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Teacher-student Interpersonal Behavior in Secondary Science Classes in Turkey

Sibel Telli
NILUFER MILLI PIYANGO ANATOLIAN HIGH SCHOOL, TURKEY

Perry den Brok
EINDHOVEN UNIVERSITY OF TECHNOLOGY, THE NETHERLANDS

Jale Cakiroglu
MIDDLE EAST TECHNICAL UNIVERSITY, TURKEY

ABSTRACT

This study examined associations between Turkish high school students' perceptions of their teachers' interpersonal behavior and their attitudes toward science and investigated what profiles could be discerned in class perceptions of these teachers. Data were collected with the Questionnaire on Teacher Interaction (QTI) and the Test of Science Related Attitudes (TOSRA). A total of 2342 students (Grades 9 to 11) from 81 classes (14 public schools) in three major Turkish cities participated in the study. Correlation analyses, regression analyses and analyses of variance revealed that students' perceptions of their teachers' interpersonal behavior were significantly associated with their attitudes and that a variety of interpersonal profiles could be distinguished.

INTRODUCTION

During the last three decades, considerable interest has been shown internationally in the conceptualization, measurement and investigation of perceptions of psychosocial characteristics of the learning environment in science classrooms (Fraser & Walberg, 1991). In these studies, the role of teachers' and students' perceptions of the classroom environment in influencing cognitive and affective outcomes has been extensively demonstrated (Wubbels & Brekelmans, 1998; Wubbels, Brekelmans, den Brok, & van Tartwijk, 2006). The teacher-student relationship can be regarded as one of the most important factors in (science) teaching, as it directly relates to classroom management (Doyle, 1986). Research has shown that students' perceptions of teacher-student interpersonal behavior are strongly related to student achievement and attitudes in all subject areas (den Brok, Brekelmans, & Wubbels, 2004; Wubbels et al., 2006) and that healthy teacher-student interpersonal relationships are a prerequisite for engaging students in learning activities (Brekelmans, Sleegers, & Fraser, 2000).

Several studies conducted in Turkey have shown a similar importance of the teacher-student interpersonal relationship for the Turkish context (Ozay, Kaya, & Sezek, 2004; Beyazturk & Kesner, 2005). These studies mainly used teacher and student interviews or (expert) observation as their primary methods of investigation and collected data with relatively small samples. The present study investigated students' perceptions of teacher interpersonal behavior by means of a (widely used) questionnaire and focused uniquely on the teacher-student relationship in the classroom. Moreover, the development of a 'Turkish typology' of science teacher interpersonal behavior in secondary schools has been attempted previously only with a small sample (Telli, den Brok, & Cakiroglu, 2007). The present study investigated to what extent earlier found typologies also apply to a large sample of Turkish secondary school science teachers. The results of this study may help teachers and teacher trainers in Turkey or countries with many Turkish immigrants by providing insight into teacher behaviors that are common in Turkish classes and that are relevant to Turkish students' attitudes toward science.

TEACHER-STUDENT INTERPERSONAL BEHAVIOR

Teachers with various communication strategies generate different types of relationships. Some teachers are businesslike and others lenient. Some are distant and others friendly. To conceptualize students' perceptions of the interpersonal behavior of a teacher, Wubbels, Créton and Hooymayers (1985, see Wubbels & Levy, 1993) adapted Leary's (1957) model for interpersonal diagnosis of personality to education and called it *the Model for Interpersonal*

Teacher Behavior (MITB). They also developed an instrument to measure these perceptions in terms of the MITB, *the Questionnaire on Teacher Interaction (QTI).* In the MITB, the interpersonal behavior of a teacher is described along two dimensions - an *influence* dimension and a *proximity* dimension. The influence dimension describes the degree of control of the teacher over the communication process, the proximity dimension the degree of cooperation or opposition between the teacher and the students. The two dimensions can be depicted in a two-dimensional plane that can be further subdivided into eight categories or sectors of behavior: Leadership (DC), Helpful/Friendly (CD), Understanding (CS), Student Freedom (SC), Uncertain (SO), Dissatisfied (OS), Admonishing (OD) and Strictness (DO). Each sector can be described in terms of the two dimensions: Leadership, for example, contains a high degree of Influence and some degree of Cooperation; Helpful/Friendly behavior some degree of dominance and a high degree of cooperation (see Figure 1).

The Questionnaire on Teacher Interaction (QTI) was constructed as a set of 77 items describing teacher interpersonal behavior in terms of the eight scales or sectors of the MITB, thus representing the two (interpersonal) dimensions. The QTI has become a popular instrument in research on teaching, teacher education and learning environments, has been translated into more than 15 languages and has been the focus of well over 120 (learning environment) studies in many countries since its development (den Brok et al., 2004). However, as Fraser (2002) has stated, most previous classroom environment research has involved students in Western countries. Turkey is a relatively new participant in this domain.

Results of past studies with the QTI usually demonstrated the importance of students' perceptions of their teachers' behavior for both cognitive and affective student outcomes. Den Brok and his colleagues (2004) reported positive relations of both dimensions to cognitive and affective students' outcomes. In another study, higher students' perceptions on the Influence dimension were associated with higher student outcomes on a Physics test (Brekelmans, Wubbels, & den Brok, 2002). Although not always straightforward, relationships between Proximity and cognitive outcomes were determined in many studies (for an overview see Wubbels et al., 2006), some of which have also been reported in the *Journal of Classroom Interaction* (den Brok, Fisher, & Koul, 2005a; den Brok, Levy, Brekelmans, & Wubbels, 2005; Kyriakides, 2005). While positive effects of both dimensions on affective outcomes were found in most studies, stronger effects have been reported for Proximity than for the Influence dimension (e.g. den Brok et al., 2004; Wubbels et al., 2006).

Data gathered with QTI has brought the development of a teacher interpersonal behavior typology (Wubbels, Brekelmans, Créton, & Hooymayers, 1990). The following profiles have been found in Dutch and American classes: Directive, Authoritative, Tolerant/Authoritative, Tolerant, Uncertain/Tolerant, Uncertain/Aggressive, Repressive and Drudging. In Figure 2, the types are characterized by means of graphic representations using the eight sections of MITB.

FIGURE 1

The Model for Interpersonal Teacher Behavior

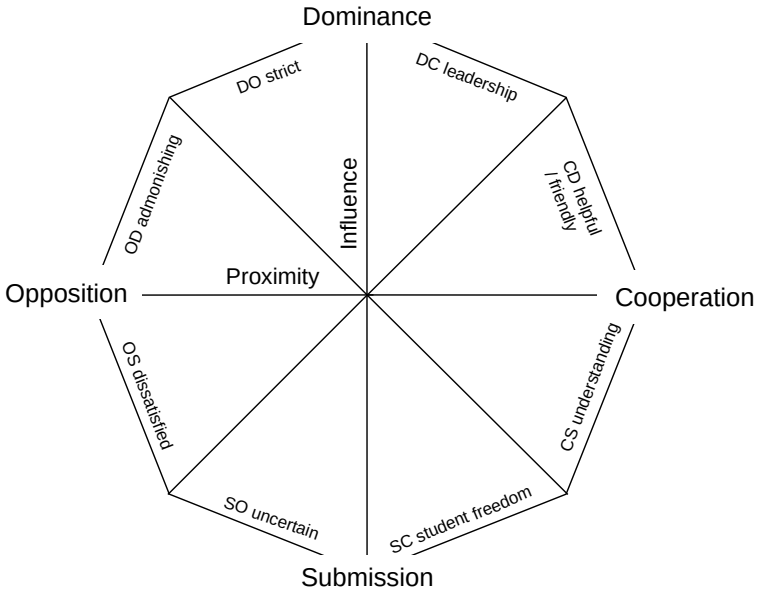
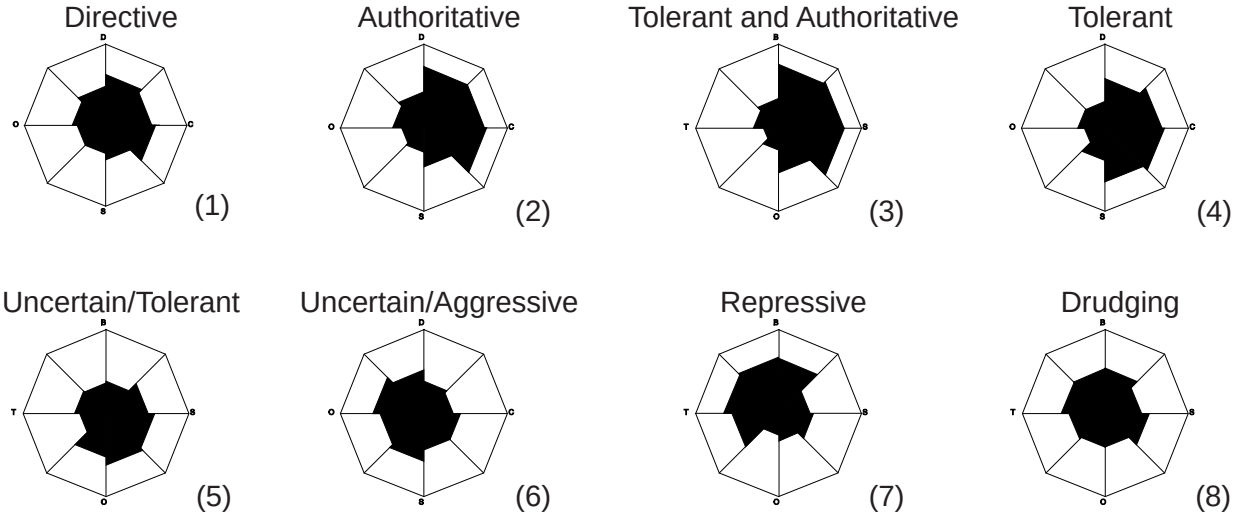


FIGURE 2

Graphic Representations of Eight Types of Patterns of Interpersonal Relationships



The greater the shaded part in each section the more the pattern of interpersonal relationships is characterized by this sector (see Figure 1).

The Authoritative, the Tolerant/Authoritative and the Tolerant type are patterns in which students perceive their teachers relatively high on the Proximity Dimension, with the Tolerant type lowest on the Influence Dimension. Less cooperative than the three previous types are the Directive type, the Uncertain/Tolerant and the Drudging type, with the Uncertain/Tolerant type lowest on the Influence Dimension. The least cooperative pattern of interpersonal relationships has Repressive and Uncertain/Aggressive type classes. In Repressive type classes, teachers are the most dominant of all eight types. The eight interpersonal types have been linked to student outcomes (Brekelmans, Levy, & Rodriguez, 1993). Repressive teachers, followed by Tolerant and Directive teachers, realized highest achievement. Lowest achievement was found in classes of Uncertain/Tolerant and Uncertain/Aggressive teachers. Highest motivation has been found in classes of Authoritative, Tolerant/Authoritative and Directive teachers, while lowest motivation occurred in classes of Drudging and Uncertain/Aggressive teachers. Since students' (and teachers') perceptions on the QTI comprise observations over a longer period of time, interpersonal styles (and as such the typology) are rather stable. Nevertheless, different profiles can be found in different classes of teachers (Wubbels & Levy, 1993), and teachers seem to change from type to type over their teaching career (Brekelmans et al., 2002). No differences in profiles have been reported between male and female teachers or between teachers from different cultural origin (Wubbels et al., 2006).

The present study is the first application of an earlier developed Turkish version of the QTI (Telli et al., 2007) to a relatively big sample from different cities in Turkey. Not much research has been conducted with Questionnaire on Teacher Interaction (QTI) in the close geographic region of Turkey, like the Mediterranean, Balkans or Middle East (an exception is a study conducted in Cyprus by Kyriakides in 2005). When the culture of this geographic area is compared with the previously mentioned QTI-related studies, a clear difference can be seen. Turkey can be regarded as a 'high-contact' or 'high-immediate' culture (Hofstede, 1991). Hall (1966) defined cultures in which people show considerable interpersonal closeness as 'high contact' or 'highly immediate' cultures. Until now, the Questionnaire on Teacher Interaction (QTI) has extensively been utilized in Northern Europe, the USA and some Asian countries, all of which can be considered as low contact cultures. Although a valid and reliable Turkish version of the QTI is available at this point, no further research has been conducted with the developed instrument. No empirical evidence is available whether Turkish students' perceptions of their teachers' interpersonal behavior are associated with their cognitive and affective outcomes and to what degree these associations are similar to other research (as described in the previous section). Although some preliminary evidence exists with respect to

interpersonal profiles that can be found in Turkish science classes (Telli et al., 2007), the presence of these profiles has not been validated with a larger sample.

RESEARCH QUESTIONS

The present study investigated the following research questions:

1. What associations exist between Turkish students' perceptions of their science teachers' interpersonal behavior and their subject-related attitudes?
2. What interpersonal profiles can be discerned in class perceptions of Turkish science teachers?

METHOD

Participants

The participants of this study were 2342 students (grades 9-11) from 14 randomly selected coeducational public schools in three major cities (Bursa, Izmir, Ankara) from three geographical regions (Marmora, Aegean, and Central Anatolia) in Turkey. The regions were selected conveniently. Only public general high schools were included, since their curriculum is almost the same in every school, which makes them easier to compare.

Data for the study were collected from 81 science classes (physics, chemistry, and biology) taught by 40 teachers with 5 to over 25 years of professional experience. Class size in these schools varied from 12 to 47 students, with an average of 29 students. A total number of 1243 girls (53 %) and 1031 (44 %) boys participated (68 students made no indication of gender). Of the students, 1224 (52.3 %) were located in grade nine, 632 (27 %) in grade ten and 486 (20 %) students in grade eleven. Students participated in following ratio over the science subjects: 915 (39.1 %) for physics, 746 (31.9 %) for chemistry and 681 (29.1 %) for biology.

A total number of 29 (72.5 %) female and 11 (27.5 %) male teachers took part in the study. Their subject distribution was: 15 (37.5 %) for physics, 13 (32.5 %) for chemistry and 12 (30.0 %) for biology.

Instrumentation

All students responded to two questionnaires: the Turkish version of the Questionnaire on Teacher Interaction (QTI) and the Test of Science Related Attitudes (TOSRA).

The original QTI with 77 items was developed in the Netherlands (Wubbels et al., 1985). Later, a 64-item American version was constructed (Wubbels & Levy, 1991). The American version formed the starting point for the development of the Turkish version (Telli et al., 2007). Analyses on data from the Turkish version indicated that a reliable and valid adaptation of the QTI for the Turkish context had been created. Sample items are given in Table 1.

To check the quality of the Turkish version of the QTI for the present sample, reliability and discriminant validity analyses were conducted on the eight scales. Cronbach's alpha for the different QTI scales ranged from .44 to .84 when using the individual as the unit of analysis and from .65 to .95 when using the class mean as the unit of analysis (see Table 2). The percentage of variance in scale scores at the class level (e.g. eta squared) ranged between 18 and 29. The results indicate that the instrument is reliable and able to

TABLE 1

Typical Items for the Scales of the Turkish QTI

Scale (sector)	Typical item for Turkish context.
DC - Leadership	This teacher exactly knows the name of all students.
CD - Helpful/ friendly	This teacher encourages students.
CS - Understanding	This teacher gives us extra time for the homework's that we cannot complete on time.
SC - Student freedom	We are allowed to break some rules in this teacher's class.
SO - Uncertain	This teacher breaks his/her promises in the classroom.
OS - Dissatisfied	It is difficult to ask this teacher a personal question.
OD - Admonishing	This teacher stops the lesson to discuss our (bad) behavior.
DO - Strict	When a question is asked by the teacher, students are afraid to give the wrong answer.

TABLE 2

Reliability (Alpha) of QTI Scales at the Student and Class Level and Eta Squared Value

Scale	Unit of analysis	Alpha Reliability	Eta Squared
DC - Leadership	Individual	.73	.25
	Class	.82	
CD -Helpful/ friendly	Individual	.84	.29
	Class	.94	
CS - Understanding	Individual	.81	.18
	Class	.95	
SC - Student freedom	Individual	.44	.21
	Class	.65	
SO - Uncertain	Individual	.69	.27
	Class	.89	
OS - Dissatisfied	Individual	.76	.29
	Class	.94	
OD - Admonishing	Individual	.72	.29
	Class	.90	
DO - Strict	Individual	.67	.27
	Class	.89	

discriminate between classes. Factor analyses on the eight scales indicated the presence of two, independent dimensions representing Influence and Proximity and a circular ordering of the scales (Telli et al., 2007).

The second questionnaire used in this study was the TOSRA. This instrument originally consisted of 7 scales (social implications of science, normality of scientists, attitude to scientific inquiry, adaptation of scientific attitudes, enjoyment of science lessons, leisure interest in science, career interest in science) and 70 items and was developed by Fraser (1981). The Turkish version of the TOSRA was first adapted into Turkish by Telli, Rakici, and Cakiroglu (2003). Since main interest here lies in subject-related attitudes, four scales -*attitude to scientific inquiry, enjoyment of science lessons, leisure interest in science, and career interest in science*- from the original form of the TOSRA were selected to be used in the present study. Reliability and average scale inter-correlations of the Turkish version of the TOSRA for the present study are given in Table 3.

Data Analysis

First, scale and dimension averages and standard deviations were computed to obtain a sample (country) description of the interpersonal behavior of science teachers as perceived by their secondary education students. These averages were also displayed into a graphical profile. To investigate how individual students' attitudes were related to their personal perceptions of the learning environment, simple correlations were computed between the TOSRA scales and QTI dimension scores (only significant findings will be reported) and a regression analysis was performed on the TOSRA scales with QTI dimension scores[1] as independent variables (student gender, report card grade and class membership were entered as covariates). To answer the second research question, student perceptions on the QTI scales were aggregated to the class level and then compared to the existing QTI related typology, in order to determine the number of classes belonging to a specific profile.

RESULTS

A first general descriptive analysis was performed to

[1] The dimension scores computed as follows (the weights in the next two formulae represent goniometric positions): Influence = (.92*DC) + (.38*CD) - (.38*CS) - (.92*SC) - (.92*SO) - (.38*OS) + (.38*OD) + (.92*DO); proximity = (.38*DC) + (.92*CD) + (.92*CS) + (.38*SC) – (.38*SO) – (.92*OS) – (.92*OD) – (.38*DO).

TABLE 3

TOSRA Scales, Sample Item, Reliability (Alpha) and Average Correlation with Other TOSRA Scales

Scales	Sample item	Alpha (student level)	Average correlation with other scales
Attitude to scientific inquiry	I would prefer to do my own experiments than to find out information from a teacher.	.69	.25
Enjoyment of science lessons	Science lessons are fun.	.88	.56
Leisure interest in science	I dislike reading books about science during my holidays.	.78	.55
Career interest in science	Working in a science laboratory would be an interesting way to earn a living.	.74	.53

obtain the average profile of teachers in the sample (n=2342; classes=81). The means and standard deviations for each of the QTI scales (sectors) are provided in Table 4, while a graphical display is presented in Figure 3. As can be seen, results of the study indicated that students generally perceived that their science teachers displayed cooperative behaviors (Leadership, Helping/Friendly and Understanding), rather than oppositional behaviors (Uncertain, Dissatisfied, Admonishing). Scores on most scales were similar to those found in other studies (Wubbels & Levy 1993).

Surprisingly, the Strict scale also obtained a much higher score than found in any other QTI related study: teachers scored 61 % out of the maximum possible rating, compared to 41 % in the Netherlands (see Table 4). In terms of the two dimensions, it appeared that Turkish science teachers were perceived as somewhat dominant (DS=.39 on a possible score range between –3 and +3) and fairly cooperative (CO=.68 on a possible score range between –3 and +3). This means that Turkish students perceived their science teachers displayed cooperative behaviors together with dominant behaviors (see Figure 3).

The outcomes of Table 4 and Figure 3 generally represent the profile of a Tolerant/Authorative teacher, although the score on Strict is higher than in previous studies in other countries (Brekelmans et al., 2002; den Brok et al., 2004; den Brok, Fisher, Brekelmans, Wubbels, & Rickards, 2006), but similar to a previous study in Turkey (Telli et al., 2007). Table 4 also shows means of student perceptions in Dutch classes (den Brok, Fisher, Brekelmans, Rickards, Wubbels, Levy, & Waldrip, 2003).

FIGURE 3

Graphical Profile of Average Interpersonal Style and Dimension Scores of Teachers in Turkish Science Classes

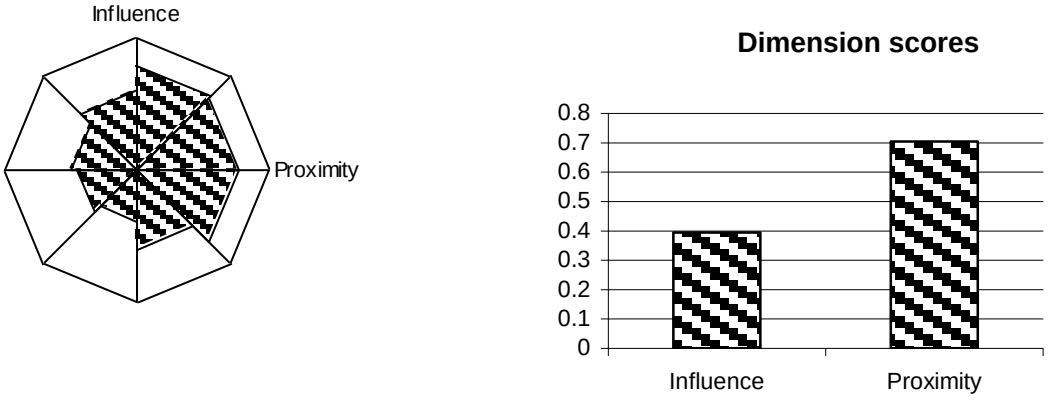


TABLE 4

Mean QTI Scores for the Study (Science) and a Large Dutch Sample (All Subjects)

Sector	Mean (st. dev) Present study (n= 2342; classes=81)	Mean Large Dutch sample (den Brok et al., 2003) (n=13668; classes=1257)
DC- Leadership	.79 (.16)	.60
CD- Helpful / Friendly	.78 (.17)	.60
CS- Understanding	.78 (.17)	.65
SC- Student Freedom	.60 (.14)	.50
SO- Uncertain	.39 (.13)	.38
OS- Dissatisfied	.46 (.14)	.29
OD- Admonishing	.50 (.14)	.40
DO- Strict	.61 (.15)	.41
DS- Influence	.39 (.28)	.14
CO- Proximity	.68 (.51)	.63

Note: scale scores range between 0 and 1, dimension scores between -3 and +3.

Associations Between Students' Perceptions of Teacher Interpersonal Behavior and Subject-related Attitudes

Correlational analysis revealed that students' attitudes were associated with students' perceptions of teacher interpersonal behavior. Teacher Influence (DS) was associated positively with enjoyment (.08) and leisure interest in science (.08). Teacher proximity (CO) was positively related with all four science-related attitudes: inquiry (.07), enjoyment (.23), leisure interest (.19) and career interest (.12).

Regression analyses indicated a similar pattern, with in all cases Influence being non-significantly related to the attitude scales and Proximity being significantly associated. Apparently, if attitude scores are corrected for report card grade, student gender and class membership, the effect of Influence diminishes, perhaps also due to the simultaneous effect of Proximity on the student attitudes. The effect of Proximity is hardly affected by the introduction of other variables into the analyses, indicating that its effect is relatively autonomous and hardly overlaps with those other variables involved.

Interpersonal Profiles of Turkish Science Teachers

Finally, analyses on class mean scores indicated that several different interpersonal profiles could be detected in Turkish science classes. Distribution of the profiles were as follows: 29 Authoritative classes (35.8 %), 28 Tolerant/Authoritative classes (34.6 %), and 16 Directive classes (9.8 %). Nevertheless, other types were found as well: two Tolerant classes, one Uncertain/Tolerant class, three Repressive classes and two Drudging classes. The outcomes of this study were compared to results of a previous study in Turkey (Telli et al., 2007) and a Dutch sample (see Table 6). As can be seen, in the previous Turkish study, apart from two classes all teachers were (on average) perceived as either being Directive, Authoritative or Tolerant/Authoritative. These three types are known for their high scores on cognitive and affective outcomes (Wubbels & Levy, 1993).

In this study, three other teacher profiles–Tolerant, Uncertain/Aggressive and Repressive--appeared besides the three commonly found profiles. When these two Turkish samples were compared to the Dutch sample, one missing profile could be noticed. In Table 6, it can be easily noticed that teachers' profiles in both Turkish samples in large numbers can be classified to the Authoritative or Tolerant/Authoritative profiles. The differences in percentage with other profiles are quite small.

CONCLUSION

This study investigated associations between students'

TABLE 5

Regression Analyses on the TOSRA Scales (n=2342)

Variables	Inquiry	Enjoyment	Leisure	Career
QTI scales:				
- Influence	-	-	-	-
- Proximity	-	.186	.175	.107
Background variables:				
- gender	.085	-	-	-
- report card grade	.071	.153	.049	.087
- class	.087	.057	-	-
Total model fit:				
- R-value	.155	.279	.203	.159
- Significance	.00	.00	.00	.00
- % explained	2.40	7.80	4.10	2.50

perceptions of their teachers' interpersonal behavior and their subject-related attitudes within the Turkish context. With respect to the first research question results indicated that the Turkish QTI had predictive validity: raw correlation coefficients showed relatively weak associations between the two dimensions and subject-related attitudes; the more precise (and conservative) regression analyses indicated that only students' perceptions of teacher proximity were statistically significant, related to their attitudes. The fact that the Proximity dimension was associated with student attitudinal outcomes is in line with previous work linking the QTI dimensions to student outcomes (den Brok et al., 2004; den Brok, Fisher, & Scott, 2005b). The effect of Proximity on attitudes varied between 2.5 and 7.5 % of the total variance. These effects may seem rather small; however, they are comparable to previous research with the QTI and findings in educational effectiveness research (den Brok et al., 2004; Wubbels et al., 2006). Moreover, reported effect sizes and coefficients of the dimensions in these studies are comparable to or even larger than those of other (background and teaching) variables. Finally, the effects comprise a one-year period, considered over the complete secondary school period; they may equate to student progress and differences in motivation of one entire school year, suggesting a considerable effect.

In terms of students' average perceptions, teachers were perceived as somewhat dominant and highly cooperative. This can be explained from the behavior expected from Turkish teachers in the classroom and the status and respect that teachers enjoy in Turkish society from both families and students. Although conflicts and arguments are common from time to time, especially with older students and inexperienced teachers, teachers usually have the last word. Moreover, while having high control and strength over their classrooms, teachers are expected to behave in a calm manner. Additionally, arguments are mostly concluded with an agreement between teacher and student(s) without taking much time. Teachers are expected to manage their classroom in a way that reduces disorder and the risk for burn-out (teachers) or school leaving (students), to be well prepared for instruction and to evaluate students as neutral as possible. Turkish teachers are usually the first people aware of the personal problems of their students. Students might directly ask help, guidance or explain their problems to their teachers.

As with respect to the second research question, several interpersonal profiles were found in this Turkish sample, with the Authoritative teacher (36 %), the Tolerant-Authoritative teacher (35 %) and the Directive teacher (20 %) being the most common ones. Although more different profiles could be found in this sample compared to a previous study (Telli et al., 2007), percentages for Tolerant, Uncertain/Tolerant, Uncertain/Aggressive, Repressive and Drudging profile are still very small. Nevertheless, they are similar to findings in other countries, such as Australia, Singapore and Brunei (den Brok, Fisher et al., 2006). It seems likely that these findings are related to the voluntary participation of teachers and their classes. Future research with larger (non-voluntary) samples could shed light on this. Such a study could also verify the definition of a "Turkish version of Tolerant/Authoritative

TABLE 6

Percentages of Occurrence of Class Interpersonal Profiles in the Turkish Sample

Interpersonal profile	Present study	Telli et al. (2007)	Dutch sample
Directive	20	17	19
Authoritative	36	46	23
Tolerant/Authoritative	35	29	14
Tolerant	3	-	19
Uncertain/Tolerant	1	4	9
Uncertain/Aggressive	-	-	3
Repressive	4	-	5
Drudging	3	4	8

teacher." The authors are currently collecting a data set that is much larger and contains more background variables, which will allow for more precise estimation of effects and open opportunities for different analysis techniques, such as multi-level analyses or structural equation modeling.

IMPLICATIONS

The QTI can be considered as a way to check the interpersonal situation in the classroom both from a student and a teacher point of view, and as a diagnosing instrument to investigate the classroom climate. The results of this study may initiate and support activities in science (teacher) education in Turkey. At this point, there are hardly (research) instruments available in the Turkish context to map the (science) learning environment in a reliable and valid way. Teachers can be provided with personal feedback regarding their own and their students' perceptions of the classroom environment. With such feedback, they can compare these perceptions, also with their ideals, and they can compare their own perceptions or those of their students with each of the different types to see with which typologies they fit best. This way, clues can be found for directions to improve oneself and to enhance the classroom environment. The QTI can be a powerful tool for (self) reflection in this respect (see also Wubbels et al., 2006). Given the connection between students' perceptions of their teachers' interpersonal behavior and their cognitive and affective outcomes, these findings may also be important for school leaders and educational evaluators.

Of course, questions for future research should focus more on why there are differences between students and teachers in their perceptions. Studies on this topic would provide more insight into communication problems within classrooms and possible solutions to resolve these. Also, research is needed using the QTI to evaluate teacher training or teacher professional development activities with respect to classroom management and interpersonal behavior; according to Wubbels et al. (2006) such research is largely lacking, despite the large number of studies conducted internationally with the QTI. Still another way to pursue research on teacher-student interpersonal behavior is linking QTI profiles to actual observations, in this case in Turkish classrooms. Not only can such research validate profiles and present observational clues in this respect, also can such findings be used for professional development activities in order to change teacher behavior.

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Correspondence regarding this article should be addressed to Jale Cakiroglu at Middle East Technical University of Ankara, Turkey. Email may be sent to jaleus@metu.edu.tr