



The influence of school leadership styles and culture on students' achievement in Cyprus primary schools

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Abstract

Purpose – This study aims to examine the validation of both the model of direct effects and the model of indirect effects of principals' leadership on student academic achievement.

Design/methodology/approach – A longitudinal study was conducted in which 22 schools, 55 classes and 1,224 Cypriot primary students participated. Specifically, achievements in Greek Language and Mathematics were assessed at the beginning and at the end of the same school year. Moreover, leadership style of school principals and teachers as well as school and classroom culture was measured.

Findings – The findings provide some empirical support for the model of direct effects of principals' leadership on student academic achievement. Moreover, student achievement gains were found to be related with five factors at the school level: the principals' human resource leadership style and four dimensions of organizational culture. At the classroom level, three dimensions of learning culture significantly influence student achievement in each subject. Finally, relationships between effectiveness factors operating at different levels were identified.

Originality/value – The article presents an original empirical study which examined the relationship among school leadership, school culture and student achievement in order to validate both the model of direct effects and the model of indirect effects of school principals on student achievement.

Keywords Schools, Leadership, Organizational culture, Learning methods, Principals, Cyprus

Paper type Research paper



In the last 25 years, much attention has been placed on educational leadership and its impact on student outcomes. In particular, researchers in the area of educational leadership have attempted to identify links between school leadership and student achievement. The empirical literature shows that both the nature and the degree of principal impact continue to be a subject of debate (Pitner, 1988; Rowan *et al.*, 1982; Van de Grift, 1999). Previous research on the effects of school leadership on students' academic achievement has produced contradictory findings. A large number of studies found some effects (Edmonds, 1979; Fuller, 1987; Rutter *et al.*, 1979; Andrews and Soder, 1987; Mortimore *et al.*, 1988; Andrews and Bamberg, 1989; Lezotte, 1989; Levine and Lezotte, 1990; Heck, 1992; Reynolds and Cuttance, 1992; Cheng, 1994a; Pashiardis,

1995, 1998, 2004). However, some studies found that the effects are indirect, if not difficult to measure (Hallinger and Heck, 1996, 1998; Leithwood and Jantzi, 1990; Witziers *et al.*, 2003). For example, Hallinger and Heck (1996, 1998) reviewed more than forty studies published about the principal's role in school between 1980 and 1995. The general pattern of results drawn from these two reviews supports the belief that principals exercise a measurable, though small, indirect effect on student achievement. On the contrary, the direct effects of principals' leadership on student achievement seem to be very rare.

The above analysis indicates the necessity for more studies that should examine the possible relationships between school leadership and student achievement. For this reason, the purpose of this study is to examine the impact of school leadership on student academic achievement in primary schools in Cyprus. In particular, it is important to examine both the direct and the indirect effects of school leadership on student academic achievement. For this reason, data from both the school level and the classroom levels are necessary. The school level data are needed for the examination of the direct effects of leadership and the classroom level data are needed for the study of the indirect effects. In addition, a third, intermediate variable such as school culture is used for the examination of the indirect effects.

Conceptual framework

Impact of school leadership on student achievement: what are the reasons that lead to the production of these conflicting findings?

Some important conceptual and methodological factors are possible to differentiate the results among the various studies. To begin with, there is no unique definition of the concept of principal's leadership, which is broadly accepted (Hallinger and Heck, 1996, 1998; Witziers *et al.*, 2003). Moreover, there is no universal paradigm or theory for examining organizational behavior that is valid in all social or organizational contexts (Hallinger and Heck, 1996, 1998; Pashiardis *et al.*, 2003; Brauckmann and Pashiardis, 2009). In addition, methodological issues and research design affect the findings of the various studies. For example, the use of longitudinal data permits the examination of the progress of student achievement (Teddlie and Reynolds, 2000). In addition, the presence or absence of either construct validity or generalizability or explicit measures of school performance as a dependent variable may lead to different findings (Hallinger and Heck, 1996, 1998). Furthermore, the presence of a third, intermediate variable between principals' leadership and student achievement, could lead to different results than the absence of this variable (Hallinger and Heck, 1996, 1998; Witziers *et al.*, 2003). Finally, the use of statistical techniques such as structural equation modeling (SEM) and multilevel analysis permit the examination of the complex relationships between principals' leadership and student achievement (Teddlie and Reynolds, 2000; Witziers *et al.*, 2003).

Conceptualizing the principals' effects on student achievement

There are some theoretical perspectives through which leadership can be studied such as the one presented by Ogawa and Bossert (1995). However, Hallinger and Heck (1998) argue that Pitner's (1988) framework offers a more useful means for conceptualizing and organizing studies on administrative effects. This framework identified a range of

approaches that could be used to study administrator effects: direct-effects, antecedent-effects, reciprocal-effects, and moderated effect models (Pitner, 1988, pp. 105-108). These models offer a comprehensive set of different perspectives for viewing the effects of school context on administrator behavior and the influence of this behavior on the school and its outcomes:

- direct-effects models propose that the leader's practice can have effects on school outcomes;
- mediated-effects models propose that leaders achieve their effects on school outcomes through indirect variables such as people, events and organizational factors (e.g. teachers' commitment, instructional practice, and school culture); and
- reciprocal-effects models propose that the relationships between the leader and variables of the school and its environment are interactive.

Halliger and Heck (1996, 1998) used Pitner's framework in order to consider a large number of studies examining principals' effects on student performance. The general pattern of results drawn from these two reviews supports the belief that principals exercise a measurable, though small, indirect effect on student achievement. On the contrary, the direct effects of principals' leadership on student achievement seem to be very rare. According to their recommendations, variables such as school culture could be used in the efforts to examine the mediated-effects models and the reciprocal effects models.

Conceptualizing school leadership

As has already been mentioned, the function of leadership seems to influence the overall performance of organizations. However, the lack of a unique definition of the concept of a principal's leadership, which is broadly accepted, creates problems in the examination of this impact. Indeed, leadership has been conceptualized and operationalized in many different ways. According to Hoy and Miskel (2008), the definitions of the concept of leadership are almost as numerous despite the fact that most of these theories could be grouped in four main historical approaches: personality or trait theories, behavioral theories, situational approaches, and transformational leadership.

On the other hand, the fact that researchers have provided inconclusive results is not a sufficient argument for rejecting the concept of "leadership" altogether. For example, Gronn (2000) argues that leadership is still needed but a fundamental reconceptualization of the nature of leadership within organizations is overdue. A first step to this reconceptualization is the identification of the causes of the lack of a universal definition of the concept of leadership (Hallinger and Heck, 1998). A second step is the identification of the main assumptions about effective leadership which seems to be a very difficult task. However, a main assumption that could be broadly accepted is presented by Riley and Louis (2000, p. 47) who argue that "there is no package for school leadership, no one model to be learned and applied regardless of culture or context, though leadership can be developed and nurtured".

Bolman and Deal's four frame leadership. A model that seems to consider both the complexity of an organization, its culture and context is the "Four leadership frames", which has been developed by Bolman 1992) and Bolman and Deal (1984, 1991, 1992, 1997). The validation of this theory in various organizations in different countries –

either businesses or schools – supports its main assumption that effective leadership requires the use of multiple perspectives which are called “frames”. This model is based on the examination of the organization from different perspectives:

- rationality (the structural frame);
- satisfaction of needs (human resource frame);
- power and conflicts (political frame); and;
- culture (symbolic frame).

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What is the main advantage of this model? According to Bolman and Deal, this is a theory of effective leadership (Bolman, 1992; Bolman and Deal, 1991, 1992). Specifically, a number of empirical studies which examined the validation of this theory agree that the Four Leadership Frames is a model of effective leadership styles (Bensimon, 1989, 1990; Wimpelberg, 1987). Furthermore, Lashway (1997) supports that this model is a way of strategic thinking which permits the leader’s analysis of the situation because it requires proficiency in the four frames in an attempt to adopt the most appropriate strategy for the situation.

Leadership of people in certain roles. Most studies have focused on the leadership of people in certain roles. Generally, that has meant studying leaders at the top of their organizations’ hierarchy such as principals at the school level. The conceptualization of a principal’s leadership has evolved considerably over the past three decades (Heck, 1992; Leithwood and Jantzi, 1990). The notions of the principals’ role have evolved from manager, to instructional leader, to transformational leader. The vast majority of studies investigating school leadership and its impact on school effectiveness were mainly focused on a principal’s leadership. This tendency was based on the belief that the principal was the single source and direction of leadership in the school (Harris, 2003).

However, recent literature emphasizes the multiple sources of leadership in schools. Terms such as “distributed leadership” are used to indicate this emphasis. For example, Ogawa and Bossert (1995), Pounder *et al.* (1995) and Deal and Peterson (1999) identified teachers, parents, students and secretaries as additional sources of leadership as these persons influence a school’ direction, goals and effectiveness. In particular, the role and the importance of teachers’ leadership were stressed by a large number of studies such as those of Gronn (2000), Harris (2003) and Harris and Muijs (2003).

The number of studies examining the effects of teachers’ leadership styles and strategies in the classroom is limited. One of these few studies was conducted by Cheng (1994b). The main assumption of this study was that a class of students is in nature a small organization that may be studied and managed by theories of organization and management. Borrowing the ideas of leadership in adult organization Cheng found that a strong relationship of classroom teachers’ leadership style to classroom performance. Nevertheless, more studies should be conducted in this direction in the future in order to establish a solid formulation on these assertions.

Conceptualizing school culture

The term culture has a long history. The meaning of the word has been discussed for many years in a number of different fields, including anthropology, sociology, and history. From humanities to the hard sciences, the meaning of the term has inspired conversations and stirred controversy which means that the notion of culture brings

with its conceptual complexity and confusion. Some efforts to present a general definition of organizational culture have been made. For example, Hoy and Miskel (2008) general definition considers organizational culture as a system of shared orientations that hold the unit together and give it a distinct identity. However, substantial disagreement arises about what is shared. Another problem is determining the intensity of shared orientations of organizational members. Do organizations have a basic culture or many cultures? Moreover, there is disagreement about the extent to which organizational culture is conscious and overt or unconscious and covert.

One way to begin to untangle some of the problems of its definition is to view culture at different levels. According to Schein's definition (Schein, 1985, 1992, 1999), culture is the deeper level of basic assumptions, values, and beliefs that become shared and taken for granted as the organization continues to be successful. Based on this definition culture is manifested in norms, shared values, and basic assumptions, each occurring at different levels of depth and abstraction. Research has shown that a large number of studies adopted Schein's model in order to examine school organizational culture.

Culture is very important for an organization as it affects significantly every aspect of it, such as stability, cohesion, unity and ability for adjustments in an organization. In particular, researchers have accumulated some compelling evidence in support of the proposition that school culture influences school outcomes (Edmonds, 1979; Fyans and Maehr, 1990; Cheng, 1993). A positive school culture is associated with areas such as student and teacher motivation, student academic achievement, teacher job satisfaction, commitment, and collaboration and school community building.

As this study is interested in school culture, we examined theoretical models of culture that had been adjusted for schools. The result of this review is that we have identified only a small number of models. One approach that includes many dimensions, such as teamwork and cooperation, communication, decision making, change and innovation, responsibility and commitment, and vision and goals, of organizational culture at the school level is the model proposed by Feitler and Gudgeon (1994).

The existence of several cultures at the school level has already been recognized (Maehr and Midgley, 1996). One sort of such culture is the school learning culture. However, the literature review indicated a lack of a theory related to school learning culture. An effort to measure learning culture has been made by Barnett *et al.* (1999) in Australia. This study used a model proposed by Midgley *et al.* (1996), who developed an instrument measuring school learning culture and student motivation. According to them, learning culture is the particular set of perceptions, thoughts and beliefs that have been found to be critical in determining motivation and student learning. There are many dimensions in their model that were related to school learning culture such as academic emphasis, academic efficiency, academic novelty, cheating behavior, disruptive behavior and success. An effort to validate this model at classroom level could be an interesting undertaking as every classroom has its own unique culture according to Maehr and Midgley (1996).

The aims of the study

The main purpose of the study presented in this paper is the examination of the relationships among: school leadership style; student academic achievement; and school culture as a third variable. More specifically, this study attempts to identify:

- (1) the extent to which leadership and culture at the classroom level (teachers' leadership and learning culture) and the school level (principals' leadership and organizational culture) affect achievement in Greek Language and Mathematics; and
- (2) the extent to which leadership and culture at the school level (principals' leadership and organizational culture) affect teachers' leadership and learning culture at the classroom level (teachers' leadership and learning culture).

Principals' and teachers' leadership style, school organizational culture, classroom learning culture and student achievement are the four main variables in this study (Figure 1). This work has adopted specific theories with regards to these variables in order to investigate their relations either at the same level (the school unit level or at the classroom level or between the two levels (multilevel nature of schools).

Based on the above, this study aimed to examine the relationship between leadership, culture and effectiveness among primary schools in Cyprus. Because of the need to validate the model of indirect effects, school culture was used as a third variable. This work has adopted specific theories with regards to three variables (leadership style, culture and effectiveness) in order to investigate their relations either at the same level (the school unit level or at the classroom level or between the two levels (multilevel nature of schools). More specifically, this study was based on:

- the Bolman and Deal (1984, 1991, 1992, 1997) theoretical model of leadership to examine principals' leadership style at the school level and the teachers' leadership style at classroom level;
- the Feitler and Gudgel (1994) model of organizational culture of schools in order to examine organizational culture at the school level;
- the Midgley *et al.* (2001) model of goal theory and school culture in order to investigate the learning culture at the classroom level; and
- Pitner's (1988) framework of models of principals' effects on student achievement.

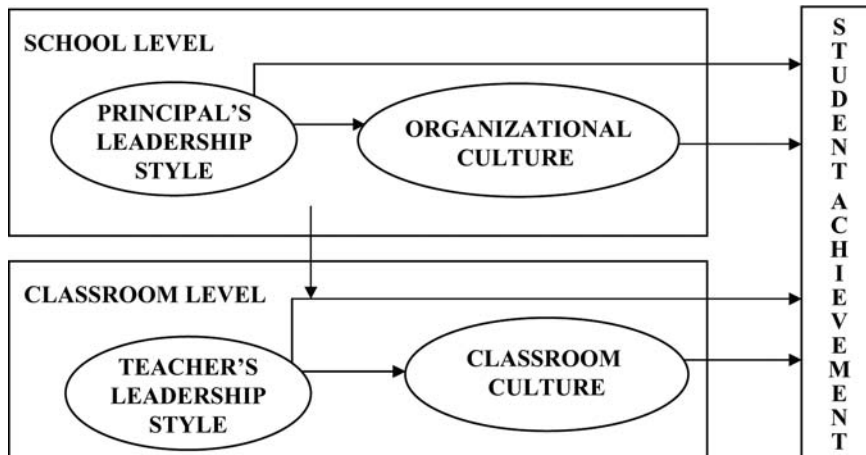


Figure 1.
The recommended conceptual framework of the study

Methodology

Participants

Stratified sampling was used to select 22 out of 115 Cypriot primary schools. All the year-6 students ($n = 1224$) from each class ($n = 55$) of the school sample were chosen. This sample represented 20 percent of the population of primary schools in Cyprus that had at least two classrooms of sixth grade (in order to make comparisons between the classrooms achievement in every school). The chi-square test did not reveal any statistically significant difference between the research sample and the population in terms of pupils' gender. The chi-square test did not reveal any statistically significant difference between the research sample and the population in terms of pupils' gender ($\chi^2 = 1.12$, $df = 1$, $p < 0.79$). Thus, it may be claimed that a nationally representative sample of Cypriot year 6 pupils was drawn.

The sample included a total of 22 primary school principals. The majority of them were men (59 percent). All of the principals were aged between 50 and 59 years old. The participants had a range between one and four years of experience as principals (16 participants), while the rest had five-eight years of experience. Almost all of the principals (20) had a range between one and three years of work in the same school while the remaining two principals had four years of work in the same school. Finally, only 14 percent of the principals had a masters' degree.

The variables of the study

Leadership style, culture and student achievement are the variables of this study (Figure 2).

Leadership style, culture and student prior knowledge and background (gender and socio-economic status) are the explanatory variables whereas student achievement is the dependent variable. Because of the multilevel nature of schools (students are grouped into classrooms and classrooms are grouped into schools), this study attempted to examine the explanatory variables at three levels: the student level, the classroom level, and the school level. Figure 2 shows the relationship among the variables that are examined in the study.

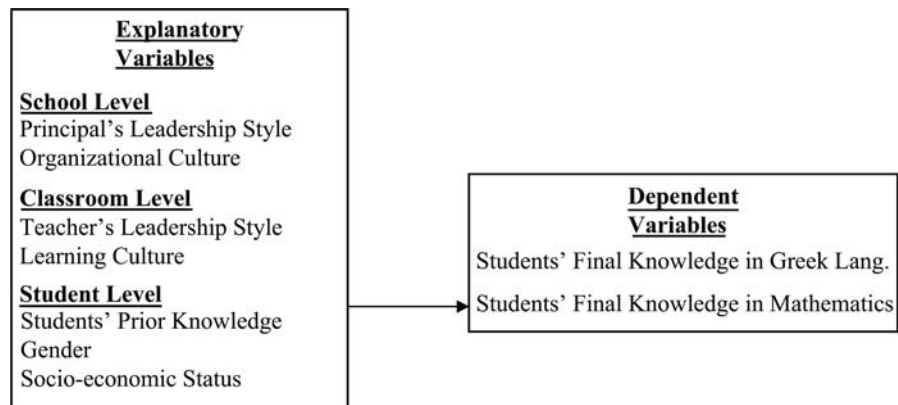


Figure 2.
The explanatory and the dependent variables of the study

- *Dependent variables: cognitive outcome of schooling.* Students' achievement scores in the two tests in Greek Language and Mathematics at the end of the school year were considered as depended variables. The construction of the tests was subject to control for reliability and validity (Kyriakides, 2005). More information about the dependent variables is given in Appendix 1.
- *Explanatory variables.* All the explanatory variables were categorized at three levels. First, prior knowledge and background factors (socio-economic status and gender) were the three variables at student level. Second, variables of the teacher's leadership style and classroom learning culture were included at classroom level. Third, variables of the principal's leadership style, the principal's perceived effectiveness and school organizational culture were included at school level. More information about each one of the explanatory variables is provided in Appendix 2.

The process of development for the Greek version of each questionnaire

The development of the Greek version of each of the instruments measuring both principals' and teachers' leadership style (Bolman and Deal, 1991, 1992), school organizational culture (Feitler and Gudgel, 1994) and classroom culture (Midgley *et al.*, 2001) followed three phases (Kythreotis, 2006). At the beginning, the translation of each questionnaire from the English language to the Greek language was undertaken. Then, the content and face validity of each questionnaire were examined. Finally, confirmatory factor analysis approaches were employed in order to examine the construct validity of each questionnaire. The reliability of each scale was also calculated.

The process of data collection

The process followed four phases between October 2002 and June 2003.

- (1) The measurement of the prior knowledge of students in Greek Language and Mathematics took place (the two tests of achievement were given to students).
- (2) The validation (piloting) of the Greek version of the four questionnaires measuring: principals' leadership style; teachers' leadership style; school organizational culture; and classroom learning culture.
- (3) Measurement of the explanatory variables at both school level (principals' leadership style and organizational culture) and classroom level (teachers' leadership style and learning culture) (the final versions of four questionnaires were given to teachers and to students).
- (4) The measurement of the final knowledge of students in Greek Language and Mathematics took place (again the two tests of achievement were given to students).

The data analysis

Two statistical techniques were used to analyze the data. First, multilevel analysis was utilized in order to examine the extent to which the explanatory variables at student level (prior knowledge in Greek language and Mathematics, gender and socio-economic status), classroom level (teachers' leadership style and learning culture), and school

level (principals' leadership style and organizational culture), affect the dependent variable (final knowledge in Greek language and Mathematics) (Aim 1 of the study). Second, structural equation modeling was employed in order to identify the extent to which leadership style and culture at school level (principals' leadership style and organizational culture) affect teachers' leadership style and learning culture at the classroom level (teachers' leadership style and learning culture) (Aim 2 of the study).

Results

As has already been mentioned, this study had two main aims. First, the study aimed to identify the extent to which leadership style and culture at both the classroom level (teachers' leadership style and learning culture) and the school level (principals' leadership style and organizational culture) affect student achievement gains in Greek language and Mathematics. Second, the study aimed at identifying the extent to which leadership style and culture at the school level (principals' leadership style and organizational culture) affect teachers' leadership style and learning culture at the classroom level (teachers' leadership style and learning culture). For this reason, the results of data analysis are presented below in agreement with the above two aims.

The influences of leadership style and culture on student academic achievement (Aim 1)

There is substantial agreement that researchers should attempt to consider the multilevel structure of the data collected in order to examine effects on student achievement, and thus multilevel modeling should be used as the method of analysis for this sort of studies (Snijders and Bosker, 1999; Goldstein, 2003). Hence, "MLwiN" (Goldstein *et al.*, 1998) was used to analyze our data because the observations are interdependent and because of multistage sampling, since students are nested within classes and classes within schools. Specifically, in order to examine the extent to which the variables of leadership style and school culture show effects upon each of the two dependent variables (i.e. the Mathematics and Greek language achievement), the analyses were performed separately for each dependent variable. The first step in the analysis was to determine the variance at student, classroom and school level without explanatory variables (empty model). In subsequent steps, explanatory variables at different levels were added starting at student level. Explanatory variables, except grouping variables, were centered as Z-scores with a mean of 0 and a standard deviation of 1. This is a way of centering on the grand mean (Bryk and Raudenbush, 1992) and produces effects that are comparable. Grouping variables were entered as dummy variables with one of the groups as baseline (e.g. boys = 0 and girls = 1).

Effectiveness in Greek language. As mentioned above, the first step in the analysis was to determine the variance at student, classroom and school level without explanatory variables (null or empty model). The variance in the empty model is 375.83. Of the total variance, 332.95 (standard error = 14.57), 28.21 (SE = 12.98) and 14.67 (SE = 6.85) is accounted for by the student, class and school level respectively. Thus, 88.5 percent of the variance is at the student level, 7.5 percent at the class level and 4.0 percent at the school level. Moreover, the variance at each level reaches statistical significance and this implies that MLwiN can be used to identify the explanatory variables, which are associated with student achievement in Greek Language.

In Model 1, the context variables (three variables: prior knowledge, socioeconomic status and gender) at student level were added to the empty model (Table I). The likelihood statistic (χ^2) shows a 1309.22 points reduction between the empty model (Model 0) and Model 1 (i.e. from 9543.84 to 8234.62 points). In a chi-squared distribution with three degrees of freedom the reduction was statistically significant ($p < 0.001$).

In Model 1/B, slopes of prior knowledge at level two (classroom) and level three (school), were made random in order to examine whether schools are differentially effective in relation to the prior knowledge of their students. In this study the reduction of the likelihood statistic between Model 1 and Model 1/B for Greek language is 24.83 points, which is statistically significant (i.e. $\chi^2 = 24.8$, $df = 4$, $p < 0.005$). The effects of all contextual factors are significant. Prior knowledge in Greek language is the strongest effect predicting the Greek language achievement score. Moreover, the socio-economic background (SES) has a strong effect on the Greek language achievement score. Finally, gender affects achievement scores as girls achieve higher scores than boys in Greek Language. This is in line with results of comparative studies (e.g. the PIRLS study), which reveal that girls perform better than boys in language. In Model 2, all the explanatory variables at classroom level were entered. The reduction of the likelihood statistic between Model 1/B and Model 2 for Greek language is 13 points, which is statistically significant ($\chi^2 = 13$, $df = 3$, $p < 0.01$). None of the two variables of the teacher' leadership style had a statistically significant effect on the dependent variable. As for the variables concerning learning culture of classroom, three variables had a statistically significant effect. Academic emphasis and academic efficiency had statistically, significant, positive effects. On the contrary, disruptive behavior had a small but statistically significant negative effect.

In Model 3, the explanatory variables at school level were entered. First, the reduction of the likelihood statistic between Model 2 and Model 3 for Greek language is 19.08 points, which is statistically significant ($\chi^2 = 19.08$, $df = 4$, $p < 0.005$). Second, one variable of leadership style, the principal's, human resource frame, had a statistically

Factors	Model 0	Model 1
<i>Fixed part (intercept)</i>	14.88 (1.38)	12.72 (1.43)
Student level		
Prior knowledge in Greek language		0.83 (0.02)
SES		1.32 (0.36)
Gender		1.91 (0.62)
Variance components		
School (%)	4.0	2.0
Class (%)	7.5	4.3
Student (%)	88.5	26.7
Absolute	375.83	121.53
Explain (%)		77
Significant test		
χ^2	9,543.84	8,234.62
Reduction		1,309.22
Degrees of freedom		3
p -value		0.001

Table I. Parameter estimates (and standard errors) for the first two models for the analysis of Greek Language achievement

significant positive effect, whereas none of the variables concerning the principal's effectiveness had any significant effect. Second, three variables of school organizational culture had statistically significant effects. More specifically, change/innovation, decision-making and responsibility/commitment had positive significant effects.

In Model 4 (the final model), interactions among explanatory variables were entered. First, the reduction of the likelihood statistic between Model 2 and Model 3 for Greek language is 5.30 points, which is statistically significant (i.e. $\chi^2 = 5.3$, $df = 1$, $p < 0.025$). Second, two interactions between the principal's leadership frames and variables of classroom learning culture had relatively small, but statistically significant positive effects. Both the interaction between the principal's symbolic frame and academic emphasis in a classroom and the interaction between the principal's structural frame and master goal orientation in a classroom affect students' achievement.

To sum up, nine explanatory variables had statistically significant effects on student final knowledge in Greek Language (Table II). More specifically, three student variables (prior knowledge, gender and socioeconomic status), two classroom variables (academic emphasis and academic efficacy) and four school variables (principal's human frame, innovation, decision-making and commitment) affect student achievement.

Effectiveness in mathematics. The variance in the empty model is 185.84 (see Table III). Of the total variance, 165.43 (standard error = 7.31), 10.85 (SE = 4.85) and 9.57 (SE = 4.74) is accounted for the individual, class and school level respectively. Therefore, 88.9 percent of the variance is at the student level, 6 percent at the classroom level and 5.1 percent at the school level. Moreover, the variance at each level reaches statistical significance and this implies that MLwiN can be used to identify the explanatory variables, which are associated with student achievement in mathematics. In Model 1, the context variables at student level were added to the empty model. The reduction of the likelihood statistic between the empty model and Model 1 was 904.87 points (from 8588.39 to 7683.52 points). In a chi-square distribution with three degrees of freedom the reduction was statistically significant ($p < 0.001$).

In Model 1/B, slopes of prior knowledge at level two (classroom) and level three (school) were made random in order to examine whether schools are differentially effective in relation to the prior knowledge of their students. The reduction of the

Level	Variable	Model 4
Student level	Prior knowledge in Greek language	0.84 (0.03)
	Gender	0.10 (0.02)
	Socio-economic status	0.05 (0.02)
Classroom level	Academic emphasis	0.12 (0.03)
	Classroom learning culture	Academic efficacy
School level	Principal human leadership style	0.04 (0.01)
	Change and innovation	0.04 (0.02)
	Decision making process	0.03 (0.01)
	Responsibility and commitment	0.03 (0.01)
<i>Significance test</i>		
χ^2		8,171.41
Reduction		5.30
Degrees of freedom		1
<i>p</i> -value		0.025

Table II.
The final multilevel model (model 4) of student achievement in Greek language (students within classes, within schools)

Factors	Model 0	Model 1
<i>Fixed part (Intercept)</i>	18.90 (0.89)	16.45 (0.94)
Student level		
Prior knowledge in Greek language		0.75 (0.02)
SES		1.17 (0.31)
Gender		- 1.14 (0.52)
Variance components		
School (%)	5.1	3.5
Class (%)	6.0	4.9
Student (%)	88.9	37.5
Absolute		84.98
Explain (%)		54.4
Significant test		
χ^2	8,588.39	7,683.52
Reduction		904.87
Degrees of freedom		3
<i>p</i> -value		0.001

Table III.
Parameter estimates (and standard errors) for the first two models for the analysis of Mathematics achievement

likelihood statistic between Model 1 and Model 1/B for Mathematics is 26.37 points ($\chi^2 = 26.4$, $df = 4$, $p < 0.001$) The effects of all contextual factors are significant. Prior knowledge in Mathematics has the strongest effect in predicting the Mathematics achievement score. Moreover, the socio-economic background (SES) has a strong effect on the Mathematics achievement score. Finally, gender affects the achievement score, as boys achieve a higher score than girls in Mathematics. This is in line with findings of effectiveness studies conducted in Cyprus, which reveal that boys perform better on Mathematics than girls (e.g. Kyriakides, 2004, 2005).

In Model 2, all the explanatory variables at classroom level were entered. The reduction of the likelihood statistic between Model 1/B and Model 2 for Mathematics is 13 points (i.e. $\chi^2 = 13$, $df = 2$, $p < 0.01$). None of the two variables of the teacher's leadership style had a statistically significant effect on the dependent variable. As for the variables concerning the learning culture of classroom, academic self-handicapping strategies had a negative effect and academic emphasis and performance approach goal orientation, had positive effects.

In Model 3 (the final model), the explanatory variables at school level were entered. First, the reduction of the likelihood statistic between Model 1/B and Model 2 for Mathematics is 4.92 points ($\chi^2 = 4.9$, $df = 1$, $p < 0.05$). Second, as for the variables concerning the learning culture of classroom, only one variable had a statistically significant effect. Academic self-handicapping strategies had a negative effect. Third, one variable of leadership style, the principal's human resource frame, had a statistically significant positive effect, whereas none of the variables concerning the principal's effectiveness had any statistically significant effect. Fourth, one variable of school organizational culture had statistically significant effects. More specifically, change/innovation had a positive, statistically significant effect. Finally, no interactions among explanatory variables had statistically significant effects on student achievement in Mathematics.

To sum up, six explanatory variables had statistically significant effects on student final knowledge in Mathematics (Table IV). More specifically, three student variables (prior knowledge, gender and socioeconomic status), one classroom variable (self-handicapping strategies) and two school variables (principal's human frame and innovation) affect student achievement.

The relationship between leadership style and culture at different levels (Aim 2)

The statistical package Mplus was used to develop the appropriate multilevel structural equation model in order to examine the relationship between leadership style and culture at the school and the classroom level. The fit statistics of the model were acceptable (i.e. scaled $\chi^2 = 193.2$, $df = 123$, $p < 0.01$, CFI = 0.952). Figure 1 depicts the structural multilevel model, which indicates the relationship between leadership style and culture. No interaction between any variables at the same level (school or classroom) was found. On the contrary, three variables at school level affect three variables at classroom level. There were effects of responsibility/commitment on academic pressure (0.43), principals' structural frame on master goal orientation (0.20) and manager effectiveness on the classroom approach goal orientation (0.19). The parameter estimates and their standard errors, which refer to the three statistically significant relations mentioned above are shown in Figure 3.

Figure 3 reveals that the principals' structural frame, the principals' effectiveness as managers and the teachers' commitment are the three variables at the school level that affect the three variables at classroom level, which are the personal achievement goal orientations, the classroom performance-goal structure and the academic emphasis. Commitment to the school, which is one variable of organizational culture, has a positive effect on academic emphasis in the classroom. This effect means that if teachers feel committed to their school, then more academic emphasis in their classrooms can be identified. It is important to note that these two variables (commitment and academic emphasis) are also associated with student achievement in both mathematics and Greek language.

The principal's structural frame affects classroom mastery goal orientation. The structural frame emphasizes goals, planning, and coordination at school level (Bolman and Deal, 1997). Mastery goal orientation emphasizes classroom purpose to develop its

Level	Variable	Model 3
Student level	Prior knowledge in Greek language	0.74 (0.04)
	Gender	-0.08 (0.04)
	Socio-economic status	0.09 (0.02)
Classroom level	Academic self-handicapping strategies	-0.10 (0.04)
	Classroom learning Culture	
School level	Principal human leadership style	0.04 (0.01)
	Change and innovation	0.08 (0.02)
Significance test		
χ^2		7,645.09
Reduction		4.92
Degrees of freedom		1
p-value		0.05

Table IV.
The final multilevel model (Model 3) of student achievement in mathematics (students within classes, within schools)

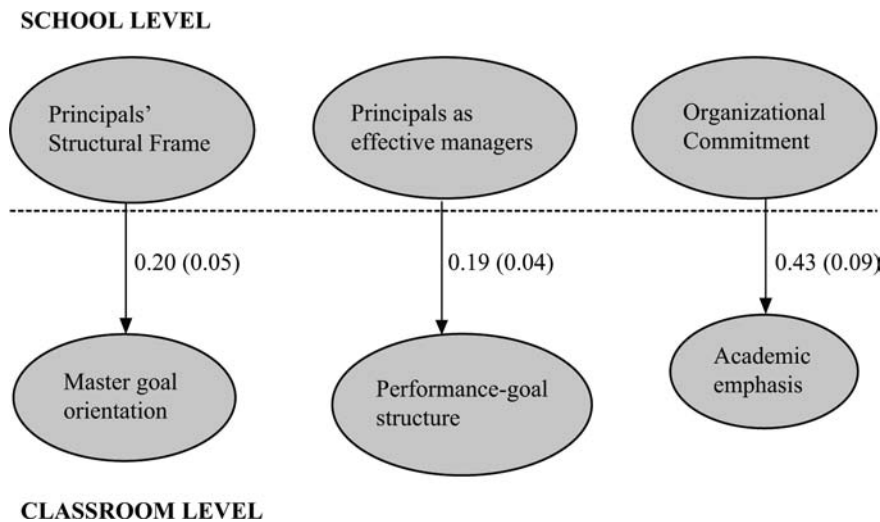


Figure 3. Parameter estimates and standard estimates for the structural multilevel model

competence (Midgley *et al.*, 2001). It could be observed that both of these two variables are related to goal achievement either at school level or at classroom level. In consequence, it could be argued that the principals, who use their structural frame, also tend to affect classroom orientation to achieve competence.

Finally, the principal's perceived effectiveness as a manager affects classroom performance-goal structure. Classroom-performance and goal structure approach refers to classroom perceptions that the purpose of engaging in academic work in the classroom is to demonstrate competence (Midgley *et al.*, 2001). In consequence, it could be argued, that the principals who are effective managers, also tend to affect classrooms in such ways that they want to demonstrate their competence.

Summary of the main findings of the study – the development of the final model of relationships among leadership, culture and student achievement

The two processes of the multilevel analysis indicate that:

- (1) Nine explanatory variables had statistically significant effects on student final knowledge in Greek Language. More specifically, three student variables (prior knowledge, gender and socioeconomic status), two classroom variables (academic emphasis and academic efficacy) and four school variables (principal's human frame, innovation, decision making and commitment) seem to affect student achievement.
- (2) Six explanatory variables had statistically significant effects on student final knowledge in Mathematics. More specifically, three student variables (prior knowledge, gender and socioeconomic status), one classroom variable (self-handicapping strategies) and two school variables (principal's human frame and innovation) seem to affect student achievement.

In addition, the final model, which was developed through structural equation modeling, indicated that three variables at the school level (principal's structural frame,

principal's effectiveness as a manager and organizational responsibility and commitment) affect three variables of culture at the classroom level (master goal orientation, performance goal structure and academic emphasis).

Based on the above results, Figure 4 presents the relationships between leadership, culture and student achievement in primary schools in Cyprus. Principal's leadership style, school culture and classroom culture seem to have direct effects on student achievement. Despite the fact that the principal's leadership affects classroom culture, no indirect effects exist between the principals' leadership style and student achievement. Indeed, principal's leadership (principal's structure frame and principal's effectiveness as a manager) affects two variables of classroom culture (master goal orientation and performance goal structure). However, the variables of classroom culture, which affect student achievement, are different. These variables are academic emphasis, academic efficacy and self-handicapping strategies. Finally, there is no teacher's leadership style that affects student achievement.

Discussion and interpretations

Some main observations that can be made based on the findings from this piece of research are presented next. It is important to clarify at the outset that the survey findings arise from both teachers' and students' responses to questionnaires (measuring principals' and teachers' leadership styles and school and classroom culture) and student achievement in Greek language and Mathematics tests.

First, the findings of the present study demonstrate that the principal's human leadership frame affects student achievement both with regards to the Greek Language (0,04, SE = 0,01) as well as Mathematics (0,04, SE = 0,01). This result is in agreement with those studies, which found small but statistically significant effect of the principal's leadership on student achievement (Hallinger and Heck, 1996, 1998; Van de Grift and Houtven, 1999). As Witzers *et al.* (2003) identified in their paper, small direct effects of the principal's leadership were found in primary schools but no effects in secondary schools. Moreover, characteristics of the human leadership style, which are

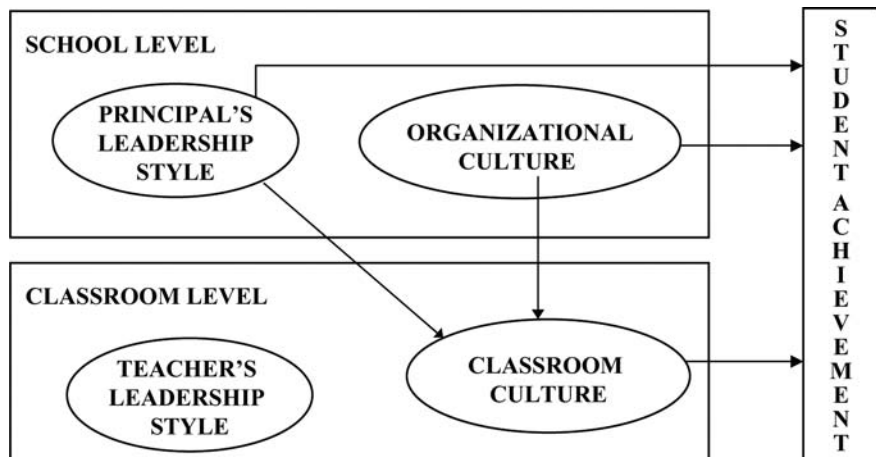


Figure 4.
The final model of the relationships among leadership, culture and student achievement

mostly and wrongly characterized as “female characteristics” in Cyprus (Pashiardis, 1998, 2004), may affect students’ achievement.

In addition, this finding validates the model of direct effects of principal’s leadership on student achievement (Pitner, 1988). This finding is in accordance with the theories, which support that school leadership is characterized by one to one relationships between the leader and the follower (Hollander, 1978; Barnett *et al.*, 1999, 2000). Despite the fact that the structural equation model showed two statistically significant effects of principal’s leadership style on classroom learning culture (an impact of the principal’s structural frame on classroom master goal orientation and an impact of the principal as a manager on classroom performance goal-structure), the multilevel analysis did not indicate any influence of these two variables of culture on student achievement. In consequence, it could be concluded that there are no indirect effects of the principal’s leadership styles on student achievement through culture.

Second, the multilevel analysis indicated the lack of any influences of teachers’ leadership style on student achievement. This evidence offers an area of discussion about this issue. On the one hand, many studies identified a significant effect of teachers at the classroom level of school effectiveness models both abroad (e.g. Creemers, 1994; Luyten, 1994; Scheerens and Bosker, 1997; Teddlie and Reynolds, 2000) and in Cyprus (e.g. Campbell *et al.*, 2004; Kyriakides, 2005). In addition, it is necessary to examine the effects of teacher leadership on student achievement due to the attention paid to teacher leadership in recent studies (Cheng, 1994b; Ogawa and Bossert, 1995; Pounder *et al.*, 1995; Deal and Peterson, 1999, Harris and Muijs, 2003, Pashiardis, 2004). On the other hand, there is a lack of studies investigating the impact of the teachers’ leadership style on student achievement. This situation leads to the conclusion that the influence of other teachers’ leadership behaviors and activities (such as management of time in the classroom or the approach of solving discipline problems or conflict) of student achievement should be examined.

Third, the identification of effects of both school and classroom cultures on students’ achievement, indicated an agreement with studies in other countries (i.e. Little, 1982; Nias *et al.*, 1989). The role of innovation, decision-making and commitment as three variables of school culture is very important in school effectiveness. Especially innovation and change is a factor at the school level, which, arguably, has the greatest impact on student achievement in both Greek language and Mathematics. In addition, the findings related to the effect of classroom culture offers some new perspectives. For example, the finding about the influence of academic emphasis on students’ achievement is in agreement with the findings of a secondary analysis of the PISA study which shows that “achievement press” is the only variable which is able to explain variation in effectiveness at the country level (Kyriakides and Demetriou, 2006).

Fourth, clarification is essential due to the fact that the principal’s leadership, influences culture at the classroom level but not at the school level. The principal’s structural frame affects classroom mastery goal orientation (refers to students’ reasons or purposes for engaging in academic behavior). In addition, the principal’s effectiveness as a manager influences the classroom perception that the purpose for engaging in academic work is to demonstrate competence (classroom performance-approach goal structure). These results demonstrate the direct effect of a principal’s leadership at the classroom level. In essence, it could be inferred that it may be easier for principals to change a teacher’s personal orientations (perceptions,

behaviours, values) than the teachers' culture at the school level taken as a group. This argument is in accordance with the theories, which support that school leadership is characterized by one to one relationships between the leader and the follower (Hollander, 1978; Barnett *et al.*, 1999, 2000). This situation also seems to be related to the educational system in Cyprus. As both principals and teachers rotate schools very often (every two or three or four years at the most), it is difficult for a principal to change the school culture, as the transformation of culture is a time consuming process.

Conclusions and recommendations

In conclusion, it can be inferred that the principal's leadership style is a factor that plays a role in student achievement as indicated by the study's small but significant effects of primary school principals' human leadership style on student academic achievement. First, this finding stresses the role of a principal's leadership style as a factor that contributes to student achievement. Second, the direct effect of this factor on student achievement increases the debate between the various studies as one category of studies found direct effects whereas other studies found indirect effects. However, this study adopted an approach which permitted the validation of the conceptual frameworks and the justification of the conditions and methodological principles adhered to in this study. Indeed, some main studies and reviews recommend a number of important conditions such as the ones mentioned in a previous section of this paper which could be adopted in future studies in order to have enhanced validity in the findings. For example, the use of statistical techniques such as multilevel analysis and structural equation modeling supports the examination of both the model of direct effects and the model of indirect effects.

Third, more attention should be paid to principals' human leadership style. As the human leadership style affects student achievement, more attention should be given to the "one to one" human relation between principals and students. Studying the conditions that strengthen this relation could help both theorists and practitioners.

At this point we would like to recommend that a further study is needed to verify the findings of this study. More research is needed in the future in order to uncover more information about some aspects of this study. First, longitudinal studies need to take place. As mentioned previously, because of the frequent rotation of both principals and teachers among schools in Cyprus, changes in the composition of both the leaders' team and personnel lead to an unstable situation. For this reason, the examination of principals' succession patterns and its impact on student achievement requires a more longitudinal research approach.

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Further reading

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Appendix 1. Dependent variables

Students' achievement scores in the two tests in Greek Language and Mathematics at the end of the school year were considered as depended variables. The construction of the tests was subject to control for reliability and validity. Structural equation modeling procedures were used to examine the construct validity of each test and the fit statistics for both the Greek Language Test ($\chi^2 = 93.1$, $df = 32$, $p < 0.001$, $RMSEA = 0.034$, $CFI = 0.962$) and Mathematics Test ($\chi^2 = 491.7$, $df = 165$, $p < 0.001$, $RMSEA = 0.027$, $CFI = 0.972$) were acceptable (see Kyriakides, 2005). The reliability of the data of the two tests was measured by calculating the relevant values of Cronbach's alpha for the scales. These values were higher than 0.82 and this implies that we can be confident about the reliability of the measures used to collect data on students' knowledge in Greek language and Mathematics (Cronbach, 1990).

Appendix 2. Explanatory variables

All the explanatory variables were categorized at three levels. First, prior knowledge and background factors (socio-economic status and gender) were the three variables at student level. Second, variables of the teacher's leadership style and classroom learning culture were included at classroom level. Third, variables of the principal's leadership style, the principal's perceived effectiveness and school organizational culture were included at school level. Information about each explanatory variable is given below.

Explanatory variables at pupil level

Prior knowledge in Greek language and mathematics. Student achievement on the two tests in Greek language and Mathematics at the beginning of the last year of primary school was considered as measures of prior knowledge.

Student's background factors. In addition to students' achievement, information was collected on two further pupils' background factors: pupils' gender (0 = boys, 1 = girls) and pupils' socio-economic status (SES). Four variables were available: father's and mother's educational level (i.e. graduate of primary school, graduate of secondary school or graduate of a college/university), the social status of father's job and the social status of mother's job.

Explanatory variables at classroom level

Teachers' leadership style. Teachers' leadership style was measured in accordance with the first section of the Greek version of "Leadership orientations" (Kythreotis, 2006). The questionnaire was administered to all students asking them to indicate their teachers' leadership style (structural, human, political and symbolic). The first of the two sections of the instrument included a five-point rating scales (1 = Never, and 5 = Always) to measure the four teachers' leadership styles (e.g. "My teacher helps us to solve our problems). As the results of confirmatory factor analysis were not satisfactory, Rasch testing was used to analyze the findings for each of the four subscales. Both the degree of reliability for the only two of the human subscale and the symbolic subscale (0.89 – 0.96) and for the cases (pupils) (0.68 – 0.71) were high. On the contrary, the degree of reliability of the structural subscale and the political subscale were low. As a result, both the structural and the political scales were excluded from the questionnaire. Furthermore, the second section of the instrument which includes six forced – choice items was excluded from the Greek final version as the results of Kendall's *W* test were not satisfactory (a range between 0.080 and 0.467). In consequence, the final version of the questionnaire included only 19 items using Likert-type questions: The teachers' human resource frame subscale, which consisted of seven items, emphasizes the teacher's sensitivity to pupils' human needs. The teacher's symbolic frame subscale, which consisted of nine items, focuses on the rituals, the myths and ceremonies that provide meaning to classroom culture.

Classroom learning culture. Classroom learning culture was measured in accordance with the Greek version of patterns of adaptive learning scales (Kythreotis, 2006). The instrument included nine factors according to the results of the confirmatory factor analysis which was used to examine the construct validity of the questionnaire. The questionnaire, which consisted of 29 items, was administered to all students asking them to describe their classroom culture (e.g. "The school encourages ideas for improvement"). The scales had a range from 1 to 5 (1 = Never, and 5 = Always). Nine interpretable factors (alpha coefficient ranging from 0.68 to 0.81) were identified in accordance with the English version of the questionnaire and the relative theoretical model. Academic emphasis refers to students' perceptions that their teacher presses them for understanding (three items, $\alpha = 0.70$). Academic efficacy refers to students' perceptions of their competence to do their classroom work (two items, $\alpha = 0.78$). Disruptive behavior refers to students' engagement in behaviors that disrupt or disturb the classroom (four items, $\alpha = 0.77$). Master goal orientation refers to students' reasons or purposes for engaging in academic behavior (four items, $\alpha = 0.76$). Different goals foster different response patterns. Performance approach goal orientation takes place when students' purpose or goal in an achievement setting is to demonstrate their competence (three items, $\alpha = 0.74$). Classroom performance-approach goal structure refers to students' perceptions that the purpose of engaging in academic work in the classroom is to demonstrate competence (three items, $\alpha = 0.81$). Skepticism about the relevance of school for future success refers to students' beliefs that doing well in school will not help them achieve success in the future (four items, $\alpha = 0.70$). Academic self-handicapping strategies refer to strategies that are used by students so that if subsequent performance is low, those circumstances, rather than lack of ability, will be seen as the cause (three items, $\alpha = 0.68$). Cheating behavior refers to students' use of cheating in class (three items, $\alpha = 0.73$).

Explanatory variables at school level

Principal's leadership style. Principals' leadership style was measured in accordance with the Greek Version of "Leadership Orientations" (Kythreotis, 2006) consisting of three sections. The items in the first two sections asked teachers to describe their own principal's leadership style (structural, human resource, political and symbolic). The first section included 19 items using Likert - type questions. The scales had a range from 1 to 5 (1 = Never, and 5 = Always). The principal's structural frame emphasizes goals, planning, and coordination (four items). The principal's human resource frame is sensitive to the human needs of others (five items). The principal's political frame recognizes the ways that people seek to advance their own interests (five items). The principal's symbolic frame focuses on the rituals, myths and ceremonies that give meaning to organizational culture (five items). As the results of confirmatory factor analysis were not satisfactory, Rasch testing was used to analyze the results of each of the four subscales (structural, human, political, and symbolic). Both the degree of reliability for each of the four subscales (0.66 – 0.88) and for the cases (teachers) (0.74 – 0.79) were high. The second section of the instrument includes six forced – choice items. Each item gives four options, and teachers must rank them from 1 ("least like your principal") to 4 ("most like your principal"). Kendall's *W* used to analyze the responses to this part of the questionnaire. It had a range between 0.111 and 0.936. Finally, the third section included two items that asked teachers to rate their principal's effectiveness as a manager and as a leader in comparison with other principals having a similar level of experience and responsibility (1 = Never, and 5 = Always).

School organizational culture. School organizational culture was measured by the Greek Version of the Organizational Culture Questionnaire (Kythreotis, 2006). The instrument included nine factors according to the results of the confirmatory factor analysis which was used to examine the construct validity of the questionnaire. The questionnaire, which consisted of 40 items, was administered to all teachers asking them to describe their school culture (e.g. "The school encourages ideas for improvement"). The scales used had a range from 1 to 5 (1 = Very little extent, and 5 = Very great extent). Nine interpretable factors (alpha coefficient ranging from 0.82 to 0.94) were identified in accordance with the English version of the questionnaire and the relative theoretical model. Gudge (1997) gives the following operational definitions of the nine factors: Teamwork and cooperation measures the degree to which various groups of people work together to accomplish organizational goals (four items, $\alpha = 0.91$). Trust and confidence measure the extent to which people have a sense of trust in each other as organizational members (five items, $\alpha = 0.93$). Risk measures the degree to which individuals feel they can take risks to further organizational goals (three items, $\alpha = 0.85$). Communication measures the extent to which the organization informs individuals about information pertinent to their jobs and organizational goals (nine items, $\alpha = 0.94$). Decision-making measures how organizational problems or issues are involved (four items, $\alpha = 0.91$). Change and innovation measure the extent to which the organization's values change and involve various people in the change process (five items, $\alpha = 0.82$). Responsibility and commitment measure the extent to which individuals feel responsible for organizational outcomes as seen by unprompted individual action in response to perceived need for such action (four items, $\alpha = 0.91$). Vision and goals measure the extent to which individuals share a clear, widely understood picture of the organization's future (four items, $\alpha = 0.92$). General organizational practices measure how effectively the organization facilitates personal growth and personal opportunities for individuals (four items, $\alpha = 0.82$).

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