. It is possible, based on the above discussions, to conclude that the giving the lesson with appropriate details increase students' interest in the topics being taught, thereby increasing their motivation.

The next most frequent issue that I observed for Teacher 1 was to provide link between mathematics and physics. Teacher 1 indicated that the mathematical and geometrical knowledge was important since mathematics and geometry included some appropriate details that made physics clearer. The following excerpt from the interview with Teacher 1 illustrates her thoughts:

> …R: "How and why does knowing the mathematical and geometrical subjects that are used in physics affect the students' motivation?"
> Teacher 1: "I always say that a physics teacher should have good maths but the opposite is not the case…For example, when I was teaching motion I didn't mention derivatives although I could have, because according to the subject, the first derivative of time is velocity and the second is acceleration but I didn't mention in this class…they wouldn't have understood it anyway. I knew they wouldn't understand. Geometry, for instance, is very important. It is essential that the teacher know some of the rules. I teach simple geometric rules but I simply don't have the time…I believe that if they solved geometry in particular they would be more successful in physics lessons. There is a lot that is connected to geometry. Especially when I teach graphics, the students motivation increases because they know the knowledge will be useful for them when solving problems"…(pp.2-3)

The students considered that physics and mathematics were interrelated to each other. The following excerpt from the interview with ST1 indicates this situation.

> …R: How and why does your teacher's knowledge of the maths and geometry needed in physics affect your motivation?
> S1-4: It increases it.
> S1-3: We hadn't studied some of the maths subjects used in physics but our physics teacher explained them to us. Just as much as we needed and this interested us and really affected our learning…(p.23)

During the analysis of the video recordings I observed that Teacher 1 provided links between mathematics and physics. The links made the students aware of the concepts and they participated in the classroom discussion. The students seemed interested in the subject and they also recalled their knowledge of mathematics to identify some points in the motion concept. The following excerpt from the video recordings identifies the situation.

> …Teacher 1: "Yes, does anyone know the concept of circles?" she said.
> A large number of students raised their hands. The teacher drew a circle on the board.
> Teacher 1: "Yes, now can anyone draw a tangent to this circle?" she asked.
> More than half of the students raised their hands. The teacher chose one of those students who drew a tangent on one of the point intersecting the circle.
> Teacher 1: "Now, who can draw a chord", she asked.
> More of the students raised their hands and the teacher chose one of them who drew a chord.

> Teacher 1: "OK. Now how can I show a slope on this tangent and this chord?" she asked.
> Although not as many as before but still at least half the class raised their hands.
> One student got up and drew a line towards the X axis and said that the slope was tangent of the angle between the line segment and the X axis.
> Teacher 1: "Right, let's go back to our subject," she said. She drew a position time graph on the board which was in the shape of a parabola. She explained that the slope of a tangent drawn at any point on the parabola was the instantaneous velocity of that moment and the slope of a chord drawn between two points would give the average velocity between time intervals. The students were listening intently; every student in the class had their eyes on the teacher. The students found the links made in this explanation effective since at every point of the lesson they interacted with the teacher whether she was explaining or drawing... Nearly all of the class was following what the teacher was doing and writing and when she was explaining something they would stop writing in their notebooks and listen intently. The teacher asked if anyone had any questions so far.
> Students: "No, we don't", they said...(pp.77-78)

The analysis of the field notes supports the findings of the video recording outlined above. Teacher 1 also provided connection between mathematics and physics for concepts that were 'addition of vectors' and 'equilibrium of forces'.

> …Teacher 1: "So tell me what would happen if I added these up in a different order?" she asked.
> S1-17: "I'm not exactly sure, Miss" he replied.
> Teacher 1: "OK, does maths have a commutative property of addition?" she asked.
> S1-17: "Yes, Miss. It does", the student replied.
> Teacher 1: "What exactly is this property?", she asked.
> S1-17: "It means that even if you change place the numbers in an equation the total will stay the same", the student answered.
> Teacher 1: "Yes, and that is exactly the case here", she said…(p.46-47)
> …S1-17: "Miss, isn't that the Lami theorem?" asked a student.
> Teacher 1: "Lami theorem or rule, whichever you prefer. It's not actually a physical equation anyway; it's just a method of application. It actually comes from the Sinus theory in maths" she said and briefly explained this theory. The students were all watching what the teacher was doing at the board very carefully and those who had been writing had put down their pencils and were listening intently.
> Teacher 1: "What did we do? We have a small side opposite a small angle and a big side opposite a big angle, don't we?" she asked.
> Students: "Yes", they said. All of the students were following the lesson and were answering the questions the teacher asked.
> Teacher 1: "The same thing applies here", she said. You can use this or any other method that you choose (for the forces in equilibrium)…(p.53)

Possessing deep subject matter knowledge increases the students' attention to the concepts, they listen quietly, their intrinsic motivation increases. They are intrinsically motivated to put connections between the subjects and they are willingness to participate the discussions in the class according to the intrinsic motivation theory. Based on the above discussion, it is possible to conclude that

when teachers possess and transfer the necessary mathematical and geometrical background knowledge they are able to increase the students' concern and interest in the subject, thereby increasing students' motivation.

The other most frequent characteristic within this category for Teacher 1 was 'coming to the lesson prepared'. Teacher 1 indicated that she always came to the class prepared. She indicated that when she had prepared the lesson she did not check her notes frequently during the lesson. She complained about her teachers at high school and she stated that they had always written from their notes and had spent too much time looking at their notes. She said that she did not want to be that kind of a teacher.

> …R: "How do you prepare to the lesson?"
> Teacher 1: "…I usually prepare by looking at my books and resources before coming to the lesson. I underline any important points in my resource books and so I have revised the subject before coming to the lesson … if there are any important points I go over them separately."
> R: "How does this preparation affect your students and how do you observe this?"
> Teacher 1: "When teaching physics I always think about my physics and maths teachers from High School. I always say I don't want to be that sort of a teacher. That's why I don't look at my lesson notes too often, just when I'm about to write something down; apart from that I don't look at my notes any more…I should just have the question paper and book in my hand, I think anything else irritates the students".
> R: "Why does coming to the lesson prepared affect the students' motivation?"
> Teacher 1: "The students listen to the teacher more carefully, they make connections between what she says and the way she behaves and they want to participate in the lesson more."…(p.4)

ST1 thought that when the teacher came to the lesson prepared, it affected their motivation positively. The following passage taken from the transcript of the interview with the students of Teacher 1 shows that the students have interesting comments regarding whether the teacher is prepared or not.

> …R: "Does your teacher coming prepared to the lesson increase your motivation?"
> S1-4 "Positive"
> R: "You mean it increases your motivation?"
> S1-4:"Yes. If she comes to the lesson prepared we are more interested and we listen more carefully"…
> R: "How do you understand if she has come prepared or not? What does she do that enables you to understand that she has prepared?"
> S1-2: "We understand from the way she explains things. She makes connections between subjects and she explains them to us."
> S1-2: "She makes connections between the examples she gives and real life."
> S1-1: "She answers our questions immediately."
> S1-3: She enriches the subject with different questions"…(p.23)

I went to the school of Teacher 1 ten-fifteen minutes before the lesson. I waited in the office of Teacher 1 and I observed that she checked her notes and books before the lesson. I observed that she prepared her notes from more than two different sources. She planned the lesson on a small piece of paper and she took her notes and books to the lesson. At some points during the lesson she checked her lesson notes briefly. ST1 indicated that Teacher 1 came to the class prepared and their motivation increased as a result. Each example that they gave, showed how they can understand if the teacher is prepared. During the analysis of the video recording I observed that she did not depend on her notes too long or too frequently. The following excerpt from my transcripts of the video recordings identifies this situation.

> …The teacher is writing Newton's Law and its applications on the board. She looks at her notes for 15-20 seconds. She asks if the students have made their notes …(p.83)
> …At this point the teacher writes down a question from her own notes rather than the test she has given out. She is trying to explain the physical situation here that one of the components of the force makes the friction less or more. All of the students are trying to solve the new question. The teacher asks a student to come to the board to answer this new question…(pp.89-90)

'Coming to the lesson prepared' was important in terms of maintaining students' engagement in learning according to the need theory. The teacher provides new examples for the students and she identifies the learning difficulties of the students when she is preparing for the lesson. The teacher should be a learner; therefore he/she should look for scientific improvements and ensure that his/her knowledge is fresh. When teachers do this their students become engaged in learning and they participate in the classroom discussions and enjoy what they are being taught. I observed that the students of Teacher 1 were mostly engaged in learning physics and they always listened to the teacher quietly, they did what she asked, and they answered/tried to answer what she had asked. With respect to the discussion above, it is possible to conclude that coming to the lesson prepared increases students' engagement, participation and awareness of the topics being taught, thereby increasing their motivation.

7.1.2 Summary of Findings for Characteristics of Teacher 1 in Category 1

The characteristics ‘answering students’ questions related to physics easily’ was expected to be an effective characteristic; however its frequency was very low. This characteristic was the most effective physics teacher characteristics as perceived by teachers and students in the quantitative part of this study. During the interview ST1 considered that they expected the cause and effect relationships and the consequences of a physical event to be explained by their teacher. Therefore for Teacher 1, its effect on students’ motivation was not clearly observed since it depended on various external factors like the number of students in the class or the interactions among the students.

In terms of ‘giving the lecture with appropriate details’, ST1 and Teacher 1 thought that this affected students’ motivation positively. They considered that the appropriate details should be with respect to the levels of the students. In order to understand the students’ levels Teacher 1 provided revision. During the revision process all the students were participating in the lesson, they enjoyed what they were doing and their interest increased. The other appropriate details were handled by Teacher 1 properly as explained in Section 7.1.1. Therefore, it is possible to conclude that the appropriate details increase students’ interest in the topics being taught, thereby increasing their motivation.

Possessing mathematical and geometrical knowledge had an effect on students’ motivation as declared by both Teacher 1 and ST1. When teachers possess and transfer the necessary mathematical and geometrical background knowledge they are able to increase the students’ concern and interest in the subject, thereby increasing students’ motivation. The other most frequent characteristic was ‘coming to the lesson prepared’. Teacher 1 and ST1 indicated that when the teacher was prepared for the lesson the students’ motivation was affected positively. I observed that Teacher 1 was systematic in her explanations and she did not check her lesson notes for too long or too frequently. The students’ engagement, participation and awareness were increased and so by exhibiting this characteristic the teacher would increase the students’ motivation.

By possessing the subject matter knowledge and transferring it through the various steps defined above, Teacher 1 managed to increase the motivation of her students in relation to this subject. With respect to the discussions in Section 7.1.1, Teacher 1 possesses the necessary subject matter knowledge and she is able to increase students' interest and students become engaged in learning. Teacher 1 also applies various steps to transfer the subject matter knowledge to make the students aware of the subject. Therefore, it is possible to conclude that possessing and transferring the necessary subject matter knowledge increases students' motivation.

7.1.3 Interactions between the Students' Motivation and the Characteristics of Teacher 2 in Category 1

The total scores for the most frequently occurring codes for each of these characteristics were added up for Teacher 2 in this category and these are presented in Table 7.4.

Table 7.4 The frequency of the observed codes for the characteristics in Category 1 for Teacher 2

Effective Teacher Characteristics	Code(s)	Freq.	Total Freq.
Possessing necessary knowledge of subject matter	TIC	4 (1-)	4 (-1)
Giving the lecture with appropriate details	TSS	5	
	TMS	2	11
	TOD	4 (4-)	(4-)
Possessing necessary mathematical and geometrical background related to physics	TMP	4 (2-)	4 (2-)
Answering students' questions related to physics easily	TRQ	3	7
	TDA	4	
Coming to the lesson prepared	TWIS	0	
	TFP	2	10
	TDN	8	

Within this category as presented in Table 7.4, the most frequently observed characteristic for Teacher 2, with 11 occurrences, was 'giving the lecture with

appropriate details'. The other most frequent characteristic within this category was 'coming to the lesson prepared' with 9 occurrences. In fact, most of the 10 observed codes were for 'depending on notes too much' (TDN) which was a negative characteristic. The effect of this issue has been explained in this section. The next observed characteristics within this category was 'answering students' questions related to physics easily' with 7 occurrences. The least frequently observed characteristic within this category was 'possessing necessary mathematical and geometrical background related to physics' with four occurrences. All of the results in this category are, in fact, related to the first characteristic which was "possessing necessary knowledge of subject matter" so the result for this category would identify the effects of this characteristic.

As I mentioned earlier in the discussion of the results from Teacher 1, 'answering the students' questions related to physics easily' was the most effective teacher characteristic. Therefore, it will also be analyzed for Teacher 2. The following excerpt from the interview with Teacher 2 explains this situation.

> …R: "How is the students' motivations affected when you answer the students questions related to physics easily?"
> Teacher 2: "They believe that the teacher knows something. There were some points that I could not handle. If I can answer at that moment they were motivated. I mean positively. For example one of my students asked me "where can I use the photoelectric effect, what is its use?" I immediately explained the photocell bulbs and I saw that his interest increased, I saw that he enjoyed this. He followed the lesson intently after that"…(p.17)

Teacher 2 declared that she encouraged the students to research when there were too many questions that were interrupting the lesson or when there were questions that she had difficulty in answering.

> …R: "During my observations I observed that you prepared a medium for the students to ask questions. However, as the number of questions increases and the questions move away from the topic how do you manage to return to the topic?"
> Teacher 2: "Sometimes they ask you questions because they are trying to evaluate you. As for me, when we have gone off the topic too far and I don't know, I tell them to do some research."
> R: "How does this method affect their motivation?"
> Teacher 2: "They show interest. Sometimes they do some research and come back. Sometimes they expect the answer from me"…(p.17)

ST2 thought that if the teacher answered their questions easily they were motivated to learn. The following excerpt from the interviews with ST2 indicates the situation.

> …R: "How is your motivation affected when your teacher easily answers your questions related to physics?"
> S2-1: "This is the important point for me. I ask quite a lot of questions. Sometimes the teacher gets sick of me but when she answers these questions the lesson is more interesting for me and I am more motivated."
> S2-2: "If the teacher can answer questions easily this is an indication of her experience and mastery of the subject…I think if we were prevented from asking questions or if our questions were dealt with very superficially then I would go off the lesson"…(p.36)

Teacher 2 gave importance to the students' questions. She tried to answer them even if the questions were not directly related to the subject being covered. She did not prevent them asking and she tried to answer immediately after the students had asked. However, contrary to what she stated in the above excerpt, during my observations she did not ask the students to research for an answer to the questions even if she had difficulty in answering them. The following excerpt from my field notes presents a situation about how the teacher dealt with a student question in that particular lesson.

> …S2-21: "Do they see the Great China Wall nearer from space because there are water particles in the atmosphere?", he asked.
> Teacher 2: "Is it related to refraction, I mean is it because of this?"
> Teacher 2: "Does anyone have any idea about this?"
> The students in the class did not answer the question. The teacher waited a while and then one student answered: "Space is one and air is almost one (refracting index) so according to this it wouldn't change much", he said.
> The teacher thought about this answer for a while.
> Teacher 2: "It would seem nearer than it is", she said, without giving any further explanation.
> S2-21: "So we'd see it in the same place, wouldn't we?" he asked.
> Teacher 2: "Yes, it wouldn't change much", she said.
> The students were unable to add anything to this answer. The teacher said:
> Teacher 2: "Keep going on about this question and we can waste some more of the lesson"…(p.96)

S2-21 had asked a question which Teacher 2 tried to answer but, since she had some difficulty the students could not construct clear understandings related to the answer of that question. The supportive interviews just after this lesson provided me a chance to enhance my interpretations. The following passage from my field notes indicates the situation during the follow up interview.

> …R: "How was your motivation affected by the question of the teacher?"
> S2-21: "The teacher answered the question superficially. I am curious about some questions and sometimes I ask immediately. I think the teacher had difficulty in answering. The response that she gave did not satisfy me."… (p.98)

In another day of observation, the following excerpt from my field notes clarifies my interpretations.

> …S2-1: "Miss, how do we find the volume of objects without a fixed geometrical shape? I mean can we do it without a liquid?" he asked. The question was not related to the subject being explained but the teacher did not refuse it.
> Teacher 2: "I don't know, can we find it without liquid?" she asked me. I (the researcher) indicated that I could not and would not interfere or become involved in the lesson.
> Teacher 2: "You can't find it at your level this means", she said.
> S2-1 "OK, Miss", he said.
> The students in the class began talking amongst themselves and this continued for some time.
> Teacher 2: "Let's make some notes", she said…(p.101)

The students were not rejected and their questions were taken into consideration. Students became self determined then. However this would not provide them with a chance to learn meaningfully. Perhaps the teacher could make the students research the questions she did not know. When the teacher tried to give an answer to the questions of the students, and if the answer was false, then the students would not participate in the class discussions. The teacher should provide scientific rules and if she does not know them she should also try to research them. She should encourage the students to research instead of giving the answers directly. When the teacher did not answer the students' questions related to physics easily, their self confidence decreased and their motivation was affected negatively. Therefore, it is possible to conclude that when teachers have difficulty in answering the questions of the students related to physics easily the students' motivation decreases.

For Teacher 2 the most frequently occurring code was 'depending on notes too much' for the characteristic of 'coming to the lesson prepared'. She thought that this characteristic affected students' motivation positively. She indicated that she had experience in teaching physics. She declared that she could feel her lack of knowledge in her lesson when she was unprepared. The following passage from the interview with Teacher 2 indicates the situation:

> …R: "In your opinion, what does coming to the lessons prepared refer to? (I have observed that you usually take a book into the lesson with you. I wonder if your preparation takes the form of notes or a number of books or something else.)
> Teacher 2: "I have had a lot of experience over the years. Coming to the lesson prepared certainly has a positive effect. When I am not prepared I feel the lack of it myself. I take the level of the class as my base…I organize the level of my questions according to their levels"…

> "R: How have you observed that this preparation affects the motivation of your students?"
> Teacher 2: "If I have come well-prepared the students pay more attention, especially in the higher level classes. I also feel more self-confident. If I haven't prepared enough the lesson just feels ordinary both to me and to the students"…(p.17)

ST2 also indicated that 'coming to the lesson being prepared' affected their motivation. They thought that if the teacher looked at notes too much they understood that she was not prepared. The following passage from the interview with ST2 indicates the situation.

> …R: "How is your motivation affected by the teacher coming to the lesson well-prepared?"
> S2-2: "It is definitely affected positively. On the days when our teacher hasn't done much preparation we are less interested in the lesson."
> S2-1: "When she comes well-prepared I feel more interested in the subjects. The more well-prepared she is, the better planned the lesson is and we don't even notice how the lesson passes."
> R: "How do you understand that she is well prepared?"
> S2-1: "She clearly states the aims of the lesson... The lessons are more fluent and the examples are easier for us to understand. She doesn't have any problems solving the examples."
> S2-2: "I don't really understand, but sometimes it's just that she spends a long time looking at her notes"…(pp.36-37)

During the whole of my observations of her class, Teacher 2 did not check or review her notes before the lesson. She took a university entrance examination practice book and physics book and came to the class. During the lesson she checked her books too frequently and for too long in order to make the students write an example or a definition. While she was checking her notes, the students were talking to each other and they made a lot of noise in the class. Most of the students were seemed unconcerned. They said they were bored and sometimes they looked at the clock. Sometimes they listened carefully and followed the teacher but when she looked at her notes for too long they seemed to have lost their concentration. At times, she spent almost three minutes looking at her notes. The second observer also noticed this behavior of the teacher and wrote it down in his notes. He stated that during the time period that the teacher looked at her notes students were talking to each other and the students were interested in different things in the class rather than in the lesson. When she looked at her notes for too long the students show little, if any, interest in what the teacher was doing, and

they mostly started to talk to each other. The following passages from the field notes indicate the situation:

> …The student erased what had been done on the board and started (to solve) again. The other students in the class were talking but the teacher just looked at her notes without warning them. The student solved the problem and sat down. The student sitting in front of the teacher's desk asked the teacher something…(p.114, researcher field notes)
> …The teacher looked at her notes for a while. The students continued talking amongst themselves… (p. 125 researcher field notes)
> …However, she kept looking through her books for example questions. When she was looking for them the students in the classroom were talking amongst themselves. The students were using every possible free moment to waste the lesson. As the time she spent looking at her notes increased, so did the noise level in the classroom…(p.128, second observer field notes)

While she was solving an example she sometimes realized that there should be a table/figure in the question. After she had realized this, she drew it on the board and she continued to explain. The following excerpts from my field notes identify the events.

> …The teacher filled in the register. Then, without standing up, she began to read a question out loud. As she was reading the question, when she got to the part which said "as in the diagram" she got up and began to draw the diagram…(p.103)
> …Teacher 2: "Linear trajectory in a table" she said and began to write the question. However, there was no table on the board.
> Teacher 2: "What will give me the velocity from position time" she said and used expressions such as x-t, v-t and a-t. The teacher creates the table on the board...(p. 111)

According to the self determination theory, identifying the students learning difficulty is important in order to increase students' attention. The students are engaged in learning and they participate in the class discussions. With respect to this theory, by being prepared for the lesson teachers help the students to relax during the learning process and they help the students to develop self esteem and self confidence. When Teacher 2 came to class without adequate preparation she checked her notes too much and she wasted time, during this process students lost concentration. ST2 expected that the teacher should be prepared for the lesson and should be able to answer all of their questions. With respect to the above discussion it is possible to conclude that when teachers come to the class without adequate preparation, there will be a decrease in students' concentration and they will make a noise and be interested in something else, so there will be a decrease in the students' motivation.

The other most frequently occurring characteristic within this category for Teacher 2 was ‘giving lecture with appropriate details’. Teacher 2 gave the appropriate details related to the students’ levels. Teacher 2 stated that the concepts in 10th grade curriculum should be given to the students within a limited time. Therefore, she said she did not give too many details during the lesson. The following excerpt from the transcripts of the interview with Teacher 2 indicates this view.

> …R: “How and why is your students’ motivation affected when you give your lectures with the appropriate details?”
> Teacher 2: “Arranging the correct details is actually related to the students’ levels. We have to teach the subjects in the curriculum in some way to the students in a very short time. At the same time the students do not study at home before the lessons. After I have taught the subject I do a few University Entrance Exam type questions related to the subject...I don’t go into much detail in this class.”
> R: “How are they affected?”
> Teacher 2: “In fact when I do give appropriate details I get positive results. When I give details according to the students’ levels I see that they participate in the lesson”...(p.16)

ST2 thought that sometimes Teacher 2 went over the concepts quickly and they could not construct clear understandings. The students also could not really understand why they were taught the derivative concept early. At this point I should indicate that the derivative concept is not included in the 10th grade physics or mathematics curricula.

> …R: “How and why is your motivation affected when your teacher gives her lectures with the appropriate details?”
> S2-1: “Sometimes she goes over the subjects too quickly. We get everything mixed up and this affects our motivation negatively. As time passes we grasp some of the subjects. For example we did simple machines really quickly with the teacher only solving a couple of example problems. I hadn’t really fully understood. I tried to solve some problems from a test book at home and I saw that the teacher hadn’t even mentioned some of the simple machines. So at that moment my interest in the lesson decreases”…
> S2-2: “Before she taught us motion our teacher tried to explain a bit about derivatives to us. I didn’t really understand but that subject is actually necessary for a student. I don’t know but it seemed then as if it was just a detail because we didn’t really use it again in later lessons.”
> R: “How was your motivation when she was teaching that subject?”
> S2-1: “I found the subject interesting but difficult to understand. We didn’t even solve any problems or anything in the lesson. We didn’t really understand exactly where we would use derivatives so our motivation decreased after that”…(p.36)

Teacher 2 explained some concepts in detail and some concepts roughly. Therefore, the lesson did not provide students with an ordered amount of details.

The following excerpt from my field notes presents evidence to conclude that if she did not give appropriate details at the right place and right time the motivation of the students decreased.

> …The student draws a direct proportion graph of F (force) with respect to a (acceleration). The teacher says:
> Teacher 1: "Let's say I find Mehmet from here. If I change the variables on the axis then I find 1/Mehmet". The students don't look as if they have fully understood this explanation…
> S2-7: "Miss, S2-1 says it's a cotangent"...(p.140-141)

This was an appropriate detail at this point and it was coming from a student. Teacher 2 did not take into consideration and she interrupted the discussion. In the continuation of the event;

> …Teacher 2: "Oooo, now it'll never finish" she said and S2-7 stops talking.
> Teacher 2: "tg α = F/a=m" she says. Let's write down an example." The teacher had only taught two of Newton's three laws…(p. 140)

Teacher 2 sometimes passed over the appropriate details when giving them would have been the right time and she missed creating an opportunity for her to increase students' motivation. This was again an appropriate detail but this time the students were unable to enhance their knowledge.

In just one of my observations Teacher 2 gave an appropriate detail in a well-structured manner. She showed the students how to convert from km/h to m/s. This was an appropriate detail that most of the students would face during the problem solving. While she was explaining the students followed the teacher and most of them took notes during her presentation.

As a physics teacher she should warn the students about graphical representations. Most of the experiments in physics result in a graph and the students should know how to make graphical interpretations to learn physics meaningfully. The units are never an inappropriate detail and in every step of problem solving they should be used.

> …The table is so simple. After she wrote the question S2-3 raised his hand and he showed his willingness to solve the problem;
> Teacher 2: "S2-3 come to the board, the rest should solve on their desks." she said. The drawing of S2-3 was quite proper. However, the line of the graph did not fit the points. The variable names on the x and y axis on the graph were forgotten. The teacher did not warn him…(p.111)

Teacher 2 did not warn the student to indicate the names of the variables on the x and y planes, but her behavior did not increase or decrease the students' motivation at that moment.

According to the need theory a teacher should maintain students' engagement and she provide new examples or appropriate details while lecturing. By this way the students could construct clear understandings and their awareness decreased. In fact, Teacher 2 had many opportunities to increase the students' motivation by giving them appropriate details, especially when the students tried to participate with their own. Teacher 2 did not give the appropriate details at the right time and right place. The students of Teacher 2 could not construct clear understandings and their interest decreased. With respect to the discussion presented above, it is not possible to conclude that when teachers do not give the appropriate details at the right time and right place they decrease the students' motivation.

The other most frequently observed characteristic for Teacher 2 that should be discussed after the characteristic of appropriate details was 'possessing necessary mathematical and geometrical background related to physics'. Teacher 2 thought that the mathematical background of a physics teacher was very important. ST2 thought that mathematics was important, but it should be given appropriately rather than with all the details. Both Teacher 2 and ST2 thought that the mathematical knowledge of the teacher affected the students' motivation positively. The following excerpt from their transcription of the interviews indicates this situation.

> …R: "How is the students' motivation affected when you possess the necessary knowledge of the subject matter?"
> Teacher 2: "It definitely increases. A good physicist should also be a good mathematician in order to explain the appropriate details related to mathematics. When the students are unsuccessful the teacher should attract their attention."
> …R: "How and why is your motivation affected when the teacher possesses the necessary knowledge related to mathematics and geometry needed in physics?"
> S2-2: "It increases it. When necessary she teaches us maths and geometry. I think it is effective as long as it helps us to understand the subject."
> S2-1: "I think a good physics teacher should have a good knowledge of maths anyway. I am affected as long as we are not given so much that we get confused, my interest in the lesson increases"…(p.36)

Teacher 2 tried to provide links between mathematics and physics. However in some situations that I observed she overloaded the students with details.

> …Teacher 2: "The derivative of velocity is acceleration or the derivative of displacement is velocity" she said.
> The students do not look surprised when she talks about derivatives.
> A boy sitting at the back of the class continually says that if we want to find the relationship between concepts, "we can find it through derivatives". The teacher pointed out the situations where derivatives would be used...(p.111)

The follow-up interview made my interpretation clear. I conducted an interview with three students which focused on this situation. I wondered whether they could link the derivative with the concept of linear motion.

> …R: "When the teacher talked about derivatives you looked as if you understood. One of your friends even said you could find it through derivatives. Where did you learn the derivatives?
> S2-6 and S2-3 indicate that they don't know anything about it.
> S2-12: "In our lesson our teacher told us a bit about how to find simple derivatives.", he said.
> R: "OK, so when you are given a graph or a formula can you use a derivative to make some conclusions?"
> The students were unable to give a clear answer to this question.
> S2-12: "We might be able to use it but only if the question is not too difficult. I don't know if we have applied it fully in any of the questions", he said…(pp. 112-113)

The concept of the derivative is higher level mathematics and the students' level was not appropriate for this detail. They could not construct clear understandings and it seemed that the students' minds were confused. Furthermore, two of the students did not know anything about the derivative so they did not pay any attention to the concept that was being taught. According to Maslow's hierarchical need theory, and the intrinsic motivation theory the teachers should avoid confusing the students' minds to increase their attention and willingness to participate. Brophy (2000) also suggested that if the students did not construct clear understandings of a concept they could not concentrate on the subject, they become unconcerned and their motivation would decrease. Teachers should possess mathematical knowledge but they should adapt that knowledge with respect to the students' level, as is considered for the characteristic 'giving the lecture with appropriate details' discussed within this category. It is crucial to transfer this knowledge to the students while avoiding the details and the knowledge inappropriate to the students' levels. With respect to the above discussion, it is possible to conclude that possessing the necessary mathematical and geometrical background has an effect on students' motivation and if the

mathematical knowledge is not appropriate to the students' level the students' motivation decreases.

7.1.4 Summary of Findings for Characteristics of Teacher 2 in Category 1

The analysis of the characteristics of Teacher 2 indicates that exhibiting the positive effective teacher characteristics in opposite way, have a negative effect on students' motivation in this category. The inadequate preparation of the teacher made her look at her book and notes for too long and too frequently and this resulted in a lot of noise in the class. This caused a decrease in the students' motivation. Difficulty in explaining the students' questions related to physics decreases students' self confidence and resulted in decrease in students' motivation. Therefore, Teacher 2 did not display the characteristics of 'coming to the lesson prepared' and 'answering the students' questions related to physics', it would have a decreasing effect on students' motivation.

The students' motivation is affected positively if the appropriate details are given, as suggested by the theory. In fact, appropriate details would increase the students' motivation as I have discussed in the previous sections. Teacher 2 did not give the details appropriate to the students' level then the students' motivation was affected negatively. In this regard, Teacher 2 possessed enough mathematical knowledge, but she did not make connections between mathematics and physics appropriate to the students' level. Finally, students' motivation seemed to be affected by the constituent characteristics of the category of 'possessing and transferring the subject matter knowledge'. If teachers exhibit the characteristics in this category negatively, that is, if they lacked the characteristics within this category, the students' interest decreased, resulting in decrease in students' motivation.

7.1.5 Comparing and Contrasting the Characteristics that Teacher 1 and Teacher 2 Possess for Category 1

When we examine both teachers in terms of the characteristics of 'answering to the questions of the students easily', we can observe that it was not

a frequently occurring characteristic for them. In fact, Teacher 1 and Teacher 2 did not prevent the students from asking questions. The students in Teacher 1's class resisted asking questions due to a number of external factors such as the class being very crowded and the students being shy of each other. However, it was observed that the students of Teacher 2 asked questions some of which were difficult for the teacher to answer. If a teacher has the characteristic 'answering students' questions related to physics easily' then this doesn't mean that the students will always be asking questions. For Teacher 2, the students asked questions on a number of occasions but did not get satisfactory answers. This resulted in a decrease in their motivation. Despite the fact that Teacher 2 stated that in such circumstances she would tell them to go and conduct research on what has been asked, I never observed her applying this strategy. As a result, this characteristic has an effect on the students' motivation and it can be concluded that if the teacher cannot answer the students' questions easily or guide them in appropriate directions to find the answers to such questions then their motivation is likely to decrease.

Teacher 1 prepared her lessons from different sources and books and took the notes she had prepared from these into the class with her. Teacher 2 also took resources with her but I had not observed her doing any preparation from these before the lesson. This obviously does not necessarily mean that since Teacher 2 did not prepare at school or in my presence that she did not prepare at all. However, in her lessons Teacher 2 spent a lot of time looking at her notes which resulted in the students' interest lessening and a lot of speaking and noise in the classroom. In contrast, Teacher 1 helped the students develop self-confidence and encouraged them to solve problems by preparing lessons containing examples that enriched the subject. In the light of this it can be said that Teacher 1 appeared to increase her students' motivation by coming to the lessons well-prepared, whereas Teacher 2 seemed to have decreased her students' motivation by looking at her notes too long, a sign that could be perceived as her not having prepared well for the lessons.

One of the most often observed characteristics for both Teacher 1 and Teacher 2 was 'giving the lecture with appropriate details'. Teacher 1 attracted the

students' attention by especially paying attention to drawing graphs, indicating the appropriate details when drawing graphs to students and paying attention to units. Because she considered that these would all be useful for students in their later studies and in solving problems. Because of this, Teacher 1 warned her students constantly about these details. Ensuring that they paid attention to them strengthened her students' self-confidence and thus caused an increase in their motivation. Teacher 2 did not give the details in the right way and at the right time then there was a decrease in the students' motivation. The students of Teacher 2 was inability to determine which details were important in physics and if these details were not emphasized by their teacher then the students do not pay them any attention. Teacher 1, Teacher 2 and their students thought that possessing the necessary mathematical and geometrical background was related to physics and lecturing with appropriate details in the same manner.

Both teachers and the students of those teachers in general thought that possessing and transferring the subject matter knowledge affected the motivation of the students. I identified each characteristic from the transcripts of the observations and I tried to construct a process of how the students' motivation was affected by the effective physics teacher characteristics. When the teachers possessed the subject matter knowledge they explained the concepts with respect to students' levels, with suitable examples and with appropriate details. When teachers did these, the students' respect to the teacher increased. Therefore, the students were interested in the subject matter and they became aware of the concepts.

7.2 Knowledge of Profession and Teaching Techniques

From the effective teacher characteristics, five of them were analyzed within this category. These characteristics were 'taking the questions of the students into consideration and repeating the subject matter that wasn't understood by students', 'explaining the subject matter with new examples when students face learning difficulties', 'giving examples from simple to complex', 'preparing exam questions as to be understood and answered by all the students', and solving

problems in lessons, which are similar to university entrance examination questions'. I have presented, in the remainder of this section, the findings from the case teachers individually at first, and then a cross-case analysis has been presented.

7.2.1 Interactions between the Students' Motivation and the Characteristics of Teacher 1 in Category 2

The total scores for the most frequently occurring codes for each of these characteristics were added up for Teacher 1 in this category and these are presented in Table 7.5.

Table 7.5 The frequency of the observed codes for the characteristics in Category 2 for Teacher 1

Effective Teacher Characteristics	Code(s)	Freq.	Total Freq.
Taking the questions of the students into consideration and repeating the subject matter that wasn't understood by students	TRS TRP	3 12	15
Explaining the subject matter with new examples when students face learning difficulties	TILT TES	16 10	26
Giving examples from simple to complex	TPSS TPH TPF	11 16 10	37
Preparing exam questions as to be understood and answered by all the students	TEQ TEC	0 0	0
Solving problems in lessons, which are similar to university entrance examination questions	TMC TAMC	0 4	4

Within this category, as presented in Table 7.5, the most frequently observed characteristic for Teacher 1, with 37 occurrences, was 'giving examples from simple to complex'. The next two most frequent was 'explaining the subject matter with new examples when students face learning difficulties', with 30 occurrences, and 'taking the questions of the students into consideration and repeating the subject matter that wasn't understood by students' with 15

occurrences. The least frequently observed characteristic; with only four occurrences was ‘solving problems in lessons, which are similar to university entrance examination questions’. The characteristic ‘preparing exam questions as to be understood and answered by all the students’ within this category has not been observed. The other characteristic in this category was with four occurrences. Due to the fact that there was a noticeable difference between the frequencies of the characteristics I observed, I have based my analysis mainly on the characteristics that I most frequently observed, which comprised the first three characteristics of this category as presented in Table 7.5.

Teacher 1 stated that understandable exam questions would not have an effect on students’ motivation. Teacher 1 indicated that their motivation depended on the exam results rather than the exam questions. She stated that if they got a good mark their motivation increased, but ST1 thought that if they got a low grade they were motivated to study in order to get a better mark. They indicated that the exam questions were similar to the examples that they had solved within the lessons. However, their motivation was related to the exam grades rather than the exam questions. One student of Teacher 1 emphasized a very interesting point related to this phenomenon. She believed that their motivation was not affected by understanding the exam questions.

> …R: “How is your motivation affected when the teacher prepares exam questions that can be understood and answered by all the students?”
> …S1-2: “if I can not understand the exam questions it indicates that I have not studied enough”…(p.25).

If the teachers solved examples similar to university entrance examination questions ST1 thought that it did not affect their motivation. ST1 thought that university entrance examination questions were just ordinary examples. They indicated that if they could solve those questions their motivation was affected positively, but if they could not solve them there would be no effect (p.26, researcher field notes). ST1 claimed that they were not interested in those examples just because they were similar to the university entrance examination questions. Teacher 1 also supported the views of ST1 by saying that she did not think that the 10^{th} grades took the university entrance examination questions seriously. Since there was no clear evidence from my observations, based on the

views of the teacher and students, it would be possible to conclude that solving university entrance examination questions at 10th grade would have minimal, if any, effect on the students' motivation. However the possible interaction between solving those types of questions and students' motivation would be mainly searched for the 11th grade, as Teacher 1 thought (p.6, researcher field notes).

One of the most frequent characteristics for Teacher 1 within this category was 'taking the questions of the students into consideration and repeating the subject matter that wasn't understood by students'. Teacher 1 stated that repeating the subject matter by taking questions into consideration affected the students' motivation in a positive manner. Teacher 1 indicated that she encouraged students to ask questions outside the class since she thought that students might not ask within the class. She stated that she gave them opportunities to ask questions, but she was dissatisfied with their level of concern towards the subjects. The following passage from the transcription of interview with Teacher 1 explains the situation.

> …R: "How is the students' motivation affected when a subject which is not understood by the students is repeated?"
> Teacher 1: "Of course, it increases but in this class there are a lot of students. When I am asked once I explain again. I tell them that I will create every opportunity to make them understand. In fact, I even get help from the counseling service; there were two students who joined us in mid-term. I told them that I had time for them and that they should come and ask me about the parts that they hadn't understood, but they never came I always try to leave a door open regarding this but they never come and ask…I mean, maybe the motivation of a student is to do with their interaction in the classroom but the real indication of whether a student is really interested in the lessons is their behavior outside the classroom. They need to come and ask and learn and I tell them at every opportunity that I am open to this"…(pp.4-5)

ST1 considered that when the teacher repeated the concepts by considering their questions their motivation was affected positively. ST1 thought that they were interested in the subject, and the following excerpt from their interview illustrates their views.

> …R: "How is your motivation affected when a subject not understood is repeated again after considering your questions?"
> S1-1: "We listen more carefully."
> S1-2: "We are motivated."
> S1-4: "When she explains a point that we did not understand, we learn easily and our interest also increases."…(p.23)

I should emphasize the situation regarding students in Section 7.1.1. Students are sometimes too embarrassed to ask questions in the classroom. The possible reasons for this could be the number of students within the class, the negative interactions among students and a decrease in their interest toward physics. I observed that Teacher 1 repeated the concepts that were not understood by the students. The students sometimes keep quiet and sometimes said "…yes, we understand…" (p.61, researcher field notes). Teacher 1 was not satisfied with what they had said but instead asked questions to ascertain what they had understood. During this process all of the students listened to the teacher quietly and the students tried to share what they thought they had understood. However, some of the students could not explain what they thought they had understood, may be they were embarrassed. The teacher explained the concepts again to make the subject clear for the students. The following excerpt from my field notes identifies this situation.

> …Teacher 1: The teacher asked "Is there anyone that has understood?" Most of the students raised their hands. The teacher asked one of the students that had raised their hands,
> Teacher 1: "Yes, what have you understood?"
> S: He said "Well…" but did not answer.
> Teacher 1: "Then give me true feedback. Only tell me that you have understood if you can explain it to me. If not then tell me how much you have understood and according to this I will repeat the subject."
> Then she repeated the things which the students had not understood.
> Teacher 1: The teacher asked again "Is there anyone that hasn't understood?"
> One girl indicated that she hadn't understood.
> Teacher 1: "What haven't you understood?" she asked. This time the student explained the point which she hadn't understood clearly and the teacher explained that part again. Not only the student that were asked the questions but also the other students were following the lesson intently. Most of the students in the class listens the definitions of the concepts and they listen the teacher's explanations. All of the students were following intently... (p.52)
> …S1-9: "OK. Teacher, Are the vector additions equal, aren't they?"…
> She stands in front the student that asked the question and explained. (To support the understanding of the students)
> Teacher 1: "Where should be the resultant force?", she asked. A girl who sat in front of me answered the question…
> Teacher 1: "In equilibrium you can use force×force arm=load×load arm"
> Teacher 1: "Use this equation while solving problems."…The students followed intently…(p.54)

Teacher 1 mostly encouraged all the students to participate and then nominated questions to them. When she behaved like this, the students asked

questions or they expressed what they thought. The following excerpt from my video recordings explained the situation.

> …S1-11: "Why did we divide by 2 or why did we subtract 2?" he asked. The student asked the point related to transform the force time graph to acceleration time graph.
> Teacher 1: "We did not subtract, since the mass was 2 kilograms we used the equation a=F/m and we found acceleration by dividing F by m." she said.
> Teacher 1: "OK. You tell what will happen if m=4 kg?"
> S1-8: "So we divided by 4" he said.
> Teacher 1: "I mean we didn't divide by 2 or subtract 2. We divided the value of m that I concluded from the equation F=ma. I mean 2 is not a magic number. Please do not choose memorizing…" All of the students were following intently. Some of them took notes and some of them participated in the discussions while sitting…(p. 95)

According to the self determination theory as presented in Section 2.3.2, if the teachers repeat the subjects by identifying learning difficulties they increase the students' motivation. Encouraging students to ask questions without humiliation also fosters students' interest and attention. The students become self determined when they participated in the classroom discussions. The students were aware of what they are being taught and why it is important. In the light of the above discussions it is possible to conclude that 'taking the students' questions into consideration and repeating the subject that wasn't understood by students' increases students' awareness, attention and interest in the lesson, thereby increasing their motivation.

In this category, 'explaining the subject matter with new examples when students face learning difficulties' was the other frequently observed characteristic. This characteristic has been analyzed in concordance with the following codes; 'identifying learning difficulties' (TILT) and 'explaining the subject matter with new examples' (TES).

During the interview with Teacher 1, she stated that explaining the subject matter with new examples increased students' motivation. Explaining the subject with the same examples did not provide chances for the students to construct clear understandings. She said the students listened more carefully when the subjects were explained with new examples. The following excerpt from the interview explains her views.

> …R: "When you face learning difficulties and explain the subject with new examples how does this affect the motivation of the students?"

> Teacher 1: "It increases. I do this from time to time. When I have to explain the same subject again with the same sample questions I have problems. I immediately explain the subject with new examples. The students listen more carefully"…(p.5)

ST1 also thought that this characteristic of the teacher affected their motivation positively. They said they were aware of the subjects and they paid attention.

> …R: "When you face learning difficulties and your teacher explains the subject to you with new examples how does this affect your motivation?"
> S1-1: "It definitely affects it positively. If we did not understand the previous explanation (for the simple one) it would be fault of us; and we listen more carefully and we ask questions if necessary."…(p.24)

Teacher 1 sometimes offered more than one way to solve a problem and explained the subject with similar examples to overcome learning difficulties. When she was faced with learning difficulties, or even when she realized that some students had not clearly understood, then she changed the example to one with a similar structure and at the same difficulty level. She encouraged the students to participate in finding the solution of the problem. During the problem solving process all the students listened to the teacher attentively and participated in finding the solution when the teacher asked. The following excerpt from my field notes explains the situation.

> …S: "Miss, how did the x component occur?"
> Teacher 1: "In the coordinate system the forces in the direction of x must be equal in order for them to balance" she said.
> The student that had asked the question looked at her notebook again and wrote something in it. The students were looking at the teacher carefully and were listening to the lesson intently…(p.58)

Teacher 1 recognized that there could still be some misunderstandings regarding the solution. She offered a new example, asked questions during the problem solving to encourage the students to participate, and provided statements giving recognition and credit to the students' answers.

> …Teacher 1: "Now let's solve a similar question and we will understand if you have understood or not" she said.
> She drew a new shape on the board and started to ask the students' ideas. Most of the students raised their hands or shared their ideas with the teacher from where they were sitting. The teacher's comments included, according to what the students had said, "Yes", "Good", "Yes that's right"…(p 59)

The following passage from the transcript of the video recordings clarified my interpretations for this characteristic.

> …The teacher got the students to do the second question in order to give them feedback. Later she said
> Teacher 1: "Look and listen, when I separate the components of the force F"…
> At the same time emphasizing the important points on the board and solving the question. After she finished explaining this problem, she then began a different analysis of the question by changing the direction of the force…The question was almost the same, but only the direction of the force pulling the object on a horizontal rough plane was opposite. The force made an angle with the horizontal so changing the direction of the force made this a new but a similar example. She was trying to explain through this example what happens when the friction of one of the components of the force increases or decreases. All of the students began to try to answer the new question. The teacher asked another student to come to the board to solve the new question. All of the students were following intently… (pp.89-90)

In another day of observation, Teacher 1 exhibited this characteristic and the students participated in the discussions. Actually the lesson was full of discussion and participation.

> …The student solved the problem and sat down. All of the students were following the teacher intently. The teacher walked around the desks and made the points that the students could not understand clear as she reached each student's desk. She offered a new example and she read the new example from the question booklet out loud. She tried to provide connection between previously solved examples and their prior knowledge to solve this example. Most of the students participated in this discussion. There were some students that raised their hands and participated in the discussion. The teacher draw the figure of the question on to the board, she did not start to solve it, but asked a student to come to the board and to solve the problem instead…(p.94).

I observed that most of the students in the class participated in the problem solving process with Teacher 1 and it seemed that their motivation was affected positively when the teacher offered a new example. The students showed their willingness to solve questions by raising their hands. According to the self determination theory, by displaying this particular characteristic, teachers encourage the students to solve the new examples and they avoid confusing students' minds. In this very classroom, the students seemed to become self determined and their interest in the lesson increased. With respect to the above discussion, it is possible to conclude that 'explaining the subject matter with new examples when students face learning difficulties' increases students' willingness to solve, increases their attention and makes them aware of the subject related to new examples every time. Therefore, it is likely to increase students' motivation.

The most frequently occurring characteristic for this category was 'giving the examples from simple to complex'. Teacher 1 stated that this would have an

effect on their motivation but she thought that adjusting the level of the examples in heterogeneous classes was very difficult. She said she tried to use examples from simple to complex for the levels of average students. She stated that there were students who stayed above this level and below this level. The following excerpt from the interview with Teacher 1 indicates her view.

> …R: "When you give examples from simple to complex for the students how does this effect their motivation?"
> Teacher 1: "I always tell them that physics is a hard lesson, it isn't an easy lesson. Sometimes even the easiest questions are hard for them; the hard questions are already hard for them. Doing things from simple to easy of course affects them but I tell them they are simple and they don't understand. I change them. I change the examples as much as I can. I think I get to an average level but as I said there are students that can do better and there are students that can't. The class is completely mixed. There are a few students who are better than the others but there are more students that are of a lower level"…(p.5)

On the other hand, ST1 thought that giving examples from simple to complex certainly increased their motivation. They thought that when they solved the simple questions, their confidence to solve the complex ones increases.

> …R: "When the teacher gives you examples from simple to complex how does this effect your motivation?"
> S1-1: "If we solve the simple on firstly my motivation increase. If we started from the complex one, we would mix up."
> S1-4: "(When we) start from the simple ones, I become more self-confident. I see I can do the simple one, so (I am able to) solve the difficult ones, it is better." …
> R: "What do you think S1-2?"
> S1-2: "When (the teacher) started from the complex ones, we can mix up and maybe we even couldn't solve the simple ones."…(p.24)

Teacher 1 stated that she was not sure whether they were motivated by the level of the examples. When she asked a slightly more complex example almost one third of the students raised their hands. However, to overcome this she offered a problem solving strategy, which identified basic steps to solve the problems, to the students. She emphasized the important points and by giving feedback and providing help she tried to enable the students to work on the examples by themselves. With the help of this strategy I observed that most of the students could handle even some of the complex problems. The following excerpt from my video recordings and the field notes indicates the situation. The first excerpt also identifies how Teacher 1 emphasized the problem solving strategy.

> …Teacher 1: "If you face a question from dynamics concept what would be the first thing you would do?" asked the teacher.

> Teacher 1: "Firstly, you apply the basic principles of dynamics to the whole system. By considering all the forces causing motion you will find the acceleration of the system. Then you will draw free body diagrams for the other objects in the system and then for each component you will apply the basic principles of dynamics. Do you understand?" she said.
> Ss: "Yes, we do".
> Teacher 1: "You will draw all the forces affecting the system, whether internal or external"
> The students were following with interest. The teacher discussed the methods to be applied either on the whole system or a component of it…
> Teacher 1: "These are the points you need to consider carefully in order to answer the question" she said.
> She wrote an example on the board. It is a simple example containing the main points of the subject and the surface is frictionless. Since the students had not yet covered the topics of friction fully, asking a question which included this topic would have been too difficult for them. The teacher makes them write down the question…Most of the students worked on the problem even though the bell rang within couple of minutes…When the bell rang some of the students stood up but since the teacher continued to talk they sat and listened to the teacher…(pp.86-87)

In this lesson I could not find the chance to observe the solution of a complex example, but during the lesson in the following week I did. At the beginning of the lesson she explained the concept of friction and she solved a couple of examples related to surfaces with friction. Then she started to solve problems including complicated systems. She emphasized the problem solving strategies again and the students applied the strategies. The following excerpt from the transcripts of the video recordings and the field notes that I took during the video recordings illustrate the situation.

> …All of the students were working on the solution of the problems. The teacher offered time to solve the third question…This time the question was a little bit harder than the previous ones. There was a friction on the surface in the example, and the question needed more than two steps to be solved instead of using just one equation. She encouraged the students to participate in the solution of the problem, and more than half of the students in the class interacted with the teacher during the solution of the problem…all of the students followed the teacher on the board and there was eye contact between them. The teacher interacted with the students also. Five or six students whose notebooks I was able to see, solved the problems step by step as the teacher had explained and they did not have any difficulty …(p.90)

Based on the need theory, providing new examples to maintain students' engagement increases the students' willingness to answer. When a teacher identifies the learning difficulties of the students during problem solving process, they do not feel anxious during the lesson. By considering students' personal learning problems and providing them with problem solving strategies, teachers could make the lessons more interesting for the students, thereby increasing

students' attention. With respect to the discussions above, when teachers give the examples from simple to complex by providing help and feedback, and by offering a problem solving strategy, they are more likely to increase students' interest and awareness. During the problem solving processes, students recall their prior knowledge. Therefore, it is possible to argue that this characteristic, when utilized properly, increases students' motivation.

7.2.2 Summary of Findings for Characteristics of Teacher 1 in Category 2

There was no clear evidence from my observations regarding the interaction between the characteristics 'preparing exam questions as to be understood and answered by all the students' and 'solving problems in lessons, which are similar to the university entrance examination questions' and students' motivation. Based on the interview findings from Teacher 1 and ST1 understandable exam questions would not affect students' motivation since they thought that the exam questions were appropriate to their level. Teacher 1 solved examples similar to university entrance examination questions at 10^{th} grades. I did not observe that Teacher 1 warned the students with such a wording as "this question is university entrance examination question so be careful". As a result the occurrence of this characteristic was minimal. Therefore, based solely on the views of the students and the teacher it is possible to conclude that 'solving problems in lessons, which are similar to the university entrance examination questions' would not affect students' motivation at 10^{th} grades.

'Taking the questions of the students into consideration and repeating subject matter that wasn't understood by students' was the characteristic that both Teacher 1 and ST1 thought increased the students' motivation, since it increased students' interest and self confidence. When Teacher 1 showed this characteristic, there was an increase in the students' awareness and attention. They started to participate in the class discussions more. Their interest in the subject increased, so the students' motivation increased.

Teacher 1 and ST1 thought that the characteristic 'explaining the subject matter with new examples when students face learning difficulty' affected

students' motivation positively. This characteristic encouraged the students to solve problems made the students more aware of the subjects and they paid more attention. Teacher 1 encouraged students to participate during the problem solving process and she provided new examples so as to overcome likely learning difficulties. This characteristic increases the students' motivation, since it increases students' interest, awareness, and attention.

The last characteristic that I have discussed for Teacher 1 in this category is 'giving the examples from simple to complex'. Teacher 1 stated that since the class was crowded and heterogeneous, students had diverse knowledge levels. I observed that Teacher 1 provided feedback and help to the students during the problem solving process. One of the major characteristics of Teacher 1 in this process was that she offered problem solving strategies to the students. When she provided a problem solving strategy the students systematically solved the examples by themselves. The students also showed willingness to solve problems by raising their hands. In this way, Teacher 1 minimized the possible effects of heterogeneity in the class. She applied a systematic process, and she taught this process during problem solving. All of these processes had a positive effect on the students' self-confidence and their willingness to solve the examples. For this reason 'giving examples from simple to complex' seemed to have increased students' motivation.

Overall, by displaying the characteristics within the category 'knowledge of profession and teaching techniques', Teacher 1 provided help and feedback and problem solving strategies to the students. She offered new examples, which resulted in increase in the students' interest and attention to the subject. She provided problem solving techniques and she allowed the students to solve the problems by themselves. Therefore Teacher 1, by displaying these characteristics, increased students' motivation.

7.2.3 Interactions between the Students' Motivation and the Characteristics of Teacher 2 in Category 2

The total frequencies for the most frequently occurring codes for each of these characteristics were added up for Teacher 2 in this category and these are presented in Table 7.6.

Table 7.6 The frequency of the observed codes for the characteristics in Category 2 for Teacher 2

Effective Teacher Characteristics	Code(s)	Freq.	Total Freq.
Taking the questions of the students into consideration and repeating the subject matter that wasn't understood by students	TRS TRP	4 1	5
Explaining the subject matter with new examples when students face learning difficulties	TILT TES	7 6	13
Giving examples from simple to complex	TPSS TPH TPF	1 (1-) 7 19	27 (1-)
Preparing exam questions as to be understood and answered by all the students	TEQ TEC	1 0	1
Solving problems in lessons, which are similar to university entrance examination questions	TMC TAMC	0 4	4

Within this category, as presented in Table 7.6 the most frequently observed characteristic for Teacher 2, with 27 occurrences, was 'giving examples from simple to complex'. The next most frequent was 'explaining the subject matter with new examples when students face learning difficulties', with 13 occurrences. The other characteristics were observed considerably less frequently compared to these two characteristics. Therefore, I have based my analysis mainly on the two most frequently observed characteristics, namely 'giving the examples from simple to complex' and 'explaining the subject matter with new examples when students face learning difficulties'. Before presenting the analyses for the two frequently occurred characteristics, I will briefly talk about the other characteristics, and why they were not observed frequently.

Teacher 2 thought that university entrance examination questions did not affect the students' motivation. Similarly, ST2 also stated that there was no

difference in their motivation between the lessons in which they solved university entrance examination type questions and the lessons in which they did not. They said that there were interesting questions sometimes but that this did not affect their motivation.

The following excerpt from the interview findings identifies the situation.

> R: "How and why is the motivation affected when the teacher solves questions related to university entrance examination in the class?"
> S2-1: "In fact it does not affect…I tried to solve every example. I was not interested more since they were university entrance examination questions."
> S2-2: "In fact it affects but when the number of these questions increased they became ordinary examples. They would not be different, I was not interested."

The following excerpt from my field notes supports my interpretations.

> …There were university entrance examination questions within the solved examples. The teacher emphasized them but there was no change in the interest of the students and their willingness to solve them with respect to ordinary examples …(p.105)

In terms of the characteristic 'preparing exam questions as to be understood and answered by all the students' Teacher 2 thought that the motivation of students was not wholly affected by this. She thought that if they did not understand the questions, they asked questions during the exam. The ST2 also stated that they understood the exam questions, and they declared that the questions were mostly similar to the examples that they solved during the lesson. During my observations I had a chance to talk to the whole class after an examination with the class of Teacher 2 and they all indicated that they could understand the questions in the exam. The following excerpt from my informal interview in the class explains the situation.

> …R: "Is there anyone who did not understand the exam questions?"
> S2-7: "They are similar to the ones that we solved in the classroom, but I did not understand" he said.
> S2-8: "The teacher does ask questions similar to the ones we have in our notebooks, I mean usually they are not too different", he said.
> Another student raised his hand. This student;
> S2-9: "We can still understand even if the questions are different from the ones we do. If there was points we didn't understand then we asked the teacher and she explained it during the exam" he said…(p.106)

'Taking the questions of the students into consideration and repeating the subject matter that wasn't understood by students' was another considerably less frequently observed characteristic for Teacher 2 within this category. Teacher 2 stated that students listened to her quietly and they took notes while she was

repeating. However, she did not indicate whether the motivation of the students was affected. I observed that the ST2 did not ask too many questions and they did not usually emphasize the points that they did not understand. It is not possible to say that if the teacher did not take the students' questions into consideration the students' motivation decreased. In fact, there was not enough evidence from observations to conclude that this characteristics decrease the students' motivation for Teacher 2.

One of the most frequent characteristics within this category was 'explaining the subject matter with new examples when students face learning difficulties'. Teacher 2 stated that if the students had difficulty in understanding the subject she explained it with new examples. Teacher 2 stated that when students had understood the new example it provided a link with the examples that they did not understand and it helped them to learn. She further stated that their willingness to solve problems increased and also their motivation increased. ST2 also indicated that if the teacher explained the subject with new examples they thought that their motivation would be affected positively. They stated that they needed different examples in order to understand better than they had. The following passages from the transcripts of the interviews identify the situation.

> …R: "How is the motivation of your students affected when you explain a subject with new examples after you have encountered learning difficulties?"
> T: "It increases. I do the things I have already mentioned and if this doesn't work, I explain again with new examples. The students link the new subjects with things they have done before. Sometimes understanding new examples helps them understand the previous ones. Their willingness to solve problems increases"… (p.18)
> …R: "How is your motivation affected when your teacher explains a subject with new examples after you have encountered learning difficulties?"
> S2-1: "It definitely affects us positively. We need different examples to help us understand the subject. When she explains with new examples we listen more carefully and try to understand"…(p.37)

Teacher 2 made the points clear for the students when they face learning difficulties. The students participated in the solution of new examples and the student who did not understand seemed to be satisfied with the solution of the new example. The following excerpt from my field notes indicates the situation.

> …T: "Who wants to tell me the coordinates of points M_1, M_2, M_3? S2-13, come. What is the first?" S2-13 answered and sat. Another student asked her a question and the teacher said "let's look at it" and she started to explain the question to this student. The students followed the teacher intently and looked at the board. There

> were not any students who were uninterested. The student said he did not understand again… She repeated the equations for the center of mass and she said,
> Teacher 2: "Let's solve another problem related to this". The problem was similar to the previous one, but it is related to finding the center of mass on the coordinate system…
> Teacher 2: "Draw boxes 6 rows to 7 columns" she said.
> All of the students in the class followed her intently and she drew the figure on the board. …She asked another student to solve it…The student solved the question and during the solution of the problem the one who said "…I did not understand…" was aware of the subject and he listened to his classmate intently. At the end of the problem solving process he said "…I've got it…"… (p.100)

According to the self determination theory, when teachers avoid confusing students' minds they increase the students' self determination. The new example provides them with an opportunity to clarify their understanding and it increases their motivation. With respect to the above discussion, it is possible to conclude that 'explaining the subject matter with new examples when students face learning difficulty' increases students' participation, and their interest and makes them aware of the subject, thereby increasing their motivation.

'Giving the examples from simple to complex' was another frequent characteristics for Teacher 2 within this category. Teacher 2 stated that giving the examples from simple to complex definitely increased the students' motivation. Teacher 2 indicated that students' motivation depended on the examples that she solved. She said that the students believed that if they understood the examples they considered that they had understood the subject matter. ST2 stated that Teacher 2 gave the examples from simple to complex and they thought that they could easily understand in this way. They stated that they felt confident and they could see what they could solve and what they could not. ST2 believed that they understood whether they had learned the subject.

> …R: "How is the motivation of your students affected when you give the examples from simple to complex?"
> Teacher 2: "It definitely increases. Their motivation is related to the examples they solve. They wait for examples as soon as I have finished explaining the subject. If they understand the example they think they've understood the subject"… (p.18)
> …R: "How is your motivation affected when your teacher gives the examples from simple to complex?"
> S2-2: "That's what our teacher usually does anyway. When we solve easy examples it is easier to understand the difficult ones."
> S2-1: "When I can solve the easy ones I feel more confident. I see what I can do and what I have difficulty with. It's obvious how much of the subject I have understood. If we can understand all the examples we think we have understood the subject. We become motivated. My interest in the lesson increases"…(p.37)

Teacher 2 mostly gave the examples from simple to complex, but the number of students who raised their hands to solve the examples decreased through the complex examples. She chose the first examples from easy ones that can be done by referring to one equation or explanation of the concept just after her presentation. Second and third examples needed some application of the students' knowledge. The following passages from my field notes indicate this situation.

> …The new question is related to the center of mass of an object that is folded onto it. The question was simple since the figure was rectangle, and it was related to previous question…
> T: "Think about this…" she said and she took a plain paper and she tried to explain by folding it…(p.103)
> …The teacher asked for the answer of the question. S2-1, S2-12 and 4 more students raised their hands…
> T: "S2-14 you?" she said. S2-14 stood up and waited. The teacher started to solve the question and she said
> T: "How many questions have we solved about center of mass? You can't even do this". She explained the answer to the question within one minute.
> T: "Do you have any points that you have not understood?" she said…(p.104)
> …She asked another question and she started to make them write it…Meanwhile the students followed the teacher. The students looked at each other when they misunderstood a point from the figure. The question was a little bit harder than the previous one. The question included finding the center of mass of an object where the cut piece is stuck to the other part of the object. Two students raised their hands; the two students were from the same group of six students as before…
> T: "Remember the slice of cake question". One of the male students raised his hand after she had said this and the teacher asked him to solve the problem. The student solved the question within 20 seconds. The teacher did not go over the solution of the question. The other students in the class seemed to have understood…the teacher began another example on the board...She wrote down another example which was a bit more difficult than the first two but similar to the second in that it included cutting and sticking again. She asked one of the girls to answer it. When she had finished it, S2-3 indicated that he had not understood the solution.
> Teacher 2: "What haven't you understood?", she asked. S2-3 indicated that the difficulty was with the simplification.
> Teacher 2: "If we stop before we reach the multiplication then the simplification is easier and we don't need to multiply", she said. S2-3 nodded his head to show that he had understood and started to write the (solution of) the question in his notebook. The teacher starts reading out new questions and the students write them down which takes 3 minutes. The whole lesson is then taken up with solving these problems.
> Teacher 2: "Who wants to come to the board?", she asks…(p.104)

The following excerpt from the field notes of the second observer indicates giving the examples from simple to complex increases students' interest in the problem solving process.

> …Teacher 2: "Let's write down some examples so that we'll remember them better".
> The students wrote the example in their notebooks. The teacher is trying to make students see the similarity of the example but the students are having difficulty making a connection between this example and the one on the board. The teacher solves the example.
> Teacher 2: "Yes, now let's go on to another example", she said. This one is slightly more difficult than the previous one. She is giving the examples from simple to more complex.
> The students solve the second example and a few students give the answer. The students are enthusiastic about solving the problems. The teacher asks one of the students to do the example on the board. Then she says that she is going to give an example related to efficiency. The students are following the lesson quietly. They write the example in their notebooks as the teacher writes it on the board…(p. 137)

According to Maslow's need theory the teacher should make the students confident by providing feedback and by providing help to the students. Students should understand the basic concepts of the subject and then the level of difficulty of the examples could be arranged by the teacher. However, 'giving examples from simple to complex' without offering proper connections with the subject, and allowing the students to confuse their knowledge decreases students' interest and the students become unwilling to do the questions by themselves. They cannot recall their knowledge and there is a decrease in their self confidence. In the light of the above discussion, it is possible to conclude that this characteristic increases students' motivation only if the teachers provide help and feedback to the students. If the students are unable to construct clear understandings for the simple examples, they cannot work on the new examples and their attention and interest to the lesson decrease; thereby decreasing their motivation.

7.2.4 Summary of Findings for Characteristics of Teacher 2 in Category 2

According to the interview findings from Teacher 2 and the ST2 solving problems related to the university entrance examination questions did not seem to affect the students' motivation. 'Preparing exam questions as to be understood and answered by all the students' was another characteristic that occurred less frequently. Teacher 2 thought that even if the students did not understand they could ask during the exam. The ST2 corroborated this but added that in fact they understood the exam questions, and they declared that if they could not

understood the questions, the teacher explained them. They stated that the exam questions were mostly similar to the examples that they solved during the lesson. However this does not mean that they would not understand if the questions were different from the ones they solved in the class. Therefore this characteristic does not affect students' motivation based on the above discussions.

'Taking the questions of the students into consideration and repeating the subject matter that wasn't understood by students' was also a less often occurring characteristic within this category. The ST2 thought that they felt confident when the teacher repeated the subject matter by taking their questions into consideration. There was not enough evidence to conclude that the students' motivation decreased if the Teacher 2 did not exhibit this characteristic.

One of the most frequent characteristics within this category was 'explaining the subject matter with new examples when students face learning difficulties'. Teacher 2 and ST2 indicated that if the teacher explained the subject with new examples they thought that their motivation would be affected positively. I observed that Teacher 2 provided the students with new examples and the students' participation in the solution of the problems seemed to have increased. The students were aware of the subject and there was an increase in students' interest, so it is possible to suggest that students' motivation increased.

'Giving the examples from simple to complex' was another frequently observed characteristic and both Teacher 2 and the ST2 stated that it affected the students' motivation. I observed that Teacher 2 presented the examples from simple to complex. When the students could not solve the simple examples and if the teacher could not recognize this situation, then the students of Teacher 2 could not solve the complex problems. Therefore this characteristic in itself would not increase the students' motivation. Teacher 2 did not identify the learning difficulty of the students and their willingness to solve the examples, which resulted in decrease in students' interest. The students of Teacher 2 were not able to construct clear understandings and thus their motivation decreased.

Overall, by displaying the characteristics within the category, 'knowledge of profession and teaching techniques', Teacher 2 did not provide enough help, feedback, and problem solving strategies to the students. She offered new

examples which aimed to achieve an increase in students' interest and attention to the subject. Especially three characteristics of this category could not be concluded for Teacher 2. So it is not possible to state that Teacher 2 did not exhibit those characteristics, so she decreased the students' motivation. The conclusion from the whole data is meaningful when all of the findings are combined in the next section.

7.2.5 Comparing and Contrasting the Characteristics that Teacher 1 and Teacher 2 Possess for Category 2

The Category 2 entitled 'knowledge of profession and teaching techniques' included five effective teacher characteristics. One of the characteristics that I observed least frequently was 'preparing understandable exam questions as to be understood and answered by all the students'. Teacher 1 and ST2 thought that if the students got good marks, their motivation increased but, surprisingly, the ST1 opposed this finding and stated that if they got low marks they studied harder in order to get a higher mark. Both ST1 and ST2 thought that they found the exam questions understandable. Therefore, for both Teacher 1 and Teacher 2 this characteristic had no affect on students' motivation.

In terms of the second characteristic within this category both Teacher 1 and Teacher 2 and both ST1 and ST2 thought that university entrance examination questions did not affect the students' motivation for 10^{th} grades. The reason for this was made clear by both Teacher 1 and Teacher 2 when they explained that the students had plenty of time before the exam since the high school education in Turkey is now four years instead of three.

While analyzing the characteristic 'taking the questions of the students into consideration and repeating subject matter that wasn't understood by students' I realized that the students seemed to have accepted the teachers' characteristics. Teacher 1 tried to provide many occasions for her students to ask questions, but since ST1 accepted that Teacher 1 gave them everything, and since she was active they stayed passive. However, Teacher 1 waited for her students to ask questions. On the other hand, Teacher 2 believed that since the students would ask again and

again she did not encourage the students to ask questions. However, the ST2 was willing to ask questions. Teacher 2 did not discourage the students asking questions but she ignored their questions or she had difficulty in answering some of the questions as stated in Section 7.1.3. These behaviors affected students' motivation negatively. However, there are not clear evidences from my observations to support the interview findings that the opposite of this characteristic decreased the students' motivation. Instead, it is possible, based on the evidence from the data of Teacher 1, to say that this characteristic increased students' motivation.

Both teachers and their students thought that the characteristic 'explaining the subject matter with new examples when students face learning difficulty' affected students' motivation positively. Students thought that when they worked on a new example, they were aware of the subject and they became more interested in it. By possessing this characteristic Teacher 1 and Teacher 2 provided new examples when they thought that students had not clarified their knowledge, so the conclusion that this characteristic increases students' motivation can be reached.

The last characteristic in this category was 'giving the examples from simple to complex'. Teacher 1 was not sure of how this affects students' motivation, since the class was heterogeneous and there were many students in this class. On the other hand, ST1, ST2, and Teacher 2 stated that it would have a positive effect on students' motivation. I observed that students of Teacher 2 sometimes had difficulty in solving the problems from simple to complex so when there were lack of some external motives such as providing help, giving feedback and offering problem solving strategies. The students of Teacher 2 could not construct clear understandings. Teacher 1 managed to handle the negative effects of a crowded class by providing those motives. Therefore the students' motivation of Teacher 1 increased, but the students' motivation of Teacher 2 decreased. In fact, it can even be said that without these external motives the students' motivation, in real terms, would decrease when this characteristic is exhibited by the teacher.

7.3 Enthusiasm for Teaching

This category includes the characteristics 'seeking and trying to find out the answers of the questions that the teacher does not know', preparing a suitable medium for learning in the class', 'encouraging students to ask questions such as how?, why?,…then what happens?', and 'lecturing reluctantly'. I have presented, in the remainder of this section, the findings from the two case teachers individually at first, and then a cross-case analysis has been presented.

7.3.1 Interactions between the Students' Motivation and the Characteristics of Teacher 1 in Category 3

The total frequencies for the most frequently occurring codes for each of these characteristics were added up for Teacher 1 in this category and these are presented in Table 7.7.

Table 7.7 The frequency of the observed codes for the characteristics in Category 3 for Teacher 1

Effective Teacher Characteristics	Code(s)	Freq.	Total Freq.
Seeking and trying to find out the answers to the questions that the teacher doesn't know	THC TSTS	1 9	10
Preparing a suitable medium for learning in the class	TAT TAC TUSR	10 5 12	27
Encouraging students to ask questions such as how?, why?, ...then what happens?	TESQ TESE	1 3	4
Lecturing reluctantly	TET TBTL TTR	13 11 0	24

Within this category, as presented in Table 7.7, the most frequently observed characteristic for Teacher 1, with 27 occurrences, was 'preparing a suitable medium for learning in the class'. The next frequent was 'lecturing reluctantly', with 24 occurrences. However, at this point, I have to point out that

13 occurrences were not for being reluctant but refer to the code for being enthusiastic about teaching (TET); whereas the code for characteristic lecturing reluctantly (TTR) was not observed in this category. The other characteristic in this category was 'encouraging students to ask questions such as how?, why?, ...then what happens?' was observed with 10 occurrences. The least frequently observed characteristic; with only four occurrences was 'seeking and trying to find out the answers to the questions that the teacher doesn't know'. Due to the fact that there was a noticeable difference between the frequencies of the characteristics I observed, I have based my analysis mainly on the two characteristics that I most frequently observed.

Teacher 1 stated that she did not want to teach reluctantly. She indicated that she did not want to be a teacher who was fed-up, tired and uninterested. She claimed that the students were already low motivated and if she showed those behaviors she believed that she would not be able to motivate the students anymore. The following excerpt from the interview transcriptions indicates her views.

> …R: "While you were teaching I never observed that you were reluctant to teach. How and why does your enthusiasm for teaching affect the students' motivation?"
> Teacher 1: "It affects them because I feel obliged in a way. I don't want them to see an uninterested, tired, fed up teacher. They already have low motivation, as I said, and S1-6 said in the lesson, spring is coming and all they can think about is being outside. If I was uninterested too we wouldn't be able to have a lesson at all"…(p.8)

In the answer to another interview questions she also supported that she was enthusiastic and she teaches enthusiastically.

> …R: "Which of your characteristics makes you think that you can say you are a good motivator?"
> Teacher 1: "…I like my job, I like the students and I like teaching…" (p.8)

ST1 thought that the teacher lectured enthusiastically, so their motivation was affected positively. ST1 stated that when Teacher 1 was always active in the class they were encouraged to keep following what she did or what she would say. S1-1 said that when the teacher lectured enthusiastically, the students listened enthusiastically and they were motivated to learn. The following passage taken from the transcripts of the interviews identified their ideas.

> …R: "How and why does your teacher teaching this enthusiastically affect your motivation?"

> S1-4: "Our teacher being enthusiastic means that she teaches in a more lively way so we constantly follow what she says and does."
> S1-1: "She teaches enthusiastically and so we listen in the same way. I become motivated to learn. If she were reluctant to teach I wouldn't be motivated"…(p.29)

Teacher 1 was enthusiastic about teaching, as she declared. I never observed that she showed any reluctant behavior. The following passage taken from my field notes is just one example of the way in which she showed enthusiastic behavior for teaching.

> …Teacher 1: "Yesterday I got a health report because I didn't have any lessons. In fact I have been on report since the beginning of the week. They only have 2 hours lessons a week as it is. I didn't want them to lose out on anything"… (Informal interview before the lesson; p. 67)

This refers to the fact that despite having a health report the teacher chose to teach the students rather than take the time off that she was entitled to. When Teacher 1 behaved enthusiastically the students were interested in the subject, they enjoyed what they did, and they were willing to participate in the lesson with their ideas or views. The following passages taken from my field notes indicate this situation.

> …Teacher 1: "Yes, I know we only solve a few problems in the lessons but you need to make an effort yourselves. I think of everything for you. For example, on Friday lunchtime you are going to come early and we'll spend an hour solving problems together". The students seemed to enjoy from this opportunity. They all smile and they said "it's good for us"…(p.59)
> …Teacher 1: "We must definitely solve problems. Then we'll know whether you have understood or not. Then you can come and ask me about any questions that you haven't understood" she said...(p.62)
> …Teacher 1: "Now let's solve another similar problem, well see if you have understood or not" she said…The students were either raising their hands or sharing what they knew with the teacher from where they sat The teacher responded to what they were saying with remarks like 'Yes', 'Good' or 'Yes, that's right"…(p.62)

The following excerpt from the transcripts of my video recordings supported my interpretation related to the interaction between teaching enthusiastically and students' motivation.

> …Teacher 1: "If you still have points you don't understand let's go over them again", she said. The students in the class indicated that they had understood by nodding their heads. They showed that they wanted to participate in the lesson by raising their hands. All of the students were interested in the lesson. Some of the students took notes of everything the teacher explained. Some of the students were giving examples to support the explanations from where they sat…(p.74)
> …In this lesson, apart from at the beginning of the lesson, the teacher did not sit down at all and for about 75 minutes was constantly on her feet and active in the lesson…(p.91)

Brophy (2004) suggested that when teachers are enthusiastic about teaching, the students are willing to study, they enjoy what they have been taught and they listen intently. The teachers, then, can easily motivate their students to learn. The teachers' enthusiasm for teaching increases students' intrinsic motivation and the teachers are able to ensure that they enjoy the tasks. The intrinsically motivated students are willing to ask more and willing to participate more. Based on all of the above, it is possible to conclude that when the teacher teaches enthusiastically she is able to increase the students' awareness and their interest. Therefore it is likely to increase students' motivation.

'Preparing a suitable medium for learning in the class' was the most frequent characteristic for Teacher 1 within this category. Teacher 1 stated that U shaped arrangements of the desks increased students' participation in the lesson as they could interact with her and with each other. She complained that since the class was too crowded it was impossible to make any changes in the arrangement of the desks. She stated that when there was a suitable medium for the students to discuss and to share their ideas they were more interested in the subject. This was also important in terms of the interactions in the class.

> …R: "When you provide a suitable medium for learning in the classroom, how and why is the motivation of your students affected? What do you understand by a suitable medium for learning?"
> Teacher 1: "It increases. I have done it before; I've sat the students down in a U-shape. For example, I'm not really very pleased with the way the desks are organized at the moment. The ones at the back and the ones at the front are not equal."
> R: "Isn't the class crowded? The number of students has gone up and up and now you have 41 students."
> Teacher 1: "Of course it's crowded. It's difficult to have a different seating plan with this number of students. If I could, I would like to because it really increases the students' motivation. I do it in the other classes and I see that the majority of the students participate more in the lessons"…(p.7)

The views relating to the suitable medium of ST1 differed from the views of Teacher 1. They thought that when the class was quiet, they could understand the lesson. The following passage taken from the transcripts of the interviews explains their views.

> …R: "When your teacher provides a suitable medium for learning in the classroom, how and why is your motivation affected?"
> S1-3: "It increases. I mean the class is quiet. When we have the lesson in this kind of medium I understand better."
> R: "By a suitable medium do you understand a quiet one?"

S1-3: “Yes.”
S1-2: “When technological tools are embedded in the classroom then my motivation increases. The teacher does all the lessons on the board and this sometimes becomes monotone”…(p.27)

The characteristics related to doing experiments and using media were not included in the study since the teachers declared they did not use them in their lessons, see Section 6.8.1. The characteristics related to activities have been discussed in the following sections. Teacher 1 could not change the arrangement of the desks, since the class was crowded. However the class was mostly quiet in her lessons, as ST1 desired. She started each lesson with revision as I explained in Section 7.1.1. Moreover, the teacher found the chance to ascertain the students’ levels. In the middle of the class hour she sometimes told a story and she frequently attracted the students’ attention. The following passage from my field notes indicates the situation.

…Teacher 1: “Then what should happen for the total moment to be zero? Are you confused?”, she asked.
Ss: “Yes, we are confused.”
Teacher 1: “Oh great, then I’ve succeeded well”, she said.
S: “Why are you saying it like that, Miss”, she asked.
Teacher 1: “Because these subjects are really important and it’s really important for me that you try to understand. If you say you are confused then it means you are trying to understand. You could have shown no interest whatsoever”, she said.
Teacher 1: “I’m erasing the left-hand side. Now take three deep breaths.”, she said.
The class did as she had asked.
Teacher 1: “OK then. Are you tired?” she asked.
Some of the students said yes and some no.
Teacher 1: “Right. Now please pay attention because after this you will face these”, she said.
After the teacher had done and said all of these things the whole class began to follow her closely…(p.55)

To support my interpretations for this characteristic, the following excerpt from the video recordings can be used.

…Teacher 1: “If you had to give your class a name, what would you say”, she asked
The students suddenly became very interested and started to list answers.
S: “Canary …eagle…lion” were said by some.
…It was an interesting question to attract the students’ attention but all of the students were seen to be having fun. At this point the teacher ended this even after 2 minutes so that the students would not start to waste time. The students returned to solving the problems…All of the students continued trying to solve the new question in the test. The teacher asked a student to come to the board in order for him to solve this new question.
This student solves the question and sits back down. None of the class stops paying attention to the teacher for even a moment...By reading the new question out loud

> and discussing it with the students she ensures that they find a way to solve the problem by utilizing their previous knowledge. More than half of the students are participating in this discussion. There are some students who are raising their hands in order to participate in the discussion ...(p.94)

According to Keller's ARCS model, see Section 2.4, the teachers should gain the attention of the students by using various methods and they should keep that interest till the end of the lesson. The intrinsic motivation theory also supports the idea that during the lesson teachers should give immediate feedback to increase the students' motivation. Teachers should also provide recognition words to the students. With respect to Keller's ARCS model, more than one motive such as media or laboratory, are needed to keep the students' interest alive. Teacher 1 was unable to use media or do any experiments. However, she provided revision at the beginning, communicate with students, asked for why they were tired, and provided recognition words. She kept the students interest alive by offering a way like taking a breath. Therefore, it is possible to conclude that preparing a suitable medium for learning in the class would increase students' interest and ensure they felt self-confident and satisfied, which thereby would increase the students' motivation.

7.3.2 Summary of Findings for Characteristics of Teacher 1 in Category 3

There was no clear evidence from my observations concerning the interaction between the characteristics 'seeking and trying to find out the answers of the questions that the teacher doesn't know' and 'encouraging students to ask questions such as how?, why?, ...then what happens?' and students' motivation. In the interview findings from ST1, it was stated that there were not any questions that Teacher 1 could not answer. However, I observed that the students of Teacher 1 did not ask questions. In fact, Teacher 1 also complained about her students not asking questions. Therefore for these two characteristics, it is not possible to conclude that when Teacher 1 exhibited those characteristics the students' motivation increased.

One of the most frequently observed characteristics within this category was 'lecturing reluctantly'. Teacher 1 stated that she did not want to teach reluctantly.

ST1 also supported the idea that Teacher 1 lectured enthusiastically. Teacher 1 was always active in the class and the ST1 said she tried to find a way to keep their interest alive throughout the lesson. Teacher 1 provided extra hours to overcome students' learning difficulties. During the observations I observed that Teacher 1 was enthusiastic about teaching and she was able to motivate the students by increasing the students' interest and the students' willingness to share ideas. Students of Teacher 1 seemed to enjoy the class hours and they were involved in the subjects were being taught. Therefore, by not exhibiting the characteristic, 'lecturing reluctantly', but instead the opposite of this characteristic, 'lecturing enthusiastically' Teacher 1 increased students' motivation. It is possible to conclude that if a teacher is enthusiastic about teaching, she/he can find a way to keep the students' interest alive.

Teacher 1 and ST1 had different opinions about what a suitable medium should be. Teacher 1 thought that arrangement of the desks was the most important indication of the suitable medium and ST1 thought that there should be silence in the class. It was impossible for Teacher 1 to make any changes in the arrangement of the desks. However, she managed to sustain the silence in the class as the ST1 desired. Teacher 1 succeeded in keeping the students' interest alive, since they all listened carefully and they from the beginning till the end of all the lessons she managed to motivate the students. Moreover, the teacher found the chance to ascertain the students' levels. In the middle of the class hour she sometimes told a story and she frequently attracted the students' attention. Therefore, by exhibiting this characteristic Teacher 1 increased the students' motivation.

To sum up, by displaying the characteristics within the category 'enthusiasm for teaching', Teacher 1 prepared a suitable medium for the students and she taught enthusiastically. She provided extra course hours to overcome the learning difficulties of students and so students' interest and attention to the subject increased. During the observations Teacher 1, by exhibiting the two characteristics within this category increased students' motivation.

7.3.3 Interactions between the Students' Motivation and the Characteristics of Teacher 2 in Category 3

The total frequencies for the most frequently occurring codes for each of these characteristics were added up for Teacher 2 in this category and these are presented in Table 7.8.

Table 7.8 The frequency of the observed codes for the characteristics in Category 3 for Teacher 2

Effective Teacher Characteristics	Code(s)	Freq.	Total Freq.
Seeking and trying to find out the answers to the questions that the teacher doesn't know	THC TSTS	1 0	1
Preparing a suitable medium for learning in the class	TAT TAC TUSR	3 2- 2	5 2-
Encouraging students to ask questions such as how?, why?, ...then what happens?	TESQ TESE	1 1	2
Lecturing reluctantly	TET TBTL TTR	0 3 (7-) 7	10 (7-)

Within this category, as presented in Table 7.8, the most frequently observed characteristic for Teacher 2, with 17 occurrences, was 'lecturing reluctantly'. The score of the code 'being on time for the lesson' (TBTL) was 7- in which "-" represents that during my observation Teacher 2 was late for the lesson 7 times. The other characteristics within this category were observed considerably less frequently. These characteristics were 'preparing a suitable medium for learning in the class' with 5 occurrences, 'encouraging students to ask questions such as how?, why?, ...then what happens?' with two occurrences, and 'seeking and trying to find out the answers to the questions that the teacher doesn't know' with one occurrence. Due to the fact that there was a noticeable difference between the frequencies of the characteristics I observed, I have based my analysis mainly on the characteristic that I most frequently observed, which was 'lecturing reluctantly'.

Teacher 2 indicated that she explained the concepts reluctantly in some lessons. She claimed that her reluctance was related to the reluctance of the students. She accepted that lecturing reluctantly affected the students' motivation negatively.

> …R: "How and why does your reluctance while teaching affect the students' motivation?"
> Teacher 2: "It affects them negatively because on some days I am truly reluctant to teach. This is to do with the students' own reluctance. If the students are uninterested then I am uninterested"…(p.19)

In the answer of another interview question she confessed that she explained the concepts reluctantly since sometimes her own problems get bigger in her head. The following excerpt indicates her views.

> …R: "When you carry your own personal problems into the classroom how do you think the students will be affected by this? How and why is your students' motivation affected when you teach in a reluctant manner?"
> Teacher 2: "My motivation and performance decrease. But I try my best not to show my problems. Your problems get bigger in your head and you teach reluctantly. The students' motivation is affected in the same way. This sort of thing doesn't happen in every lesson but sometimes it does and I can't prevent it. I can't say I teach really reluctantly but of course it has an effect"…(p.21)

ST2 supported the views of Teacher 2 in that in some lessons the teacher was reluctant especially when she had difficulty in explaining the concepts.

> …How and why does your teacher's reluctance / enthusiasm when teaching affect your motivation?
> S2-1: "In fact the teacher's enthusiasm could in some way increase my motivation but for me the teaching of the subject is also important. How enthusiastic she is, if her knowledge is lacking and she can't teach well then this affects me negatively."
> S2-2: "That's true. Our teacher is enthusiastic in some of the lessons but when she can't find the answers to some of our questions our understanding becomes difficult and we aren't motivated in the lesson."
> R: "How do you understand that a teacher is enthusiastic?"
> S2-2: "She interacts well with us. She has control of the class. She is always on her feet."
> R: "What do you think S2-1?"
> S2-1: "When she really does everything to help us understand then I do."
> R: "Could you explain what you mean by 'everything'?"
> S2-1: "Sometimes she changes the examples and gives us different examples."
> R: "Does your teacher do these?"
> Students: "Yes, sometimes; but usually no (she did not)"…(p.23)

With respect to the ST2 the teacher should be active in the class. She should give them different opportunities to learn. In fact, evaluating and understanding the teachers' reluctance was more difficult than evaluating and understanding the teachers' enthusiasm. The following steps with excerpts from the field notes

corroborate the fact that Teacher 2 was reluctant, especially when teaching this specific class.

> …At the beginning of the observations she complained about the class and she told me that;
> Teacher 2: "I taught this class last year and every student that I don't want to see is in this class"…(p.98)

I observed that Teacher 2 came to the class 3-5 minutes late. I observed Teacher 2 for ten weeks and she was late for 7 times. This shows that she was not enthusiastic about teaching. Moreover, the following excerpt from my field notes supported my interpretation that Teacher 2 was not happy to teach this class.

> …Students: "These subjects are difficult, Miss" they said.
> Teacher 2: "Why did you come to the Science strand? I warned you last year many times not to come to the Science strand", she said…(pp.132-133)
> …The teacher looks tired. Her tone of voice and the amount of her movement around when she was teaching has decreased. The students begin to make noise… (p.112)

All of the examples given above indicate that she was not enthusiastic about teaching in this class. Teacher 2 showed reluctant behaviors and this affected the students' motivation negatively. Furthermore, I have supported my interpretations with an informal interview with the students of Teacher 2.

> …R: "Right, which of your teacher's behaviors or appearance have had a negative effect from the point of view of your motivation in this lesson?" he asked.
> S2-6: "It affects me when she looks ill. When she is ill she is bad-tempered".
> S2-3: "She went over the subjects really quickly"…
> S2-12: "She makes us write too much...When I'm writing I sometimes don't even think about what I am writing. I think to learn the subject I just need to read what I have written at home and I follow the lesson less…" (pp.112-113)

According to the intrinsic motivation theory, the teacher should be enthusiastic about teaching in order to increase the students' interest. The teacher should encourage the students to research and she should ensure that they enjoy what they are learning. Brophy (2004) suggested that teachers should find time to implement meaningful learning activities. In order to use the time efficiently the teacher should be on time for the lesson. Brophy also suggested that the teacher should introduce the curriculum with enthusiasm to focus the students' interest on the lesson. Therefore, with respect to the above discussions, it is possible to conclude that when the teacher lectures reluctantly the students feel rejected. It decreases students' interest and awareness, thereby decreasing students' motivation.

7.3.4 Summary of Findings for Characteristics of Teacher 2 in Category 3

The effects of the characteristics like ‘preparing a suitable medium for learning in the class’ and ‘encouraging students to ask questions such as how?, why?, ...then what happens?’ have not been concluded for Teacher 2 since there was not enough evidence from the observations. In terms of the characteristic ‘seeking and trying to find out the answers to the questions that the teacher doesn’t know’, I would state that Teacher 2 had some difficulty in answering the questions of the students, and she was not willing to research to improve herself. She did not encourage the students to research, either. The observational findings considered in Section 7.1.3 and Section 7.2.3 also supported my interpretations. Therefore the students could not construct clear understandings about the concepts. Their interest decreased and they did not participate in the lesson. Therefore, the motivation of the students decreased.

The characteristic ‘lecturing reluctantly’ was analyzed in this category for Teacher 2. Teacher 2 confessed that she sometimes taught reluctantly. The ST2 indicated that they were affected negatively by her reluctance. They thought that the teacher should be active in the class. In fact, during my observations Teacher 2 could be considered not to be enthusiastic about teaching in this class. While she exhibited reluctant behaviors, students started to make a noise, they became uninterested. Therefore, the conclusion that this characteristic would decrease students’ motivation can be reached from the above discussions.

7.3.5 Comparing and Contrasting the Characteristics that Teacher 1 and Teacher 2 Possess for Category 3

The third category in this study was ‘enthusiasm for teaching’ that included four characteristics. Within this category, the characteristic ‘encouraging students to ask questions such as how?, why?,…then what happens?’ was the least frequently observed one for both teachers. Teacher 1 and Teacher 2 did not encourage the students to ask these kinds of questions. ST1 thought that Teacher 1 asked those questions so they did not need to ask them. Teacher 2 thought that

students frequently ask those questions without her encouragement and she understood that the students were motivated. The ST1 and ST2 thought that those questions were crucial in terms of their learning only if the teachers would answer them immediately after they had asked. Therefore, for both teachers the effect of this characteristic on students' motivation was not concluded.

The participants understood "preparing a suitable medium for learning" from different perspectives. The students and the teachers had quite contrasting ideas. Teacher 1 thought that the arrangement of the desks in the class was important for interactions in the class. Likewise ST2 emphasized that the participation and discussions in the class would affect their motivation. Teacher 2 and ST1 thought that the suitable medium was a silent one and that all students should be good observers and listeners. Therefore one teacher's perspective matched the perspective of the students of the other teacher. This could be an interesting result in that perhaps it suggests that the students are not happy in the medium of their classes in terms of learning. In fact Teacher 1 could not change the arrangement, since the class was crowded. However, Teacher 1 was able to prepare a suitable medium for learning, by providing revision at the beginning of the lesson, and then providing recognition and credit words. She attracted and maintained the students' attention and then she included activities while she was lecturing. Teacher 1 sometimes told a story to attract the students' attention when their interest had decreased. Therefore Teacher 1 exhibited the characteristic 'preparing a suitable medium for learning in the class' and she was able to increase the students' motivation. On the other hand, Teacher 2 did not exhibit this characteristic. I can not say that she exhibited the opposite of this characteristic; namely she did not prepare an unsuitable medium for the students to prevent their learning. There was not enough evidence in terms of Teacher 2 to conclude the effect of this characteristic on students' motivation, so there was not any conclusion for Teacher 2 with regard to exhibiting this characteristic.

In terms of the characteristics 'seeking and trying to find out the answers of the questions that the teacher doesn't know' Teacher 1 tried to sustain the students' thinking skills. I did not observe any situation that Teacher 1 and Teacher 2 honestly confessed not to know. ST1 thought that there were no

questions which the teacher did not know the answer to. ST2 thought that, see Section 7.2.3, they used to ask questions but the teacher had some difficulty in answering those questions. I observed that the students of Teacher 2 give up asking questions since she had some difficulty answering. She did not do any research about any questions to which she did not know the answer. There was a decrease in students' self confidence and they were unable to construct clear understandings. Therefore reaching a conclusion for Teacher 1 was not possible because of lack of observational data, but there was a decrease in students' motivation since Teacher 2 did not exhibit this characteristic.

Teachers thought that if the teacher wanted to increase the students' motivation they should teach enthusiastically. Students thought that when the teacher was enthusiastic she had good communication with the students. Teacher 1 managed the class, she was always active, she solved different problems and the teacher encouraged the students to explain the concepts with their own words. She tried to make the lesson interesting by telling stories and encouraging the students to take part in the activities, so the students of Teacher 1 could not stay uninterested and they enjoyed what they did. Teacher 1 exhibited enthusiasm for teaching, so she increased the students' willingness to share their ideas and increased in their interest. It is likely to conclude that she increased the students' motivation by exhibiting the opposite of the characteristic 'lecturing reluctantly'. On the other hand, Teacher 2 was often late to the lesson and she criticized the students, upset some of the students in the class and usually she stayed passive in the class. Therefore, in that way Teacher 2 showed her reluctance during the lesson and as a result the students' interest and attention directly decreased. It is possible to conclude that Teacher 2 would decrease students' motivation by exhibiting this characteristic.

7.4 Activities for Meaningful Learning

The activities for meaningful learning included the characteristics 'making the physics lesson interesting by giving examples from daily life', 'during the class session, introducing some concrete equipment related to concepts' and

‘asking questions to the students to enhance the active participation’. Firstly, I have presented, in the remainder of this section, the findings from the two case teachers individually. Then a cross-case analysis has been presented.

7.4.1 Interactions between the Students’ Motivation and the Characteristics of Teacher 1 in Category 4

The total frequencies for the most frequently occurring codes for each of these characteristics were added up for Teacher 1 in this category and these are presented in Table 7.9.

Table 7.9 The frequency of the observed codes for the characteristics in Category 4 for Teacher 1

Effective Teacher Characteristics	Code(s)	Freq.	Total Freq.
During the class session, introducing some concrete equipment related to the concepts	TCEC	0	0
Making the physics lesson interesting by giving examples from daily life	TPPN TRC TPST	15 19 18	52
Asking questions to the students to enhance the active participation	TEP TEH	63 1	64

Within this category, as presented in Table 7.9, the most frequently observed characteristic for Teacher 1, with 64 occurrences, was ‘asking questions to the students to enhance their active participation’. At the same time, this was the characteristic with the highest frequency among all the categories. The other frequently observed characteristic within this category was ‘making the physics lesson interesting by giving examples from daily life’ with 52 occurrences. The least frequently observed characteristic within this category, with no occurrences, was ‘during the class session, introducing some concrete equipment related to the concepts’. Due to the fact that there was a noticeable difference between the frequencies of the characteristics I observed, I have based my analysis mainly on the two characteristics that I most frequently observed.

Teacher 1 stated that she always tried to find examples related to real life. She said she could not manage to find examples for every concept in physics. However, she thought that she should support most of the concepts with a real life example. Teacher 1 thought that by giving those examples she tried to make the lesson interesting and enjoyable in order to support meaningful learning. She stated that when teachers did not give examples from daily life they could not motivate the students and she said she recognized whether they had understood or were motivated from the way they looked at her.

> …R: "In almost every lesson I observed you made the physics lessons interesting and fun by giving examples from daily life. How and why do you think examples like this affect the students' motivation?"
> Teacher 1: "It's important because physics is already difficult enough…I don't want to be a teacher who makes it even more difficult…I want the 80 minutes to be fun and educational for them because my physics teacher never explained anything like this or in this way. That's why I try to make it interesting and I understand that they have understood and are motivated by the way they behave"…
> Teacher 1: "I also think that you should make connections between the examples you have given and the lesson. It's no good having the lesson here and the example there"…(pp.8-9)

ST1 claimed that the daily life examples were useful tools for meaningful learning and to have fun. They stated that to understand the real world applications would only be possible with those examples. ST1 thought that they directly increased their motivation.

> …R: "How and why does your teacher giving you examples from real life when she is teaching affect your motivation?"
> S1-2: "Positively, because when we imagine things we've seen in real life we understand what they are like in reality."
> S1-3: "It's more fun."
> S1-4: "It's more meaningful. Because it's things we always see"…
> S1-2: "Actually when we see those things outside of school, every time we see them we remember our lessons and the things we've learnt"…(p.29)

When Teacher 1 provided examples from daily life, students started to participate in the discussions in the class and the students did not get involved in other things but instead focused on the lesson. The following passage from my field notes indicates the situation.

> …Teacher 1: "Yes S1-9, can you give me an example of force from daily life?" she asks. The student pushes her hand against the desk
> S: "Miss, this is an example of force" she says.
> Teacher 1: "Yes, good. Anything else?" she asks. The students are quiet for a while and then one student says
> S: "Gravitational force"

> Teacher 1: "Yes, that's weight. Anything else? You boys are obviously not very interested in football" she says.
> One male student,
> S: "Is it the force applied to the ball, Miss?"
> Teacher 1: "Yes, of course. Pushing force, or" taking a piece of paper and ripping it, "I pull this to tear it, that's pulling force" she says. All of the students are following the teacher with their eyes.
> Teacher 1: "It can also be the force applied to a car engine, I mean you can see force at every moment in your daily lives" she says.
> During this explanation and when the examples were being given some students raised their hands to indicate that they wanted to give examples. Some of the students were giving examples from where they sat… (p.49)
> …Teacher 1: "Perhaps there are hundreds of movements in our daily lives which we do like this" she said.
> Teacher 1: "What is there for example?", she added.
> S: "We open a door", said one student. Another student
> S: "We turn on a tap" he said.
> Teacher 1: "That's right, good it's movements like these" she said.
> …Teacher 1: How did it turn?" she asked.
> S: "It turned a round a pivot point. For example, the window turns like this", he said. He indicated the hinge of the door turning with his hand… (p.60)

The students' interest increased and they enjoyed the process. Even if they had been talking or doing something else they became interested in the subject matter. The following excerpts from my video recordings supported my interpretations.

> …She mentioned the car factories where there were rolling surfaces that are used to test the speed of a car; she emphasized that although the car is not moving there is a value on the speedometer that shows the speed of the car without any displacement. Mostly, the male students were very interested in this subject, there were students who gave up writing to their notebooks and followed the teacher intently…(p.77)
> …Teacher 1: "The working principle of the rockets could be explained by one of the three laws of the dynamics" she said. "Find this law and explain it' she said. The students stopped talking amongst themselves and began to follow the teacher. She told them that the mechanism which ejects a pilot with the seat from a plane is also worked with the same principle…(p.86)

When the teacher ensures that the students enjoy the tasks, the students voluntarily participate in the classroom discussions. They engage in the lesson by finding examples from their daily life experiences and they enjoy the task. Therefore according to the intrinsic motivation theory and with respect to the above discussions, when the teacher makes the physics lesson interesting by giving examples from daily life, the students' interest and attention increase, thereby resulting in an increase in the students' motivation.

The most frequent characteristic within this category was ‘asking questions to the students to enhance the active participation’. Teacher1 and ST1 thought that this characteristic increased their motivation. Teacher 1 indicated that students’ interest should be alive from the beginning till the end of the lesson. She claimed that she asked questions in order to make them aware of the concepts. She stated that if she could achieve this, then the motivation of the students increased. In fact, in the interview, there is a sentence of Teacher 1 that emphasized the main process of increasing student’s motivation. She claimed that in order to achieve fully motivated students in the class a teacher should do more than one thing. The following excerpt indicates her views on the effects of this characteristic.

> …R: “How is the motivation of your students affected when you ensure their active participation by asking them questions?”
> Teacher 1: “It is affected. From the beginning of the lesson when I revise the subject I continually bring them to the board in order to attract their attention and I try to share the subjects of the lesson with them. When I succeed in this, their motivation increased.”
> R: “When you bring a student to the board and he can’t solve the problem do you help him at the board and how does this affect his motivation?”
> Teacher 1: “I help. It definitely increases. At least it develops their self confidence. I have never said to the student at the board you sit down let someone else do it…There is always a part of the question that they can do anyway. I mean I feel that I need to give them that self-confidence”… (p.9)
> …R: “How do you understand when their motivation has increased or decreased?”
> Teacher 1: “Actually, it only lasts a short time. It’s a mistake to think that everything you do will keep the students’ interest alive (throughout the lesson). Sometimes their lack of motivation decreases even my motivation... As I said, I prefer to see students who challenge me but unfortunately there are not many students who make me sweat”…(pp.10-11)

ST1 thought that they tried to be prepared for the questions by taking notes and participating in the discussions. They thought that while they were trying to find an answer to the question they became interested in the subject and their motivation increased. The following passage indicates their views.

> …R: “How is your motivation students affected when the teacher ensures your active participation by asking you questions?”
> S1-1: “When we know the question we want to participate in the lesson. I mean we listen well.”
> S1-4: “It means that each student is more awake in the lesson.”
> S1-2: “It has a positive effect. We are always ready. To be able to answer the question we need to follow the teacher carefully. We write down whatever she writes down.”
> S1-3: “Sometimes the teacher asks us questions which we are interested in before we even have the chance to ask them. I get surprised sometimes when she asks the

> question that was in my head. 'Trying to find the answer' forces (the students) in whole class to study. We are motivated."...(p.30)

This characteristic increased students' attention towards the subject matter and they became aware of the subject. There were many examples related to this characteristic, but the following passages from my field notes were thought-provoking ones.

> …She draws a new shape on the board and asks the students for their comments on it. Most of the students are raising their hands or sharing what they know with their teacher from where they are sitting. The teacher responds to what they say with statements such as "Yes", "Good", "OK, that's right."...(p.59)
> …Teacher 1: "Are you afraid of physics?" she asks.
> A few students raise their hands.
> Teacher 1: "Who is most afraid?", she asks.
> Teacher 1: "Let's ask the most frightened person this question," she says and asks a student from the front up. By helping the student at the board by telling him the distances and lengths she gets him to answer the question…After he has answered the question he says "It was easy, Miss".
> Teacher 1: "If you study there is nothing to be afraid of", she says. (p.66)

The following examples from my video recordings also support the idea that the students' motivation is affected by this characteristic and that it increases.

> Teacher 1: "OK, S1-5 what can we say about your position. Describe it with reference to the board" she said to a student in the middle row.
> S1-6: "It is 6 from the front of the board or 6 from the back", he said.
> Teacher 1: "Yes, well done", she said.
> Teacher 1: "It can be described like this. We need to have a reference point. S1-5 come here", she said.
> Teacher 1: "Look (to the class) S1-5, make a displacement. He has come next to me from where he was before", she said. All the students are watching these events carefully and most of them are following the teacher with their eyes.
> Teacher 1: "S1-10, now give me S1-5's position with relation to the board", she said.
> S1-10: "About 1 meter in front of it with her back facing it", she said.
> Teacher 1: "Where was he a while ago?", she asked.
> S1-10: "He was 6 meters in front of it. Now he is one meter in front", she said.
> Teacher 1: "So his position has changed. What can we say the result of this is?" she asked
> Students: "He has displaced" they said.
> Teacher 1: "Yes, so you identify the first position. If there is a difference between the first position and the final position this means the object had changed its place" she said. While the teacher is explaining the lesson the students are showing from where they sit that they are enthusiastic about answering the teacher's questions. (p. 72)

According to the Keller's ARCS model, sustaining the curiosity during the lesson increase the students' interest. The students pay more attention to the subject that is taught. One of the ways for the teacher to gain students' attention is

by asking questions to them to enhance their active participation. Teachers could also encourage students to ask questions without feeling humiliation. Therefore, it is possible to conclude that by ‘asking questions to the students to enhance the active participation’ students’ willingness to participate increases and the students become concerned about the subject, thereby increasing the students’ motivation.

7.4.2 Summary of Findings for Characteristics of Teacher 1 in Category 4

During the selection of the teacher process, I carried out informal interviews with Teacher 1 and the students of Teacher 1. They declared that Teacher 1 brought some concrete equipment related to the concepts to the class. However, during my observations, the characteristic ‘during the class session, introducing some concrete equipment related to the concepts’ was not observed. On the other hand, the other characteristics were the most frequently observed ones, even in the other categories.

The code, encouraging students to participate (TEP), was the most frequently occurring code, with 63 occurrences. Teacher 1 usually exhibited the characteristic ‘asking questions to the students to enhance the active participation’ and she frequently encouraged the students to share their ideas, participate and ask questions. Teacher 1 usually asked questions by nominating the students who seemed disinterested. The students felt self-confident and they willing to share their ideas. The students became more aware of the subject when Teacher 1 encouraged them to give answers to the questions she asked. Therefore, by possessing this characteristic and exhibiting it frequently in the class, she managed to motivate the students during the lesson.

The other most frequently occurring characteristic in the class of Teacher 1 was ‘making the physics lesson interesting by giving examples from daily life’. While exhibiting this characteristic, Teacher 1 also provided scientific truths to the students and she provided links between prior and new knowledge. I observed that when Teacher 1 asked for real life examples the students also shared their ideas and they participated in the lesson. They were aware of the subject. The

students' self-confidence and their interest increased. Therefore, by exhibiting this characteristic, Teacher 1 increased the students' motivation.

To sum up, two of the characteristics within the category 'activities for meaningful learning' were frequently exhibited by Teacher 1. The most frequently occurring codes were also in this category for Teacher 1. Therefore, it can be stated that most of the time during the lesson, Teacher 1 displayed these characteristics and she managed to increase the students' interest and attention in the lesson, causing an increase in students' motivation.

7.4.3 Interactions between the Students' Motivation and the Characteristics of Teacher 2 in Category 4

The total frequencies for the most frequently occurring codes for each of these characteristics were added up for Teacher 2 in this category and these are presented in Table 7.10.

Table 7.10 The frequency of the observed codes for the characteristics in Category 4 for Teacher 2

Effective Teacher Characteristics	Code(s)	Freq.	Total Freq.
During the class session, introducing some concrete equipment related to the concepts	TCEC	1	1
Making the physics lesson interesting by giving examples from daily life	TPPN TRC TPST	6 9 (2-) 3 (1-)	18 3-
Asking questions to the students to enhance the active participation	TEP THE	22 2	24

Within this category, as presented in Table 7.10, the most frequently observed characteristic for Teacher 2, with 24 occurrences, was 'asking questions to the students to enhance the active participation'. The other most frequently observed characteristic within this category, with 18 occurrences, was 'making the physics lesson interesting by giving examples from daily life'. The least frequently observed characteristic within this category, with one occurrence, was

'during the class session, introducing some concrete equipment related to the concepts'. Due to the fact that there was a noticeable difference between the frequencies of the characteristics I observed, I have based my analysis mainly on the two characteristics that I most frequently observed.

One of the most frequent characteristics within this category was 'making the physics lesson interesting by giving examples from daily life'. Teacher 2 emphasized the importance of the real life examples. She said those examples really affected students' motivation. She said the motivation of students directly increased. However, she indicated that she did not try to bring concrete equipments related to daily life examples to the class. The following excerpt from the transcripts of the interview clarified her thoughts.

> …R: "I have observed that in a few physics lessons you used examples from daily life to make the lessons more fun and interesting. How and why do you think these kinds of examples affect the students' motivation?"
> Teacher 2: "I try to give these kinds of example depending on the kind of lesson. It definitely has a positive effect. The students can visualize the concepts. Otherwise the lesson is abstract"…(p.19)

ST2 strictly emphasized almost the same points as Teacher 2. They said they could link concepts to real life. They stated that if the teacher provided concrete tools related to those examples it would be more interesting than just giving the examples and they became motivated. The following passage taken from the interview transcripts explained the situation.

> R: "How and why is your motivation affected when your teacher uses examples from daily life when she teaches?"
> S2-1: "It helps us to be able to see something. We make connections with daily life. If she doesn't give examples we can't understand the subject fully. Examples are very important for me."
> R: "When you didn't understand some of the subjects your teacher used some equipment she had found to try and explain them to you. How did this affect your motivation?"
> S2-1: "I didn't really notice that."
> S2-1: "Sometimes she does that. For example when she was teaching homogenous rods in moment equilibrium she used my friend's pencil. It was a bit more memorable like that"…(p.41)

When Teacher 2 gave examples from daily life of the students started to participate in class discussions and they enjoyed what they were doing. Therefore their motivation increased.

> …Teacher 2: "We studied simple machines. What is the aim when using a simple machine?"

> Students: "To benefit from force" they all said at once. This subject can be found in the curriculum of the 8th grade.
> Teacher 2: "Which example from daily life can you give?"
> …The students reply "pulley". All of them are raising their hands and asking to contribute. The teacher asking them to find examples from daily live has increased their interest and motivation.
> Teacher 2: "They can be found in construction can't they? Anything else?" she asked.
> Students: "Nutcracker, scissors" they said.
> Teacher 2: "What about tweezers? The girls know all about them. What else do we know about simple machines? Is there anyway who thought to look it up before the lesson?" The students are eagerly trying to give examples and are participating in the lesson…(p.131)

The second observer supported my interpretations related to this characteristics and students' motivation.

> …The teacher asks the students to give some examples from real life. When one student gives the example "wheel barrow" the teacher informs him that force can not be achieved with a wheel barrow when in fact a wheel barrow is a simple machine and the teacher had already said that it was in the previous lesson.
> …The students gave examples such as "pulley, nutcracker, (and) scissors". They were participating well in the lesson and it seemed as if giving real life examples made them happy. Some students were enthusiastically raising their hands to give examples and the teacher was encouraging them to give more examples by saying "Yes, anything else?".
> Some of the students give the example of set of pulleys…(p.136)

According to the intrinsic motivation theory, see Section 2.3.1, 'making the physics lesson interesting by giving examples from daily life' increases students' willingness to participate to the classroom discussions. Therefore, the students' interest increase and they pay attention to what the teacher has taught, thereby increasing the students' motivation.

The most frequent characteristic for this category was 'asking questions to the students to enhance the active participation'. Teacher 2 stated that she nominated some students to answer questions so that they would participate in the class discussions. She stated that it affected and increased the motivation of a student who could answer the question. She chose a student in the class to ask her a question in order to try to make her participate in the discussions. ST2 stated that they were interested in the subject and listened to the teacher carefully since the teacher could ask a question at any time during the lesson. If the questions included some details with respect to the concepts they indicated that they could understand the concepts when they answered those questions. The following excerpts from my field notes indicate the situation.

> …R: "How is the students' motivation affected when you ensure they participate actively by asking them questions?"
> Teacher 2: "I ask them questions as I explain the subject to make them participate. In fact, being able to answer increases a student's motivation. I choose some students who can answer and some who can't to come to the board."…(p.19)
> …R: "How is your motivation affected when asking you questions ensures you participate actively?"
> S2-1: "It affects us positively. Everyone in the class thinks they are about to be asked a question. Everyone listens more carefully and is motivated in the lesson."
> S2-2: "When the teacher brings the subjects to our level we understand them more easily. If the questions include details from the subjects then this makes us more motivated."…(p.42)

During my observations, Teacher 2 frequently asked questions to the students to make them aware of the concepts. She usually asked questions related to the examples and she encouraged the students to participate in solving the examples. Students got used to answering the questions of the teacher. They mostly participated in the discussions. She applied this technique more than three times in some lessons. By possessing this characteristic Teacher 2 increased the motivation of the students. The following excerpt from my field notes enhances my interpretations.

> …Teacher 2: "Who wants to solve this one?" she asked.
> S2-7: "Miss, is it asking with respect to the ground?" he asked.
> Teacher 2: "Yes, S2-7. The question is clear. You will find velocity relative to the ground" she said.
> Most of the class raised their hands and indicated that they wanted to answer the question. S2-4 was discussing the solution to the problem with the person sitting next to him. Some of the girls sitting next to the window were arguing about something else
> Teacher 2: "Come on S2-1", she said. S2-1 immediately jumped out of his seat and began to solve the problem…(p.123)

The following passage from the field notes of the second observer supports my interpretation.

> …After having written the problem and without giving anyone a chance to reread it the teacher asked who wanted to do it. The students in the front of the class were raising their hands…The teacher brought one of these students to the board and sat down while this student solved the problem. The teacher, from where she was sitting, by interfering at some points tried to make the question understandable for the student…instead of following what was being done on the board, preferred to try and solve the problem by themselves in their own notebooks…(p.128)
> …The teacher writes another example on the board but it is similar to the first two examples. The difficulty of the examples is not increasing. Student S2-3 wants to come to the board to answer the question…The teacher allows another student to speak. After this, S2-3 does not really follow the lesson. The other student answers the question correctly… (p.138)

> …The teacher writes a new question on the board. The question is composed of two parts. The students write down the question. This time the teacher calls S2-3, who she had previously refused, to the board… He starts to answer the question but is helped by the teacher when he gets stuck. Despite this help, student S2-3 does not find the correct answer. The teacher explains to him again and asks him to try again. To solve the second part of the question the teacher calls a boy…When he gets stuck the teacher asks another student to continue...(pp.138-139)

When the teacher displays the characteristics 'asking questions to the students to enhance the active participation' the students pay attention to the lesson and they feel satisfied, as stated in Section 7.4.1. The teacher encourages the students to participate and she allows them to ask questions. According to Keller's ARCS model and the intrinsic motivation theory the students' interest increases and they pay attention to what is being taught, thereby leading to an increase in students' motivation.

7.4.4 Summary of Findings for Characteristics of Teacher 2 in Category 4

According to the observations in the class of Teacher 2, she exhibited the characteristic 'making the physics lesson interesting by giving examples from daily life' frequently. ST2 also enjoyed the lesson when they found examples from daily life and when they linked the concepts with their lives. The students of Teacher 2 could construct clear understandings and they were willing to share their ideas. When the teacher displays this characteristic there would be an increase in students' motivation.

The most frequently occurring code for Teacher 2 within all categories was 'encouraging students to participate', with 22 occurrences. Teacher 2 encouraged the students to participate and sometimes she asked questions to increase students' interest. When ST2 answered the questions of Teacher 2, they were aware of the subject. The students' self-confidence increased and the motivation of the students increased.

To sum up, with respect to my observations two of the characteristics within the category 'activities for meaningful learning' were the only positive effective physics teachers' characteristics that Teacher 2 obviously exhibited. By exhibiting those characteristics, she managed to increase the students' interest and attention in the lesson and she made the students aware of the subject. During the

observations Teacher 2 exhibited the characteristics in this category, causing an increase in students' motivation.

7.4.5 Comparing and Contrasting the Characteristics that Teacher 1 and Teacher 2 Possess for Category 4

Category 4 'activities for meaningful learning' included three characteristics. Within this category, the characteristic 'during the class sessions, introducing some concrete equipment related to the concepts' was the least frequently observed one for both teachers. On the other hand the other two characteristic were observed frequently in the lessons of Teacher 1 and Teacher 2. Teacher 2 was selected since she exhibited mostly the negative effective physics teacher characteristics. Interestingly she displayed the two positive characteristics that were related to providing daily life examples and enhancing active participation. The number of occurrences of the codes representing the two characteristics exhibited by Teacher 1 was far greater than that of Teacher 2. The students of Teacher 1 and the students of Teacher 2 were willing to participate in the lesson and they also gave examples from daily life. Both teachers also asked questions to enhance the active participation of the students. However, the frequency of code TEP for Teacher 1 was almost three times greater than that for Teacher 2. During my observations, even if there was an increase in the students' motivation of both teachers, I observed that the students of Teacher 1 were more enthusiastic about learning physics than the students of Teacher 2. Finally, in general the teachers that possess mostly the positive effective teacher characteristics of the teachers are more able to motivate the students than the teachers that possess mostly the negative effective physics teacher characteristics in this category.

7.5 Classroom Management

The characteristics that were analyzed under this category were 'keeping the students' interests alive during the whole lesson', 'being able to motivate the

students efficiently' and 'being interested in some students more than the whole class'. I have presented, in the remainder of this section, the findings from the two case teachers individually at first, and then a cross-case analysis has been presented.

7.5.1 Interactions between the Students' Motivation and the Characteristics of Teacher 1 in Category 5

The total frequencies for the most frequently occurring codes for each of these characteristics were added up for Teacher 1 in this category and these are presented in Table 7.11. For this category, the first two characteristics were combined and they were analyzed together since the codes for one of them could be implemented for the other.

Table 7.11 The frequency of the observed codes for the characteristics in Category 5 for Teacher 1

Effective Teacher Characteristics	Code(s)	Freq.	Total Freq.
Keeping students' interests alive during the whole lesson Being able to motivate the students efficiently	TPCC	9	38
	TAR	11	
	TAA	0	
	TGO	0	
	TIEL	1	
	TSC	5	
	TTV	12	
Being interested in some students more than the whole class	TSSP	0	0
	TSMP	0	
	TUTE	0	

The first two characteristics could be accepted as being together, namely, 'keeping the students' interests alive during the whole lesson' results from 'being able to motivate students efficiently'. These two characteristics was also the main concern of this study and since they were very general characteristics and they were accepted as one of the effective teacher characteristics as perceived by the

students and teachers they were not excluded from the study. Therefore the codes corresponding to these characteristics were more than for the other characteristics.

Within this category, as presented in Table 7.11, the most frequently observed the combined characteristic for Teacher 1, with 38 occurrences, was 'keeping students' interests alive during the whole lesson' and 'being able to motivate the students efficiently'. The characteristic 'being interested in some students more than the whole class' within this category has not been observed. Due to the fact that there was a noticeable difference between the frequencies of the characteristics I observed, I have based my analysis mainly on the two characteristics that I most frequently observed. In fact, being able to motivate students efficiently was the characteristic that seemed to be the main concern for whole study. Therefore, the analysis of this characteristic was both important and difficult to handle.

The combined characteristics 'keeping students' interests alive during the whole lesson' and 'being able to motivate the students efficiently' were the most frequent ones within this category. Teacher 1 wanted to have more theatrical ability so that she could attract the students' attention more than she actually did. She indicated that when there was an activity or role play the students were willing to be a part of the activities. She believed that when wondered that students work together, they have fun together and learn together. She stated that she wanted to make all the students a part of the activity. She indicated that the students' willingness to be part of an activity increased, and so their motivation increased. The following excerpt from the interview transcript of Teacher 1 indicates the situation.

> …R: "How and why would keeping the students' interest alive throughout the lesson affect their motivation?"
> Teacher 1: "It would affect it positively. If they are interested throughout this lesson this shows that they are motivated anyway."
> R: "How do you manage to do this?"
> Teacher 1: "I start each lesson by revising the previous lesson until the students feel they are ready for this lesson… I don't feel that they do much preparation at home"…
> R: "Which methods do you use to keep the students' interest alive (activities, games, lab work, computers etc)"
> Teacher 1: "I do activities and games and they remember them. They really remember them…if I had more theatrical ability maybe I would do, I don't know,

> maybe change my voice, my accent, I think all these attract the students' attention …and affect them positively. They join in the games of their own accord anyway."
> R: "When they join in the games of their own accord and they are a part of the game can you say that they are motivated?"
> Teacher 1: "I think so. I want to do something…I want them to be aware that they can have fun together and learn together."
> R: "Active participation?"
> Teacher 1: "Yes, active participation, that's want I want. They (only referring to this class) don't participate much sometimes, I don't know, they seem to be moaning."
> R: "Then what do you do, for example with the activity you have planned, or designed, when they don't participate, what do you do?"
> Teacher 1: "I try to plan them really well before I go into the class, I mean if I do it like this, this will happen, or if I do it like this what will their reaction be, I plan these in my head before entering the lesson…the point when the students' interest is aroused is important for me"…(p.13)

Teacher 1 stated that she was ready to create every opportunity for the students to learn. The teacher could be considered as being enthusiastic with respect to the above passage and this is supported by my interpretation in Section 7.3.1. In the following passage taken from the interview she indicates that the word 'good motivator' was quite thought-provoking for her.

> …R: "Which of your characteristics can you say makes you a good motivator? Should a good motivator work by making the students' success a prime consideration?"
> Teacher 1: "I possess the subject matter knowledge maybe but to say I am a good motivator might be going too far…I understand that they are motivated when they don't show signs of tiredness in their dialogues with me"…(p.13)

ST1 also thought about the activities that they did in the classroom. They found those activities interesting so their willingness to participate in the activities increased. During the interview I asked about any activities that they remembered. They remembered the cause and effect of those activities even though some of them had been done three-four months earlier. Furthermore, ST1 stated that using her voice effectively, walking around the desks, and being active during the lesson were the behaviors of the teachers which kept their interest alive.

> …R: "How is your motivation affected when your teacher keeps your interest alive throughout the lesson?"
> S1-1: "It's affected positively."
> S1-4: "As long as she does things to keep us interested our motivation increases. Our teacher does this anyway and our interest increases."
> R: "Are there any games or activities that you remember from the lessons? How did they affect your motivation?"
> S1-1: "For example there is the bus example. One of the students in the class was the bus driver. I was singing on the bus. The other students were passengers."
> R: "Yes, I observed that. What was the aim of this activity?"

S1-2: "We did it to see motion with constant deceleration and motion with constant acceleration and the differences between them."
S1-1: "There was also the concept of inertia. We did that too."
S1-4: "This activity made it easier for us to understand the lesson."
R: "S1-5, was the value you saw on the bus's speedometer velocity or speed?"
S1-4: "Speed."
R: "Are there any others that come to mind?"
S1-1: "When we were studying moment we did examples involving opening and closing the door."
S1-2: "To see the effect of the length of the door handle on the moment."
S1-1: "We are more motivated. Our desire to join in the lesson and be a part of the game increases. It's fun"…(pp.30-32)

The students accepted the Teacher 1 as a good motivator and they told me her characteristics and behaviors made her a good motivator.

…R: "Which of your teacher's characteristics can you say makes her a good motivator? Should a good motivator work by making the students' achievement a prime consideration?"
S1-4: "The teacher's tone of voice and the way she uses her voice."
S1-2: "The look she gives us or her position, a look over her glasses, her facial expressions."
S1-1: "The way she teaches, doing the lesson together with us."
S1-3: "Her changing place all the time and moving around the classroom"… (pp.32-33)

I observed those activities and during some activities students became part of the activities and they mostly enjoyed what they did. Therefore the students' interest really increased. The following excerpt from my field notes partly identifies the situation.

…Teacher 1: "In order to apply the second condition of equilibrium the resulting force must be zero" she said and drew two intersecting forces on the board.
Teacher 1: "Where are you going to draw the third intersecting force?" she asked. More than half of the class raised their hands. The teacher walked between the desks attracting their attention. The girls sitting by the window were watching carefully. The teacher called a student to the board and he drew the diagram correctly. She got a notebook and made them pull it in three different directions (see Figure 7.2).

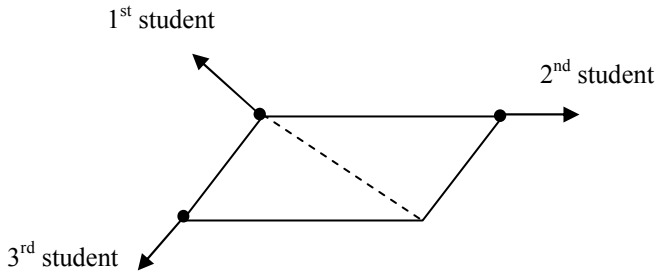


Figure 7.2 The role-play to determine the resultant force on the system

> These three students and the others who were sitting down watched this with interest.
> Teacher 1: "There is no motion, so there is equilibrium. This is why the resultant force is zero" she said…(p.51)
> …Teacher 1: "What do you know about moment? What is moment a result of?"
> S: "The turning effect of force" he said.
> Teacher 1: "Not turning. It is directly a result of the effect of the torque" she said.
> Teacher 1: "Bring me my chair. Who is the smallest in the class? "she asked.
> Students: "S1-1 Miss", they said.
> Teacher 1: "S1-1 come here dear and sit on the chair" she said. S1-1 sat on the chair. The whole class were participating and showing an interest. Because the class was crowded some of the students at the back stood up so as to be able to see. The teacher held the back of the chair and pushed it down so that it was turning on 2 legs with 2 legs in the air. S1-1 screamed.
> Teacher 1: "Yes, this is the force I have used and this is S1-1's scream. Next time when I ask about the effect of force you will remember S1-1's scream and the turning effect. That's why I asked you to close your notebooks. With the force you use when you close your notebooks you are turning the cover and the pages of the notebook" she said…(p.60)

The following excerpt from the video recordings also enhanced my interpretation related to this characteristic.

> …Teacher 1: "I would like the students I chose at the beginning of the lesson to come here" she said. She got them to sit down right at the front of the middle row. The other students in the class begin to laugh. It is especially amusing to them that student S1-1 is going to sing a song.
> The teacher is uncomfortable because of the noise (in the class).
> Teacher 1: "OK, right. It's impossible if you are going to be like this." she said.
> The teacher asks twice that the other students sit in the middle row but both 3-4 students next to the wall and the window do not move to the middle. Of course because the class is large the middle row is not big enough to take all the students…The teacher warned the students again about the noise. The middle row is now like a minibus. This is what the teacher had wanted the students to do, she wanted to relate the movement of the minibus to the subject of motion. Even at the beginning of the activity the students are cheerful and enjoying themselves. The teacher explains each person's role in the activity and it takes about 5 minutes before the activity begins…(pp.79-80)

The activity took longer than Teacher 1 thought. She had to warn the students all the time during the activity because of the crowd in the class. She seemed not to be happy since some of the students were not participated the activity.

> ...Two attempts to start have been made but her every time S1-1 starts to sing the students laugh even more.
> Teacher 1: "Please friends, join in the game, how old are you, your still at the age to play games" she said.
> There is a student directly behind the driver making engine noises. The vehicle is going forwards and in accordance with the teacher's instructions the vehicle and the passengers, that is the other students, are reacting.

> When the teacher says "there's a customer at the side, stop immediately" the student making noises makes a braking sound and the students at the back lean forward. A simple simulation had taken place. However…the students have somewhat strayed from the aim of the activity. It hasn't worked perfectly for this class. The amount of noise has prevented it being enjoyable. When the teacher realizes this she does not want to continue and she ends the activity…
> Teacher 1: "It didn't really work because you didn't concentrate. If you participate in things like this they will help you learn. You do not behave as you should", she said…(pp.79-80)

It was a very long activity. The class is crowded and the activity did not reach its aim. After this lesson Teacher 1 said she had done this activity before in the other classes but she was not happy with the students' approach this time. However, the students enjoyed what they did and most of them participated into the activity.

Gaining students' attention by engaging them to an activity makes the interest of the students increase. According to Keller's ARCS model, when the teacher applies proper techniques to sustain the students' curiosity, the students' interest increases. The teacher should encourage the students to participate an activity. If possible, the teacher should encourage all of the students in the class to actively participate in the classroom discussions. The teacher should identify the students' learning difficulties and she should avoid activities that are too hard or too easy. She should provide well structured activities and during the activity in the class, she should provide continuous communication by adjusting the tone of her voice. Therefore, it is possible to conclude that by 'being able to motivate the students efficiently' and by 'keeping students' interest alive during the whole lesson' the teacher increases the students' interest and the students pay attention to the lesson. Therefore, the motivation of students would increase.

7.5.2 Summary of Findings for Characteristics of Teacher 1 in Category 5

There was no clear evidence from my observations regarding the interaction between the characteristic 'being interested in some students more than the whole class' and students' motivation. I did not observe that Teacher 1 exhibited this characteristic.

Teacher 1 declared that there is no one thing that the teacher did that enabled her to keep the students' interest alive during the whole lesson. That's why she provided activities and role plays during the lesson. She avoided poorly planned activities and by this way she sustained their curiosity. Therefore she did not have to spend too much time on management problems. The students' willingness to take part in the activities increased. The students enjoyed what they were doing and the most crucial point is that they remembered the activities. During the interview I asked the ST1 and they could remember the cause and effect relationship between the activities and the concepts. The activities make them happy, since they have fun when they take part in an activity. Their self-confidence was also increased. Finally, Teacher 1, by possessing and exhibiting the two characteristics within this category, seemed to increase the students' motivation.

7.5.3 Interactions between the Students' Motivation and the Characteristics of Teacher 2 in Category 5

The total frequencies for the most frequently occurring codes for each of these characteristics were added up for Teacher 2 in this category and these are presented in Table 7.12. For this category the first two characteristics were combined and they were analyzed together as stated in Section 7.5.2.

Table 7.12 The frequency of the observed codes for the characteristics in Category 5 for Teacher 2

Effective Teacher Characteristics	Code(s)	Freq.	Total Freq.
Keeping students' interests alive during the whole lesson Being able to motivate the students efficiently	TPCC	3	7 1-
	TAR	0	
	TAA	1	
	TGO	0	
	TIEL	1-	
	TSC	2	
	TTV	1	
Being interested in some students more than the whole class	TSSP	0	5
	TSMP	4	
	TUTE	1	

Within this category, as stated in Section 7.5.1, the first two characteristics were combined together. As presented in Table 7.12 both characteristics had very low frequencies thus the observations do not give clear evidence regarding these characteristics. There were not any noticeable differences between the frequencies of the characteristics I observed. However, with respect to these characteristics I have collated evidence from the interviews with Teacher 2 and ST2. Therefore, the analysis of these characteristics with regard to Teacher 2 has mainly been based on the interview results without clear concrete evidence from other sources.

Despite the fact that these characteristics were not frequently observed in the lessons of Teacher 2, I will still be analyzing the characteristics in this category. This is due to the fact that even if the negative characteristics of Teacher 2 have not been frequently observed in the lessons, the effect on the students has clearly been shown. As I explained in the part dealing with teacher selection, see Section 6.5, this teacher was chosen since she showed negative characteristics more than positive ones.

Teacher 2 stated that 'keeping students' interest alive during the whole lesson' or 'being able to motivate the students efficiently' had an effect on students' motivation. She stated that she kept students' interest alive by warning the students who were uninterested in the subject during the lesson. She said that she asked questions directly to the students whom she considered to be low-motivated. She declared that she designed group work activities to make the lesson fun for the students. She complained about finding the time to carry out many activities and experiments. The following excerpt from the interview transcription with Teacher 2 indicates the situation.

> …R: "How and why does keeping the students' interest alive throughout the entire lesson affect the students' motivation?"
> Teacher 2: "Yes, generally I immediately say their (students who have lost interest) names to warn them. I mean, when I say their names they know that they should wake up and follow the lesson. I implement the lesson in the form of question – answer. I find examples that will interest the students. I try to make the lessons as fun and interesting as possible. When they have fun in the lessons they are more motivated"…
> Teacher 2: "We can't do experiments in this class. We only have a few lesson hours. Sometimes I do group work. They all join in and they enjoy it but most of the time I don't have enough time"…(p.20).

She indicated that she had a kind of link between the students and herself, and she said this was mainly based on her attitude towards students' personal problems or health problems. She stated that students liked her since they knew her and they knew her rules. She considered that when the students had learnt her rules, they liked her. She also indicated that she was harsh sometimes, in other words she liked to be the only authority in the class. The following excerpt from the interview transcription with Teacher 2 indicates the situation.

> …R: "Which of your characteristics enables you to say that you are a good motivator?"
> Teacher 2: "I am interested in everything about my students; their health problems, their financial problems – I even sometimes give them money to get home if they do not have enough – family problems, everything. In the lessons I am a strict teacher and I am harsh but students who know me and learn my rules are never a problem. They like me. I try to find out whatever is bothering my students and once they trust me we have a connection between us. I make jokes in the lessons but these are under my control. When I say it's finished, it finishes. In this way I don't have many problems in my lessons and my students are motivated"…(p.20)

With respect to ST2, Teacher 2 was not able to maintain their interest in the lesson. They thought that her reluctant behaviors such as being fed up or tired prevented the students paying attention to the lesson. However, they declared that Teacher 2 sometimes made jokes and she managed to increase students' interest at that moment. The following extract illustrates these situations:

> …R: "Can your teacher keep your interest alive throughout the lesson? How and why does this affect your motivation?"
> S2-2: "I can't say she totally keeps my attention. Sometimes she seems really tired and fed up when she comes to the lesson…I mean she doesn't have the energy to try and keep us involved in the lesson"…
> R: "How could a teacher do this?"
> …S2-2: "Actually sometimes when we have lost interest she makes a joke or if there is a current example to do with the subject she talks about that. She emphasizes the important points in the subject. However, sometimes when she does this we get off the subject and it's really hard to get back to the lesson. Sometimes she tells us 'research something and share what you have found in the next lesson' but we have not shared yet"…(p.43)

ST2 stated that Teacher 2 was the only authority in the class, as she declared in the interview with her. They considered that she did not have any tolerance for the students who did not study. The following excerpt from the transcripts of the interview with the ST2 indicates their views.

> …R: "Which of your teacher's characteristics do you think make her a good motivator? Should a good motivator work by making her students' success the top priority?"

> S2-1: "She has a strict but kind approach. She has no tolerance for those not studying in the classroom. She's authoritarian. She tries to do things at the students' level. She behaves nicely to us but in some lessons we can't even hear her while in others she shouts a lot"…(p.43)

During my observations, in one lesson students worked together on the blackboard. It was poorly planned work and it did not reach its aim. There were a lot of noise and students began to talk to each other. The following excerpt from my field notes identifies the situation.

> …S2-12 got up. He helped solve the question. Both S2-3 and S2-12 are at the board. The teacher steps back.
> Teacher 2: "From now on the teacher is not going to be the person teaching in this classroom. One of the best methods of learning is through group work" she said. The two students at the board started trying to solve the question.
> Teacher 2: "When the teacher's explanations are ineffective, it is more effective if the students explain things to each other" she said. The teacher began to emphasize the important points in the question.
> Teacher 2: "Somebody is looking out of a train window…" she said.
> Teacher 2: "S2-6 don't react like that!", she said…
> Teacher 2: "What can be said about the speed of the bus relative to its position?" she asked. As the students at the board continued to try and answer the question;
> Teacher 2: "OK, I'm drawing our figure" she said and sat down. S2-3 and S2-6 are arguing at the board and trying to solve the question but they haven't got a result yet. The teacher tells S2-12 to sit down.
> …When the students find an answer they are shouting it out without raising their hands. There is a lot of noise in the classroom. One of the students is trying to say something to the teacher but it can't be heard above the noise. The teacher laughingly says:
> Teacher 2: "Don't confuse us S2-7, be quiet" she said…(p.119)

Keller's ARCS model proposes that teachers should use various activities and methods to keep students' attention in the lesson and to increase their interest. The teacher should encourage the students to participate in an activity. If possible, the teacher should encourage all of the students in the class to actively participate in the classroom discussions. When the teacher does not apply those methods the students' motivation would decrease. When the teacher, for example, did not plan the activity well, the students could not participate in the discussions properly or they could not construct clear understandings. The teacher would spend more time on management problems than teach the subject. With respect to the discussions above, it is possible to argue that if the teacher does not apply the characteristics 'being able to motivate the students efficiently' and 'keeping students' interest alive during the whole lesson' properly it is possible to conclude that students' motivation would decrease.

7.5.4 Summary of Findings for Characteristics of Teacher 2 in Category 5

There were not enough evidence to conclude the interaction between Teacher 2 by possessing 'being interested in some students more than the whole class' and the students' motivation. In fact, during my observations she did not display that characteristic and during the interviews her students did not even mention such characteristic of her. Teacher 2 stated that she kept the attention of the students by calling the students' names during the lesson. She thought that the students knew her rules and those they respected to her. However the ST2 did not corroborate this. They declared that sometimes in some lesson they got off from the subject and they could never come back. I also observed that the activities that she tried to keep the students' attention were not well planned. She spent too much time on management problems. The students made a noise and they were unaware of the subject. When the teacher did not exhibit the characteristics 'keeping students' interest alive during the whole lesson', and 'being able to motivate students efficiently' the students' interest and attention decreased. Therefore, if the teacher does not possess and exhibit the two combined characteristics within this category, she would not able to increase students' motivation.

7.5.5 Comparing and Contrasting the Characteristics that Teacher 1 and Teacher 2 Possess for Category 5

The fifth category in this study was 'classroom management' that included three characteristics. Within this category, the characteristic 'being interested in some students more than the whole class' was the least frequently observed one for both teachers. The other two characteristics were combined during the analysis. Teacher 1 provided revision, activities, and continuous communication to sustain the students' curiosity. In extraordinary cases she needed to adjust her tone of voice to make the students pay attention. The activities were usually well designed and they were appropriate to the students' level. On the other hand, Teacher 2 provided group work that was not well designed. She usually spent too

much time on management problems and did not provide activities or other motives to keep their interest alive. In the light of all of above, it is possible to conclude that the teacher who possesses and exhibits the characteristics within this category, she would increase the students' motivation. However, if the teacher does not exhibit these characteristics in the class, it is possible to conclude that the students' motivation decreases.

7.6 Personal Characteristics

The personal characteristics of the case teachers were analyzed with respect to three characteristics which were 'considering about his/her personal problems', 'having fed up and tired behavior', and 'being hard-hearted, intolerant and tedious'. I have presented, in the remainder of this section, the findings from the two case teachers individually at first, and then a cross-case analysis has been presented.

7.6.1 Interactions between the Students' Motivation and the Characteristics of Teacher 1 in Category 6

The total frequencies for the most frequently occurring codes for each of these characteristics were added up for Teacher 1 in this category and these are presented in Table 7.13.

Table 7.13 The frequency of the observed codes for the characteristics in Category 6 for Teacher 1

Effective Teacher Characteristics	Code(s)	Freq.	Total Freq.
Considering about his/her own personal problems	TCD	0	0
Having fed up and tired behavior	TTB TBW	0 0	0
Being hard-hearted, intolerant and tedious	TTFI	0	0

For this category the three characteristics for Teacher 1 had no occurrences. I expected to see that there would be no occurrences for Teacher 1, since these characteristics in Table 7.13 were negative characteristics. Teacher 1 was selected because she displayed mostly the positive effective teacher characteristics. In addition to this, the analysis of the interview questions for Teacher 1 within this category would provide me with an opportunity to understand why Teacher 1 does not display these characteristics in the class.

It is impossible to reach a conclusion based on observations for a characteristic which has an occurrence of 0 (zero). However, for these characteristics the points brought up in the interviews with the teacher and the students will be discussed. The results of this, however much they are not supported by my observations, will be discussed in the light of the information about these characteristics given by the teacher and the students.

'Considering about his/her own personal problems' was one of the characteristics in this category. During the interview Teacher 1 stated she tried once and she realized that students were really interested. She stated that when the teacher talked about his/her own personal problems the students' concentration would be on these rather than the subject, so their motivation would decrease. The following excerpt from the transcripts of the interview with Teacher 1 identifies the situation.

> …R: "When you consider your own personal problems into the classroom how do you think the students will be affected by this?"
> Teacher 1: "Yes. Actually I tried to. In a lesson yesterday that you weren't observing, I made the mistake of sharing the things that make me bored. I mean I told the students that I was having a bad day. (She had found out that her best friend at school had cancer). Although I asked the students to help me by listening quietly I realized that they weren't that interested. It wasn't really important for them"…
> Teacher 1: "How am I? How do I feel? I realized that they weren't really interested in my situation. That's why it's better not to carry things to the class…One day, because I am the Vice Principal I was on duty. I told the students in the 10th grade that I was really tired and I was teaching them in the last hour and I asked them to be understanding. I just did it that once and that day I gave a really nice lesson…I don't carry my problems to the lessons but I wanted to say that I did this only twice."
> R: "Do you think that a teacher should share what she is thinking or her problems honestly with her students?"
> Teacher 1: "She shouldn't share them. No, never…This includes things like her likes and dislikes; if she shares these the students' motivation will be on these rather than on the lessons. It's nothing but a waste of time"…(p.13)

ST1 also declared that when a teacher considered about his/her own personal problems they said their interest would decrease. They considered that if a teacher had a problem outside the school, he/she came to the class fed up or tired. S1-2 and S1-4 emphasized that the problems of the teacher belonged to herself. They really did not care about the teachers' problems. They indicated that Teacher 1 never displayed this characteristic.

> …R: "How do you think you are affected when the teacher considered her own problems to the classroom?"
> …S1-3 and S1-4: "I think it would decrease because if she came to the class and said I'm fed up so I can't teach today, although our teacher has never said anything like that, then the students motivation would decrease."
> S1-2: "She would get more angry (meaning tolerance level) when we couldn't solve a problem when she had her own worries."
> R: "S1-5, what do you think?". (The students are quiet for a while)
> R: "Please feel free to say whatever you want"…
> …S1-4 and S1-3: "If she carried her problems to the classroom we would be affected negatively."
> S1-1: "It would have a negative effect. Our teacher has never shared with us and she shouldn't."
> S1-2: "She might have worries outside of school but as far as our teacher is concerned she shouldn't let us find out about them by reflecting them on us"…
> S1-4: "If she shared them with us our interest in the lesson would decrease because her problems don't interest us"…(pp.33-34)

Teacher 1 did not display the characteristics 'having fed up and tired behavior' and 'being hard-hearted intolerant and tedious'. Teacher 1 stated that she loved her job, she liked students and she liked teaching, see Section 7.3.1. The following passages from the interview transcriptions enhance my interpretations.

> …R: "How is the students' motivation affected when you show you are tired or fed up in the classroom?"
> Teacher 1: "Most of the time I don't display it but there are times when I say "uf" because that's how I feel…it's because I am bored. I'm not tired or fed up of teaching but sometimes the students… I mean the events happening in the class lead me to feel like this. I can't help it, I feel I should be active but when they don't participate in the lesson I get bored."
> R: "You said that some events in the class make you feel that way? What are they?
> Teacher 1: It annoys me that they don't participate in the lessons. There is nothing else"… (p.14)

ST1 stated that Teacher 1 never showed a tired, tedious or fed up behavior. If she showed those behaviors in the class their motivation would be affected negatively.

> …R: "How is your motivation affected when your teacher's behaviors seem tired and fed up?"
> Students: "She has never been like that."

R: “How would you be if she was?”
S1-4: “The teacher would seem reluctant and so we would be reluctant too.”
R: “What are these behaviors? How would you know if your teacher was tired and fed up?”…
S1-3: “She might think, I prepare for them, I’m making an effort for them, if they aren’t preparing properly then why should I make an effort, and then she might lose interest in us. But our teacher would never say this”…(pp.33-34)

According to the self determination theory, see Section 2.3.3, when the teacher listens and responds to the students’ questions and encourages them to participate they become self-determined persons. However, when the teacher considers her own problems, has fed up or tired behavior, and when she is hard-hearted, students would not be motivated and they would not be participated in the classroom discussions. Teacher 1 did not exhibit these negative characteristics. In the light of the above discussions, there was no clear evidence that Teacher 1 displayed these characteristics. Therefore, it is not possible to draw conclusions for Teacher 1 within this category.

7.6.2 Summary of Findings for Characteristics of Teacher 1 in Category 6

Within this category the three characteristics were the negative ones. Thus Teacher 1 did not exhibit those characteristics. She stated that when the students did not listen quietly and carefully the lesson appeared to her like never ends. In terms of the personal characteristics of Teacher 1, she proclaimed that she never gave up explaining and she was not tired. She indicated that she only showed fed up behavior depending on the students’ unwillingness to participate in the discussions during the lesson. She stated her enthusiasm depended partly on students’ willingness to participate. The interview data from Teacher 1 and ST1 roughly clarified the interaction between this characteristic and students’ motivation. However, the interview findings were not supported with observations in this category. There was not enough evidence to conclude that the students’ motivation decreased if Teacher 1 exhibited; or increased if Teacher 1 did not exhibit the characteristics in this category.

7.6.3 Interactions between the Students' Motivation and the Characteristics of Teacher 2 in Category 6

The total frequencies for the most frequently occurring codes for each of these characteristics were added up for Teacher 2 in this category and these are presented in Table 7.14.

Table 7.14 The frequency of the observed codes for the characteristics in Category 6 for Teacher 2

Effective Teacher Characteristics	Code(s)	Freq.	Total Freq.
Considering about his/her own personal problems	TCD	4	4
Having fed up and tired behavior	TTB	3	4
	TBW	1	
Being hard-hearted, intolerant and tedious	TTFI	1	1

Within this category, presented in Table 7.14, the characteristics 'considering about his/her own personal problems' and 'having fed up and tired behavior', with 4 occurrences, were the most frequently observed characteristics. Teacher 2 did not display these negative characteristics frequently, but in the case that she exhibited them I was able to observe the interaction with the students' motivation. The least frequently observed characteristic was 'being hard-hearted, intolerant and tedious' with one occurrence. Although Teacher 2 criticized the students and upset them in my observations there were no clear evidences to reach a conclusion for this characteristic. I have based my analysis mainly on the interaction between the other two characteristics and students' motivation that I observed. In fact, the two frequent characteristics of Teacher 2 were important to analyze since the main concern when selecting Teacher 2 was to observe those negative characteristics. Therefore, the analysis of these characteristics was both important and difficult to handle.

During the interview with Teacher 2, she accepted that sometimes she had personal problems and she reflected those problems, even if she did not want to,

to the students. The following passage from the interview transcriptions identifies the situation.

> …R: "When you carry your own personal problems into the classroom how do you think the students will be affected by this? How and why is your students' motivation affected when you teach in a reluctant manner?"
> Teacher 2: "However much I don't want them to be reflected in these lessons, these problems are in my mind even if only momentarily. Once, for instance, I was really ill. I couldn't talk. That day instead of the 10-12 problems I was going to solve I could only do 5-6. My motivation and performance decreased. But I try my best not to show my problems. Your problems get bigger in your head and you teach reluctantly. The students' motivation is affected in the same way…I have never had any reactions from the students about this. They usually understood. But of course their interest does decrease."
> R: "Do you think that a teacher should share what she is thinking or her problems honestly with her students?"
> Teacher 2: "As far as possible she should not share them or cause them to be felt by the students although this is not always possible"… (p.21)

In the interview with ST2, they complained that their motivation decreased when Teacher 2 considered her own problems.

> …R: "How do you think you are affected when a teacher carries her own problems into the classroom?"
> S2-2: "This affects us negatively. If the worries, she shares with me, are about me or the class then I would be interested but if they are related to her then I am not interested. There is not usually a lot of noise in the classroom but when a situation like this occurs, for example she's ill or something then she is not very willing to teach and it can get noisy in the classroom"…
> S2-1: "Yes, when she is ill or tired she shares this with us. We are not affected in a positive way but she tries to affect us with her eyes. I personally can empathize with her and I understand how she feels but actually there is a lot of noise in the lesson and it is difficult for us to focus our attention"…(pp.43-44)

Teacher 2 stated that she was intolerant and sometimes she was hard-hearted. She claimed that the students should learn her rules in order not to face problems. She said she tried to find out the personal problems of students and they shared those problems with her. Thus she said there was a kind of linkage between her and the students. She stated that she was the only authority in the class. She said

> …Teacher 2: "…I make jokes during the lesson but it's under my control. When I say it's over, it's over"…(p.20).

Teacher 2 believed that with these characteristics she would be able to motivate the students. She stated that when the students did not listen quietly and carefully the lesson appeared to her to be never ending.

> R: How is the students' motivation affected when you show you are tired or fed up in the classroom?
> Teacher 2: When I get a positive light from the class then I feel more comfortable and I explain more fluently.
> R: Is your fed up or tired behavior dependent on the situation in the classroom?
> Teacher 2: Yes, definitely. When I have a class full of prejudiced students who are unable to listen and do nothing for learning; then I teach what I have to teach but from my point of view the lesson seems never-ending. In good classes the lessons are better. (p.14)

ST2 declared that when the teacher showed fed up or tired behavior, their motivation was affected negatively. They declared that when she said she was tired some students understood this sentence of the teacher to mean that she did not want to carry out the lesson and that there was no need to do the lesson. Therefore, the motivation of the students decreased. ST2 concluded that Teacher 2 was the only authority in the class and that she had harsh interactions with students and had no respect for the students who were unconcerned. The following excerpt from the interviews with students explains the situation.

> …R: "How is your motivation affected when your teacher's behaviors show that she is tired or fed up in the classroom?"
> S2-1: "It doesn't affect us much if she has told us the reason for her tiredness and she can still explain the subjects. However, sometimes she comes to the classroom in a bad mood and we don't know why. This makes the classroom environment tense and in situations like this our interest decreases."
> S2-1: "Sometimes she says she hasn't got enough light from us and this affects her negatively. Sometimes it seems as if she gets fed up when she has to explain the same thing a few times…our motivation decreases."
> S2-1: "In fact she doesn't resist repeating things but when she has explained the same thing in the same way a few times she gets bored, I that situation she is right."
> S2-2: "Sometimes she says "I'm not well enough to teach" and then she carries on teaching. Some of my friends who don't want to do a lesson anyway come to the conclusion that since the teacher doesn't want to teach they don't have to listen"…(p.44)

The students' views were also supported with my observations. The following excerpt from the field notes explains the situation.

> …Teacher 2: "I was very busy on Friday and Saturday. I was trying to pack everything at home. In the midst of that mess I tried to mark the exams" she said. As the teacher talked about these, the amount of talking in the class increased. The students weren't really sharing what the teacher was telling them. They were talking amongst themselves. Nobody asked the teacher anything said anything to her. Then the teacher warned the students to stop talking. She wrote an example on the board…(p.119)
> …However, she told the class that she hadn't eaten lunch and needed to go somewhere urgently after school. I observed that the students weren't really interested in what she was saying. They didn't say anything about this nor did they

> use any sentences indicating that they understood her situation. I observed that the teacher looked tired and fed up. From the start of the lesson to the end, the students' interest lessened…(p.110)

When she considered about her problems the students could not concentrate on the lesson and their interest decreased. The students also did not share her personal problems, and they caused disruptions during the lesson. The following excerpt from my field notes also explains that the teacher looked tired in some lessons but the students did not empathize with her tiredness but instead they made a noise and became unconcerned.

> …The teacher looked tired again. As soon as she had written or drawn something on the board she immediately sat in her place. When asked a question she answered from where she was sitting and did not put a time limit on the solutions. When the problems were being solved some students were giving answers from their places, others were not saying anything. When there was a lot of talking the students couldn't decide whether to raise their hands or to just say the answer. This situation caused the students' interest to decrease rather a lot. While some students were shouting from their seats others were joking with their friends. (p.116)

The following excerpt from the supportive interview with ST2 explains the situation that when they feel Teacher 2 was ill or fed up they became uninterested.

> …R: "Your motivation in this lesson was less than in the previous one. Why was that?"
> S2-3: "I had trouble understanding the lesson. When I couldn't understand I didn't want to follow it anymore" he said.
> S2-6: "The teacher was probably a bit ill today. Our approach to the lesson is affected (negatively) by this" he said…(p.113)

Two characteristics within this category could be based on the theory of self determination. According to this theory, in order to make the students self determined the teacher should support the students' willingness to do things by themselves. The teacher should explain the concepts with enthusiasm. If the teacher considers her own problems instead of finding time to convey students' learning problems, then students feel anxious and become uninterested. According to Brophy (2004) well planned classroom activities allow the teacher to use the time efficiently. If the teacher wastes time talking about her problems or displaying fed-up or tired behavior the students became unconcerned and they can not pay attention. Therefore, when the teacher considers her personal problems and when she has fed up and tired behavior, the students become uninterested and unconcerned about the subject, thereby there would be a decrease in the students' motivation.

7.6.4 Summary of Findings for Characteristics of Teacher 2 in Category 6

The characteristics within this category were not frequently observed, but the field notes of the researcher and the second observer identified the situations when Teacher 2 exhibited those characteristics. When Teacher 2 considered her problems in the class, students became unconcerned and lacked of attention. There was also a lack of communication between the students and Teacher 2 as ST2 stated. When Teacher 2 had fed up and tired behavior by stating her tiredness or illness, the students were unwilling to participate and their attention decreased. There was too much noise in those lessons as ST2 stated. Therefore, if the teacher has the characteristics in this category the students' motivation decreases. In this category, there was not enough evidence from observations to conclude the effects of the third characteristic 'being hard-hearted, intolerant and tedious' on students' motivation.

7.6.5 Comparing and Contrasting the Characteristics that Teacher 1 and Teacher 2 Possess for Category 6

The category 'personal characteristics' included three characteristics that were all negative effective teacher characteristics. Based on my observation, as was expected the characteristics were not exhibited by Teacher 1. On the other hand, Teacher 2 displayed the two characteristics in the class and the students became uninterested and unconcerned. The students made a noise whenever Teacher 2 considered her problems or whenever she showed fed up or tired behavior. The interest of the students also decreased. In the light of the above discussions, when the teacher, who mostly applied negative effective characteristics, displays the characteristics in this category she would decrease the students' motivation.

7.7 Attitude toward Discipline in the Class

Attitude toward discipline in the class included five characteristics that were 'humiliating students in front of their friends with the aim of giving

punishments', 'shouting at students', 'getting angry with students' mistakes, and shouting at or hitting students who are disturbing the classroom atmosphere', 'giving punishments to the whole class because of a fault of only one student' and 'giving low grades for the aim of constructing discipline (threatening students with low grades)'. I have given, in the remainder of this section, the findings from each case teacher individually at first, and then a cross-case analysis has been presented.

7.7.1 Interactions between the Students' Motivation and the Characteristics of Teacher 1 in Category 7

The total scores for the most frequently occurring codes for each of these characteristics were added up for Teacher 1 in this category and these are presented in Table 7.15.

Table 7.15 The frequency of the observed codes for the characteristics in Category 7 for Teacher 1

Effective Teacher Characteristics	Code(s)	Freq.	Total Freq.
Humiliating students in front of their friends with the aim of giving punishments	TNC	0	0
Shouting at students	TS	3	3
Getting angry with students' mistakes, and shouting at or hitting students who are disturbing the classroom atmosphere	TGA THIT TWS	0 0 22	22
Giving punishments to the whole class because of a fault of only one student	TGP	0	0
Giving low grades for the aim of constructing discipline (threatening students with low grades)	TOM	1	1

Within this category, as presented in Table 7.15 the most frequently observed characteristic for Teacher 1, with 22 occurrences, was 'getting angry with students' mistakes, and shouting at or hitting students who are disturbing the classroom atmosphere'. In fact, this characteristic for Teacher 1 totally covered the code 'warning the students' (TWS). Teacher 1 never got angry or hit the

students during my observations. The characteristics ‘humiliating students in front of their friends with the aim of giving punishments’ and ‘giving punishments to the whole class because of a fault of only one student’ within this category have not been observed. The other two characteristics ‘shouting at students’, with 3 occurrences and ‘giving low grades for the aim of constructing discipline’ with one occurrence were the less frequently observed characteristics. It was too difficult to make an interpretation when there was not enough evidence. The interview findings related to these characteristics usually inferred these behaviors. She shouted three times, but she shouted since the class was crowded and they sometimes caused disruptions during the lesson. Teacher 1 did not exhibit the negative effective characteristics, instead she only warned the students. In the interview Teacher 1 and ST1 declared that she did not display the negative characteristics within this category.

> …R: “How and why do you think getting angry with or shouting at a student for a mistake he has made would affect the motivation of that student or the class?”
> Teacher 1: “I think it has a bad effect, that’s why I don’t do that sort of thing in the middle of the class but prefer to deal with students individually”…
> R: “When you say individually do you mean you shout outside the classroom?”
> Teacher 1: “No, not shouting. I never shout. I either talk to the student in my office or, I don’t know, if they have a special problem then I try to find them but never in the classroom”…
> R: “Can getting angry with a student or shouting at him have the effect of decreasing his motivation while increasing the motivation of the other students in the classroom?”
> Teacher 1: “No, I don’t think so…without making it personal I try to deal with it by talking generally. It would not be fair to focus my anger on one person in a class of 40, especially if that person is not the reason for my anger or I am focusing on the wrong person”…(p.14)

ST1 also declared that the Teacher 1 did not shout or getting angry or giving punishments in the class.

> …R: “How and why do you think your teacher getting angry with or shouting at a student for a mistake he has made would affect the motivation of that student or the class?”
> S1-1: “Our teacher never deals with this kind of thing in the classroom.”
> R: “How would it affect the class? If the teacher shouted at one of your friends for a mistake he had made, how would you behave?”
> S1-1: “Everyone would be afraid of her. We wouldn’t make any noise. I wouldn’t ask any questions or anything.”
> R: “Does being quiet or afraid mean you would be more motivated?”
> S1-1 and S1-4: “No, of course not”…
> S1-3: “I wouldn’t say my ideas openly.”

> S1-5: "Even if I knew the answer I wouldn't say it, I wouldn't participate in the lesson"… (p. 34-35)

Teacher 1 really did not shout at or getting angry with the students. The crowd in the class forces her to warn the students, sometimes, to concentrate on the lesson. The following excerpt from the field notes explains the situation.

> …At this time a few of the students asked the student next to them something. There was a bit of noise.
> Teacher 1: "Don't speak. You can ask me but not the person next to you. I would prefer it if you asked me", she said. After the teacher had said this noise in the classroom stopped. (p. 64)
> …She writes an example on the board related to the previous subject. At this time two students are talking.
> Teacher 1: "Can I ask something? Are you talking about the lesson?" she warned them. These students immediately quietened down and began to write in their notebooks. After she had written the question on the board she wrote "moment" in capital letters…(p.59)

The following excerpt from the video recording also supports my interpretations.

> …They are talking to their friends and there is a lot of noise in the class.
> Teacher 1: "OK, OK young people, just look over here" she said. She explained how a displacement could be found on a velocity graph. All of the students are dealing with the writing on the board but there is a bit of noise in the class.
> Teacher 1: "Kids, I said OK"…(p.77).
> …The teacher asks the other students to sit at the middle desks and she says this twice. However, both next to the window and the wall there are 3-4 students who have remained in their places without moving to the middle row. Because the class is crowded it is impossible for all the students to sit in the middle row. One student is sitting in the teacher's chair at the front. The teacher warns the students again about the noise. The middle row looks like a full up minibus… (p. 79)
> …After the teacher has filled in the register she asks the students if they have done any test questions. 8-10 students indicate that they haven't and she warns them about this".
> Teacher 1: "This is not going to work if I am the only one making an effort. You have to show an interest too or nothing will happen" she said.
> Teacher 1: "OK, now we…deal with these problems and I am going to help you solve them" she said. The students are trying to do the questions while the teacher sits at her desk and, starting with the front row, calls the students up to help them with what they can't do. Every student in the class is trying to solve the problems…(p.92)

When the teacher warns the students immediately after they exhibit undisciplined behavior the students' interest increases. Teacher 1 also warned them to make them study. The negative characteristics for this category give students the chance to attribute their failure. According to the attribution theory, see Section 2.3.4, when the students fail or get low marks from the exam, they can attribute this failure to some external factors that the teacher has displayed in the

classroom, like “the teacher shouted at me so I failed the exam”. Since there was no clear evidence for the four characteristics within this category, I could not reach exact conclusions for those characteristics. Teacher 1 did not display the negative effective physics teacher characteristics in the class. When Teacher 1 warned the students, they paid attention to the lesson and they listened intently. It is obvious from the above considerations that when the teacher warns the students, without getting angry, shouting or giving punishments, there would be an increase in students’ motivation.

7.7.2 Summary of Findings for Characteristics of Teacher 1 in Category 7

The category ‘attitude toward discipline in the class’ included 5 characteristics that were negative. The interview findings were not supported with observations for the four characteristics in this category for Teacher 1. There was not enough evidence to conclude that the students’ motivation decreased if Teacher 1 exhibited these characteristics in this category. Teacher 1 only exhibited the opposite of ‘getting angry with students’ faults, and shouting at or hitting the students who are disturbing the classroom atmosphere’. She mostly warned the students gently, and she made them aware of the subject. The students paid attention to the lesson and there was an increase in their interest and as a result their motivation increased.

7.7.3 Interactions between the Students’ Motivation and the Characteristics of Teacher 2 in Category 7

The total frequencies for the most frequently occurring codes for each of these characteristics were added up for Teacher 2 in this category and these are presented in Table 7.16.

Within this category, as presented in Table 7.16 the most frequently observed characteristic for Teacher 2, with 21 occurrences, was ‘getting angry with students’ mistakes, and shouting at or hitting students who are disturbing the classroom atmosphere’.

Table 7.16 The frequency of the observed codes for the characteristics in Category 7 for Teacher 2

Effective Teacher Characteristics	Code(s)	Freq.	Total Freq.
Humiliating students in front of their friends with the aim of giving punishments	TNC	12	12
Shouting at students	TS	12	12
Getting angry with students' mistakes, and shouting at or hitting students who are disturbing the classroom atmosphere	TGA THIT TWS	4 1 16	21
Giving punishments to the whole class because of a fault of only one student	TGP	0	0
Giving low grades for the aim of constructing discipline (threatening students with low grades)	TOM	0	0

The other frequently observed characteristics, in Table 7.16, for Teacher 2 with 12 occurrences were 'humiliating students in front of their friends with the aim of giving punishments' and 'shouting at students'. The least frequently observed characteristics within this category, with no occurrences, were 'giving punishments to the whole class because of a fault of only one student' and 'giving low grades for the aim of constructing discipline (threatening students with low grades)'. Due to the fact that there was a noticeable difference between the frequencies of the characteristics I observed, I have based my analysis mainly on the two characteristics that I most frequently observed. In fact, the three frequent characteristics of Teacher 2 were important to analyze since the main concern to select Teacher 2 was to observe those negative characteristics. Therefore, the analysis of these characteristics was both important and difficult to handle.

During the interview with Teacher 2, she declared that she got angry or shouted sometimes but she said the students knew the reason for her anger.

> …R: "When you get angry about students' mistakes or shout at students who disturb the class atmosphere how is the motivation of that student and the class in general affected? (In one of my observations you shouted at a student named S2-3 as soon as you had entered the classroom. For the rest of that lesson that student did not pay any attention to the lesson and you did not warn him at all)"
> Teacher 2: "S2-3 has been my student for two years. We know each other very well. My students know that if I am angry or shouting about something then I have a valid reason for this. The student in question knows what he has done and that he is at fault. S2-3 has not been participating in the lessons and has been sleeping. The student has understood me and this means that his motivation has not been affected negatively"…(pp.21-22)

ST2 declared that Teacher 2 sometimes shouted and she was angry. The ST2 also stated that when she was angry in the lesson they got bored and whether she had a valid reason or not their willingness to participate decreased. The following excerpt from the interview transcriptions identifies the situation:

> …R: "How and why do you think your teacher getting angry with or shouting at a student for a mistake that student has made would affect the motivation of that student or the class?"
> S2-1: "It would have a very negative effect. Sometimes that's what happens in the lessons. When she shouts the lessons are difficult to get through. If the teacher is shouting for a good reason it doesn't have much effect on our motivation but sometimes she starts shouting as soon as she enters the class and we don't exactly know why. There is bound to be a reason but it affects me really negatively. Then I don't have much interest in the lesson or much willingness to participate."
> S2-2: "It has a really bad effect. I get really bored in that lesson period. At least for that lesson nothing the teacher does seem attractive to me"…(pp.43-44)

Teacher 2 could have a reason to shout but they stated that they should also know that reason. Students thought that this behavior of the teacher affected them negatively.

> …R: "How is the class affected? If the teacher shouts at one of your friends for a mistake he has made, how would you behave?"
> S2-2: "When something like this happens we go quiet. When a teacher shouts; it is important whether she has a valid reason or not. When she shouts at us we consider how we have been behaving. We think about whether we have done anything to make her shout. If she's right then that's OK but sometimes she shouts all the time. This affects us to a certain extent but when she shouts all the time and makes us keep quiet we don't learn anything in that lesson. Sometimes some of my friends can't even ask about something they haven't understood because they are too frightened"…(pp.43-44)

Teacher 2 sometimes ignored the students' undisciplined behaviors. When she exhibited this characteristic, the students' willingness to share their ideas and the students' interest decreased. Teacher 2 also ignored some students who did not participate the discussions and she sometimes did not warn the students who caused disruptions in the class. The following excerpt from my field notes identifies the situation.

> …S2-3's head has been on the desk for 5 minutes. The teacher does not warn him about this at all.
> Although the students are shouting and making a noise the teacher does nothing. (p.114)
> …The teacher has been sitting at her desk since the beginning of the lesson.
> Teacher 2: "Look at the board and stop writing" she said and got up to go towards the board in order to explain the answer to the question.
> As she is explaining it;

> Teacher 2: "My child, look here" she warns the students continually. After each warning the students follow the teacher quietly.
> She writes another example.
> Teacher 2: "It's a river problem", she says. The classroom is quite quiet and the majority of the students are looking at the teacher. After the teacher has had them write down the question.
> The students are discussing the answer amongst themselves. The teacher is quiet at first, and then she says "Sshh"…(pp. 121-122)

The following excerpt from the field notes of the second observer supports my interpretations.

> While the teacher was explaining the students seemed uninterested. When the teacher was looking at her notes or explaining the subject there were three or four students who had no interest in the lesson. The teacher did not warn them…(p. 130)
> Teacher 2: "At this point pay attention to the concepts. The speeds which cause the object to cross the river and to change position in a horizontal way is different from each other", she said. The students are not asking the teacher anything. The girls sitting in front of me are talking amongst themselves and are not very interested in the lesson. Despite the fact that there is a noise in the class and the students are all talking the teacher does nothing about this. She is going to write another example and she is waiting for the class to quieten down. The teacher is sometimes able to ignore the behavior of the students…(researcher field notes, pp.124-135; second observer field notes, pp. 128-129)

Teacher 2 sometimes shouted at students and sometimes she humiliated them in front of their friends with the aim of giving punishments. She got angry about students' mistakes or she got angry with the students who were disturbing the classroom atmosphere. She did not hit any students during my observations but just once she slapped the face of a student. The students seemed to be not affected since she smiled during this action. She did not aim to hit him because of her anger. The following passages from my field notes illustrate the situation.

> …The teacher came next to S2-16 and saying
> Teacher 2: "Your notebook is not complete" slapped his face.
> S2-16 grinned and said "It is complete, Miss".
> Teacher 2: "So where is all this?" she asked, indicating the board.
> S2-16: "It's all here, Miss. It's all the same", he said.
> Teacher 2: "Oh, come on" she said…(p.140)
> …S2-3 is eating a cracker and is talking to the teacher with food in his mouth. The teacher gets annoyed and says in the middle of the class
> Teacher 2: "Isn't a full half hour lunch break enough for you? You were eating yesterday as well. Stop eating!" she shouts.
> S2-3: "I wasn't eating yesterday" he said.
> Teacher 2: "Be quiet S2-3! Shut up!" she shouted in aloud voice.
> As a result of this all the noise in the classroom stopped. Everyone is in their place and started to follow the teacher. The teacher filled in the register. Then without getting up she started to read a question out loud. As she did this when she came to the part which said "as in the diagram" she got up and began to draw it on the

> board. S2-3's mobile phone rang. S2-3 managed to turn it off. The teacher wasn't really interested and didn't warn him about this.
> Suddenly she shouted at S2-3.
> Teacher 2: "S2-3 is your mental health OK today?"
> S2-3: "What's happened, Miss? What have I done?"
> Teacher 2: "Shut up, let's not turn it into a debate" she shouted…(p.133)

Teacher 2 explained the reason of why she shouted a student during the observation. She emphasized that she never shouted or got angry in the class without a reason. She declared that the student knew the reason and she never repeated that behavior later. However, ST2 thought that whether she had a valid reason, their motivation decreased when she shouted.

> …Teacher 2: "S2-3 you keep eating biscuits and playing around with S2-15. Everyone else went back to their seats but you kept playing around" she continued shouting.
> S2-3: "Miss, all of my friends were standing up", he said.
> Teacher 2: "I know you have a chemistry exam so I'm going to let you have the last 20 minutes of the second lesson off. What kind of rudeness is this" she shouts at S2-3.
> S2-3 tries to answer but;
> Teacher 2: "Don't speak, just sit down" she said.
> Teacher 2: "Who is going to solve the problem that I wrote down in the first lesson?". More than half of the class raises their hands.
> S2-3 is still not looking at either the board or the teacher.
> The teacher calls S2-15 to the board and he starts solving the problem. S2-3 has put his head on his desk and is not following the lesson…(p.115)
> …Teacher 2: "Now I've gone back to my childhood, a see-saw. This is related to balance, when balance is mentioned you will remember moment", she said. At this point she warns the students,
> Teacher 2: "S2-3!", she warns in a loud voice.
> Teacher 2: "Don't write anything, just listen carefully", she said…(p.133)

According to the goal theory, see Section 2.3.3, the teacher should encourage the student effort and she should create a competitive classroom climate. Instead of doing this if she allows demotivating practices like humiliating the students then the students would feel rejected and anxious. The teacher should warn the students immediately after their undisciplined behavior, but she should not make them unconcerned, and she should not allow the students to be uninterested from the subject. According to the attribution theory, some of the negative characteristics like shouting at students or getting angry and hitting them give students chance to attribute their failure as stated in Section 7.7.1. When the teacher allows nagging criticism in the class the students would remain uninterested. It is obvious from the above considerations that when the teacher

exhibits three of the negative effective teacher characteristics, there would be a decrease in students' motivation.

7.7.4 Summary of Findings for Characteristics of Teacher 2 in Category 7

In this category, all of the five characteristics were the negative effective physics teacher characteristics. Teacher 2 exhibited the first three of them, but she did not exhibit the other two. When she exhibited those characteristics, students felt anxious and sometimes they felt rejected. Students usually did not participate in the classroom interactions and sometimes the teacher did not warn them to participate. According to the goal and attribution theories, the students' participation and awareness usually depend on the opposite of these characteristics. Finally, it is possible to conclude that, by exhibiting the negative characteristics considered within this category, the teachers would decrease the students' motivation.

7.7.5 Comparing and Contrasting the Characteristics that Teacher 1 and Teacher 2 Possess for Category 7

The category 'attitude toward discipline in the class' included five effective physics teacher characteristics that were all negative. Based on my observation, as was expected, the characteristics were not exhibited by Teacher 1. Teacher 1 only warned the students to make them participate in the classroom discussions. When she warned the students, they paid attention to the lesson, thereby increasing their motivation. On the other hand Teacher 2 displayed the three characteristics that were related to getting angry, humiliating the students and shouting at them. The students felt rejected and anxious and made a noise whenever Teacher 2 displayed those characteristics. The interest of the students also decreased. In the light of the above discussions, when the teacher who mostly displays negative effective characteristics in this category she would decrease the students' motivation.

7.8 Overall Findings

The effective physics teacher characteristics were embedded to each other. In terms of this feature they should be considered thought together to determine that whether those characteristics increase the students' motivation. However the teachers should also know which characteristics affected the students' motivation separately and how? In other words students' motivation was affected by some of the characteristics of the physics teacher but with what process. The Table 7.17 is presented to illustrate the summary of the interaction between the characteristics of effective teachers and students' motivation derived from the qualitative part of the study.

At the beginning of the qualitative analysis I had 38 characteristics of which 10 were eliminated before the analysis, during the data collection. The 28 effective physics teacher characteristics and the process of how they affect the students' motivation have been summarized in Table 7.17. With respect to Table 7.17 most of the effective teacher characteristics were affected students' motivation whereas a few and some of them did not affect it. There were six teachers' characteristics that I could not conclude with the data I gathered. Those characteristics will be researched in further studies. Finally, after the qualitative analysis I could conclude the interaction between 22 effective physics teacher characteristics and the students' motivation.

Table 7.17 The interaction between the effective physics teacher characteristics and students' motivation

			TEACHERS		STUDENTS			
		Effective Teacher Characteristics	How did the teacher exhibit…?		Students of Teacher 1		Students of Teacher 2	
Cat	No		TEACHER 1	TEACHER 2	Effect on Motivation	Result	Effect on Motivation	Result
Possessing and Transferring the Subject Matter Knowledge	1	Possessing necessary knowledge of subject matter	(all of the below for this category)	(all of the below for this category)	(all of the below for this category)	Positively affected Increase in motivation	(all of the below for this category)	Negatively affected Decrease in motivation
	2	Giving the lecture with appropriate details	*Avoiding overloading students with details *Adjusting the details according to the students' level	*Overloading with details *Did not adjust details according to students' level	*Willingness to participate *Increase in interest *Increase in awareness	Positively affected Increase in motivation	*Decrease in interest *Unable to construct clear understandings *Decrease in awareness	Negatively affected Decrease in motivation
	3	Possessing necessary mathematical and geometrical background related to physics	*Providing revision *Avoiding overloading students with details *Adjusting the details according to the students' level	Possessed but; *Overloading with details *Did not adjust details according to students' level	*Willingness to participate *Increase in interest *Willingness to solve	Positively affected Increase in motivation	If inappropriate level; *Decrease in interest *Unable to construct clear understandings *Decrease in awareness	Negatively affected Decrease in motivation
	4	Answering students' questions related to physics easily	*Encouraging students to ask *Answering students' questions	*Encouraging students to ask *Difficulty in answering students' questions	Not enough evidence to conclude (external factors like crowded classroom)	not concluded	*Decrease in self confidence *Unable to construct clear understandings *Making noise	Negatively affected Decrease in motivation
	5	Coming to the lesson prepared	*Planned her lesson on a paper *Did not check notes too long *Did not have difficulty in implementing	*Checking her notes too long and too frequently *Did not solve the problems before came to the class	*Willingness to participate *Listened to teacher intently *Engaged in learning	Positively affected Increase in motivation	*Decrease in students concentration *Unwillingness to participate	Negatively affected Decrease in motivation

Table 7.17 (continued)

		TEACHERS			STUDENTS			
		Effective Teacher Characteristics	How did the teacher exhibit…?		Students of Teacher 1		Students of Teacher 2	
Cat	No		TEACHER 1	TEACHER 2	Effect on Motivation	Result	Effect on Motivation	Result
Knowledge of Profession and Teaching Techniques	6	Taking the questions of the students into consideration and repeating the subject matter that wasn't understood by stdnts	*Repeating the subjects in a different way *Providing scientific truths *Answering the students' questions immediately	*Answering the students' questions immediately	*Increase in awareness *Increase in self confidence *Increase in interest *Increase in attention	Positively affected Increase in motivation	No enough evidence from observations	not concluded
	7	Explaining the subject matter with new examples when he/she faces with learning difficulty	*Identifying / overcoming learning difficulty *Offering a new example *Encouraging students to solve	*Encouraging students to participate *Offering a new example *Encouraging students to solve	*Willingness to solve *Increase in attention *Make them aware of the subject *Become self actualized	Positively affected Increase in motivation	*Willingness to solve *Increase in participation *Make them aware of the subject	Positively affected Increase in motivation
	8	Giving examples from simple to complex	*Providing help *Providing problem solving strategy *Providing feedback	*Not providing help *Not providing problem solving strategy *Providing feedback	*Willingness to solve *Increase in attention *Make them aware of the subject	Positively affected Increase in motivation	*Difficulty in solving complex problems *Decrease in self confidence	no effect at first; complex problems decrease in motivation
	9	Preparing exam questions as to be understood and answered by all the students	*Asking understandable questions	*Asking understandable questions *Exam questions reflecting covered content	*Not enough evidence from observations (willingness to solve-from interview findings)	no effect-concluded from interviews	*Not enough evidence from observations (willingness to solve-from interview findings)	no effect-concluded from interviews
	10	Solving problems in lesson, similar to the university entrance examination questions	solving problems similar to university entrance examination questions	solving problems similar to university entrance examination questions	*Like an ordinary example (willingness to solve)	no effect (10th grades)	*Willingness to answer *Willingness to solve	no effect (10th grades)

Table 7.17 (continued)

			TEACHERS		STUDENTS			
		Effective Teacher Characteristics	How did the teacher exhibit…?		Students of Teacher 1		Students of Teacher 2	
Cat	No		TEACHER 1	TEACHER 2	Effect on Motivation	Result	Effect on Motivation	Result
Enthusiasm in Teaching	11	Seeking and trying to find out the answers of the questions that he/she doesn't know	*Honestly confessed not to know *Sustaining students thinking skills	*Unwillingness to research *Difficulty in answering students' questions	(There were no questions which the teacher did not know the answer to)	not concluded	*Decrease in self confidence *Unable to construct clear understandings	Negatively affected Decrease in motivation
	12	Preparing a suitable medium for learning in the class	*Providing feedback *Providing recognition and credit words *Gaining attention by telling a story or by an interesting discussion *Providing activity	not concluded	*Feeling satisfied *Increase in interest *Increase in self confidence	Positively affected Increase in motivation	not concluded	not concluded
	13	Encouraging students to ask questions such as how?, why?, ...then what happens?	(the students did not ask these kind of questions and the teacher did not encourage them to ask)	(the students did not ask these kind of questions and the teacher did not encourage them to ask)	No enough evidence to conclude	not concluded	No enough evidence to conclude	not concluded
	14	Lecturing reluctantly	(lecturing enthusiastically) *Providing extra course hours *Be on time for the lesson	*Being late to the lesson frequently *Criticizing students and upsetting them *Not providing an activity	*Willingness to share their ideas *Increase in interest *Willingness to participate	Positively affected Increase in motivation	*Decrease in students interest *Decrease in students' attention	Negatively affected Decrease in motivation

Table 7.17 (continued)

			TEACHERS		STUDENTS			
		Effective Teacher Characteristics	How did the teacher exhibit…?		Students of Teacher 1		Students of Teacher 2	
Cat	No		TEACHER 1	TEACHER 2	Effect on Motivation	Result	Effect on Motivation	Result
Activities for Meaningful Learning	15	During the class session, introducing some concrete equip. related to the concept	*Bringing concrete equipments related to concepts (did not do)	*Bringing concrete equipments related to concepts (did not do)	No enough evidence to conclude	not concluded	No enough evidence to conclude	not concluded
	16	Making the physics lesson interesting by giving examples from daily life	*Providing links between prior and new knowledge *Providing links between real life and concepts *Providing sci. truths	*Providing links between real life and concepts	*Increase in interest / attention *Willingness to participate / share their ideas	Positively affected Increase in motivation	*Willingness to participate *Willingness to share their ideas	Positively affected Increase in motivation
	17	Asking questions to the students to enhance the active participation	*Encouraging students to participate *Encouraging students to ask questions without feeling humiliation	*Encouraging students to participate *Encouraging students to ask questions	*Increase in attention / self-confidence *Willingness to participate /ask *Aware of the subject	Positively affected Increase in motivation	*Increase in self confidence *Willingness to participate	Positively affected Increase in motivation
Classroom Management	18	Keeping students' interests alive during the whole lesson	*Encouraging students to participate *Providing revision *Sustaining curiosity *Providing activities *Adjusting the tone of voice *Avoiding poorly planned activities *Providing continuous communication	providing group work (badly designed) adjusting the tone of voice spending too much time on management problems	*Increase in self confidence *Increase in students' attention *Willingness to participate *Willingness to share their ideas	Positively affected Increase in motivation	*Making noise *Being unaware of the subject *Did not pay attention *Causing disruptions	Negatively affected Decrease in motivation
	19	Being able to motivate the students efficiently						
	20	Being interested in some students more than the whole class	*Not allowing mostly the same students to participate *Using time efficiently	*Not allowing mostly the same students to participate *Using time efficiently	No enough evidence to conclude	not concluded	No evidence to conclude	not concluded

Table 7.17 (continued)

			TEACHERS		STUDENTS			
		Effective Teacher Characteristics	How did the teacher exhibit…?		Students of Teacher 1		Students of Teacher 2	
Cat	No		TEACHER 1	TEACHER 2	Effect on Motivation	Result	Effect on Motivation	Result
Personal Characteristics	21	Considering about his/her personal problems	never exhibited	*Not finding time to convey students' learning problems *Considering her prob.s	No evidence from observation	not concluded	*Unconcerned *Lack of attention / communication	Negatively affected Decrease in motivation
	22	Having fed up and tired behavior	never exhibited	*Stating the tiredness, illness *Criticizing the students	No evidence from observation	not concluded	*Uninterested *Unwillingness to participate *Unconcerned	Negatively affected Decrease in motivation
	23	Being hard-hearted, intolerant and tedious	never exhibited	*Criticizing the students *Upsetting them	No evidence from observation	not concluded	No evidence from observation	not concluded
Attitude toward discipline in the class	24	Humiliating students in front of their friends with the aim of giving punishment	never exhibited	*Getting angry *Unkind criticism *Humiliating the students	No evidence from observation	not concluded	*Feeling anxious *Feeling rejected *Unwillingness to participate	Negatively affected Decrease in motivation
	25	Shouting at students	never exhibited	*Shouting at students	No evidence from observation	not concluded	*Feeling anxious *Lack of attention *Unwillingness to participate	Negatively affected Decrease in motivation
	26	Getting angry with students' faults, and shouting at students who are disturbing the classroom atmos.	warning the students (to keep them awake)	*Shouting at students *Warning the students *Unkind criticism *Getting angry	*Paying attention *Listening intently	Positively affected Increase in motivation	*Feeling anxious *Feeling rejected *Unconcerned *Uninterested *Making noise	Negatively affected Decrease in motivation
	27	Giving low grades as a matter of discipline	never exhibited	never exhibited	No evidence from observation	not concluded	No evidence from observation	not concluded
	28	Giving punishment to whole class…	never exhibited	never exhibited	No evidence from observation	not concluded	No evidence from observation	not concluded

CHAPTER 8

CONCLUSIONS, IMPLICATIONS AND RECOMMENDATIONS

The conclusions of the second part of the study and the overall conclusions of the study are considered in this chapter. Moreover, implications for physics teachers, for the ministry of education (MEB), for the educational faculties and for the Student Selection and Placement Center (ÖSYM) of Turkey; and recommendations for further researches are discussed in this chapter.

8.1 Conclusion of the Qualitative Part

The qualitative results of the study include many interpretations mostly derived by the researcher. In fact, this feature is the key characteristic of qualitative analysis. The effective physics teacher characteristics derived from the quantitative part of the study were analyzed and almost two thirds of those characteristics were analyzed intensely. The case teachers were selected to identify the effects of those characteristics. If they had been randomly selected teachers, I would not have been able to analyze this quantity of characteristics.

The effective characteristics were analyzed within 7 categories and 28 effective teacher characteristics. There were no priorities between the categories before I started to analyze them. However, with respect to the findings of the study, which were the interview data, field notes and video recordings, the analyses were limited to 22 characteristics. In other words, the interaction between effective physics teacher characteristics and students' motivation was analyzed for 22 characteristics. The findings were represented with respect to effective physics teacher characteristics within the categories that were derived from the quantitative part of the study. From the findings of the study, following conclusions are listed in items with respect to the categories.

The category ‘possessing and transferring the subject matter knowledge’ included frequently observed characteristics both for Teacher 1 and Teacher 2. The characteristics within this category had an effect on students’ motivation, whether positively or negatively. The conclusions for this category are as follows.

1. The characteristic ‘answering the questions of the students easily’ decreases students’ motivation if the teacher has difficulty in either answering the students’ questions easily or guiding them to find the answers to such questions.
2. ‘Coming to the lesson prepared’ increases the students’ motivation if the teacher enriches the subjects with new examples and if she does not check her notes too frequently and for too long; otherwise, the students’ motivation decreases.
3. The characteristic ‘giving the lecture with appropriate details’ increases students’ motivation when a teacher adjusts the level of the content with respect to the students’ level and when she indicates the appropriate details in physics. It decreases the students’ motivation when a teacher does not give the details in the right way, at the right time, and if they are inappropriate to the students’ level.
4. The characteristic ‘possessing necessary mathematical and geometrical background related to physics’ affects students’ motivation. However, the characteristic does not explain the process since teachers mostly have this background. In fact, how this characteristic affect students’ motivation is related to accepting the mathematical and geometrical knowledge as an appropriate detail. Therefore it should be concluded as in the previous item.

Category 2 entitled ‘knowledge of profession and teaching techniques’ had also frequently observed characteristics affecting students’ motivation positively. The following conclusions have been drawn for this category:

1. The characteristics ‘preparing understandable exam questions as to be understood and answered by all the students’ and ‘solving problems in lesson, similar to university entrance examination questions’ do not affect students’ motivation, especially for 10^{th} grades.

2. The characteristic ‘taking the questions of the students into consideration and repeating subject matter that wasn’t understood by students’ increases the students’ motivation when a teacher repeats the subjects in a different way and she answers the students’ questions immediately.
3. ‘Explaining the subject matter with new examples when students face learning difficulty’ increases the students’ motivation, when a teacher identifies the learning difficulty of the students and she offers new examples.
4. ‘Giving the examples from simple to complex’ increases the students’ motivation when a teacher provides feedback, help, and problem solving strategies. If the students do not even solve the simple examples, they cannot solve the complex ones. I observed that the students of Teacher 2 sometimes had difficulty in solving the problems from simple to complex since there is lack of some motives like providing help and feedback and offering problem solving strategies causing a decrease in their motivation.

The third category in this study was ‘enthusiasm for teaching’ which included frequently observed characteristics for Teacher 1. This characteristic affects students’ motivation. The conclusions for this category are as follows.

1. Within this category, the characteristic ‘encouraging students to ask questions such as how?, why?,…then what happens?’ was the least frequently observed one for both teachers. The effect of this characteristic on students’ motivation has not been concluded.
2. In terms of the characteristic ‘seeking and trying to find out the answers of the questions that the teacher doesn’t know’, it can be said to decrease students’ motivation if the teacher displays the characteristic negatively; that is when a teacher has some difficulty in answering and she does not do any research related to the questions that she does not know the answer, the students’ motivation is likely to be decreased.
3. The characteristic ‘preparing a suitable medium for learning’ could be analyzed from different perspectives. In fact, it increases the students’ motivation, if a teacher provides revision at the beginning of the lesson,

provides recognition words during the lesson, and she gains the students' attention by various ways, like telling a story.

4. 'Lecturing reluctantly' was the effective physics teacher characteristics, but within the analysis the effects 'lecturing enthusiastically' was also determined. If a teacher is enthusiastic about teaching it is likely to increase in students' motivation, since there can also be good communication between students and the teacher. Furthermore, if she is active in the class, she solves different problems and the teacher encourages the students to explain the concepts with their own words. The students cannot remain uninterested in the lesson. On the other hand, a reluctant teacher is often late to the lesson, criticizes the students, make the students upset in the class, and usually stays passive in the class, causing a decrease in students' motivation.

Category 4 'activities for meaningful learning' included the most frequently occurring characteristics, like 'asking questions to the students to enhance active participation', especially for Teacher 1. The characteristics within this category affect students' motivation positively. The teachers, by possessing those characteristics within this category, increase the students' motivation. The following conclusions have been drawn for this category:

1. The characteristic 'asking questions to the students to enhance the active participation' increased the students' motivation, when a teacher asked questions to the students to enhance the active participation of the students. This characteristic of the teacher encourages make the students enthusiastic in learning, so it increases the students' motivation.
2. The characteristic 'making the physics lesson interesting by giving examples from daily life' increases the students' motivation, if a teacher provides links between prior and new knowledge and provides links between real life and concepts.

The fifth category in this study was 'classroom management' which included frequently observed characteristics that affect students' motivation positively. The conclusions for this category are as follows:

1. The characteristic 'being interested in some students more than the whole class' was the least frequently observed one for both teachers.

2. The other two characteristics ‘keeping students’ interest alive during the whole lesson’ and ‘being able to motivate the students efficiently’ were combined during the analysis. These characteristics increase the students’ motivation, when a teacher provides revision, activities, and continuous communication to sustain the students’ curiosity. The activities that are provided by the teacher should be well designed and appropriate to the students’ level. If a teacher does not exhibit these characteristics by a badly designed activity and spending too much time on management problems then students’ motivation decreases.

The category ‘personal characteristics’ included frequently observed characteristics that affect students’ motivation negatively. In fact, all of the characteristics in this category are negative. The conclusions for this category are as follows:

1. When a teacher ‘considers about his/her personal problems’, there are lack of communication between the students and the teacher. As a result, the teacher cannot find time to convey the students’ learning problems and the students’ motivation decreases.
2. The other observed characteristic within this category is ‘having fed up and tired behavior’. The students would make a noise and become unconcerned when a teacher displays this characteristic, causing a decrease in students’ motivation.

The characteristics, which were negative ones, in the 7th category entitled ‘attitude toward discipline in the class’ affected students’ motivation negatively. The conclusions from the findings of this category are as follows:

1. ‘Getting angry with students’ faults, and shouting at or hitting the students who are disturbing the classroom atmosphere’ is a characteristic that decreases the students’ motivation. On the other hand, when a teacher warns the students gently to keep their attention in the lesson without anger, she increases the students’ motivation.
2. The characteristic ‘humiliating students in front of their friends with the aim of giving punishments’ decreases the students’ motivation, when a teacher uses unkind criticism, gets angry, and humiliates the students.

3. ‘Shouting at students’ decreases the students’ motivation, since the students feel rejected and anxious when a teacher shouts at them. They will make a noise or cause disruptions.

In the class of a physics teacher, possessing mostly the positive effective physics teacher characteristics, the teacher exhibits the characteristics in the category ‘activities for meaningful learning’. The teacher does not exhibit the negative characteristics within the category of ‘personal characteristics’. A physics teacher, possessing mostly the negative characteristics, exhibits the characteristics in the category of ‘the knowledge of profession and teaching techniques’ frequently and also the teacher exhibits the negative characteristics within the category of ‘attitudes toward discipline in the class’. If teachers find time to provide activities to the students, and if they do not exhibit fed up or tired behavior or allow boring work the students’ motivation is likely to increase. If teachers exhibit the negative characteristics especially related to management problems or a discipline problem, if they shout or hit the students instead of warning them students’ motivation possibly decreases. As a result of all these, by possessing most of the negative characteristics, a teacher decreases the students’ motivation, even if she exhibits some of the positive characteristics. When a teacher exhibits most of the positive characteristics without displaying negative ones, it is possible to conclude that, students’ motivation increases.

When the teachers are failed to display the positive effective teachers’ characteristics, it is likely to decrease the students’ motivation. In other words when a positive characteristic is not displayed by teachers, students’ motivation possibly decreases. For example, giving the lecture with appropriate details, the positive characteristic, caused an increase in students’ motivation. However, if the teacher does not give the lecture with appropriate details, the students are unable to construct clear understandings and it is possible to decrease in interest, causing a decrease in their motivation.

The qualitative results revealed that, if a teacher exhibits the negative characteristics in a positive way it is likely to increase students’ motivation. For example, ‘lecturing reluctantly’ was the negative characteristic that caused a decrease in students’ motivation. If a teacher lecture enthusiastically, the students’

willingness to share ideas and their interest are increased, causing an increase in their motivation. Some of the other negative effective characteristics, on the other hand, do not cause an increase in students' motivation when a teacher does not exhibit them. For example, 'shouting at students' is a negative effective characteristics and it causes a decrease in students' motivation. There is not an observable change in students' motivation when a teacher does not exhibit this characteristic.

According to the students, whether their teachers have positive or negative effective physics teacher characteristics, students are found to be overall unsatisfied with the situation they are in. Even though a teacher mostly exhibits the positive effective characteristics by providing every opportunity for their learning, students want a classroom environment where they can stay calm and be more passive. The students do not like to be constantly forced by the teacher to share their views. In the lesson of a teacher, who mostly exhibit the negative effective characteristics, students demand a classroom environment where they were more active and with lots of participation. The students are not satisfied when their teacher usually avoids asking questions or has difficulty in solving the problems. This causes unwanted situations to arise like resisting the existing environment, which is also an indicator of students' unawareness of their own positions.

8.2 Conclusion of the Study

The quantitative part of the study indicated teachers' and students' perceptions of the teachers' characteristics affecting students' motivation in physics. In the qualitative part of the study, it was aimed to find out whether they really affect motivation and if so, how these characteristics have an effect on students' motivation in physics. The effective characteristics were listed as 'answering students' questions related to physics easily', 'lecturing reluctantly', 'making the physics lesson interesting by giving examples from daily life', 'using offensive language to students', 'getting angry with students' faults, and shouting at or hitting the students that are disturbing the classroom atmosphere'.

In the qualitative part of the study the interaction between the teachers who possess the characteristics; 'answering students' questions related to physics easily' and 'using offensive language to students' were not concluded, since the former was not frequently exhibited by the case teachers and the latter was eliminated before the qualitative analysis. The quantitative and qualitative parts are sequential in this study. For all of the characteristics the qualitative part identifies the process of how effective teacher characteristics, as perceived by teachers and students in the quantitative part, affect students' motivation. Almost 58 % of the characteristics derived from the quantitative part of the study were analyzed in depth.

In the quantitative part of the study the categories of the effective physics teacher characteristics like 'possessing and transferring the subject matter knowledge', 'classroom management', 'enthusiasm for teaching', and 'activities for meaningful learning' were found to be important for students' motivation. In the qualitative part of the study 'activities for meaningful learning' and 'possessing and transferring the subject matter knowledge' included the most frequently occurring characteristics that increase the students' motivation. In the category of 'the activities for meaningful learning', for example, a teacher by possessing positive characteristics mostly, provided any kind of activity and role play that could be used to motivate the students. A teacher , on the other hand, by exhibiting negative characteristics within the category of 'personal characteristics' and 'attitude toward discipline in the class', decreases the students' motivation.

The perceptions of teachers and students are the almost the same in terms of effective physics teachers characteristics. There are 38 common effective teacher characteristics under eight categories in terms of students' motivation and achievement as perceived by teachers and students. Within 7 categories, 22 of these characteristics have been analyzed with qualitative analytic techniques. With respect to the qualitative part of the study, those characteristics were observed and interviewed in class situations to ascertain whether they really affect students' motivation or not. Furthermore, some characteristics, like 'solving problems related to university entrance examination' were expected to be effective and it was actively looked for during observations. However, for 10^{th} grades this

characteristic had no effect on students' motivation. Furthermore 'answering students' questions related to physics easily' was the most effective physics teacher characteristics in the quantitative part of the study. From the qualitative part of the study, it was observed that, the effects of this characteristics depended on many external factors, like the number of students in classes or humiliating of the students. In fact, when a teacher does not exhibit this characteristic, there is a decrease in students' motivation.

The quantitative conclusion of this study was effective physics teacher characteristics with all of the 8 categories are important in terms of students' motivation and these characteristics have an effect on students' motivation in physics lesson as perceived by teachers and students. The qualitative aspect of this study enhances the results of the quantitative part of the study in that it enlightens the way that those characteristics affect students' motivation and what would happen if those characteristics were not exhibited in the class or were exhibited negatively.

8.3 Theoretical Interpretations and Discussions

I consider that this study has provided useful knowledge of how students view motivation and their thoughts about their physics lesson. By using detailed students' and teachers' interviews, it was found how the students' motivation increased or decreased by the effects of effective physics teacher characteristics. In this section of the study the theory and the use of the theory for the interpretations have been discussed.

In this study, I have discussed six motivational theories and one model derived from the theories. The students' motivation is referred to as the situated motivation. Most of the interpretations are supported by the corresponding theories. I did not have enough evidence to conclude for the effects of some of the effective teacher characteristics, since I could not base my interpretations on the theories for these characteristics. In fact, I expected an effect on students' motivations according to the extrinsic motivation theory when the teachers offer a mark, for example, but I could not observe this characteristic for Teacher 1 and

Teacher 2. Likewise the goal theory indicates that students' motivation increases when teachers create a competitive classroom climate. However Teacher 1 and Teacher 2 did not provide this climate for the students, so the interpretations could not be directly referred to this theory.

The main theories for the effect of teacher characteristics on students' motivation were self-determination, attribution, intrinsic motivation, and need theories. All of my interpretations in the qualitative findings sections have been based on one or more of those theories. In fact, the students' interest and attention from the beginning to the end of the lesson should be kept constant or increased according to Keller's ARCS model. This model is mainly derived from the intrinsic motivation theory and it has also been used to support some of my interpretations in the qualitative part of the study.

The findings on students' motivation are consistent with the current theories of motivation found in the literature. Most students are not intrinsically motivated to engage in learning physics, since the teachers do not exhibit the main characteristics that increase the students' intrinsic motivation, like making use of film and video while lecturing or doing experiments. In fact, when teachers provided some intrinsic motives to the students like 'giving examples from daily life related to the concepts', I observed that almost all of the students fully engaged in learning. When students attribute their failure to some of the characteristics of the teachers, like shouting at students or getting angry with students' faults, I observed that their motivation decreased.

The findings of this study suggest that teachers' characteristics like enthusiasm, subject matter knowledge, coming to class being prepared and use of examples increase the students' motivation. This result was correspondingly supported by the results of Alkhayyatt (2000).

The effective physics teachers' characteristics gained importance when the teacher tried to motivate the students throughout the lesson. Teachers, by exhibiting the effective characteristics, should create every opportunity for the students to increase their motivation. The teachers should provide class activities and continuous communication. They should transfer knowledge with enthusiasm and teachers should spend more time on activities, experiments and role-plays

instead of management problems. Teachers, by possessing and exhibiting the effective teacher characteristics, should modify their lessons to gain students' attention, they should make the content relevant to the level of students and they should help students have confidence in their learning activities. These interpretations from the findings of the qualitative part of this study are based on the explanations made by Brophy (2004) and Keller (1983).

The categories of the effective physics teacher characteristics were found to be affecting students' motivation, whether negatively or positively. In the same way according to Aiello-Nicosia and Sperandeo-Mineo (2000) and Sperandeo-Mineo, Fazio and Tarantino (2006) teachers should have deep subject matter knowledge of physics to apply and transfer it into various tasks in the class. Likewise Kelly and Staver (2005) emphasized that, teachers' professional development activities and the methods applied in the class were the two effective characteristics in terms of affecting students' self-conceptualization and their motivation.

With respect to the overall findings of this study the effective physics teacher characteristics were crucial to ensure that teachers could transfer their knowledge, to manage the class and implement the curriculum with respect to the students' level. Brophy (2000) also emphasized the same results in that teachers were the major components in effective teaching to increase the students' motivation. Brophy suggested that teachers should find appropriate methods to motivate their students. Teachers should utilize an optimal program that is a mixture of instructional methods and learning outcomes.

8.4 Implications

The implications of the study have been analyzed within four phases, which are the physics teachers, Ministry of National Education (MEB), Student Selection and Placement Center (ÖSYM), and educational faculties. According to the theories and the findings of this study the following implications are useful.

8.4.1 The Physics Teachers

The following implications for physics teachers are presented with respect to the categories of effective physics teacher characteristics.

1. Teachers should try to exhibit the positive effective physics teacher characteristics frequently in the lesson by knowing that these characteristics increases students' motivation. The teachers should possess and transfer the necessary subject matter knowledge. Teachers should improve themselves. They should come to the lesson prepared in order to answer the students' questions easily, and to be planned during teaching. The students will be less interested in lessons when they recognize that the teachers are unprepared or they do not possess necessary knowledge of subject matter.
2. Any example that is given at the right time and in the right place with proper expressions will affect students' motivation positively. Teachers should take the students' questions into consideration and provide students with opportunities to express physical rules and the learning of the students should not be limited and confined to the lesson.
3. Teachers should have respect for their jobs. Variables like school, students or any personal problems should not affect the teachers' attitude and they should compensate for these problems in order not to affect students' motivation. The characteristics of any teacher are effective if she teaches with enthusiasm to encourage the students to love physics. Any students who see their teacher's enthusiasm will not stay uninterested in the lesson. Therefore, the student will join in every activity to learn the about the subject, will do the homework and will be motivated.
4. The teachers should make the physics lesson interesting by giving examples from daily life. They should ask what the students have learned in physics and encourage them to express in their own words what they have learned. By giving real life examples from physics, students' attention can be kept at the same level. It makes the students' learning meaningful and as they say when they meet those examples in daily life, they remember the lesson and the subject.

5. ‘Keeping the students’ interest alive during the whole lesson’ should be the major aim of the teachers. There is not one thing that a teacher did and she would manage to keep their interest alive throughout the lesson. Teachers should provide activities and experiments. The major point here is that the teacher should guide the students well during the activities and experiments. Giving wrong feedback at wrong points may result in decrease in motivation. A teacher should try to hold all students in the activity and when the activity has run its course or failed to achieve its aims then the teacher should support it with new activities or methods. In other words teachers should use more than one method, one activity and more than one technology to keep the students’ motivation at the same level throughout the lesson.
6. Teachers should not talk about their personal problems in the class. They should construct pleasantly-harsh interactions with students without exhibiting fed up or tired behavior. Teachers should gently warn the students, if they became unconcerned in order to increase the students’ motivation.
7. There should be a continuous communication between the teachers and their students to motivate them. Teachers’ characteristics like shouting at students, humiliating the students, and getting angry would interrupt the communication, causing a decrease in students’ motivation.

8.4.2 Ministry of National Education (MEB)

The characteristics of effective physics teachers could be shown to teachers and discussed with them during in-service training programs. This would have the possible effect of creating a group of physics teachers possessing the necessary characteristics in order to teach effectively. Furthermore, during the routine inspections of schools made by the MEB, teachers should be observed and evaluated with these characteristics in mind. The classroom and laboratory environments should be enriched with computers and whatever the teachers need in order to they exhibit positive effective physics teacher characteristics easily.

8.4.3 Student Selection and Placement Center (ÖSYM)

When candidate teachers are to be placed in education faculties of universities their characteristics could be taken into consideration during the selection process. Additionally, for candidates wishing to become teachers, the selection process could include character analysis processes and/or psychological analysis to determine which candidates are likely to develop the positive effective teachers' characteristics and which the negative.

8.4.4 Educational Faculties

One of the lessons given to prospective teachers could be based on the characteristics of effective teachers. This could include both a description of what they are and also suggestions and guidance on how to develop these characteristics. During the training period of prospective teachers, they can be informed about the effective physics teacher characteristics in the educational training program offered by the Faculties. Instructors should observe prospective teachers with these characteristics in mind. When prospective teachers are undertaking field training, again these characteristics should be observed with instructors giving feedback and guidance where necessary.

8.5 Recommendations for Further Research

1. A similar study of the effects of physics teachers' characteristics on students' achievements in physics and/or their attitudes towards physics could be undertaken.
2. A similar study could be applied to groups of high and low achievers in physics to ascertain how/if their motivation levels are affected and whether their achievement levels are directly linked to their motivation levels or not.
3. A similar study could be undertaken to measure and evaluate effective characteristics in other branches.
4. A separate qualitative study could be undertaken for each category derived in this study.

REFERENCES

Aiello-Nicosia, M. L., & Sperandeo-Mineo, R. M. (2000). Educational reconstruction of physics content to be taught and of pre-service teacher training: a case study. International Journal of Science Education, 22(10), 1085-1097.

Aiello-Nicosia, M. L., Sperandeo-Mineo, R. M., & Valenza, M. A. (1984). The relationship between science process abilities of teachers and science achievement of students: An experimental study. Journal of Research in Science Teaching, 21, 853-858.

Akboy, R. (1991). Öğretmen öğrenci etkileşimi ve önemi. Çağdaş Eğitim, 16, 22-24.

Aksu, M. (1987). ODTÜ öğretmen yetiştirme programı ve mezun öğretmenlere ilişkin bir çalışma. Eğitim ve Bilim, 11, 17-26.

Alkhayyatt, S. N. (2000). Montana high school students' perceptions about teaching characteristics. (Dissertation Abstracts International, UMI No. 9956722).

Ames, C. (1992). Classroom: goals, structures, and student motivation. Journal of Educational Psychology, 84, 261-271.

Aydın, Y. (1989). Characteristics of secondary-school mathematics teacher a Turkish study of practice teaching. Journal of Education for Teaching, 15(3), 255-259.

Barlia, L., & Beeth M.E. (1999). High school students' motivation to engage in conceptual change learning in science. (ERIC Document Reproduction Service No. ED 428 966).

Bogdan, R.C., & Biklen, S.K. (1998). Qualitative research for education: An introduction to theory and methods. Allyn & Bacon. Boston.

Brekelmans, M., Wubbels, T., & Creton, H. (1990). A study of student perceptions of physics teacher behavior. Journal of Research in Science Teaching, 27(4), 335-350.

Bridge, C.A., Reitsma, B.A. & Winograd, P.N. (1993). Primary thoughts: Implementing Kentucky's primary program. (ERIC Document Reproduction Service No. ED 370 678).

Brophy, J. (2000). Teaching. International Academy of Education, Brussels, Belgium.http://www.ibe.unesco.org/publications/EducationalPracticesSeries Pdf/prac01e.pdf, last accessed date, June 19, 2008

Brophy, J. (2004). Motivating students to learn. (2nd ed.). Lawrence Erlbaum Associates, New Jersey.

Brunkhorst, B.J. (1992). A study of student outcomes and teacher characteristics in exemplary middle and junior high science programs. Journal of Research In Science Teaching, 29, 571-583.

Büyükkaragöz, S.Ş., & Kesici, Ş. (1998). Eğitimde öğretmenin rolü ve öğretmen tutumlarının öğrenci davranışları üzerindeki etkisi. Milli Eğitim, 137, 68-73.

Champagne, A. B., & Hornig, L.E. (1987). Issues of science teacher quality, supply, and demand. Science Teacher Education, 71, 57-76.

Creswell, J. W. (1994). Research design-qualitative, quantitative, and mixed methods approaches. (1st ed). Sage Publications, California.

Creswell, J. W. (2003). Research design-qualitative, quantitative, and mixed methods approaches. (2nd ed). Sage Publications, California.

Cunia, E.C. (2005). Behavioral learning theory- A Web Quest, Syracuse University, http://suedstudent.syr.edu/~ebarrett/ide621/behavior.htm, last accessed date, June 19, 2008.

Çakmak, M., & Ercan, L. (2003). Student teachers' views on the role of motivation for mathematics teaching and learning, Hacettepe Üniversitesi Eğitim Fakültesi Dergisi, 25, 31-37.

Çimer, A. (2007). Effective teaching in science: A review of literature, Turkish Science Education, 4, 20-44.

Deci, E. L., & Ryan, R. M. (1985). Intrinsic motivation and self-determination in human behavior. Plenum Press, New York.

Druva, C. A., & Anderson, R.A. (1983). Science teacher characteristics by teacher behavior and by student outcome: A meta analysis of research. Journal of Research in Science Teaching, 20(5), 467-479.

Duruhan, K., Akdağ, M., & Güven, M. (1990). Lise üçüncü sınıf fen bölümü öğrencilerinin matematik dersi öğretmenlerinden okulda ders içi ve ders dışı davranışlarına ilişkin beklentileri. Eğitim ve Bilim, 14, 37-53.

Dzama, E.N.N. (2006). Malawian Secondary School Students' Learning of Science: Historical Background, Performance and Beliefs. University of the Western Cape, http://etd.uwc.ac.za/usrfiles/modules/etd/docs/etd_gen8Srv25Nme4_9442_1182745409.pdf, last accessed date June 19, 2008.

Ergün, M., & Duman, T. (1998). Kritik durumlarda öğretmen davranışları. Milli Eğitim, 137, 45-58.

Eryılmaz, A., & İlaslan, H. (1999). Determining and evaluating ideal physics teachers' characteristics. Hacettepe Üniversitesi Eğitim Fakültesi Dergisi, 16-17, 53-60.

Fives, H. (2003). What is teacher efficacy and how does it relate to teachers' knowledge? A theoretical review. Paper Presented at the American Educational Research Association Annual Conference. Chicago, USA.

Fox, R.B., & Peck, R.F. (1978). Personal characteristics of teachers that affect student learning. (ERIC Document Reproduction Service No. ED 156 644).

Fraenkel, J.R., Wallen, N.E. (1996). How to design and evaluate research in education. (3rd ed.). McGraw-Hill Inc, New York.

Gagne, M., Deci, E.L. (2005). Self determination theory and work motivation. Journal of Organizational Behavior, 26, 331-362.

Gallagher, J.J., & Tobin, K. (1987). Teacher management and student engagement in high school science. Science Teacher Education, 71, 535-555.

Guskey, T.R. (1984). The influence of change in instructional effectiveness upon the affective characteristics of teachers. American Educational Research Journal, 21, 245-259.

Güner, C. (1995). Öğretmenlerin, öğrencilerin okuldaki akademik başarılarına etkileri üzerine bir araştırma". Unpublished Master Thesis, Dokuz Eylül University, İzmir, Turkey.

Gürses, A., Yalçın, M., & Doğar, Ç. (2003). Fen sınıflarında öğretmenin yeri. Milli Eğitim Dergisi, http://yayim.meb.gov.tr/dergiler/157/gurses.htm, last accessed date June 19, 2008.

Gylnn, S.M., & Koballa, T.R. (2006). Handbook of college science teaching. National Science Teachers Association Press, Arlington.

Hall, V.C. (1976). Review of research on classroom communication patterns, leading to improved student performance. (ERIC Document Reproduction Service No. ED 127 292).

Haussler, P., & Hoffmann, L. (2000). A curricular frame for physics education: Development, comparison with students' interests, and impact on students' achievement and self-concept. Science Education, 84(6), 689-705

Heider, F. (1958). The psychology of interpersonal relations. John Wiley & Sons, New York.

Hufton, N.R., Elliot, J.G. & Illushin, L. (2002). Educational motivation and engagement: Qualitative accounts from three countries. British Educational Research Journal, 28(2), 265-289.

Huitt, W. (2001). Motivation to learn: An overview. Educational Psychology Interactive, Valdosta State University, http://chiron.valdosta.edu/whuitt/col/motivation/motivate.html, last accessed date June 19,2008.

Kelecioğlu, H. (1992). Güdülenme. Hacettepe Üniversitesi Eğitim Fakültesi Dergisi, 7, 175-181.

Keller, J. M. (1983). Motivational design of instruction. In C. M. Reigeluth (Eds.), Instructional-design theories and models: An overview of their current status. Lawrence Erlbaum Associates, New Jersey.

Kelly, M.P., & Staver, J.R. (2005). A case study of one school system's adoption implementation of and elementary science program, Journal of Research in Science Teaching, 42, 25-52.

Klausmeier, H.J., Goodwin, W. (1975). Learning and human abilities. (4th ed.).Harper & Row Publishers, New York.

Knowles, K.T. (1999). The effect of teacher engagement on student achievement and motivation. (Dissertation Abstracts International, UMI No. 9925813).

Korur, F. (2001). The Effects of Teachers Characteristics on High School Students' Physics Achievement, Motivation and Attitudes. Unpublished Master Thesis, Middle East Technical University, Ankara, Turkey.

Lawrenz, F. (1975). The relationship between teacher characteristics and student achievment and attitude. (ERIC Document Reproduction Service No. ED 161 679).

Lederman, N.G., Ges-Newsome, J., & Latz, M.S. (1994). The nature and development of preservice science teachers' conceptions of subject matter pedagogy. Journal of Research in Science Teaching, 31(2), 129-146.

Lin, Y., McKeachie, W.J. & Kim, Y.C. (2001). College student intrinsic and/or extrinsic motivation and learning. Learning and Individual Differences, 13(3), 251-258.

Maslow, A.H. (1943). A theory of human motivation. Psychological Review, 50, 370-396.

McDermott, L.C. (1990). A perspective on teacher preparation in physics and other sciences: The need for special science courses for teachers. American Journal of Physics, 58(8), 734-742.

McGarity, J.R., & Butts, D.P. (1984). The relationship among teacher classroom management behavior, student engagement, and student achievement of middle and high school science students of varying aptitude. Journal Of Research In Science Teaching, 21, 55-61.

McLaughlin, M.W., Pfeifer, R.S., Swanson-Owens, D., & Yee, S. (1986). Why teachers won't teach. Phi Delta Kappan, 67, 420-426.

McManic, J. A. (2004). Students' perceptions of motivation in high School Biology Class: Informing current theories. (Dissertation Abstracts International, UMI No. 3150273).

Meloy, J.M. (1994). Writing the qualitative dissertation: Undestanding by doing. Lawrence Erlbaum Associates, New Jersey.

Meriam, S.B. (1998). Qualitative research and case study applications in education. Jossey-Bass Inc., California

Miles, M.B., & Huberman, A.M. (1994). Qualitative data analysis. (2nd ed.) Sage Publications, California.

Miller, A.D., & Murdock, T.B. (2007). Modeling latent true scores to determine the utility of aggregate student perceptions as classroom indicators in HLM: The case of classroom goal structures, Contemporary Educational Psychology, 32, 83-104.

Morgil, F.İ., & Yılmaz, A. (1999). Fen öğretmeninin görevleri ve nitelikleri, fen öğretmeni yetiştirilmesine yönelik öneriler. Hacettepe Üniversitesi Eğitim Fakültesi Dergisi, 15, 181-186.

Norton, J.L. (1997). Educating the effective practitioner: improving the preservice curriculum. (ERIC Document Reproduction Service No. ED 424 193).

Ogden, D.H. (1994). Characteristics of good/effective teachers: Gender differences in student descriptors. (ERIC Document Reproduction Service No. ED 383 657).

Opdenakker, M.C., & Damme, J.V. (2006). Teacher characteristics and teaching styles as effectiveness enhancing factors of classroom practice. Teaching and Teacher Education, 22, 1-21.

Özler, D. (1998). Temel eğitimde (ilköğretim) öğretmen niteliklerinin öğrenci başarılarına etkileri üzerine bir inceleme. Unpublished Master Thesis, Dokuz Eylül University, İzmir, Turkey.

Patton, M.Q. (1987). How to use qualitative methods in evaluation. Sage Pub. California

Piburn, M.D., & Baker, D.R. (1993). If I were the teacher…Qualitative study of attitude toward science. Science Teacher Education, 77(4), 393-406.

Powers, W.G., Nitcavic R., & Koerner, D. (1990). Teacher characteristics: A college level perspective. Communication Education, 39, 227-233.

Reyes, A. (1997). School productivity: Teachers as resources. (ERIC Document Reproduction Service No. ED 423 583).

Richardson, A.G., & Thomas, A.A. (1989). Characteristics of the effective teacher as perceived by pupils and teachers: A Caribbean case study. (ERIC Document Reproduction Service No. ED 311 013).

Robinson, S. (1995). Student stories in a high school physics class. (ERIC Document Reproduction Service No. ED 417 086).

Rowan, B., Chiang, F.S., & Miller, R.J. (1997). Using Research on employees' performance to study the effects of teachers on students' achievement. Sociology of Education, 70, 256-284.

Sanders, L.R., Borko, H., & Lockard, J.D. (1993). Secondary science teachers' knowledge base when teaching science courses in and out of their area of certification. Journal of Research in Science Teaching, 30(7), 723-736.

Shadid, J., & Thompson, D. (2001). Teacher efficacy: A research synthesis. (ERIC Document Reproduction Service No. ED 453 170).

Shirkey, D. (2003). Motivational strategy guidelines based on self-efficacy. Kansas State University, http://www.math.ksu.edu/math791/finalpaper/david term.pdf, last accessed date June 19, 2008.

Sperandeo-Mineo, R.M., Fazio, C., & Tarantino, G. (2006). Pedagogical content knowledge development and pre-service physics teacher education: A case study. Research in Science Education, 36(3), 235-268.

Sweet, A.P., Guthrie, J.T. (1996). Teachers' perceptions and students' literacy motivations. (ERIC Document Reproduction Service No. ED 402 554).

Şahin, F. (2001). Öğretmen adaylarının kavram haritası yapma ve uygulama hakındaki görüşleri. Pamukkale Üniversitesi Eğitim Fakültesi Dergisi, 10, 12-25.

Taylor, J.A., & Dana, T.M. (2003). Secondary school physics teachers' conceptions of scientific evidence: An exploratory case study. Journal of Research in Science Teaching, 40(8), 721-736

Temel, A. (1989). Öğrenci gözüyle öğretmen. Çağdaş Eğitim, 13, 21-28.

Tobin, K. (1986). Validating teacher performance measures against student engagement and achievement in middle school science. Science Education , 70, 539-547.

Tuan, H., & Chin, C. (2000). Students' motivation through learning physical science-A case from four classes of Taiwanese students. (ERIC Document Reproduction Service No. ED 440 889).

Tuan, H., & Chin, C., & Tsai, C. (2003). Promoting students motivation in learning physical science-An action research approach. (ERIC Document Reproduction Service No. ED 475 481).

Uz, H., & Eryılmaz, A. (1999). Effects of socioeconomic status, locus of control, prior achievement, cumulative GPA, future occupation and achievement in mathematics on students' attitudes toward physics. Hacettepe Üniversitesi Eğitim Fakültesi Dergisi, 16-17, 105-112.

Ünal, G., Tatlı, A., & Eryılmaz, A. (2000). Comparison of pre-service and in-service science teachers' perceptions about good science teachers' characteristics. Hacettepe Üniversitesi Eğitim Fakültesi Dergisi, 19, 220-229.

Wayne, A.J., & Youngs, P. (2003). Teacher characteristics and student achievement gains: A review. Review of Educational Research, 73, 89-122.

Weiner, B.(ed.) (1974). Cognitive views of human motivation. Academic Press, New York.

Wheatley, K.F. (2005). The case for reconceptualizing teacher efficacy research. Teaching and Teacher Education, 21(7), 747-766.

Witcher, A. E. & Onwuegbuzie, A.J. (1999). Characteristics of effective teachers: perceptions of preservice teachers. (ERIC Document Reproduction Service No. ED 438 246).

Witcher, A.E., Onwuegbuzie, A.J., Collins, K.M.T., Filer, J.D., Wiedmaier, C.D., & Moore, C. (2003). Students' perceptions of characteristics of effective college teachers. (ERIC Document Reproduction Service No. ED 482 517).

Wright, C. (1984). Stereotyping: "Teacher" and "Good Teacher" characteristics. (ERIC Document Reproduction Service No. ED 255 533).

Wubbels, T., Tartwijk, J.V., Brekelmans, M. (1995). An interpersonal perspective on teacher behaviour in the classroom. (ERIC Document Reproduction Service No. ED 398 193).

Yıldırım, A., & Şimşek, H. (2000). Sosyal bilimlerde nitel araştırma yöntemleri. (2nd ed.). Seçkin Yayıncılık. Ankara

Yin, R.K. (2003). Case study research design and methods. (3rd ed.). Sage Publications. California.

APPENDIX A

THE NAMES OF SCHOOLS THAT THE ETAM ADMINISTERED

Geographical Regions	Cities	No	School Names
CENTRAL ANATOLIA	ANKARA	1	Aydınlıkevler İnönü Lisesi *
		2	Aydınlıkevler (İrfan Baştuğ)Lisesi
		3	Altındağ Esenevler Lisesi
		4	Altındağ Uluğbey Lisesi *
		5	Altındağ Yeşilöz Lisesi
		6	Anıttepe Lisesi
		7	Ankara Atatürk Lisesi *
		8	Ayrancı Lisesi
		9	Batıkent Lisesi
		10	Keçiören Kanuni Lisesi
		11	Fethiye Kemal Mumcu Lisesi
		12	Kaya Bayazıtoğlu Lisesi
		13	Reha Alemdaroğlu Lisesi
		14	Kılıçarslan Lisesi
		15	Etimesgut Eryaman Lisesi *
		16	Keçiören Fatih Sultan Mehmet Lisesi
		17	Keçiören Farabi Lisesi
		18	Ankara İncirli Lisesi *
		19	Keçiören Kalaba Lisesi
		20	Keçiören Rauf Denktaş Lisesi *
		21	Mamak Lisesi
		22	Mamak Nahit Menteşe Lisesi
		23	Mamak Niğbolu Lisesi
		24	Yenimahalle 75.Yıl Lisesi
		25	Yenimahalle Halide Edip Adıvar Lisesi
		26	Yenimahalle Mustafa Kemal Lisesi
	KONYA	27	Erbil Koru Lisesi *
		28	M. Akif Ersoy Lisesi
		29	Meram 75. Yıl Lisesi
		30	Zeki Özdemir Lisesi
		31	Meram M.Güzelkılınç Lisesi
		32	Meram Naciye Mumcuoğlu Lisesi
		33	Selçuklu Atatürk Lisesi
		34	Selçuklu Cumhuriyet Lisesi

CENTRAL ANATOLIA	NİĞDE	35	Atatürk Lisesi *
		36	Fatih Lisesi
		37	Gölcük Lisesi
		38	Remide-Yılmaz Atabek Lisesi
MEDITERRANEAN	ADANA	39	Borsa Lisesi *
		40	Büyük Selçuklu Lisesi
		41	Fatih Terim Lisesi
		42	Şehit Temel Cingöz Lisesi
		43	Toros Gübre Sanayi Lisesi
	ANTALYA	44	75. Yıl Cumhuriyet Lisesi
		45	Çağlayan Lisesi
		46	Karatay Lisesi
		47	Kepez Lisesi
		48	Konyaaltı Lisesi
		49	Muratpaşa Lisesi *
		50	Mustafa-Ayten Aydın Lisesi
		51	Saime Salih Konca Lisesi
		52	Yavuz Selim Lisesi *
	HATAY (Antakya)	53	Antakya Lisesi
		54	Merkez 23 Temmuz Lisesi *
		55	Merkez Lisesi
		56	Süleyman Nazif Lisesi *
BLACK SEA	ORDU	57	Atatürk Lisesi *
		58	Fatih Lisesi *
		59	Cumhuriyet Lisesi
	SAMSUN	60	19 Mayıs Lisesi
		61	50. Yıl Lisesi
		62	100. Yıl (Devrim) Lisesi *
		63	Samsun Gazi Lisesi *
		64	Namık Kemal Lisesi
		65	Tülay Başaran Lisesi
	TRABZON	66	Affan Kitapçıoğlu Lisesi
		67	Atatürk Lisesi *
		68	Erdoğdu Lisesi
		69	Fatih Lisesi *
		70	Yunus Emre Lisesi
		71	Çağlayan Adnan Menderes Lisesi *

* The schools were in the sample of the previous study.

APPENDIX B

THE EFFECTS OF TEACHERS' CHARACTERISTICS ON HIGH SCHOOL STUDENTS' PHYSICS ACHIEVEMENT AND MOTIVATION QUESTIONNAIRE (ETAM)

Değerli Meslektaşım;

Bu çalışmaya yaptığınız özverili katkılardan dolayı şimdiden teşekkür eder, saygılarımı sunarım.

GENEL AÇIKLAMALAR

Bu araştırma etkili niteliklere sahip bir fizik öğretmeninin ne tür niteliklerinin öğrencinin başarı ve motivasyonuna etkili olabileceği konusunda fizik öğretmenlerinin genel bir eğilimini tespit etmeyi amaçlamaktadır. Daha önce yapılan anketteki öğrencilerin verdikleri cevaplarla, bu anketteki öğretmenlerin verdikleri cevaplar ilişkilendirilerek bir fizik öğretmeninin öğrencinin başarısını artırmadaki ortak nitelikleri de araştırma kapsamında incelenecektir. Araştırma sonuçlarının, öğretmen yetiştiren kurumlarda, fizik öğretmenliğini okuyacak öğrencilerin niteliklerinin tespitinde, üniversitelerin eğitim fakültelerinde okutulacak derslerde kullanılabilecek bir kaynak olması beklenmektedir. Ayrıca bundan sonra, bu amaçla yapılacak araştırmalar, makaleler, tezler veya kitaplar için de bir kaynak olması beklenmektedir.

Araştırmada **kesinlikle** öğretmenler **değerlendirilmeyecek** ve öğretmenlerin varolan nitelikleri üzerine bir sonuca **ulaşılmayacaktır.**

ANKET FORMUNUN DOLDURULMASI

1. Araştırmanın objektif olması amacıyla hiçbir şekilde sizlerden isim istenmeyecektir. Sonuçlar istatistiksel olarak değerlendirilecektir.
2. Anket Formu 6 soruluk size ait "Kişisel Bilgiler" ve 142 soruluk "Anket Formu" olmak üzere toplam 6 sayfadan oluşmaktadır. Anket Formu aynı zamanda cevap kâğıdı olarak kullanılacaktır.
3. Anket formundaki sayfaların kaybolması verilerin kaybolması anlamına geleceğinden lütfen zımba ile tutturulmuş sayfaları birbirinden ayırtmayınız.
4. Kişisel Bilgiler kısmını kendinize uygun bilgilerle doldurduktan sonra okuduğunuz her cümle için yanlarında bulunan kutucuklara her soru için ayrı ayrı "Başarı" ve "Motivasyon" sütunlarına **birer işaretleme (X)** yapacaksınız.
5. Anket bir bütün halinde önem arz ettiğinden hiçbir soruyu **boş bırakmayınız**.
6. "Anket"teki hiçbir niteliğin belli bir cevabı yoktur. Bu nedenle size uygun olan seçenek en doğru cevaptır.
7. Kişisel Bilgiler ve Anket Formu kısımlarının tamamını eksiksiz bir biçimde doldurduktan sonra Anket'i idareye teslim ediniz.

ÖRNEK : Aşağıda anketin birinci cümlesi ve ne şekilde işaretleneceği örnek olarak verilmiştir. Lütfen dikkatlice inceleyiniz.

" **1.** Konu bilgisine yeterince sahip olması" .

Etkili niteliklere sahip bir fizik öğretmeninin bu niteliği sizce öğrencinin başarısına ve motivasyonuna ne derecede etkili olur?

Eğer yukarıda verilen fizik öğretmeni niteliğinin öğrenci başarısını **Etkilemez** ve motivasyonunu **Çok Artırır** olarak düşünüyorsanız işaretlemeniz;

	BAŞARI					MOTİVASYON				
	Çok Azaltır	Azaltır	Etkilemez	Artırır	Çok Artırır	Çok Azaltır	Azaltır	Etkilemez	Artırır	Çok Artırır
1. Konu bilgisine yeterince sahip olması			X							X

şeklinde olacaktır.

ÖNEMLİ NOT: Bütün okuyacağınız maddeler etkili niteliklere sahip bir fizik öğretmeni ile ilgili olduğundan her niteliğin başına "Fizik öğretmeninin" kelimesi **eklenmemiştir.** Yardımlarınız, sabrınız ve katkılarınız için teşekkür ederim.

Fikret KORUR
ODTÜ Eğitim Fakültesi Orta Öğretim Fen ve Matematik Alanları Eğitimi Bölümü
Fizik Eğitimi Doktora Öğrencisi

KİŞİSEL BİLGİLER

1. Cinsiyetiniz: Erkek ☐ Kadın ☐
2. Yaşınız: 21–30 ☐ 31–40 ☐ 41–50 ☐ 51–60 ☐ 61-üzeri ☐
3. Öğrenim Durumunuz Üniversite ☐ Yüksek Lisans ☐ Doktora ☐
4. Öğretmenlikte kaçıncı yılınız: 1–5 ☐ 6–10 ☐ 11–20 ☐ 21–30 ☐ 31-üzeri ☐
5. Mezun olduğunuz üniversite: .....……
6. Mezun Olduğunuz Fakülte: Eğitim ☐ Fen Edebiyat ☐ Mühendislik ☐

ANKET FORMU

Fizik öğretmeninin;	BAŞARI					MOTİVASYON				
	Çok Azaltır	Azaltır	Etkilemez	Artırır	Çok Artırır	Çok Azaltır	Azaltır	Etkilemez	Artırır	Çok Artırır
1. Konu bilgisine yeterince sahip olması										
2. Konu bilgisini uygun detayda vermesi										
3. Konuların tarihsel gelişimini anlatması										
4. Fizikte kullanacağı matematik ve geometri konularına hakim olması										
5. Öğrencilere üretken ve sorumluluk sahibi vatandaşlar olmayı öğütlemesi										
6. Mesleğine saygısının olması										
7. Kendi sorunlarını sınıfa taşıması										
8. Derse zamanında girip çıkması										
9. Öğrencilerin fizik konularıyla ilgili sorularına rahatlıkla cevap vermesi										
10. Öğrencilerin kişisel sorunlarının çözümünde rehberlik etmesi ve kişilik gelişimine önem vermesi										

11. Öğrencilerle tek tek ya da gruplar halinde konuşma ve tartışmaya zaman ayırması										
12. Öğrenciye karşı arkadaşça tutumu olması										
13. Öğrencilere karşı dürüst olması										
14. Öğrencilere ders dışında zaman ayırması										
15. Derse ve kendisine yönelik eleştirilere açık olması										
16. Öğrencilerce düzenlenen akademik ya da sosyal etkinliklere ilgi göstermesi										
17. Öğrencilerle birlikte spor yapması										
18. Derse hazırlıklı gelmesi										
19. Kendisini geliştirmek için çaba göstermesi										
20. Öğrencilerin yeteneklerine, ilgi ve ihtiyaçlarına göre konuları ayarlaması										
21. Sınıf çalışmalarına ek olarak seviye yükseltme kursları yapması										
22. Mesleki yenilikleri takip etmesi ve elde ettiği bilgileri öğrencilerine aktarması										
23. Öğrencilerin sorularına mantıklı yaklaşıp cevabını bilmediği soruları araştırıp öğrencilere açıklaması										
24. Öğrencilerin kütüphaneden yararlanmaları için teşvik etmesi										
25. Sınıfta öğrenme için elverişli bir ortam sağlaması										
26. Dersin amaç ve hedeflerini öğrencilere açıklaması										
27. Dersin başında, önceki fen/fizik konuları ile bağlantı kurması										
28. Derse, konu ile ilgili ilginç bir hikaye anlatarak başlaması										
29. Öğrencilerini tanıması ve onlara isimleri ile seslenmesi										
30. Öğrencileri bağımsız birer kişilik olarak görmesi										
31. Bazı öğrencilerle daha fazla ilgilenip, sınıfın genelini düşünmemesi										
32. Ders süresini etkili biçimde kullanması										
33. Öğrencilerin okuldan sonraki yaşamlarında fizikte öğrendikleri konuları uygulamaya geçirebileceklerini vurgulaması										
34. Öğrencilere sorular sorarak derse aktif katılım sağlaması										
35. Konu ile ilgili çok sayıda soruyu sorup öğrencilerin anlama düzeylerini kontrol etmesi										
36. Dersi içten gelmeyerek (isteksiz) anlatması										
37. Ders süresi boyunca öğrencilerin ilgisini canlı tutması										
38. Tahtayı düzgün bir şekilde kullanması ve yazısının okunaklı olması										
39. Ders anlatımında açık, anlaşılır, akıcı ve yalın bir dil kullanması										

40. Öğrencilerin sorularını dikkate alarak, anlaşılmayan konuları tekrar anlatması										
41. Öğrenme güçlükleri ile karşılaşınca yeni örneklerle konuyu açıklaması										
42. Derste işlenen konu ile ilgili bilimsel yayınlardan ve dergilerden örnekler vermesi										
43. Konuyu anlatırken notlarına çok bağlı kalması										
44. Ses tonunu sınıfın ve konunun gerektirdiği biçimde etkili olarak kullanması										
45. El, kol, jest, mimik ve vücut hareketlerini konuların önemine uygun kullanması										
46. Konularla ilgili teknolojideki uygulamalardan örnekler vermesi										
47. Derste ÖSS de çıkmış ya da çıkabilecek tipte sorular çözmesi										
48. Fizik konularını bir bütünlük içinde anlatması										
49. Fizik dersini neden-sonuç ilişkileri ile açıklaması										
50. Öğrencileri, Nasıl?, Niçin?...ise ne olacak? tipinde sorular sormaya teşvik etmesi										
51. Örneklerini basitten karmaşığa doğru vermesi										
52. Fizikteki kanunları formüle ederken, formüllerin ispatını yapması										
53. Öğrencileri ezber bilgiye yönlendirmesi										
54. Fizik dersi ile diğer alanlar arasındaki ilişkileri kavrayacak kadar genel kültür sahibi olması										
55. Öğrencilere proje çalışmaları yaptırması										
56. Dersi geleneksel (tahta başında) yöntemler kullanarak işlemesi										
57. Dersleri problem çözme yöntemi ile işlemesi										
58. Örnek çözerken problem çözme teknikleri geliştirmesi ve birimlerin, büyüklüklerin, işaretlerin (+,-) ve problemin sonucunun gösterilmesinin önemli olduğunu vurgulaması										
59. Derste öğrenci merkezli yöntemler kullanması										
60. Derslerini laboratuvardan yararlanarak işlemesi										
61. Derste gösteri deneyleri yapması										
62. Fizik etkinliklerinde sözlü, yazılı ve uygulamalı bir denge kurması										
63. Fizik dersini günlük hayattan örneklerle ilginç ve eğlenceli hale getirmesi										
64. Dersleri sorgulama tekniği ile işlemesi										
65. Fizik kavramlarının öğrenilmesine önem vermesi										
66. Konuları birden fazla farklı yollarla anlatması										
67. Derste tahtanın yanında tepegöz ve slayt göstericisi gibi materyallerden yararlanması										
68. Sınıf içi derse yönelik aktiviteleri iyileştirmesi ve geliştirmesi										
69. Öğrencilerin fiziksel olarak ta aktif olduğu aktiviteler kullanması										
70. Ders anlatımında film ve video ortamından yararlanması										

71. Bilgisayar ortamında eğitim programlarından yararlanması										
72. Konulara uygun somut araç gereçleri sınıfa getirip öğrencilere tanıtması										
73. Öğrencilerin istek ve becerilerine göre kaynak ve yardımcı kitaplar önermesi										
74. Sınıf içinde belli bir yerde sabit kalması (dolaşmaması)										
75. Derste sürekli oturması										
76. Ayakta dururken sürekli sallanması ya da bir yere yaslanması										
77. Sürekli sıraların arasında dolaşması										
78. Bıkkınlık ve yorgunluk hareketleri göstermesi										
79. Her dersin sonunda o derste işlenilen konuları özetlemesi										
80. Ders sonunda konuyu pekiştiren ödevler vermesi										
81. Kavram veya gözleme dayalı ödev vermesi										
82. Hesap yapmaya dayalı ödev vermesi										
83. Çok fazla ödev vermesi										
84. Çok az ödev vermesi										
85. Ödevleri düzenli kontrol edip not olarak değerlendirmesi										
86. Anlama düzeyini ölçecek ödevler vermesi										
87. Sınav sorularını tüm öğrencilerin anlayacağı ve cevaplayacağı biçimde hazırlaması										
88. Sınavda kopya çekilmesini engelleyecek önlemler alması (yer değiştirmesi, ders notlarını uzaklaştırmalarını istemesi gibi)										
89. Sınavlarda soruları sürekli klasik tipte hazırlaması										
90. Sınavlarda soruları sürekli çoktan seçmeli hazırlaması										
91. Sınav soruları öğrenci başarısını ölçer nitelikte olması										
92. Müfredat programını yetiştirmek için konuları çok hızlı geçmesi										
93. Not verirken tarafsız davranması										
94. Başarıyı ya da başarısızlığı tam olarak yansıtacak notu vermesi										
95. Sınav sonuçlarını en kısa zamanda öğrenciye duyurması										
96. Sınıfta öğrencilere verdiği öğütleri önce kendisinin yerine getirmesi										
97. Hatalarını kabul etmesi ve bunlardan kısa zamanda vazgeçmesi										
98. Ceza olarak öğrenciyi arkadaşlarının önünde küçük düşürmesi										
99. Disiplin olaylarını, okul yönetimine haber vermeden, öncelikle kendinin çözümlemesi										
100. Derslerde öğrencilere yerli/yersiz bağırması										
101. Öğrencilere kötü kelimeler kullanması										
102. Öğrencilerin yanlışlarına kızması ve sınıf atmosferini bozan öğrencilere bağırması veya kaba kuvvet uygulaması										

103. Kötü davranış gösteren öğrencinin yanlışını kendisine ya da diğer öğrencilere buldurması										
104. Disiplin anlayışı olarak öğrencilere düşük not vermesi (öğrencileri notla korkutması)										
105. Ödüllendirme ve cezalandırmanın derecesini iyi ayarlaması										
106. Disiplin anlayışı olarak öğrencilere güven vermesi ve örnek olması										
107. Öğrencilerin yanlış davranışlarını anında düzeltmesi										
108. Bir öğrencinin yaptığı bir hatadan dolayı bütün sınıfı cezalandırması										
109. Dersin işlenişi sırasında dersle hiç ilgilenmeyen, başka şeyle meşgul olan öğrenciyi uyarması										
110. Erkek olması										
111. Kadın olması										
112. Bedensel engelli olması										
113. Sürekli hasta olması										
114. Duygusal olması										
115. Zeki olması										
116. Sorumluluk sahibi olması										
117. Kendini beğenmiş görüntüsü olması										
118. Varlıklı görünmesi										
119. Yoksul görünmesi										
120. İyi ve örnek bir insan olması										
121. Kaba olması										
122. Lider olması ve lider görüntüsü vermesi										
123. Kararlı olması										
124. Sabırlı ve hoşgörülü olması										
125. Nazik olması										
126. Şaka yapması ve şakadan anlaması										
127. Esnek (toleranslı) davranması										
128. Neşeli ve iyi huylu olması										
129. Dinamik ve enerjik olması										
130. İyi motive edici olması										
131. Katı, huysuz, anlayışsız, donuk ve can sıkıcı olması										
132. İnsanları ve dolayısıyla öğrencileri sevmesi										
133. Demokratik olması										
134. Otoriter olması										
135. Güvenilir olması ve kendine güveni olması										
136. Yardımsever, himaye edici ve anlayışlı olması										
137. Zevksiz bir giyim tarzı olması										
138. Genel olarak bakımlı bir görünüşü olması										
139. Yaşlı olması										
140. Genç olması										
141. Mesleğinde tecrübeli olması										
142. Toplumun ahlaki değerlerine saygı duyması										

APPENDIX C

LIST OF LITERATURE REVIEW KEYWORDS

NO	KEYWORDS	ERIC	Dissr.	SSCI-SCI	Turkish Jour.
1	Effects of Teachers' Characteristics	□	□	□	□
2	Characteristics of Teachers (Teachers' Characteristics)	□	□	□	□
3	Physics teachers + qualitative+ characteristics+ achievement	□	□	□	□
4	Physics teachers + qualitative + characteristics +motivation	□	□	□	□
5	Physics teachers+ qualitative + characteristics +students' motivation	□	□	□	□
6	Teachers + case study + physics + teaching and learning	□	□	□	□
7	Teachers +case study+ physics + characteristics	□	□	□	□
8	Teachers' characteristics + case study + students' motivation	□	□	□	□
9	Teachers' characteristics +case study + students' achievement	□	□	□	□
10	Qualitative + physics teachers + characteristics	□	□	□	□
11	Physics teachers' characteristics	□	□	□	□
12	Characteristics of physics teachers	□	□	□	□
13	Case study + achievement	□	□	□	□
14	Case study + motivation	□	□	□	□
15	Case study + physics + students' perception	□	□	□	□
16	Case study + achievement + characteristics of teachers	□	□	□	□

17	Qualitative + case study + physics teachers	□	□	□	□
18	Case study + motivation + characteristics of teachers	□	□	□	□
19	Case study + attitude + characteristics of teachers	□	□	□	□
20	Case study + students' perception + characteristics of physics teachers	□	□	□	□
21	Meta analysis + teachers' characteristics	□	□	□	□
22	Meta analysis + characteristics of physics teachers	□	□	□	□
23	Interview schedule + physics teachers + characteristics of teacher	□	□	□	□
24	Interview schedule + physics teachers' characteristics + qualitative	□	□	□	□
25	Observational case study +qualitative + characteristics of physics teachers	□	□	□	□
26	Observation schedule + physics teachers' characteristics	□	□	□	□
27	Qualitative + mixed methods + characteristics + teachers	□	□	□	□
28	Qualitative + mixed methods + physics + teachers	□	□	□	□
29	Mixed methods + physics teachers + characteristics	□	□	□	□
30	Characteristics of physics teachers + mixed strategies	□	□	□	□

APPENDIX D

MINISTRY OF NATIONAL EDUCATION OFFICIAL PERMISSION PAPER

ASLI GİBİDİR

T.C.
MİLLÎ EĞİTİM BAKANLIĞI
Araştırma, Planlama ve Koordinasyon Kurulu Başkanlığı

Sayı : B.08.0.APK.0.03.05.01-01/ 7241 14/11/2005

Konu : Araştırma İzni

…. … … … …..VALİLİĞİNE
(İl Milli Eğitim Müdürlüğü)

İlgi :Orta Doğu Teknik Üniversitesi Rektörlüğü'nün 24.10.2005 tarih ve 001 sayılı yazısı.

Orta Doğu Teknik Üniversitesi Ortaöğretim Fen ve Matematik Alanlar Eğitimi Bölümü Doktora programı öğrencisi Fikret KORUR"un "Öğretmen Niteliklerinin Lise Seviyesindeki Öğrencilerin Fizik Başarı ve Motivasyonlarına Etkileri ve Öğrencilerin Etkili Nitelikleri Olan Öğretmeni Algıları" konulu araştırma anketini ortaöğretim kurumlarında uygulama izin talebi incelenmiştir.

Orta Doğu Üniversitesi tarafından kabul edilen ve ekte gönderilen 10 sayfa 142 sorudan oluşan anketin araştırmacı tarafından uygulanmasında Bakanlığımızca sakınca görülmemektedir.

Bilgilerinizi ve gereğini rica ederim.

Cevdet CENGİZ
Bakan a.
Müsteşar Yardımcısı

EKLER :
EK-1 Anket (10 sayfa)

DAĞITIM :
B Planı

ASLI GİBİDİR
Mehmet BİLGİN
İlköğretim Müfettişi
Şube Müdürü

ÜCRETSİZ 444 0 632 DANIŞMA HATTI
Atatürk Bulvarı Nu: 98 Kızılay 06650 ANKARA
Telefon: 425 00 86 - 425 33 67 Faks : 418 64 01
e – posta : apk @ meb.gov.tr Elektronik ağ : www.meb.gov.tr

ASLI GİBİDİR

APPENDIX E

METU-FACULTY OF EDUCATION COVER PAGE

1956

T.C. ORTA DOĞU TEKNİK ÜNİVERSİTESİ
MIDDLE EAST TECHNICAL UNIVERSITY
EĞİTİM FAKÜLTESİ
FACULTY OF EDUCATION

Tarih/Date: 28.11.2005

Sayı/Reference: B.30.2.ODT.0.36.00.00/05/155- 1083 018072

Konu/Subject :

..... LİSESİ MÜDÜRLÜĞÜNE;

.....

Doktora çalışması olarak fakültemizde yürütülen bu araştırma bir fizik öğretmeninin ne tür niteliklerinin öğrencinin başarısında ve motivasyonunda etkili olabileceği konusunda **fizik öğretmenlerinin** genel bir eğilimini tespit etmeyi amaçlamaktadır. Belirtilen anketin 12 ilde 113 okulda ortalama 339 fizik öğretmenine uygulanabilmesi için Milli Eğitim Bakanlığı Araştırma Planlama ve Koordinasyon Kurulu Başkanlığı'ndan ekteki izin belgesi alınmış durumdadır.

Araştırmada **kesinlikle** öğretmenler değerlendirilmeyecek ve öğretmenlerin **var olan nitelikleri üzerine bir sonuca ulaşılmayacaktır**. Araştırma sonuçlarının, öğretmen yetiştiren kurumlarda, öğrencilerin seçiminden, uygulayacakları programdaki ders içeriklerinin hazırlanmasına kadar çeşitli şekillerde kullanılabilecek bir kaynak olması beklenmektedir. Ayrıca bundan sonra yine bu amaçla yapılacak araştırmalar, makaleler, tezler veya kitaplar için kaynak olarak kullanılması beklenmektedir. Araştırmanın sonuçları bir rapor halinde T.C. MEB Araştırma Planlama ve Koordinasyon Kurulu Başkanlığı'na sunularak Milli Eğitim Bakanlığı'nın öğretmen nitelikleri üzerine yaptığı araştırmalara katkı sağlaması beklenmektedir.

Anket formlarının okulunuzdaki **fizik öğretmenleri** tarafından, ekteki Anket Uygulama Yönergesine uygun olarak doldurulması, kargo/posta yolu ile yollanan formların doldurulduktan sonra en kısa sürede öğrencimizin eline geçmesini sağlamak amacıyla gereğini ilgilerinize saygılarımla sunarım.

Prof. Dr. Meral AKSU
Eğitim Fakültesi Dekanı

EKLER:

Ek 1: Milli Eğitim Bakanlığı APK Kurulu Başkanlığı izin yazısı
Ek 2: 1 adet anketin uygulanacağı iller ve okulların listesi
Ek 3: 1 Adet Anket Uygulama Yönergesi
Ek 4: 1 adet Anket Formu örneği
Ek 5: 3 adet Anket Formu
Ek 6: 1 adet adres yazılı geri dönüş poşeti

Tel: 0 (312) 210 40 05 Faks: 0 (312) 210 11 12 06531 ANKARA / TÜRKİYE www.fedu.metu.edu.tr

APPENDIX F

APPLICATION INSTRUCTION GUIDE

OKUL KODU: ….....

ANKET UYGULAMA YÖNERGESİ

Anket dahilinde 142 anket maddesi ve istatiksel değerlendirmenin sağlıklı olması açısından, 'Kişisel Bilgiler' kısmında 6 soru olmak üzere tamamı **fizik öğretmenleri veya okulunuzda fizik dersine giren öğretmenler** tarafından doldurulacak toplam 148 madde bulunmaktadır. Yaptığımız pilot çalışmalarda anket formunun 40-55 dakika arasında tamamlandığı görülmüştür.

Araştırmanın objektif olması bakımından da araştırmaya katılan fizik öğretmenlerimizden isim istenmemiştir. Anketin uygulanacağı her okulda ortalama 3 fizik öğretmeni olduğu düşünülerek kargo poşetine 3 adet Anket Formu konulmuştur. Sayının yetmemesi durumunda yine kargo poşetinden çıkan Anket Formu fotokopi ile çoğaltılarak öğretmenlerimize verilebilir. Ayrıca Anket Formlarının gönderilen her okulda standart bir şekilde doldurulabilmesi ve anketi doldururken yaşanacak güçlüklerin önüne geçilmesi amacıyla her anketin başında bir sayfalık "Genel Açıklamalar" ve "Anket Formunun Doldurulması" ile ilgili bilgiler bulunmaktadır. Anket Formunu dolduran öğretmenimizin bu açıklamalardaki hususları dikkate alması araştırma sonuçlarının sağlıklı olması açısından önem taşımaktadır.

Öğretmenlerimizden zımbalı Anket Formları toplandıktan sonra, bu anket formlarını EN GEÇ **26 Aralık 2005 Pazartesi** gününe kadar size ulaşan kargo poşetinin içinden çıkan üzerinde **adres yazılı geri gönderme** poşetine koyarak, MNG kargo şubesine, adrese teslim ve **ücret alıcı (ücretini bizim ödeyeceğimiz şekilde)** yollayınız veya sizin bölgenize bakan MNG kargo'yu telefonla arayarak adresten alım yaptırınız.

Uygulama veya geri gönderme ile ilgili her türlü sorununuzda araştırma ekibine aşağıdaki telefonlardan ya da elektronik posta adresinden ulaşabilirsiniz.

İrtibat İçin:

Fikret Korur (Cep): **0532 603 39 32 – fkorur@hotmail.com**
AVEA (MEB Personel): **0 505 66 999 13**

Yrd. Doç. Dr. Ali Eryılmaz (ODTÜ): **0312 210 40 55 – eryilmaz@metu.edu.tr**

APPENDIX G

MEAN SCORES OF TMOT AND TACH*

ITEM NO	TMOT	TACH
Item018	1,3692	1,5093
Item101	1,5888	1,4579
Item004	1,2430	1,4019
Item036	1,5607	1,3738
Item009	1,4579	1,3692
Item001	1,2430	1,3505
Item063	1,5888	1,3505
Item060	1,4299	1,3458
Item102	1,5467	1,3458
Item002	1,2523	1,3178
Item019	1,1449	1,3178
Item098	1,5514	1,3131
Item131	1,4579	1,2897
Item039	1,3084	1,2804
Item007	1,3318	1,2710
Item034	1,3411	1,2664
Item025	1,3131	1,2664
Item067	1,3598	1,2664
Item078	1,4019	1,2570
Item051	1,1449	1,2523
Item130	1,4907	1,2430
Item037	1,3785	1,2383
Item040	1,1308	1,2336
Item075	1,3738	1,2336
Item041	1,0981	1,2336
Item027	1,2103	1,2290
Item020	1,2477	1,2290
Item108	1,4393	1,2290
Item061	1,2757	1,2290
Item053	1,0514	1,2243
Item059	1,3131	1,2243
Item006	1,2336	1,2243
Item104	1,4439	1,2243
Item049	1,1869	1,2056
Item031	1,4065	1,2056
Item141	1,1636	1,1916
Item048	1,0748	1,1822
Item047	1,3364	1,1729
Item068	1,2383	1,1682
Item106	1,3692	1,1682
Item113	1,2430	1,1682
Item081	1,0701	1,1636
Item087	1,1028	1,1636
Item071	1,3131	1,1636

ITEM NO	TMOT	TACH
Item100	1,4159	1,1589
Item035	1,1121	1,1589
Item124	1,2664	1,1542
Item010	1,3598	1,1542
Item072	1,3084	1,1542
Item062	1,0514	1,1495
Item021	0,8738	1,1449
Item050	1,2196	1,1449
Item080	0,9112	1,1449
Item070	1,3645	1,1262
Item011	1,2757	1,1168
Item132	1,3925	1,1168
Item116	1,1963	1,1168
Item022	1,2617	1,1168
Item129	1,3037	1,1121
Item123	1,2103	1,1075
Item121	1,3037	1,0981
Item055	1,2150	1,0981
Item092	1,1121	1,0981
Item120	1,2991	1,0888
Item069	1,2383	1,0841
Item046	1,2944	1,0794
Item086	1,0000	1,0794
Item091	1,0047	1,0748
Item064	1,1402	1,0701
Item032	1,0187	1,0701
Item066	1,0234	1,0701
Item029	1,4626	1,0654
Item014	1,1822	1,0607
Item079	0,9112	1,0514
Item105	1,1822	1,0467
Item073	0,9579	1,0467
Item044	1,2897	1,0467
Item023	1,1542	1,0421
Item135	1,2430	1,0374
Item013	1,2150	1,0280
Item058	0,7944	1,0280
Item008	1,0841	1,0234
Item054	1,1355	1,0234
Item115	1,0280	1,0093
Item045	1,2897	1,0000
Item133	1,1916	1,0000
Item065	0,8178	0,9953
Item074	1,1776	0,9907
Item026	1,1168	0,9720
Item038	1,0888	0,9673
Item042	1,2570	0,9673
Item030	1,2850	0,9579
Item096	1,2056	0,9533
Item012	1,2336	0,9486
Item094	1,0140	0,9486
Item125	1,1729	0,9393
Item033	1,1449	0,9346
Item024	0,9159	0,9299

ITEM NO	TMOT	TACH
Item076	1,1028	0,9252
Item093	1,0981	0,9252
Item085	0,9112	0,9206
Item057	0,7290	0,8972
Item097	1,0935	0,8925
Item142	1,1075	0,8879
Item028	1,4206	0,8692
Item005	1,0093	0,8645
Item107	1,0607	0,8645
Item015	0,9673	0,8598
Item122	1,0981	0,8551
Item128	1,1355	0,8458
Item126	1,2383	0,8411
Item136	1,1402	0,8131
Item103	1,0467	0,8037
Item127	1,0234	0,8037
Item134	0,8925	0,7430
Item099	0,9907	0,7383
Item016	1,0421	0,7243
Item083	0,8364	0,7103
Item117	1,0234	0,7009
Item052	0,7664	0,6822
Item084	0,6916	0,6729
Item077	0,8972	0,6495
Item095	0,9953	0,6495
Item090	0,5981	0,6355
Item082	0,5374	0,6215
Item109	0,8925	0,6215
Item056	0,7523	0,6075
Item138	1,0047	0,6075
Item089	0,6121	0,5794
Item043	0,8178	0,5701
Item088	0,6308	0,5467
Item017	0,8411	0,4673
Item003	0,8645	0,4673
Item137	0,8645	0,4439
Item114	0,5421	0,3738
Item140	0,5421	0,3178
Item139	0,4159	0,2523
Item112	0,3364	0,2290
Item119	0,4252	0,2290
Item118	0,3364	0,1963
Item110	0,0841	0,0841
Item111	0,0981	0,0374

N=214

* Descending order with respect to the mean scores of TACH

APPENDIX H

EFFECTIVE TEACHER IDENTIFICATION QUESTIONNAIRE (ETIQ)

ÖĞRETMEN NİTELİKLERİ DEĞERLENDİRME ANKETİ

Değerli Meslektaşım;

Bu çalışmaya yaptığınız özverili katkılardan dolayı şimdiden teşekkür eder,

saygılarımı sunarım.

GENEL AÇIKLAMALAR

Bu araştırma bir fizik öğretmeninin ne tür karakteristiklerinin öğrencinin başarı, ve motivasyonuna etkili olabileceği konusunda fizik öğretmenlerinin genel bir eğilimi tespit etmek amacıyla üç coğrafi bölgedeki toplam 2177 fizik öğrencisine ve belki içine sizin de dahil olduğunuz 214 fizik öğretmenine uygulanmış ve aşağıdaki 38 nitelik öğrencilerin başarısını ve motivasyonunu en çok etkileyen nitelikler olarak belirlenmiştir. Bu niteliklere sahip bir fizik öğretmeninin sınıf içi aktivitelerdeki bu nitelikleri ne kadar uyguladığı nitel bir araştırma ile detaylı incelenecektir. Araştırma sonuçlarının, öğretmen yetiştiren kurumlarda, fizik öğretmenliğini okuyacak öğrencilerin niteliklerinin tespitinde, üniversitelerin eğitim fakültelerinde uygulanacak programların hazırlanmasında kullanılabilecek bir kaynak olması beklenmektedir.

Ankete verdiğiniz BÜTÜN cevaplar ve bilgiler **GİZLİ TUTULACAKTIR** ve sizin izniniz olmadan **kesinlikle hiç kimseyle paylaşılmayacaktır.**

ANKET FORMUNUN DOLDURULMASI

1. Anket Formu 38 soru ve 5 sayfadan oluşmaktadır. Anket Formu aynı zamanda cevap kağıdı olarak kullanılacaktır.

2. Okuduğunuz niteliğin karşısındaki ölçeğe işaretleme **(X)** yaptıktan sonra bu cevabınızı destekleyen bir örneği ilgili maddenin hemen altındaki boşluğa (varsa) yazınız.

3. "Anket"teki hiçbir niteliğin belli bir cevabı yoktur. Bu nedenle size uygun olan seçenek ve vereceğiniz yanıt en doğru yanıttır.

4. Anket bir bütün halinde önem arz ettiğinden hiçbir soruyu **boş bırakmayınız**.

Fikret KORUR
Ortadoğu Teknik Üniversitesi
Orta Öğretim Fen ve Matematik Alanları Eğitimi Bölümü
Fizik Eğitimi-Doktora Öğrencisi

FİZİK ÖĞRETMEN NİTELİKLERİ	**Hayır/Hiçbir zaman**	**Bazen**	**Oldukça sık**	**Çok sık**	**Evet/Her zaman**
1. Konu bilgisine yeterince sahibim.					
Bu cevabınızı (olumlu ya da olumsuz) destekleyen birkaç örnek verir misiniz?					
2. Konu bilgisini uygun detayda veririm.					
Bu cevabınızı (olumlu ya da olumsuz) destekleyen birkaç örnek verir misiniz?					

3. Fizikte kullanacağım matematik ve geometri konularına hakimim.					
Bu cevabınızı destekleyen birkaç örnek verir misiniz?					
4. Öğrencilerin fizik konularıyla ile ilgili sorularına rahatlıkla cevap veririm.					
Bu cevabınızı destekleyen birkaç örnek verir misiniz?					
5. Derse hazırlıklı gelirim.					
Bu cevabınızı destekleyen birkaç örnek verir misiniz?					
6. Mesleğimde tecrübeli olduğumu düşünüyorum.					
Bu cevabınızı destekleyen yorumlarınızı yazarmısınız?					
7. Öğrencilerin sorularını dikkate alarak, anlaşılmayan konuları tekrar anlatırım.					
Bu cevabınızı destekleyen birkaç örnek verir misiniz?					
8. Öğrenme güçlükleri ile karşılaşınca yeni örneklerle konuyu açıklarım.					
Bu cevabınızı destekleyen birkaç örnek verir misiniz?					
9. Örnekleri basitten karmaşığa doğru veririm.					
Derste çözdüğünüz örneklerin sıralamasına önem verirmisiniz? Bununla ilgili bir örnek yazabilirmisiniz?					
10. Sınav sorularını tüm öğrencilerin anlayacağı ve cevaplayacağı biçimde hazırlarım.					
Bu cevabınızı destekleyen bir örnek verir misiniz?					
11. Derste ÖSS de çıkmış ya da çıkabilecek tipte sorular çözerim.					
12. Derste tahtanın yanında tepegöz ve slayt göstericisi gibi materyallerden yararlanırım.					
Tepegöz ve slayt göstericisi gibi araçların özellikle fiziğin hangi konularında kullanıyorsunuz?					

FİZİK ÖĞRETMEN NİTELİKLERİ	**Hayır/Hiçbir zaman**	**Bazen**	**Oldukça sık**	**Çok sık**	**Evet/Her zaman**
13. Ders anlatımında konu ile ilgili film ve video ortamından yararlanırım.					
Video ve film gibi araçların özellikle fiziğin hangi konularında kullanıyorsunuz?					
14. Bilgisayar ortamında eğitim programlarından yararlanırım.					
Bilgisayar-İnternet veya eğitim yazılımlarından fiziğin hangi konularında yararlanıyorsunuz?					
15. Konulara uygun somut araç gereçleri sınıfa getirip öğrencilere tanıtırım.					
Bu uygulama ile ilgili birkaç örnek verir misiniz?					
16. Öğrencilerin yeteneklerine, ilgi ve ihtiyaçlarına göre konuları ayarlarım.					
Bu cevabınızı (olumlu ya da olumsuz) destekleyen birkaç örnek verir misiniz?					
17. Öğrencilerin sorularına mantıklı yaklaşıp sınıfta cevabını bilemediğim soruları araştırırım ve öğrencilere açıklarım.					
Böyle bir durumla hiç karşılaştınız mı? Bu cevabınızı destekleyen bir örnek verir misiniz?					
18. Sınıfta öğrenme için elverişli bir ortam sağlarım.					
Bu cevabınızı (olumlu ya da olumsuz) destekleyen birkaç örnek verir misiniz?					
19. Öğrencileri, Nasıl?, Niçin?, … ise ne olacak? gibi sorular sormaya teşvik ederim.					
Bu cevabınızı (olumlu ya da olumsuz) destekleyen birkaç örnek verir misiniz?					
20. Dersleri laboratuardan yararlanarak işlerim.					
Örnek verir misiniz? Hangi sıklıkta ve genellikle hangi konularda?					

FİZİK ÖĞRETMEN NİTELİKLERİ	**Hayır/Hiçbir zaman**	**Bazen**	**Oldukça sık**	**Çok sık**	**Evet/Her zaman**
21. Derste gösteri deneyleri yaparım.					
Örnek verir misiniz? Hangi sıklıkta ve genellikle hangi konularda?					
22. Fizik dersini günlük hayattan örneklerle ilginç ve eğlenceli hale getiririm.					
Örnek verir misiniz?					
23. Mesleki yenilikleri takip eder bunları öğrencilerle paylaşırım.					
Düzenli takip ettiğiniz dergi(ler) veya İnternet adresi(leri) varsa yazınız.					
24. Öğrencilere sorular sorarak, derse aktif katılım sağlarım.					
Derse aktif katılımı sağlayan uygulamalarınıza bir iki örnek verir misiniz?					
25. Ders süresi boyunca öğrencilerin ilgisini canlı tutarım.					
Bu cevabınızı (olumlu ya da olumsuz) destekleyen birkaç örnek verir misiniz?					
26. Ders anlatımında açık anlaşılır, akıcı ve yalın bir dil kullanırım.					
Bu cevabınızı (olumlu ya da olumsuz) destekleyen birkaç örnek verir misiniz?					
27. Öğrencileri derse karşı iyi motive ederim.					
Bu cevabınızı (olumlu ya da olumsuz) destekleyen birkaç örnek verir misiniz?					
28. Sınıfın genelini düşünürüm, bazı öğrencilerle daha fazla ilgilenmem.					
Bu cevabınızı (olumlu ya da olumsuz) destekleyen birkaç örnek verir misiniz?					
29. Kendi sorunlarımı sınıfa taşımam.					
Bu cevabınızı (olumlu ya da olumsuz) destekleyen birkaç örnek verir misiniz?					

FİZİK ÖĞRETMEN NİTELİKLERİ	**Hayır/Hiçbir zaman**	**Bazen**	**Oldukça sık**	**Çok sık**	**Evet/Her zaman**
30. Dersi istekli bir şekilde anlatırım.					
Bu cevabınızı (olumlu ya da olumsuz) destekleyen birkaç örnek verir misiniz?					
31. Bıkkınlık ve yorgunluk hareketleri göstermem.					
Bu hareketleri gösterdiğiniz oldu mu? Cevabınızı destekleyen bir örnek verir misiniz?					
32. Yumuşak huylu, anlayışlı, sıcak kanlı, ve neşeliyim.					
Öğrenciler arasında (veya öğretmen arkadaşlarınız arasında) nasıl bir öğretmen olarak bilinirsiniz?					
33. Ceza olarak öğrenciyi arkadaşlarının önünde küçük düşürmem.					
Bu cevabınızı (olumlu ya da olumsuz) destekleyen birkaç örnek verir misiniz?					
34. Derslerde öğrencilere yerli/yersiz bağırmam.					
Bu cevabınızı (olumlu ya da olumsuz) destekleyen birkaç örnek verir misiniz?					
35. Öğrencilere kötü kelimeler kullanmam.					
Bu cevabınızı (olumlu ya da olumsuz) destekleyen birkaç örnek verir misiniz?					
36. Öğrencilerin yanlışlarına kızmam ve sınıf atmosferini bozan öğrencilere bağırmam ve kaba kuvvet uygulamam.					
Bu cevabınızı (olumlu ya da olumsuz) destekleyen birkaç örnek verir misiniz?					
37. Disiplin anlayışı olarak öğrencilere düşük not vermem ve öğrencileri notla korkutmam.					
Bu cevabınızı (olumlu ya da olumsuz) destekleyen birkaç örnek verir misiniz?					
38. Bir öğrencinin yaptığı bir hatadan dolayı bütün sınıfı cezalandırmam					

(Bu bölümdeki bilgiler tamamen gizlilik ilkelerine uygun olarak saklanacaktır.)

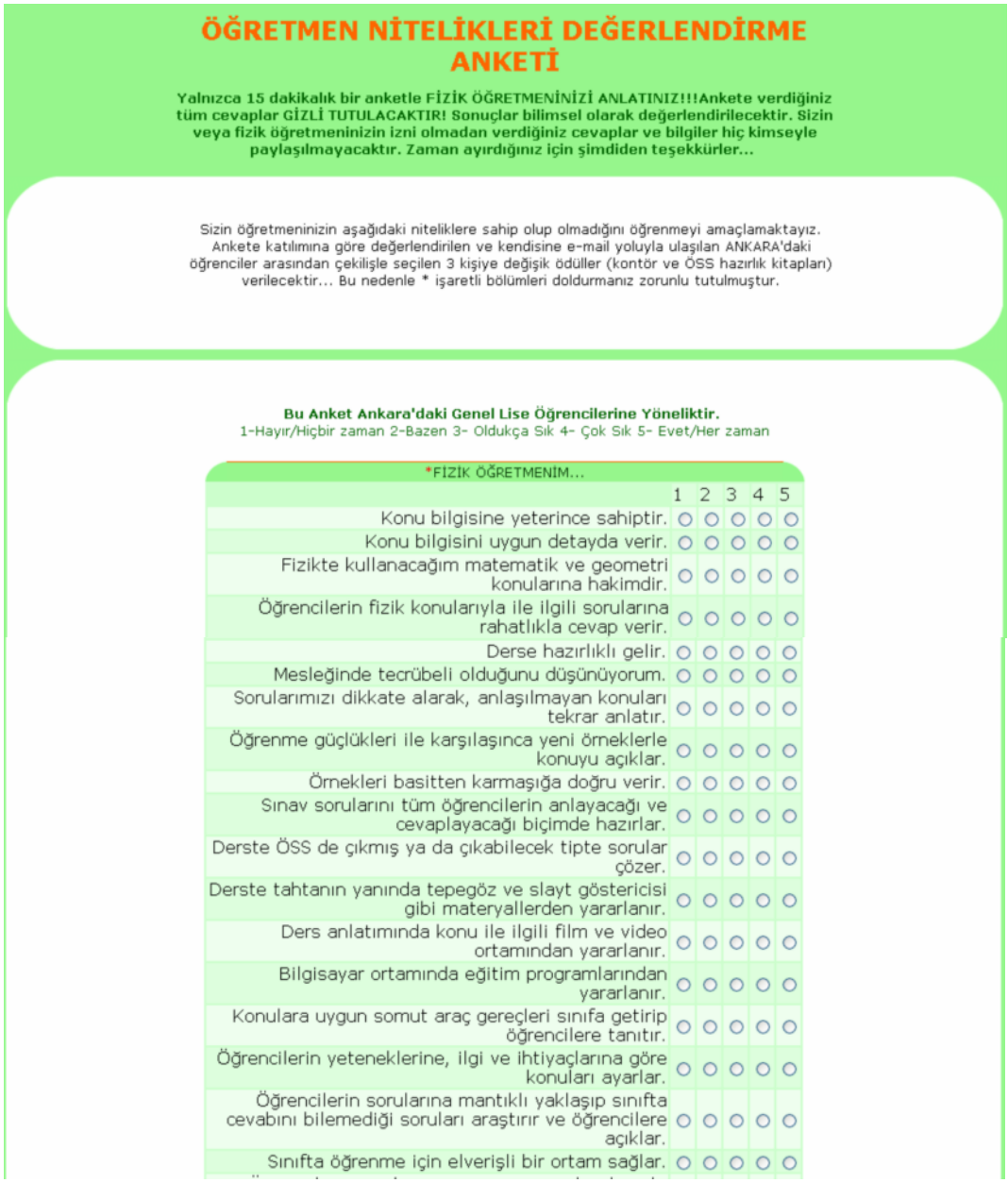
Anketi Dolduran Öğretmenin Adı Soyadı :

Anketi Dolduran Öğretmenin Çalıştığı Okul :

Tarih :

APPENDIX I

ONLINE EFFECTIVE TEACHER IDENTIFICATION QUESTIONNAIRE (ETIQST)



ÖĞRETMEN NİTELİKLERİ DEĞERLENDİRME ANKETİ

Yalnızca 15 dakikalık bir anketle FİZİK ÖĞRETMENİNİZİ ANLATINIZ!!!Ankete verdiğiniz tüm cevaplar GİZLİ TUTULACAKTIR! Sonuçlar bilimsel olarak değerlendirilecektir. Sizin veya fizik öğretmeninizin izni olmadan verdiğiniz cevaplar ve bilgiler hiç kimseyle paylaşılmayacaktır. Zaman ayırdığınız için şimdiden teşekkürler...

Sizin öğretmeninizin aşağıdaki niteliklere sahip olup olmadığını öğrenmeyi amaçlamaktayız. Ankete katılımına göre değerlendirilen ve kendisine e-mail yoluyla ulaşılan ANKARA'daki öğrenciler arasından çekilişle seçilen 3 kişiye değişik ödüller (kontör ve ÖSS hazırlık kitapları) verilecektir... Bu nedenle * işaretli bölümleri doldurmanız zorunlu tutulmuştur.

Bu Anket Ankara'daki Genel Lise Öğrencilerine Yöneliktir.
1-Hayır/Hiçbir zaman 2-Bazen 3- Oldukça Sık 4- Çok Sık 5- Evet/Her zaman

*FIZIK ÖĞRETMENİM...	1	2	3	4	5
Konu bilgisine yeterince sahiptir.	○	○	○	○	○
Konu bilgisini uygun detayda verir.	○	○	○	○	○
Fizikte kullanacağım matematik ve geometri konularına hakimdir.	○	○	○	○	○
Öğrencilerin fizik konularıyla ile ilgili sorularına rahatlıkla cevap verir.	○	○	○	○	○
Derse hazırlıklı gelir.	○	○	○	○	○
Mesleğinde tecrübeli olduğunu düşünüyorum.	○	○	○	○	○
Sorularımızı dikkate alarak, anlaşılmayan konuları tekrar anlatır.	○	○	○	○	○
Öğrenme güçlükleri ile karşılaşınca yeni örneklerle konuyu açıklar.	○	○	○	○	○
Örnekleri basitten karmaşığa doğru verir.	○	○	○	○	○
Sınav sorularını tüm öğrencilerin anlayacağı ve cevaplayacağı biçimde hazırlar.	○	○	○	○	○
Derste ÖSS de çıkmış ya da çıkabilecek tipte sorular çözer.	○	○	○	○	○
Derste tahtanın yanında tepegöz ve slayt göstericisi gibi materyallerden yararlanır.	○	○	○	○	○
Ders anlatımında konu ile ilgili film ve video ortamından yararlanır.	○	○	○	○	○
Bilgisayar ortamında eğitim programlarından yararlanır.	○	○	○	○	○
Konulara uygun somut araç gereçleri sınıfa getirip öğrencilere tanıtır.	○	○	○	○	○
Öğrencilerin yeteneklerine, ilgi ve ihtiyaçlarına göre konuları ayarlar.	○	○	○	○	○
Öğrencilerin sorularına mantıklı yaklaşıp sınıfta cevabını bilemediği soruları araştırır ve öğrencilere açıklar.	○	○	○	○	○
Sınıfta öğrenme için elverişli bir ortam sağlar.	○	○	○	○	○

Öğrencileri, Nasıl?, Niçin?, ... ise ne olacak? gibi sorular sormaya teşvik eder.	○	○	○	○	○
Dersleri laboratuardan yararlanarak işler.	○	○	○	○	○
Derste gösteri deneyleri yapar.	○	○	○	○	○
Fizik dersini günlük hayattan örneklerle ilginç ve eğlenceli hale getirir.	○	○	○	○	○
Mesleki yenilikleri takip eder bunları öğrencilerle paylaşır.	○	○	○	○	○
Öğrencilere sorular sorarak, derse aktif katılım sağlar.	○	○	○	○	○
Ders süresi boyunca öğrencilerin ilgisini canlı tutar.	○	○	○	○	○
Ders anlatımında açık anlaşılır, akıcı ve yalın bir dil kullanır.	○	○	○	○	○
Öğrencileri derse karşı iyi motive eder.	○	○	○	○	○
Sınıfın genelini düşünür, bazı öğrencilerle daha fazla ilgilenmez.	○	○	○	○	○
Kendi sorunlarını sınıfa taşımaz.	○	○	○	○	○
Dersi istekli bir şekilde anlatır.	○	○	○	○	○
Bıkkınlık ve yorgunluk hareketleri göstermez.	○	○	○	○	○
Yumuşak huylu, anlayışlı, sıcak kanlı, ve neşelidir.	○	○	○	○	○
Ceza olarak öğrenciyi arkadaşlarının önünde küçük düşürmez.	○	○	○	○	○
Derslerde öğrencilere yerli/yersiz bağırmaz.	○	○	○	○	○
Öğrencilere kötü kelimeler kullanmaz.	○	○	○	○	○
Öğrencilerin yanlışlarına kızmaz ve sınıf atmosferini bozan öğrencilere bağırmaz ve kaba kuvvet uygulamaz.	○	○	○	○	○
Disiplin anlayışı olarak öğrencilere düşük not vermez ve öğrencileri notla korkutmaz.	○	○	○	○	○
Bir öğrencinin yaptığı bir hatadan dolayı bütün sınıfı cezalandırmaz.	○	○	○	○	○

Bunlar dışında fizik öğretmeninizi bize anlatırmısınız?

*e-mail adresiniz:

*Okulunuzun Bulunduğu İl:

Okulunuzun Adı:

*Okulunuzun Türü:

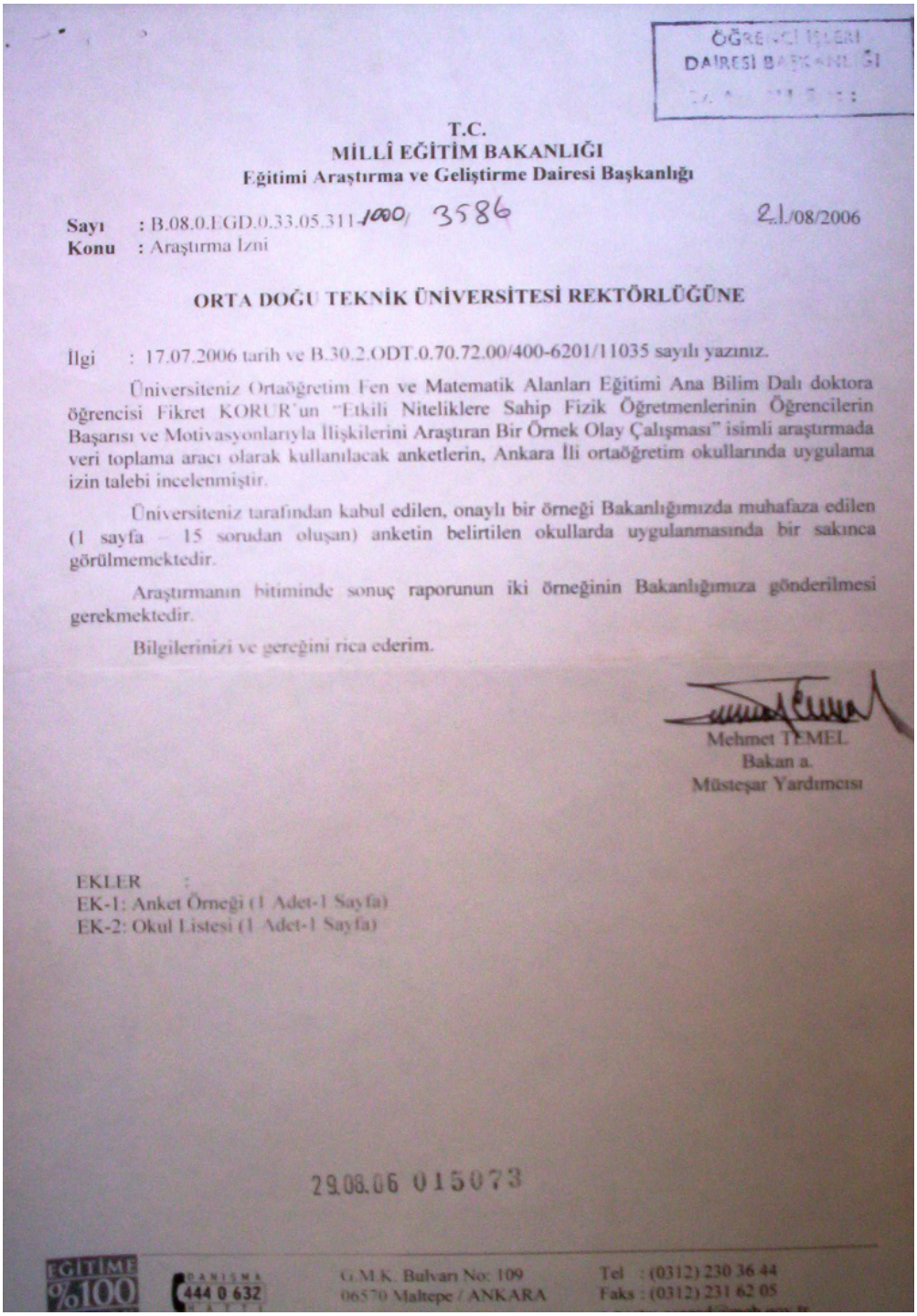
- ◉ Genel Lise (Devlet)
- ○ Anadolu Lisesi
- ○ Fen Lisesi
- ○ Özel Lise
- ○ Meslek Lisesi

Kaydet

[Anketi Temizle]

APPENDIX J

MINISTRY OF NATIONAL EDUCATION OFFICIAL PERMISSION PAPER FOR THE QUALITATIVE PART OF THE STUDY



ÖĞRENCİ İŞLERİ DAİRESİ BAŞKANLIĞI

T.C.
MİLLÎ EĞİTİM BAKANLIĞI
Eğitimi Araştırma ve Geliştirme Dairesi Başkanlığı

Sayı : B.08.0.EGD.0.33.05.311/1000/ 3586 21/08/2006
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ORTA DOĞU TEKNİK ÜNİVERSİTESİ REKTÖRLÜĞÜNE

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Üniversiteniz Ortaöğretim Fen ve Matematik Alanları Eğitimi Ana Bilim Dalı doktora öğrencisi Fikret KORUR'un "Etkili Niteliklere Sahip Fizik Öğretmenlerinin Öğrencilerin Başarısı ve Motivasyonlarıyla İlişkilerini Araştıran Bir Örnek Olay Çalışması" isimli araştırmada veri toplama aracı olarak kullanılacak anketlerin, Ankara İli ortaöğretim okullarında uygulama izin talebi incelenmiştir.

Üniversiteniz tarafından kabul edilen, onaylı bir örneği Bakanlığımızda muhafaza edilen (1 sayfa – 15 sorudan oluşan) anketin belirtilen okullarda uygulanmasında bir sakınca görülmemektedir.

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Bilgilerinizi ve gereğini rica ederim.

Mehmet TEMEL
Bakan a.
Müsteşar Yardımcısı

EKLER :
EK-1: Anket Örneği (1 Adet-1 Sayfa)
EK-2: Okul Listesi (1 Adet-1 Sayfa)

29.08.06 015073

EĞİTİME %100 DANIŞMA 444 0 632
G.M.K. Bulvarı No: 109
06570 Maltepe / ANKARA
Tel : (0312) 230 36 44
Faks : (0312) 231 62 05

APPENDIX K

PAPER TO INFORM THE PARTICIPANTS

MULTIPLE CASE STUDY ON HOW PHYSICS TEACHERS' CHARACTERISTICS AFFECT STUDENTS' MOTIVATION IN PHYSICS

RESEARCH QUESTION

How do the effective physics teacher characteristics, from students' and teachers' shared perceptions, interact with students' motivation in physics classes?

PURPOSE

The main purpose of this study is to explore the interaction between the teachers who have effective physics teacher characteristics as perceived by teachers and students. The characteristics of physics teachers were determined and the number decreased to 38 by shared perceptions of teachers and students. The characteristics were observed in the class by the researcher.

School: Date and Time: Interviewee:

INTRODUCTION

Hello, my name is Fikret KORUR. I'm a Ph.D student in the Secondary School Science and Mathematics Department of the Faculty of Education in METU. I am here to talk to you about your effective characteristics. Those characteristics were mostly observed by me in terms of affecting students' motivation. However, your personal reflections and thoughts are crucial for the progress of the study. I will ask the questions and you will answer and if there are some points that I want you to make clear, I will ask additional questions related to that item. The main focus of my questions would be related to how, through what process and how much you can motivate your students with your effective characteristics. I plan to use my findings in education faculties as a course for prospective teachers, in the selection of physics teachers with a project with YOK and the MEB. Your name and school and the information given to us will be kept in secret.

- Do you mind if I tape our conversation, and do you have enough time to carry on for the following 40 minutes? Do you have any further questions for me?

OK, lets' start with questions and please be relax in answering. What I want to do is to get your own ideas. There is no correct answer for the following questions, and the only answer is what you thought and what you want to say.

(Merhaba, benim adım Fikret KORUR. Ben ODTÜ Ortaöğretim Fen ve Matematik Alanları Bölümünde doktora öğrencisiyim. Burada sizinle etkili niteliklerinizi konuşmak üzere bulunuyorum. Öğrencilerin motivasyonuna etki ettiğini düşündüğümüz nitelikleriniz daha çok benim tarafımdan gözlendi. Fakat çalışmanın gelişmesi için sizin kişisel görüşleriniz ve düşünceleriniz benim için çok önemli. Ben sorularımı soracağım siz cevaplayacaksınız ve eğer daha açık anlatmanızı istediğim bazı noktalar olursa bunlarla ilgili ek sorular soracağım. Sorularımın temel odağında, sahip olduğunuz etkili niteliklerle öğrencileri nasıl, ne gibi bir yöntemle ve ne kadar motive ettiğiniz olacak. Bu çalışmanın sonuçlarını da eğitim fakültelerinde öğretmen adaylarına ders olarak okutulması ve YÖK ve MEB'le geliştirilen projelerle fizik öğretmenlerinin seçiminde kullanmayı planlıyorum. Çalıştığınız okulun adı, sizin adınız ve verdiğiniz bilgiler gizli tutulacaktır.

- Konuşmalarımızı kasete almamda sizin açınızdan bir sakınca var mı ve bundan sonraki 40 dakikalık süre için yeterli zamanınız var mı? Bana herhangi bir sorunuz var mı?

Tamam, sorularımızla başlayalım ve lütfen cevaplarınızda rahat olun. Benim sizden istediğim kendi düşüncelerinizdir. Bu soruların tam bir doğru cevabı yoktur, ve tek doğru cevap sizin düşünceleriniz ve söylemek istediklerinizdir.

APPENDIX L

INTERVIEW PROTOCOL OF TEACHER 1

1. Konu bilgisine yeterince sahip olmanız öğrencilerin motivasyonunda ne gibi bir etki yapar?

a. Konu bilgisine hâkim olmayan bir öğretmen herhangi bir şekilde öğrencileri motive edemez mi? Edebilirse neden ve nasıl? Edemezse niye?

2. Siz konu bilgisini uygun detayda verdiğiniz de öğrencilerin motivasyonu nasıl ve niye etkilenir? (Bazı konuları öğrenciler anlamadığında sınıfta bulduğunuz araç gereçlerle anlatmaya çalıştığınızı birkaç kez gözlemledim.)

3. Fizikte kullanacağınız matematik ve geometri konularına hâkim olmanız öğrencilerin motivasyonunu nasıl ve niye etkiler?

4. Öğrencilerin fizik konularıyla ilgili sorularına rahatlıkla cevap verdiğinizde öğrencilerin motivasyonu bundan nasıl etkilenir?

5. Derse hazırlıklı gelmek sizce nasıl olmalıdır? (Genelde derse hazırlıklı girdiğinizi gözlemliyorum)

a. Peki derse nasıl hazırlanırsınız?

b. Bu hazırlıklarınızın öğrencinin motivasyonunu nasıl etkilediğini ne şekilde gözlemlersiniz?

c. Niye derse hazırlıklı gelmek öğrencinin motivasyonunu etkiler?

6. Öğrencilerin sorularına göre öğrenciler tarafından anlaşılmayan bir konuyu tekrar ettiğinizde öğrencilerin motivasyonu nasıl etkilenir?

7. Öğrenme güçlükleri ile karşılaşınca yeni örneklerle konuyu açıklamanız öğrencilerin motivasyonunu nasıl etkiler?

8. Örnekleri basitten karmaşığa doğru vermeniz öğrencilerin motivasyonunu nasıl etkiler?

9. Sınav sorularını bütün öğrencilerin anlayacağı ve cevaplayacağı biçimde hazırladığınızda, öğrencilerin motivasyonu bundan nasıl etkilenir?

10. 10. sınıf seviyesinde, derste ÖSS de çıkmış ya da çıkabilecek tipte sorular çözmeniz öğrencilerin motivasyonunu nasıl ve niye etkiler?

11. Öğrencilerin sorularına mantıklı yaklaşıp cevabını bilmediğiniz soruları araştırıp diğer derste öğrencilerle paylaştığınız oldu mu? Bundan öğrencilerin motivasyonu nasıl etkilendi?

12. Sınıfta öğrenme için elverişli bir ortam sağlamanız öğrencilerin motivasyonunu nasıl ve niye etkiler?

a. Sizce derslerde test çözdürmek öğrencinin motivasyonuna nasıl bir etki yapıyor? Bu yöntemi uygulamanızdaki temel amaç nedir?

13. Öğrencileri nasıl?, niçin?, ...ise ne olacak tipinde sorular sormaya teşvik ettiğinizde öğrencilerin motivasyonu nasıl etkilenir?

a. Öğrencilerin ezberlememesi için nasıl bir yöntem kullanıyorsunuz?

14. Ders anlatırken isteksiz olduğunuzu hiç gözlemlemedim. Dersi bu kadar istekli anlatmanız öğrencilerin motivasyonunu nasıl ve niye etkiler?

15. Hemen hemen her gözlemimde fizik dersini günlük hayattan örneklerle ilginç ve eğlenceli hale getirdiğinizi gözlemledim. Sizce bu tür örnekler öğrencilerin motivasyonunu niye ve nasıl etkiler?

16. Bu tür günlük hayattan örnekleri sağlayan aletlerden örnekleri sınıfa getirip öğrenciye göstersek motivasyonları nasıl etkilenir? Mesela basit makinelerde pense dediniz, makas dediniz.

17. Öğrencilere sorular sorarak aktif katılım sağladığınızda öğrencilerin motivasyonu nasıl etkilenir?

a. Yaptığım gözlemlerde öğrencileri soru sormasına zemin hazırladığınızı gördüm. Fakat soru sayısı arttıkça sorular konudan uzaklaştıkça konuya dönmeyi nasıl sağlarsınız? Bu yönteminiz sizce öğrencilerin motivasyonunu nasıl etkiler?

18. Ders süresi boyunca öğrencinin ilgisini canlı tutmanız öğrencilerin motivasyonunu nasıl ve niye etkiler?

19. Hangi özelliklerinizi düşünerek ben iyi bir motive ediciyim diyebilirsiniz? İyi bir motive edici aynı zamanda öğrencilerin başarısını da ön plana alarak çalışmalı mıdır?

20. Bazı öğrencilerle daha fazla ilgilenip sınıfın genelini düşünmediğinizde öğrencilerin motivasyonu nasıl etkilenir?

21. Kendi sorunlarınızı sınıfa taşıdığınızda öğrencilerin bundan nasıl etkileneceğini düşünürsünüz? (Böyle bir şey ben gözlemlemedim. Bir sürü sorununuz olduğunu dersten önce benle paylaşıyorsunuz ama derse bunların hiçbirini yansıtmıyorsunuz?)

a. Sizce bir öğretmen dürüstçe aklındakileri veya bazı sorunlarını öğrencileri ile paylaşmalı mı? Yani kendi sorunlarını sınıfa yansıtması ayrı bunları paylaşmak ayrı mı diye düşünüyorsunuz?

22. Bıkkınlık ve yorgunluk hareketleri gösterdiğinizde öğrencilerin motivasyonu bundan nasıl etkilenir? Bu hareketler nelerdir? Bıktığınızı ve yorulduğunuzu nasıl belli edersiniz?

23. Sizce yanlışından dolayı bir öğrenciye kızmak, bağırmak o öğrencinin ve sınıfın motivasyonunu nasıl ve niye etkiler? (Sizin dersinizde sınıf atmosferini bozan bir öğrenci hiç gözlemlemedim. Bazen uğultu olarak bir gürültü oldu ama ses tonunuzu ayarlayarak öğrencilerin ilgisini çekmeyi başardınız.)

a. Bu okulda "müdür yardımcısı" olmanız öğrencilerin motivasyonlarını nasıl etkiledi?

Bunlara sizin eklemek istedikleriniz var mı? Öğretmen niteliği olarak öğrencilerin motivasyonunu şunlarda artırmıştı dediğiniz noktalar var mı?

APPENDIX M

INTERVIEW PROTOCOL OF TEACHER 2

1. Konu bilgisine yeterince sahip olmanız öğrencilerin motivasyonunda ne gibi bir etki yapar?

a. Konu bilgisine hâkim olmayan bir öğretmen herhangi bir şekilde öğrencileri motive edemez mi?

2. Siz konu bilgisini uygun detayda verdiğiniz de öğrencilerin motivasyonu nasıl ve niye etkilenir?

3. Fizikte kullanacağınız matematik ve geometri konularına hâkim olmanız öğrencilerin motivasyonunu nasıl ve niye etkiler?

4. Öğrencilerin fizik konularıyla ilgili sorularına rahatlıkla cevap verdiğinizde öğrencilerin motivasyonu bundan nasıl etkilenir?

a. Yaptığım gözlemlerde öğrencileri soru sormasına zemin hazırladığınızı gördüm. Fakat soru sayısı arttıkça sorular konudan uzaklaştıkça konuya dönmeyi nasıl sağlarsınız?

5. Derse hazırlıklı gelmek sizce nasıl olmalıdır? (Genelde bir kitap alarak derse girdiğinizi gözlemledim. Acaba hazırlık not veya kitap sayısında mı yoksa başka şekillerde mi oluyor sizin için?)

a. Bu hazırlıklarınızın öğrencinin motivasyonunu nasıl etkilediğini ne şekilde gözlemlersiniz?

6. Öğrencilerin sorularına göre öğrenciler tarafından anlaşılmayan bir konuyu tekrar ettiğinizde öğrencilerin motivasyonu bundan nasıl etkilenir?

7. Öğrenme güçlükleri ile karşılaşınca yeni örneklerle konuyu açıklamanız öğrencilerin motivasyonunu nasıl etkiler?

8. Örnekleri basitten karmaşığa doğru vermeniz öğrencilerin motivasyonunu nasıl etkiler?

9. Sınav sorularını bütün öğrencilerin anlayacağı ve cevaplayacağı biçimde hazırladığınızda öğrencilerin motivasyonu bundan nasıl etkilenir?

10. 10. sınıf seviyesinde, derste ÖSS de çıkmış ya da çıkabilecek tipte sorular çözmeniz öğrencilerin motivasyonunu nasıl ve niye etkiler?

a. ÖSS sorularını çözdüğünüz ders saatleri uzadıkça öğrencilerin motivasyonunda bir azalma oluyor mu?

11. Öğrencilerin sorularına mantıklı yaklaşıp cevabını bilmediğiniz soruları araştırıp diğer derste öğrencilerle paylaştığınız oldu mu? Bundan öğrencilerin motivasyonu nasıl etkilendi?

12.Sınıfta öğrenme için elverişli bir ortam sağlamanız öğrencilerin motivasyonunu nasıl ve niye etkiler?

13.Öğrencileri nasıl?, niçin?, ...ise ne olacak tipinde sorular sormaya teşvik ettiğinizde öğrencilerin motivasyonu nasıl etkilenir?

14. Ders anlatırken isteksiz olmanız öğrencilerin motivasyonunu nasıl ve niye etkiler?

15. Birkaç derste fizik dersini günlük hayattan örneklerle ilginç ve eğlenceli hale getirdiğinizi gözlemledim. Sizce bu tür örnekler öğrencilerin motivasyonunu niye ve nasıl etkiler? (Basit makineler konusunda el arabası, cımbız, makara makas gibi)

16. Bu tür aletlerden örnekleri sınıfa getirip öğrenciye göstersek motivasyonları nasıl etkilenir?

17.Öğrencilere sorular sorarak aktif katılım sağladığınızda öğrencilerin motivasyonu nasıl etkilenir?

a. Öğrencileri tahtaya kaldırdığınızda yapamayan öğrenciye tahtada yardım ettiğinizde mi yoksa "yerine otur ve dinle" dediğinizde mi motivasyonları artar?

18. Ders süresi boyunca öğrencinin ilgisini canlı tutmanız öğrencilerin motivasyonunu nasıl ve niye etkiler?
(Gözlemlerimde derste ilgisi dağılan veya başka bir şeyle uğraşan öğrenciyi hemen ismini söyleyerek uyarıyordunuz.)

a. Bu sizce onların anlık motivasyonunu sağlıyor ama ders boyunca motivasyonlarını korumalarını sağlıyor mu? Bu sizce çok etkili değilse niye çok sık yapıyorsunuz?

19. Hangi özelliklerinizi düşünerek ben iyi bir motive ediciyim diyebilirsiniz? İyi bir motive edici aynı zamanda öğrencilerin başarısını da ön plana alarak çalışmalı mıdır?

20. Bazı öğrencilerle daha fazla ilgilenip sınıfın genelini düşünmediğinizde öğrencilerin motivasyonu bundan nasıl etkilenir?

21.Bıkkınlık ve yorgunluk hareketleri gösterdiğinizde öğrencilerin motivasyonu bundan nasıl etkilenir?

a. Bıkkınlığınız veya bu tür hareketler göstermeniz sınıfın durumuna mı bağlı?

22. Kendi sorunlarınızı sınıfa taşıdığınızda öğrencilerin bundan nasıl etkileneceğini düşünürsünüz? Dersi isteksiz bir şekilde anlatmanız öğrencilerin motivasyonunu nasıl ve niye etkiler?

a.Sizce bir öğretmen dürüstçe aklındakileri veya bazı sorunlarını öğrencileri ile paylaşmalı mı?

23.Öğrencilerin yanlışlarına kızmanız ve sınıf atmosferini bozan öğrencilere bağırmanız o öğrencinin ve sınıfın genelinin motivasyonunu nasıl etkiler? Bir gözlemimde sınıfa girer girmez S2-3 isimli öğrencinize bağırdınız. O ders boyunca öğrenciniz bir daha dersi takip etmedi ve siz de kendisini hiç uyarmadınız. Böyle davranarak öğrencilerin motivasyonları sizce artıyor mu azalıyor mu?

Bunlara sizin eklemek istedikleriniz var mı? Öğretmen niteliği olarak öğrencilerin motivasyonunu şunlarda artırmıştı dediğiniz noktalar var mı?

APPENDIX N

INTERVIEW PROTOCOL OF STUDENTS

1. Öğretmeninizin konu bilgisine yeterince sahip olması sizin motivasyonunuzda ne gibi bir etki yapıyor?

a. Konu bilgisine hâkim olmayan bir öğretmen herhangi bir şekilde sizi motive edemez mi? Edebilirse neden ve nasıl? Edemezse niye?

2. Öğretmen konu bilgisini uygun detayda verdiğinde sizin motivasyonunuz nasıl ve niye etkileniyor?

3. Öğretmeninizin fizikte kullanacağı matematik ve geometri konularına hâkim olması sizin motivasyonunuzu nasıl ve niye etkiliyor?

4. Öğretmeniniz sizin fizik konularıyla ilgili sorularınıza rahatlıkla cevap verdiğinde sizin motivasyonunuz bundan nasıl etkileniyor?

5. Öğretmeninizin derse hazırlıklı gelmesi sizin motivasyonunuzu artırır mı?

6. Sizin sorularınızı dikkate alarak anlaşılmayan bir konuyu tekrar anlattığında motivasyonunuz nasıl etkilenir?

a. Öğretmeninizin sizin sınıfta soru sormanız için zemin hazırlaması motivasyonunuzu nasıl ve niye etkiliyor?

7. Öğretmenin siz öğrenme güçlükleri ile karşılaşınca yeni örneklerle konuyu açıklaması sizin motivasyonunuzu nasıl etkiler?

8. Örnekleri basitten karmaşığa doğru vermesi sizin motivasyonunuzu nasıl etkiliyor?

9. Öğretmeniniz sınav sorularını tüm öğrencilerin anlayacağı ve cevaplayacağı biçimde hazırlaması sizin motivasyonunuzu nasıl etkileniyor?

a. Sınavdan düşük not aldın soruları anlayamadığın için. O zaman motivasyonun düşer miydi?

10. 10. sınıf seviyesinde, derste ÖSS de çıkmış ya da çıkabilecek tipte sorular çözmesi sizin motivasyonunuzu nasıl ve niye etkiler?

11. Öğretmeninizin sizin sorularınıza mantıklı yaklaşıp cevabını bilmediği soruları araştırıp diğer derste öğrencilerle paylaştığı oldu mu?

12. Öğretmeninizin sınıfta öğrenme için elverişli bir ortam sağlaması sizin motivasyonunu nasıl ve niye etkiliyor?

a. Sizce derslerde test çözmeniz sizin motivasyonunuzda nasıl bir etki yapıyor? Bu yöntem hoşunuza gidiyor mu nasıl olmasını istersiniz?

13. Öğretmeninizin sizi nasıl?, niçin?, ...ise ne olacak tipinde sorular sormaya teşvik ettiğinde sizin motivasyonunuz bundan nasıl etkileniyor?

14. Dersi bu kadar istekli/isteksiz anlatması sizin motivasyonunuzu nasıl ve niye etkiliyor?

15. Öğretmeniniz ders anlatımında günlük hayattan örnekler vermesi sizin motivasyonunuzu niye ve nasıl etkiliyor?

16. Bu verdiği örneklerle ilgili somut örnekleri sınıfa getirip size gösterse motivasyonunuz nasıl etkilenir?

a. Öğretmeninizin günlük hayattan örnekler vermediği derslerde aynı motivasyonu yakalayamadığınızı gözlemlediniz mi?

17. Öğretmeniniz size sorular sorarak aktif katılım sağladığında sizin motivasyonunuz bundan nasıl etkileniyor?

18. Öğretmenin ders boyunca sizin ilginizi canlı tutması motivasyonunuzu nasıl etkiler?

19. Öğretmeninizi hangi özellikleri ile iyi bir motive edici olarak düşünüyorsunuz? İyi bir motive edici aynı zamanda öğrencilerin başarısını da ön plana alarak çalışmalı mıdır?

20. Bazı öğrencilerle daha fazla ilgilenip sınıfın genelini düşünmediğinde bunun sizin motivasyonunuza etkisi nasıl olur?

21. Kendi sorunlarını sınıfa taşıdığında siz bundan nasıl etkileneceğini düşünürsünüz?

22. Öğretmeniniz bıkkınlık ve yorgunluk hareketleri gösterdiğinde sizin motivasyonunuz bundan nasıl etkileniyor?

23. Sizce yanlışından dolayı öğretmeninizin bir öğrenciye kızması, bağırması o öğrencinin ve sınıfın motivasyonunu nasıl ve niye etkiliyor? (Sınıf atmosferini bozan bir öğrenci hiç gözlemlemedim. Bazen uğultu olarak bir gürültü oldu ama öğretmen ses tonunu ayarlayarak öğrencilerin ilgisini çekmeyi başardı.)

Bunlara sizin eklemek istedikleriniz var mı? Öğretmen niteliği olarak öğrencilerin motivasyonunu şunlarda artırmıştı dediğiniz noktalar var mı?

Katkılarınızdan dolayı teşekkür ederim…

APPENDIX O

EFFECTIVE PHYSICS TEACHERS' CHARACTERISTICS CLASSROOM OBSERVATION CHECKLIST

MULTIPLE CASE STUDY ON HOW PHYSICS TEACHERS' CHARACTERISTICS AFFECT STUDENTS' MOTIVATION IN PHYSICS (OBSERVATION CHECKLIST)

Name of person observed		Location of class within the module (e.g. week number within the total weeks)	
Class/Level of Physics		Type of class (lecture, lab, computer lab...)	
Title of the subject		Number of students	
Observation Number		Name of observer and date	

Teacher's Characteristics Item	**Observation Record** **(Do students motivated to learn the subject matter? Do they have positive attitude? How does the teacher implement desired characteristics or behavior in the class to motivate their students? …)**	**Possessing the given characteristic.** **(Not Demonstrated-ND, Weak-W, Average-A, Good-G, Fully-F)**	**Time duration that shows the given characteristics.**							
			5	**10**	**15**	**20**	**25**	**30**	**35**	**40**	**45**
1.36. Lecturing reluctantly. (Does the teacher seem interested in the subject matter and the students?) **(Dersi içten gelmeyerek (isteksiz) anlatması)**											

Teacher's Characteristics Item	Observation Record (Do students motivated to learn the subject matter? Do they have positive attitude? How does the teacher implement desired characteristics or behavior in the class to motivate their students? …)	Possessing the given characteristic. (Not Demonstrated-ND, Weak-W, Average-A, Good-G, Fully-F)	Time duration that shows the given characteristics.								
			5	10	15	20	25	30	35	40	45
2.101. Using offensive language to students. **(Öğrencilere kötü kelimeler kullanması)**											
3.9. Answering students' questions related to physics easily. (Does the teacher encourage students to ask questions? Does the teacher ignore the students questions? Do the students seem motivated to ask questions related to the subject matter?) **(Öğrencilerin fizik konularıyla ilgili sorularına rahatlıkla cevap vermesi)**											
4.18. Coming to the lesson prepared. (Does the teacher look his/her notes too much to affect the lesson? Do the students relate with other things while the teacher looking at his notes? Do the students behave differently when they understand that the teacher is not prepared?) **(Derse hazırlıklı gelmesi)**											
5.31. Being interested in some students more than others. **(Bazı öğrencilerle daha fazla ilgilenip, sınıfın genelini düşünmemesi)**											

Teacher's Characteristics Item	Observation Record (Do students motivated to learn the subject matter? Do they have positive attitude? How does the teacher implement desired characteristics or behavior in the class to motivate their students? …)	Possessing the given characteristic. (Not Demonstrated-ND, Weak-W, Average-A, Good-G, Fully-F)	Time duration that shows the given characteristics.							
			5	10	15	20	25	30	35	40	45
6.63. Making the physics lesson interesting by giving examples from daily life. **(Fizik dersini günlük hayattan örneklerle ilginç ve eğlenceli hale getirmesi)**											
7.1. Possessing necessary knowledge of subject matter. (Does the teacher ability to understand and answer students' questions? Do the students seem to trust the teacher?) **(Konu bilgisine yeterince sahip olması)**											
8.98. Humiliating students in front of their friends with the aim of giving a punishment. **(Ceza olarak öğrenciyi arkadaşlarının önünde küçük düşürmesi)**											

Teacher's Characteristics Item	Observation Record (Do students motivated to learn the subject matter? Do they have positive attitude? How does the teacher implement desired characteristics or behavior in the class to motivate their students? …)	Possessing the given characteristic. (Not Demonstrated-ND, Weak-W, Average-A, Good-G, Fully-F)	Time duration that shows the given characteristics.								
			5	10	15	20	25	30	35	40	45
9.102. Getting angry with students' mistakes, and shouting at or beating the students that are destroying the classroom atmosphere. **(Öğrencilerin yanlışlarına kızması ve sınıf atmosferini bozan öğrencilere bağırması veya kaba kuvvet uygulaması)**											
10.25. Preparing a suitable medium for learning in the class. **(Sınıfta öğrenme için elverişli bir ortam sağlaması)**											
11.2. Giving the lecture with appropriate details. (Do the details support the main aim? Are the examples given appropriate?) **(Konu bilgisini uygun detayda vermesi)**											

Teacher's Characteristics Item	Observation Record (Do students motivated to learn the subject matter? Do they have positive attitude? How does the teacher implement desired characteristics or behavior in the class to motivate their students? …)	Possessing the given characteristic. (Not Demonstrated-ND, Weak-W, Average-A, Good-G, Fully-F)	Time duration that shows the given characteristics.								
			5	10	15	20	25	30	35	40	45
12. 37. Keeping students' interests alive during the whole lesson. **(Ders süresi boyunca öğrencilerin ilgisini canlı tutması)**											
13. 60. Making use of physics laboratory for lecturing. **(Derslerini laboratuardan yararlanarak işlemesi)**											
14. 131. Being hard-hearted, intolerant and tedious. **(Katı, huysuz, anlayışsız, donuk ve can sıkıcı olması)**											
15.130. Being able to motivate the students efficiently. (Is the lesson interesting for the students? Why they are doing something?) **(İyi motive edici olması)**											
16.47. Solving problems in lesson which are similar to the university entrance examination questions. **(Derste ÖSS de çıkmış ya da çıkabilecek tipte sorular çözmesi)**											

Teacher's Characteristics Item	Observation Record (Do students motivated to learn the subject matter? Do they have positive attitude? How does the teacher implement desired characteristics or behavior in the class to motivate their students? …)	Possessing the given characteristic. (Not Demonstrated-ND, Weak-W, Average-A, Good-G, Fully-F)	Time duration that shows the given characteristics.								
			5	10	15	20	25	30	35	40	45
17.7. Carrying his/her personal problems to the classroom. (Is the teacher more or less tolerant on different days?) **(Kendi sorunlarını sınıfa taşıması)**											
18.34. Asking questions to the students to enhance the active participation. **(Öğrencilere sorular sorarak derse aktif katılım sağlaması)**											
19.104. Giving low grades as a matter of discipline. **(Disiplin anlayışı olarak öğrencilere düşük not vermesi-öğrencileri notla korkutması)**											
20.39. Using proper, understandable and fluent language during the lesson. **(Ders anlatımında açık, anlaşılır, akıcı ve yalın bir dil kullanması)**											

Teacher's Characteristics Item	Observation Record (Do students motivated to learn the subject matter? Do they have positive attitude? How does the teacher implement desired characteristics or behavior in the class to motivate their students? …)	Possessing the given characteristic. (Not Demonstrated-ND, Weak-W, Average-A, Good-G, Fully-F)	Time duration that shows the given characteristics.								
			5	10	15	20	25	30	35	40	45
21.108. Giving punishments to the whole class because of a fault of only one student. **(Bir öğrencinin yaptığı bir hatadan dolayı bütün sınıfı cezalandırması)**											
22.100. Shouting at students with or without a reason. **(Derslerde öğrencilere yerli/yersiz bağırması)**											
23.4. Possessing necessary mathematical and geometrical background related to physics. (Do the students listen to the teacher more carefully when he/she consider about the mathematical and geometrical background related to physics?) **(Fizikte kullanacağı matematik ve geometri konularına hakim olması)**											

Teacher's Characteristics Item	Observation Record (Do students motivated to learn the subject matter? Do they have positive attitude? How does the teacher implement desired characteristics or behavior in the class to motivate their students? …)	Possessing the given characteristic. (Not Demonstrated-ND, Weak-W, Average-A, Good-G, Fully-F)	Time duration that shows the given characteristics.								
			5	10	15	20	25	30	35	40	45
24.40. Taking the questions of the students into consideration and repeating the subject matter that wasn't understood by students. (When the teacher do this students seem to be motivated to the lesson? When the teacher do this most of the students try to ask further questions to understand the concept well.) **(Öğrencilerin sorularını dikkate alarak, anlaşılmayan konuları tekrar anlatması)**											
25.71. Making use of computer packages related to the subject matter. **(Bilgisayar ortamında eğitim programlarından yararlanması)**											
26.78. Being fed up and tired. **(Bıkkınlık ve yorgunluk hareketleri göstermesi)**											
27.20. Adjusting the subject matter according to students' needs and interests. **(Öğrencilerin yeteneklerine, ilgi ve ihtiyaçlarına göre konuları ayarlaması)**											

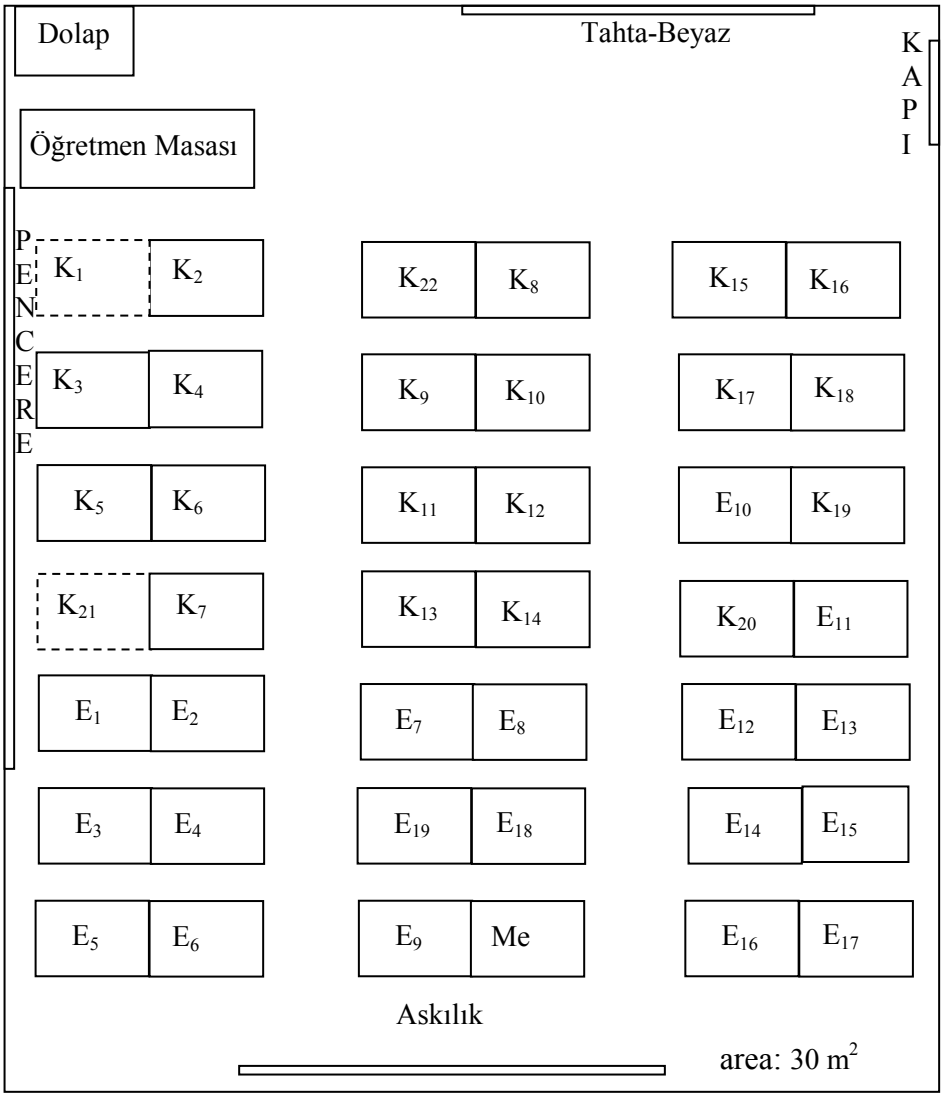
Teacher's Characteristics Item	Observation Record (Do students motivated to learn the subject matter? Do they have positive attitude? How does the teacher implement desired characteristics or behavior in the class to motivate their students? …)	Possessing the given characteristic. (Not Demonstrated-ND, Weak-W, Average-A, Good-G, Fully-F)	Time duration that shows the given characteristics.								
			5	10	15	20	25	30	35	40	45
28.22. Following new trends in his/her job and transferring them to the students. **(Mesleki yenilikleri takip etmesi ve elde ettiği bilgileri öğrencilerine aktarması)**											
29.70. Making use of film and video while lecturing. **(Ders anlatımında film ve video ortamından yararlanması)**											
30.67. Making use of materials like overhead projectors or slide shows as well as the board. **(Derste tahtanın yanında tepegöz ve slayt göstericisi gibi materyallerden yararlanması)**											
31.41. Explaining the subject matter with new examples when students face learning difficulties. (When the teacher do this most of the students seem to understand the subject matter. Do the students easily notice the learning difficulties?) **(Öğrenme güçlükleri ile karşılaşınca yeni örneklerle konuyu açıklaması)**											

Teacher's Characteristics Item	Observation Record (Do students motivated to learn the subject matter? Do they have positive attitude? How does the teacher implement desired characteristics or behavior in the class to motivate their students? …)	Possessing the given characteristic. (Not Demonstrated-ND, Weak-W, Average-A, Good-G, Fully-F)	Time duration that shows the given characteristics.								
			5	10	15	20	25	30	35	40	45
32.51. Giving examples from simple to complex. **(Örneklerini basitten karmaşığa doğru vermesi)**											
33.23. Seeking and trying to find out the answers to the questions that he/she doesn't know. **(Öğrencilerin sorularına mantıklı yaklaşıp cevabını bilmediği soruları araştırıp öğrencilere açıklaması)**											
34.50. Encouraging students to ask questions such as how?, why?, ...then what happens? **(Öğrencileri, Nasıl?, Niçin?...ise ne olacak? tipinde sorular sormaya teşvik etmesi)**											
35.61. Doing demo experiments in the class. **(Derste gösteri deneyleri yapması)**											

Teacher's Characteristics Item	Observation Record (Do students motivated to learn the subject matter? Do they have positive attitude? How does the teacher implement desired characteristics or behavior in the class to motivate their students? …)	Possessing the given characteristic. (Not Demonstrated-ND, Weak-W, Average-A, Good-G, Fully-F)	Time duration that shows the given characteristics.								
			5	10	15	20	25	30	35	40	45
36.72. During the class session, introducing some concrete equipment related to the concepts. (**Konulara uygun somut araç gereçleri sınıfa getirip öğrencilere tanıtması)**											
37.87. Preparing exam questions as to be understood and answered by all the students. **(Sınav sorularını tüm öğrencilerin anlayacağı ve cevaplayacağı biçimde hazırlaması)**											
38.141. Being an experienced teacher. (Does the teacher relate easily and appropriately to the students?) **(Mesleğinde tecrübeli olması)**											

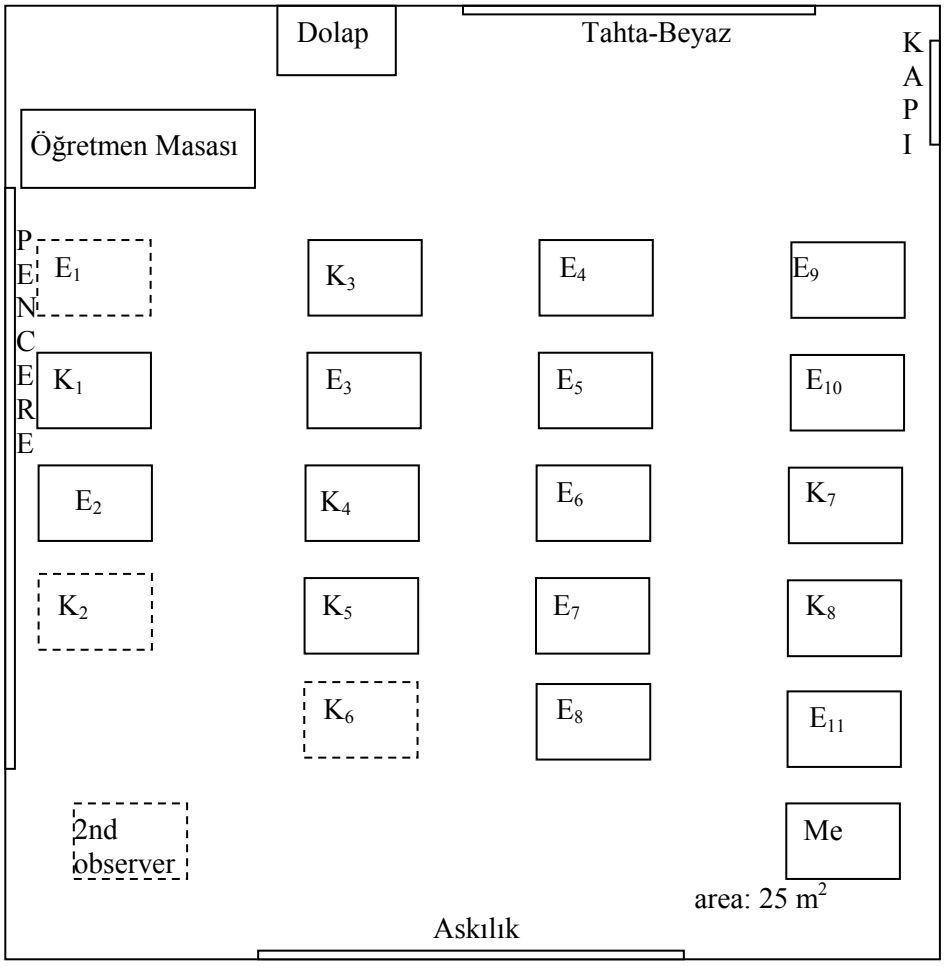
APPENDIX P

PHYSICAL SETTING OF THE CLASS OF TEACHER 1



APPENDIX R

PHYSICAL SETTING OF CLASS OF TEACHER 2



APPENDIX S

TIME TABLE OF DATA COLLECTION FOR TWO CASE TEACHERS AND THEIR STUDENTS

Date / Class Hours	Teacher	Sources of Evidenve
04.10.2006 / 1 hour	Teacher 2	Observation-Descriptive Field Notes Open-ended interviews
05.10.2006 / 2 hours	Teacher 1	Observation-Descriptive Field Notes
11.10.2006 / 2 hours	Teacher 2	Observation-Descriptive Field Notes Open-ended interviews
18.10.2006 / 2 hours	Teacher 2	Observation-Descriptive Field Notes Open-ended interviews
19.10.2006 / 2 hours	Teacher 1	Observation-Descriptive Field Notes
01.11.2006 / 2 hours	Teacher 2	Observation-Descriptive Field Notes Open-ended interviews
02.11.2006 / 2 hours	Teacher 1	Observation-Descriptive Field Notes Open-ended interviews
09.11.2006 / 2 hours	Teacher 1	Observation-Descriptive Field Notes Open-ended interviews
13.11.2006 / 1 hour	Teacher 2	Observation-Descriptive Field Notes Open-ended interviews
16.11.2006 / 2 hours	Teacher 1	Observation-Descriptive Field Notes
20.11.2006 / 2 hours	Teacher 2	Observation-Descriptive Field Notes
23.11.2006 / 2 hours	Teacher 1	Observation-Descriptive Field Notes
04.12.2006 / 2 hours	Teacher 2	Observation-Descriptive Field Notes Open-ended interviews
08.12.2006 / 2 hours	Teacher 1	Observation-Descriptive Field Notes Open-ended interviews
08.12.2006 / 2 hours	Teacher 2	Observation-Descriptive Field Notes Multiple Observers
11.12.2006 / 2 hours	Teacher 2	Observation-Descriptive Field Notes Multiple Observers

Date / Class Hours	Teacher	Sources of Evidenve
18.12.2006 / 1 hour	Teacher 2	Observation-Descriptive Field Notes Open-ended interviews
22.12.2006 / 2 hours	Teacher 1	Observation-Descriptive Field Notes Video-recording
29.12.2006 / 2 hours	Teacher 1	Observation-Descriptive Field Notes Video-recording
09.03.2007 / 2 hours	Teacher 1	Observation-Descriptive Field Notes Video-recording
16.03.2007 / 2 hours	Teacher 1	Observation-Descriptive Field Notes Video-recording
30.03.2007 / 2 hours	Teacher 1 Students	Observation-Descriptive Field Notes Video-recording
03.04.2007 / 2 hours	Teacher 2 Students	Focused Interviews
04.04.2007 / 2 hours	Teacher 1 Students	Focused Interviews

CURRICULUM VITAE

PERSONAL INFORMATION

Surname, Name : Korur, Fikret

Nationality : Turkish (TC)

Date and Place of Birth : 26 June 1975, Burdur

Marital Status : Married

Phone : 312 4900202

email :fikretkorur@gmail.com

EDUCATION

Degree	**Institution**	**Year of Graduation**
MS	METU, SSME, Physics Education	2001
BS	METU, SSME, Physics Education	1997
High School	Burdur Lisesi	1992

WORK EXPERIENCE

Year	**Place**	**Enrollment**
1999-Present	Private Yüce College	Physics Teacher / Head of Science Dept.
1997-1999	Private Yüce Science High School	Physics Teacher

FOREIGN LANGUAGES

Advanced English

PUBLICATIONS / CONFERENCES

1. Korur, F. IB-DP Group 4 Science Workshop, Athens-GREECE, participant, (27 June - 01 July 2006).

2. Korur, F. A Study of Effects of Teacher's Characteristics on Students' Physics Achievement, Marmara University, presentation, (09-11 September 2004).

3. Korur, F. Effects of Teacher's Characteristics on Students' Physics Achievement, Motivation and Attitude, METU, presentation-paper, (16-18 September 2002).

4. Korur, F. (2001). The Effects of Teachers Characteristics on High School Students' Physics Achievement, Motivation and Attitudes. Unpublished Master Thesis, Middle East Technical University, Ankara, Turkey.

HOBBIES

Basketball, music, computer technologies, movies, theatre and books.