**UNIVERSITY OF CYPRUS**

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# MOTIVATIONAL CHANGE IN MATHEMATICS ACROSS THE TRANSITION FROM PRIMARY TO SECONDARY SCHOOL

DOCTORAL DISSERTATION

CHRYSO CHR. ATHANASIOU

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# MOTIVATIONAL CHANGE IN MATHEMATICS ACROSS THE TRANSITION FROM PRIMARY TO SECONDARY SCHOOL

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# ABSTRACT

The purpose of this study was to examine students' motivational change in mathematics across transitions and especially across the transition from primary to secondary school, focusing primarily on how modifiable facets of the classroom culture and of students' social backgrounds influence the nature and the quality of students' motivation and investment in mathematics. Motivational, classroom culture and social background change across transitions was investigated through multidimensional models which were proposed and validated in this study.

The study was longitudinal in design with the same students participating over a period covering two consecutive school years. Three cohorts of students participated in the study. The two hundred and twenty students in CT experienced the transition from primary to secondary school, whereas the forty two students in CE and the sixty nine students in CS experienced the transition from one grade level to the next within the same school, primary and secondary school respectively. Questionnaire data were gathered at four time-points, including one measurement prior and three measurements after the transition. Eight students experiencing the transition from primary to secondary school were selected for semi-structured interviews in order to complement the information gained from the analyses of the group data.

This study provided the first multifaceted model for examining motivation across the transition from primary to secondary school. Although other studies examined motivational change across this transition (e. g., MacCallum, 1997; Urdan & Midgley, 2003), they have not addressed the range of motives included in this study. The validity of the motivational model proposed was demonstrated across the transition, indicating that the cognitive, social and affective dimensions represent three distinct aspects of students' motivation in mathematics with each dimension having a differential prediction on the overall motivational construct. The validity of all the proposed models (the classroom culture and environment and the social background models) was also illustrated by the analyses of this research.

The results of the study showed the negative shifts in students' motivation in mathematics across the transition from primary to secondary school. Students after the transition to secondary school become more performance-oriented and less mastery and socially-oriented than in primary school, whereas their self-efficacy in mathematics


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declines. This deterioration in motivation is long term, since students motivation in this study is not appearing to recover after an initial adjustment period in secondary school.

In addition, the study highlighted the fact that primary and secondary schools are very different organizations with respect to instructional practices, goal emphases and social relations as suggested by other researchers (e.g., Rice 1997; Urdan & Midgley, 2003). Students in primary school perceive their classroom goal structure to be more mastery-focused and less performance-focused and their mathematics teachers as more friendly, caring and helpful and encouraging more cooperation, investigation and participation than in secondary school. Students' relationships with parents and peers undergo a stressful period across the transition to secondary school as well. Students report decreases in their parent and peer help and support across the transition to secondary school.

Furthermore, the necessity to situate studies regarding motivational change across transitions in specific classroom and broader social contexts was demonstrated in this study, by indicating that the changes in students' perceptions of their classroom culture and of their social backgrounds contribute to making the transition to secondary school a stressful period in students' lives and are significant predictors of the change in their motivation in mathematics. More specifically, this study demonstrated that the discontinuities in classroom and social contexts are sources of problems for students' motivation in mathematics as they pass through the transition from primary to secondary school. Students who experience a decline in their teacher, peer and parent help and view their classroom as more performance-oriented and less mastery oriented show the most negative changes in their motivation in mathematics as well. On the contrary, students who experience the transition positively and report an increase in their teacher, peer and parent help and in the mastery orientation of their classroom also report an increase in the most adaptive patterns of their motivation (mastery and social orientation and self-efficacy).

Finally, the study showed that the majority of the students experience a negative shift in their perceptions of their classroom culture and social background across the transition to secondary school. This indicates that the majority of the students in Cyprus view the transition to secondary school as a negative event in their lives that leads to deterioration of their motivation in mathematics. According to the latent class analyses conducted in the study, only 3-4% of the students perceive the transition as contributing to positive changes in their classroom culture and in their social backgrounds and subsequently in their motivation in mathematics.

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# ΠΕΡΙΛΗΨΗ

Σκοπός της παρούσας εργασίας ήταν η εξέταση της αλλαγής που συντελείται στα κίνητρα των μαθητών στα μαθηματικά κατά την περίοδο μεταβάσεων, κυρίως κατά τη μετάβαση από το δημοτικό στο γυμνάσιο. Η αλλαγή στα κίνητρα στα μαθηματικά εξετάστηκε σε σχέση με την αλλαγή στο σχολικό πλαίσιο και στο ευρύτερο κοινωνικό περιβάλλον των μαθητών κατά την περίοδο των μεταβάσεων. Τα κίνητρα στα μαθηματικά, το σχολικό και κοινωνικό περιβάλλον των μαθητών εξετάστηκαν μέσα από πολυδιάστατα μοντέλα των οποίων η εγκυρότητα επιβεβαιώθηκε στην παρούσα έρευνα.

Η έρευνα ακολούθησε ένα μακροχρόνιο σχεδιασμό με τους ίδιους μαθητές να συμμετέχουν για δύο συνεχόμενα σχολικά έτη. Πιο συγκεκριμένα, τρεις ομάδες μαθητών συμμετείχαν στην έρευνα. Οι διακόσιοι είκοσι μαθητές στην ομάδα CT μελετήθηκαν κατά τη μετάβαση από το δημοτικό στο γυμνάσιο (από την έκτη τάξη στην πρώτη γυμνασίου). Οι σαράντα δύο μαθητές στην ομάδα CE μελετήθηκαν κατά τη μετάβαση από την προτελευταία στην τελευταία τάξη του δημοτικού σχολείου (από την πέμπτη στην έκτη τάξη του δημοτικού), ενώ οι εξήντα εννιά μαθητές στην ομάδα CS μελετήθηκαν κατά τη μετάβαση από την πρώτη στη δευτέρα τάξη γυμνασίου. Οι μαθητές όλων των ομάδων συμπλήρωσαν το ερωτηματολόγιο της έρευνας σε τέσσερα χρονικά σημεία, ένα πριν και τρία μετά τη μετάβαση (ένα κάθε τρίμηνο). Οκτώ μαθητές που βίωσαν τη μετάβαση από το δημοτικό στο γυμνάσιο συμμετείχαν σε ημιδομημένες κλινικές συνεντεύξεις με σκοπό την περαιτέρω μελέτη της αλλαγής των κινήτρων τους στα μαθηματικά καθώς και για μελέτη των αλλαγών στις αντιλήψεις τους σχετικά με το σχολικό και το κοινωνικό τους περιβάλλον κατά τη μετάβαση.

Η έρευνα αυτή επιβεβαίωσε την πολυδιάσταση φύση των κινήτρων των μαθητών στα μαθηματικά κατά τη μετάβαση από το δημοτικό στο γυμνάσιο. Παρόλο που αρκετές έρευνες μελέτησαν την αλλαγή που συντελείται στα κίνητρα των μαθητών κατά τη μετάβαση αυτή (π.χ., MacCallum, 1997; Urdan & Midgley, 2003), οι έρευνες αυτές δεν μελέτησαν την πολυδιάσταση φύση των κινήτρων. Η εγκυρότητα του προτεινόμενου πολυδιάστατου μοντέλου για τη μελέτη των κινήτρων επιβεβαιώθηκε από την επιβεβαιωτική παραγοντική ανάλυση της παρούσας έρευνας. Πιο συγκεκριμένα, τα αποτελέσματα της ανάλυσης έδειξαν ότι τα κίνητρα των μαθητών στα μαθηματικά αναλύονται σε τρεις διαστάσεις (γνωστική, κοινωνική και συναισθηματική) και ότι οι διαστάσεις αυτές αποτελούν τρεις διαφορετικές διαστάσεις της έννοιας των κινήτρων των μαθητών στα μαθηματικά οι οποίες συνεισφέρουν με διαφορετικό τρόπο στην κατασκευή



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της έννοιας των κινήτρων.

Τα αποτελέσματα της εργασίας έδειξαν τις αρνητικές αλλαγές που συντελούνται στα κίνητρα των μαθητών στα μαθηματικά κατά τη μετάβαση από το δημοτικό στο γυμνάσιο. Οι μαθητές μετά τη μετάβαση υιοθετούν περισσότερο στόχους επίδοσης και λιγότερο στόχους μάθησης ή κοινωνικούς στόχους συγκριτικά με πριν τη μετάβαση στο γυμνάσιο. Επίσης, οι πεποιθήσεις επάρκειας των μαθητών στα μαθηματικά μειώνονται μετά τη μετάβαση στο γυμνάσιο. Οι αλλαγές αυτές που συντελούνται στα κίνητρα στα μαθηματικά είναι μακροχρόνιες αφού όπως φάνηκε από τα αποτελέσματα της παρούσας έρευνας τα κίνητρα των μαθητών μετά τη μετάβαση δεν επανέρχονται στο επίπεδο που βρίσκονταν πριν από τη μετάβαση στο γυμνάσιο.

Επίσης, η έρευνα αυτή έδειξε ότι το δημοτικό και το γυμνάσιο είναι δύο πολύ διαφορετικά σχολικά πλαίσια αναφορικά με τις πρακτικές των εκπαιδευτικών, τους στόχους που τονίζονται στην τάξη και τις κοινωνικές σχέσεις όπως έδειξαν και προηγούμενες έρευνες (π.χ., Rice 1997; Urdan & Midgley, 2003). Στο δημοτικό σχολείο οι μαθητές αντιλαμβάνονται το μαθησιακό περιβάλλον ως περισσότερο προσανατολισμένο στη μάθηση παρά στην επίδοση και αναφέρουν ότι οι εκπαιδευτικοί που τους διδάσκουν μαθηματικά είναι περισσότερο φιλικοί, βοηθητικοί και ενθαρρύνουν περισσότερο τη συνεργασία, τη συμμετοχή και τη διερεύνηση σε σχέση με τους εκπαιδευτικούς στο γυμνάσιο. Οι σχέσεις των μαθητών με τους γονείς και τους φίλους τους επίσης περνούν μια δύσκολη φάση κατά τη μετάβαση από το δημοτικό στο γυμνάσιο. Οι μαθητές αναφέρουν μείωση στη βοήθεια των γονιών και των φίλων τους στα μαθηματικά μετά τη μετάβαση στο γυμνάσιο.

Η παρούσα έρευνα τόνισε την ανάγκη για τη μελέτη του σχολικού και ευρύτερου κοινωνικού πλαισίου μαζί με τη μελέτη της αλλαγής που συντελείται στα κίνητρα των μαθητών στα μαθηματικά κατά τη μετάβαση στο γυμνάσιο, αφού τα αποτελέσματα της εργασίας έδειξαν ότι οι αλλαγές στη σχολική κουλτούρα και στο ευρύτερο κοινωνικό περιβάλλον των μαθητών συνεισφέρουν στην πτώση των κινήτρων στα μαθηματικά κατά τη μετάβαση αυτή. Πιο συγκεκριμένα, οι μαθητές που αναφέρουν μείωση στη βοήθεια από τους δασκάλους, τους φίλους και τους γονείς και οι οποίοι αντιλαμβάνονται το σχολικό περιβάλλον ότι είναι περισσότερο προσανατολισμένο στην επίδοση παρά στη μάθηση μετά τη μετάβαση στο γυμνάσιο παρουσιάζουν μεγάλη πτώση στα κίνητρα τους στα μαθηματικά. Αντίθετα, οι μαθητές που αναφέρουν αύξηση στη βοήθεια από τους δασκάλους, τους φίλους και τους γονείς και οι οποίοι αντιλαμβάνονται το σχολικό περιβάλλον ότι είναι περισσότερο προσανατολισμένο στη μάθηση παρά στην επίδοση



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μετά τη μετάβαση παρουσιάζουν αύξηση στα κίνητρά τους στα μαθηματικά.

Τέλος, η εργασία έδειξε ότι η πλειοψηφία των μαθητών βιώνουν αρνητικές αλλαγές στο σχολικό και κοινωνικό τους περιβάλλον κατά τη μετάβαση στο γυμνάσιο. Οι περισσότεροι μαθητές αντιμετωπίζουν τη μετάβαση στο γυμνάσιο σαν ένα αρνητικό γεγονός στη σχολική τους ζωή το οποίο οδηγεί στην πτώση των κινήτρων τους στα μαθηματικά κατά την περίοδο αυτή.

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To all my family,

for holding my hand

through this difficult ride

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# CHAPTER I

# THE PROBLEM

## Introduction

The term motivation comes from the Latin root of motive motivus, "to move" (MacCallum, 1997) and early researchers were concerned with what moved a resting organism to a state of activity (Weiner, 2004). Motivation has been defined in various ways and after many years of empirical research there is still little agreement about what motivation is and what dimensions it includes. It has been defined in terms of needs, causal attributions, affective responses, expectancies for success and self-perceptions (Schunk, 1996).

The whole notion of motivational change has also been defined and measured in different ways. Traditionally it has been studied with age as the independent variable and almost independently of context, with theorists suggesting that the changes in students' motivation occur because of physiological and psychological pubertal changes also occurring at a specific time point (e.g., Blyth, Simmons & Carlton-Ford, 1983; Rosenberg, 1986). Other investigators have suggested that gender-role appropriate activities may become more important to students as they try to conform more to gender-role stereotypes for behavior (e.g., Eccles, 1987). This phenomenon was labeled as gender-role intensification (Hill & Lynch, 1983) and researchers posited that it may lead students to have less positive beliefs about and be less involved in activities that they see as less appropriate for their own gender (Wigfield, Eccles, Mac Iver, Reuman & Midgley, 1991).

In the last decades, however, there was a notable shift in the research literature with studies incorporating both individual and context factors in examining motivational change (e.g., Barber & Olsen, 2004; Schneider, Tomada, Normand, Tonci & De Domini, 2008; Urdan & Midgley, 2003). This shift indicates that the developing trend in motivation research is to consider the sociocultural dimensions of motivation and to situate motivational studies in particular social contexts (Hart & Allexsaht-Snider, 1996).

The transition to a new school is one of the defining parameters of development in students' lives. Transitions to new schools (such as from primary to secondary school, from secondary to high school and from high school to university or college) are

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considered part of the normative events that children endure in their progression to adulthood, during which the academic, personal and interpersonal functioning of students changes (Barber & Olsen, 2004).

More specifically, the transition from primary to secondary school has been identified as an important life event for early adolescents and an ideal period during which to study change in motivation (Zanobini & Usai, 2002). Empirical studies examined motivational change during the transition to secondary school for various subject domains such as language (e.g., MacCallum, 1997), mathematics (e.g., Urdan & Midgley, 2003), science (e.g., Speering & Rennie, 1996) and sports (e.g., Wigfield et al., 1991). The changing nature of the educational environments experienced by many early adolescents across the transition to secondary school was hypothesized to be responsible for the changes in motivation observed at this period (Chung, Elias & Schneider, 1998). The transition from primary to secondary school introduces students to what Rice (1997) termed "institutional discontinuities", organizational and social. Organizational discontinuities include changes in school size, departmentalization, academic standards, teacher expectations and student autonomy. Social discontinuities include changes in the diversity of student population, relations with teachers and sense of belonging (Anderson, Jacobs, Schramm & Splittgerber, 2000).

Describing the effects of the contextual factors on motivational change, Eccles and her colleagues proposed the person-environment fit theory (Eccles, Wigfield, Harold & Blumenfeld, 1993a; Eccles, Wigfield, Midgley, Reuman, Mac Iver & Feldlaufer, 1993b). According to this theory, students' motivation is influenced by the fit between the characteristics individuals bring to their social environments and the characteristics of these social environments. Individuals are not likely to do well, or be motivated if they are located in social environments that are not meeting their needs. If the social environments in secondary school do not fit with the psychological needs of adolescents, then person-environment fit theory predicts declines in motivation, interest and performance (Tonkin & Watt, 2003).

## Terms

Motivation is seen by researchers as the inclination to do certain things and avoid doing some others (Hannula, 2006). Stated differently, the notion of motivation denotes the



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reasons individuals have for behaving in a given manner in a given situation (Middleton & Spanias, 2006). Motivation in this study is considered as a multifaceted construct including students' personal goal orientations and their self-efficacy beliefs. Personal goal orientations refer to the specific goals that individuals strive to attain in achievement contexts such as schools (Urdan & Schoenfelder, 2006). In this study four types of goal orientations were examined in particular. Mastery goals involve seeking to acquire new knowledge or master something new. These goals focus on the task at hand and relate especially to developing competency and gaining understanding and insight. Performance goals involve either obtaining favorable judgments of competence (performance-approach goals) or avoiding unfavorable judgments of competence (performance-avoidance goals). These goals focus on the self and relate especially to how ability is judged and how one performs especially in relation to others. Social goals involve seeking cooperation with classmates and expressing a concern for other students and a willingness to help them. Self-efficacy beliefs refer to a person's judgments of confidence to perform academic tasks or succeed in academic activities (Bandura, 1997). These judgments individuals make about their ability to perform a specific task are derived in comparison to a specific standard (Urdan & Schoenfelder, 2006).

Motivational change refers to the quantitative and the qualitative shifts in a person's motivation. The qualitative aspect of change involves the change in the form of a motivational construct, whereas the quantitative aspect refers to the change in the amount of motivation (MacCallum, 1997).

A transition is a point at which students move from one segment of education to another (Rice, 1997). Strictly, two words have been used to label the movements through the educational system. Transfer denotes the move from one phase of education to another involving a change of schools (e.g., from primary to secondary school), whereas transition refers to year by year moves within a school when moving up a grade (Galton, Morison & Pell, 2000). The majority of the researchers and authors are using the terms transfer and transition interchangeably. Therefore, the use of the word transition in describing both types of movements in the educational system prevailed in the research literature. The distinction is made by investigating transitions *across* different school contexts and transitions *within* the same school.

Primary school in this study is the educational system that spans grades from 1 to 6 when students are 6 to 12 years old. Secondary school is the educational system that follows primary school and spans grades from 7 to 9 with students from 13 to 15 years of

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age. The transition from primary to secondary school that was investigated in this study involves changing school institutions and moving to a new school building.

The emphasis on achievement goals in the learning environment of the classroom is called the classroom's goal structure (Urdan & Midgley, 2003). These messages in the learning environment make certain goals salient. In a classroom with a mastery goal structure the emphasis is on task mastery, improvement and intellectual development. On the contrary, in a classroom with a performance goal structure the emphasis is on competition and demonstration of ability relative to others (performance-approach goal structure) or on avoidance to demonstrate incompetence (performance-avoid goal structure).

## The Problem and the Aim of the Study

The transition from primary to secondary school is an important life event for early adolescents. Despite the fact that theorists and researchers consider this transition as stressful and challenging, the empirical findings do not all agree with this notion. The more recent studies have shown negative effects on children's immediate and later psychological and behavioral adjustment across the transition to secondary school (e.g., Anderson et al., 2000; Barber & Olsen, 2004; Zanobini & Usai, 2002). On the other hand, studies conducted in the last two decades indicated that the transition does not have consistently negative effects and may have positive effects on adolescents' motivation and school adjustment. These studies revealed no change (e.g. Harter, Whitesell & Kowalski, 1992) or even a decrease in the emotional and behavioral problems of adolescents (with students viewing the transition as more desirable than stressful e.g., Berndt & Mekos, 1995), and an increase in their competence beliefs and self-esteem (e.g., Proctor & Choi, 1994; Wallis & Barrett, 1998).

Researchers seem to be reaching an agreement about the impact of contextual factors on students' motivational change stories across the transition from primary to secondary school (Urdan & Midgley, 2003). It has been suggested that the two school settings are very different organizations with respect to "ethos" and that this discrepancy influences students' motivation and performance (Midgley, Anderman & Hicks, 1995). Children move from a relatively small, more personalized and task-focused primary school

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environment to a larger, more departmentalized, impersonal and achievement-oriented secondary school (Chung et al., 1998). In the new school environment, children face differences in grading and teaching practices and in teachers' expectations (Eccles et al., 1993b). Their social relationships, particularly peer relations or teacher-student relations are also affected by these transitions (Ferguson & Fraser, 1998). This discontinuity in both school structure and social relationships requires significant adaptive efforts from early adolescents and for some students these transitions can be really stressful and challenging.

Specifically for mathematics, researchers found the overall impact of the transition to secondary school on students' motivation to be negative, leading to a decreased self-esteem (Eccles et al., 1993b), lower self-concept of ability (Anderman & Midgley, 1997; Fredricks & Eccles, 2002; Wigfield & Eccles, 1994), lower math importance and interest (Schneider et al., 2008; Watt, 2004; Wigfield & Eccles, 1994) and lower intrinsic motivation (Gottfried, Marcoulides, Gottfried, Oliver & Wright-Guerin, 2007; Middleton & Spanias, 1999). These studies suggested that there are developmentally inappropriate changes in a cluster of classroom organizational, instructional and climate variables. The dimensions of the school culture that were found to have an effect on motivation in mathematics during the transition from primary to secondary school include the perceived classroom goal structure (Urdan & Midgley, 2003), teachers' sense of efficacy and teachers' ability to discipline and control students (Midgley, Feldlaufer & Eccles, 1989a), teacher-student relations (Midgley, Feldlaufer & Eccles, 1989b), opportunities for students to participate in decision making (Midgley & Feldlaufer, 1987) and curriculum continuity (Galton et al., 2000, Sdrolias & Triandafillidis, 2008).

However, the above studies yielded equivocal findings regarding the permanency of the declines in students' motivation in mathematics across the transition to secondary school. Some studies indicated that the declines in mathematics self-concepts were fairly short-lived, since students' motivation was lower immediately after the transition but increased during seventh grade (e.g., Wigfield & Eccles, 1994; Wigfield et al., 1991). On the contrary, other studies indicated that the declines seen in motivation across the transition from primary to secondary school are part of a consistent downward trend (e.g., Fredricks & Eccles, 2002; Gottfried et al., 2007; Schneider et al., 2008; Watt, 2004). It has been hypothesized that differences in study populations, school characteristics and methodologies (different time-points of measurement) are responsible for these inconsistent findings (Wargo-Aikins, Bierman & Parker, 2005).

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These mixed findings suggest the need to study the development and change of students' motivation in mathematics over time in a more systematic way (Middleton & Spanias, 1999). Previous studies examined motivation as a single-faceted construct, focusing primarily on the affective component of motivation i.e., self-esteem or self-concept of ability (Eccles et al., 1993b; Fredricks & Eccles, 2002). But in order to be able to fully understand the impact of the transition on students' motivation in mathematics, multiple indices of students' motivation should be used (Chung et al., 1998). Motivation should be treated as a multidimensional construct including cognitive (i.e., students' personal learning goals), social (i.e., students' personal social goals) and affective (i.e., students' self-perceptions) dimensions in order to gain a broader view of the changes across the transition and of the diversity of the general trends of motivational change over different school contexts.

Furthermore, much of the existing literature implies that the transition to a new school setting will systematically affect all children in a similar manner, most likely attenuating their perceptions of competence and their intrinsic motivation (e.g., Eccles et al., 1993b). Recent studies (e.g., Urdan & Midgley, 2003) provided evidence that there are large individual differences among early adolescents in their response to the secondary school transition: some adolescents show significant negative changes in their motivation in mathematics following the transition, while others manifest no negative and sometimes even positive changes subsequent to the transition. These findings suggest the need to examine more closely the individual differences in motivational change in mathematics following the secondary school transition.

Another issue is the consideration of the environmental factors associated with students' motivation in mathematics during the transition from primary to secondary school. The consideration of the classroom environment using multiple indices (measuring the cognitive and social dimensions) along with the consideration of students' broader sociocultural context (i.e., peer and parent support) is important in examining motivational change in mathematics across transitions (Anderman & Maehr, 1994; Schneider et al., 2008). Typically the focus of research studies so far has been on the characteristics of the academic environment of schooling. However students' perceptions about the social environment can also be expected to influence their motivation within a new school setting (Anderman & Anderman, 1999). In studying motivational change, students' perceptions of the classroom's social environment and of their broader social background need to be studied in order to clarify how the teacher-student, the family-student and the peer-student



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relations are instrumental in the development of adolescents. The conditions of the school and of the broader socializing environment have not been assessed or linked to students' motivation at transition points. According to Barber and Olsen (2004) this is an area that has been characterized by more presumption than empirical evidence.

Even more, studies have not addressed directly the issue of person-environment fit across the transition from primary to secondary school, through the examination of the discrepancy between students' preferences and their perceptions about how the classroom environment actually is. Primary schools are mainly concerned with the development of basic skills of literacy and numeracy and the social, aesthetic and emotional development of young children. Secondary schools in contrast, tend to concentrate on curriculum subject matter rather than on the developmental needs of students (Tonkin &Watt, 2003). Therefore, a developmental mismatch might occur between maturing adolescents who want more input into classroom functioning and the opportunities afforded to them in the classroom and that this mismatch may be related to negative changes in students' motivation across the transition to secondary school.

Lastly, there is a need to examine the changes in students' motivation across transitions within the same school, either in primary or in secondary school. Such studies will be useful in order to compare the motivational and classroom culture changes observed across the transition to a new school setting with the changes observed across the transition to a new grade within the same school. This examination would provide information in order to clarify whether the negative shifts observed in students' motivation across the transition to a new school are replicated across transitions within the same school (i.e., the last two grades in primary and the first two grades in secondary school).

The purpose of this longitudinal study was to examine students' motivational change in mathematics across transitions and especially across the transition from primary to secondary school, focusing primarily on how modifiable facets of the classroom culture and students' social background influence the nature and quality of students' motivation and investment in learning mathematics. More specifically, the aims of the study were to examine: (a) the structure of students' motivation in mathematics and of their perceptions of the classroom culture and of their social background across transitions, (b) the structure of students' perceptions of the actual and their perceptions of the preferred classroom environment in mathematics across transitions, (c) the change in students' motivation in mathematics across transitions, (d) the change in students' perceptions of the classroom culture in mathematics and of their social background across transitions, and (e) the

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developmental changes of the actual and the preferred classroom environment and of the fit between the actual and the preferred classroom environment in mathematics across transitions.

## Research Questions of the Study

The research questions that guided this study were:

(a) What is the structure of students' motivation in mathematics, of their perceptions of the classroom culture in mathematics and of their social background across transitions?

(b) How does students' motivation in mathematics, their perceptions of the classroom culture and of their social background change across the transition from primary to secondary school?

(c) Are the changes observed in students' motivation in mathematics, in their perceptions of the classroom culture and of their social background during the transition to secondary school similar to the changes observed in students' perceptions during the transition from one grade level to the next within primary and within secondary school?

(d) Are there any differences in students' perceptions of the direction of change in classroom culture across the transition from primary to secondary school? Are these differences influencing their motivational change across the transition?

(e) Are there any differences in students' perceptions of the direction of change in their social background across the transition from primary to secondary school? Are these differences influencing their motivational change across the transition?

(f) What is the structure of students' perceptions of the actual and the preferred classroom environment across transitions?

(g) What are the developmental changes in students' perceptions of the actual and the preferred classroom environment and of the fit between the actual and the preferred classroom environment in mathematics across the transition to secondary school?

(h) How do individual students explain their experiences of the change in their motivation in mathematics and of their perceptions of the change in classroom culture and of their social backgrounds across the transition from primary to secondary school?

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## Necessity and Originality of the Study

Motivational change across the transition from primary to secondary school was investigated by many studies throughout the world. The majority of the research was conducted in the USA (Eccles et al., 1993b; Gottfried et al., 2007; Urdan & Midgley, 2003), whereas studies were conducted in Canada (Lipps, 2005), in Australia (Ferguson & Fraser, 1998; MacCallum, 1997), in New Zealand (Ward, 2000) and in Europe such as in UK (Tobbell, 2003; Zeedyk, Gallacher, Henderson, Hope, Husband & Lindsay, 2003), in Italy (Schneider et al., 2008), in Germany (Lohaus, Ev Elben, Ball & Klein-Hessling, 2004; Schnepf-Sylke, 2002), in Austria (Sirsch, 2003), in Norway (Alsaker & Olweus, 1992; Kvalsund, 2000), in Finland (Pietarinen, 2000) and in Greece (Sdrolias & Triandafillidis, 2008). Despite the worldwide interest on the effect of the secondary school transition on students' motivation, surprisingly just one study was conducted in Cyprus examining how Cypriot students' emotions in general and not specifically for mathematics change across this transition (Psaltis, 2008). This lack of empirical studies in Cyprus indicates the need for further exploration of how and why our students' motivation changes when moving to secondary school.

The importance of assessing transitional impact on students' motivation in separate subject domains has been recognized in the literature, because not all domain-related perceptions are affected in the same way and domain-specific findings differ from general student perceptions (Wigfield et al., 1991). Mathematics is a unique subject area regarding motivation, perhaps because the conditions that are detrimental to other subject areas and to school in general, are more detrimental for mathematics (Gottfried, Fleming & Gottfried, 2001). This subject area appears to be the most at-risk for developmental decline, but the research so far on the change in mathematics motivation across transitions is limited and has produced contradictory findings (Gottfried et al., 2007). Therefore, there appears to be a necessity for more studies to examine motivational change in mathematics across the transition from primary to secondary school, in order to clarify whether the negative changes observed in mathematics motivation across the transition are short-lived or have long-lasting effects.

One contribution of the present study is the examination of the reasons why the transition to secondary school is hazardous for students' motivation in mathematics with the consideration of the classroom culture and of students' social background. By addressing this broad range of variables in this study the impact of the transition on



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students' motivation in mathematics can be understood more fully. There is still much that research can do to validate the downward shift in motivation in mathematics in transition periods. There is substantial evidence about the motivational declines at transition but there is relatively little evidence that documents the correlates of this decline, especially the school-related correlates. An equally important domain of concern that has not received research attention is the social background environment of students' across the transition. Attention must be paid to the broader context of adolescents' lives over the course of a school transition such as experiences in the family or with friends. It has been suggested that the consideration of the broader sociocultural context is important in examining attitudes and motivation in mathematics learning for all students (Barber & Olsen, 2004). For adolescents, friendships are likely to constitute a major source of social support and thus friendships may play an important role in adjustment following a potentially stressful event such as a school transition (Berndt & Hawkins, 1985). Students supported by trusted adults are better at retaining information, display better academic achievement and are more intrinsically motivated (Schneider et al., 2008). The magnitude of the effect of the transition on students' motivation is likely to be dependent on a number of factors such as the existence and quality of support structures available to student (Rice, 1997). The resiliency of the student during the period of a transition may depend not only on his/her own coping mechanisms but also on the level of social support available from external sources such as parents and peers.

Another contribution of the study is the consideration of the individual changes in motivational change across the transition, through the examination of whether students' perceptions of the direction of change in the classroom environment or in their social backgrounds are related to variations in their motivation in mathematics across the transition to secondary school. The majority of the research in motivational change across the transition to secondary school has examined mean level changes in children's motivation. This analytic strategy fails to account for individual differences in developmental trajectories (Fredricks & Eccles, 2002). One cannot assume that all students are affected similarly by the transition to secondary school. Gender, ability and students' socioeconomic background have been identified as three salient dimensions along which to examine group differences (Anderman & Midgley, 1997). Students, however, do not all perceive the same environment in the same way at least on some of its dimensions (MacCallum, 1997). There appear to be large individual differences among early adolescents in their responses to the secondary school transition with some adolescents

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showing significant negative changes, while others manifest no negative and sometimes even positive changes subsequent to the transition (Urdan & Midgley, 2003).

Lastly, another contribution of this study concerns the research design and the methodological approach used to analyze the data collected. Two limitations of previous studies examining motivational change across the transition to secondary school were observed. Firstly, the majority of the research so far were short-term longitudinal studies with two time-point measurements, one prior and one after the transition (e.g., Chung et al., 1998; Lipps, 2005; Rudolph, Lambert, Clark & Kurlakowsky, 2001; Zanobini & Usai, 2002). Such research designs did not address the issue of change in students' motivation within the first year in secondary school that is to whether the changes observed in motivation immediately after the transition to secondary school remain after an initial period of adaptation to the new school environment. Secondly, previous studies used data analysis techniques such as multivariate analysis of variance-MANOVA (e.g., Lohaus et al., 2004; Schneider et al., 2008; Urdan & Midgley, 2003). These methods of analyses used addressed changes in mean levels over time, have been limited to measuring linear change and are less elegant and parsimonious to apply to multiple waves of data (Watt, 2004). In this study a long-term longitudinal design is followed with four time-points of measurement (one prior and three after the transition), whereas data analysis is conducted with structural equation modeling techniques which offer a greater degree of flexibility in testing a variety of hypotheses concerning the developmental trends than a number of other more traditional techniques like repeated measures analysis of variance (Raykov & Marcoulides, 2006).

The originality of the study concerns the conceptualization of motivation as a multifaceted construct including cognitive, social and affective dimensions and the examination of the validity of this proposed model across the transition to secondary school. This multidimensional nature of motivation in mathematics was not addressed in the research so far, since studies viewed motivation as an isolated dimension either cognitive (in terms of students' personal goals e.g., Urdan & Midgley, 2003) or affective (self-esteem and self-competence e. g., Fredricks & Eccles, 2002).

In examining the cognitive aspect of motivation in this study, the focus was not only on mastery and performance goals as it has been the case with research so far (Anderman & Midgley, 1997). These studies yielded contradictory findings, since a performance goal was sometimes found to be associated with adaptive and sometimes with maladaptive patterns of learning (Midgley, Kaplan, Middleton, Maehr, Urdan, Anderman



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& Roeser, 1998). In the last few years, theorists suggested that a dichotomous model of goals (mastery vs. performance goals) is not enough in order to graph students' motivation (Covington & Müeller, 2001), leading to the consideration of the performance-approach and avoidance goals. The inconsistencies found in studies so far might be related to the failure until recently to distinguish between the approach and avoidance of performance goals. In this study, students' mastery, performance-approach and performance-avoidance goals are examined across the transition to secondary school.

Furthermore, in the motivational model of the study, students' social goals were also included as an aspect of motivation that has not been studied in the research literature of the secondary school transition so far. Studies emphasized that students' social goals influenced their motivation especially within a new school setting (e.g., Anderman & Anderman, 1999). Social goals are intertwined with academic goals and students' motivation in particular settings and motivational change across transitions cannot be fully explored without consideration of students' social goals (MacCallum, 1997).

Another originality of this study is the examination of the fit of the perceived as actual and the preferred classroom environment in mathematics across the transition to secondary school. Studies investigating the congruence or discrepancy between students' perceptions of the way the classroom actually is and the way they would prefer it to be, find congruency to be related to increases in achievement and more positive attitudes toward science (Fraser & Fisher, 1983). In mathematics, only two studies examined the fit of the actual and the preferred classroom environment. The study of Reuman, MacIver, Klingel, Midgley, Feldlaufer and Hermalin (1984) was cross-sectional and examined the student-classroom congruency in secondary school but not across the transition. Midgley and Feldlaufer (1987), taking a developmental approach examined students and teachers actual and preferred student decision-making opportunities in mathematics before and after the transition to secondary school. Other studies are needed in order to gather students' perceptions of actual and preferred practices across a wider range of classroom climate and instructional features, which is another aim of this study. Drawing on person-environment fit theory it is possible that some types of changes in the educational environments may be inappropriate or even regressive at certain stages of development and that such changes are likely to lead to a poor person-environment fit. This lack of fit could account for some of the declines in mathematics motivation seen across the transition to secondary school. Charting the developmental changes of the fit between the actual and the preferred classroom environment in mathematics would help to address the "why" questions

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regarding motivational change by providing information of the dimensions of the classroom environment that have an influence on motivational change.

This study has a practical contribution as well. The identification of the dimensions of the classroom culture and social backgrounds that have a negative or positive impact on students' motivation will be useful for teachers, educators, counselors and policy makers to make transitions easier so fewer students are lost. This can be achieved through the development and strengthening of the support structures provided to students either by their family or by the school (transition programs).

## Thesis Structure

In the following chapters of this thesis the literature review, the methodology, the results and the discussion of the study's findings are illustrated. More specifically, in Chapter II the related literature is presented. The different approaches in studying motivation are described focusing on goal approaches that formed the theoretical background of the study. The chapter ends with the presentation of research studies addressing the issue of motivational change across transitions and especially across the transition from primary to secondary school.

In Chapter III, the methodological aspects of this study are discussed. The design of the study is presented, followed by the consideration of methodological issues such as the participating students, the research methods and the data analysis.

In Chapter IV, the results of the study are presented in four sections. The first three sections refer to the quantitative analyses, whereas the latter in the qualitative data derived from clinical interviews. More specifically, in the first section the analyses addressing the structure of motivation, of the classroom culture and of students' social backgrounds focus on the validation of the proposed models for students experiencing the transition from primary to secondary school and from one grade level to the next within the same school. In the second section, the analyses addressing the issue of motivational, classroom culture and social background change across the transition from primary to secondary school are illustrated. Thirdly, the developmental changes of the perceived as actual and the preferred classroom environment in mathematics across the transition to secondary school are

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presented. Lastly, in the fourth part of this chapter the qualitative analyses for individual students are presented based on students' responses to semi-structured interviews.

Lastly, in Chapter V the results of the study are discussed focusing on motivational change across the transition and on how it is related to classroom culture and social contexts. The chapter proceeds with the educational issues and implications arising from the results of the study and concludes with the limitations of this study and the recommendations for future research in the area of motivational change across transitions.

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# CHAPTER II

# LITERATURE REVIEW

## Introduction

Motivation refers to the inclination to do certain things and to avoid doing some others (Hannula, 2006). Motivation is not observed directly but rather inferred from behavioral indexes like people's verbalizations, task choices, effort expenditure and persistence in learning. Thus, motivation is an explanatory concept used to understand why people behave as they do (Schunk, 1996).

One of the most prominent developments in motivation research in the last decades has been the emergence of goal approaches to motivation, which emphasize a person's goals in a particular setting as the focus of motivation. Goal theory incorporates many variables hypothesized to be important by other theories (Schunk, 1996), and hence provides a broader and a more adequate framework for the investigation of motivation and motivational change.

Maehr and Braskamp's (1986) formulation of goal theory is set in a wider context than those discussed previously. Goals for which a person is striving are one facet of his Personal Investment Theory (PIT). PIT is concerned with how persons choose to invest their energy, talent and time in particular activities (Maehr & McInerney, 2004). This theory also emphasizes the role played by social and cultural contexts in determining motivational patterns while performing achievement tasks. PIT provided the theoretical background for studying motivational change in this study because of the central role of the interaction between the person and the environment. In the next sections of this chapter the different perspectives on motivation that exist in the literature are reviewed in order to identify the different constructs for studying motivational change and to justify the selection of Personal Investment Theory as the theoretical background of the study.

Previous research has shown that the transition from primary to secondary school can be accompanied by changes in students' motivation in various subjects including mathematics (Lohaus et al., 2004). There are numerous aspects of the new school (institutional, learning and social aspects) that are thought to pose risk for students'



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motivation. These aspects along with the research studies conducted so far are reviewed in the next sections of this chapter.

## Brief Overview of Perspectives on Motivation

In the literature motivation was studied using different theories and approaches. Some recent motivation theories give cognition a prominent place viewing motivation in terms of the thoughts and knowledge of beliefs that mediate behaviour. Other theories perceive competence to be important, mirroring the growing societal emphasis on ability traits in the second half of the twentieth century. The origins of motivational constructs are briefly stated in the following sections of this chapter.

### *Achievement Motivation Theory*

Atkinson and his associates (Atkinson, 1964) considered a motive to achieve. From this perspective motivation is determined by a "personality trait" i.e., the motive, which is rather stable in nature and covers a variety of tasks and situations. The achievement motivation theory incorporates two conflicting motives: the motive to succeed and the motive to avoid failure. The notion of the two motives implies that some individuals will have a stronger tendency towards success which is different from a tendency to avoid failure and hence characterizes differences between individuals. According to this theory, the intrinsic achievement motivation is the algebraic sum of a positive tendency to strive for success and a negative tendency to avoid failure. For success-oriented individuals the resultant intrinsic motivation to strive for success and to avoid failure is positive. On the contrary, for failure-threatened individuals it is negative. In achievement settings, two variables (the expectancy of success and failure and the incentive value of success and failure) also influence which motive will prevail and the strength of the motivation to achieve. That is the reason why the name often used in reference to this view of motivation is the expectancy-value framework. This model suggests a multiplicative relationship between motive, expectancy and value, such that if any of the variables is zero, motivation is zero.

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### *Modern Expectancy-Value Models*

Contemporary expectancy-value theories developed by Eccles, Wigfield and their colleagues (Eccles, 1984; Eccles, Adler, Futterman, Goff, Kaczala, Meece & Midgley, 1983; Eccles & Wigfield, 2002) are based on Atkinson's work in that they link performance, persistence and choice to individuals' expectancy-related and task-value beliefs. However, they differ from Atkinson's theory in a number of ways. First, in the modern theories, the expectancy and value components are further elaborated and are linked in a broader array of psychological and social determinants. Second, these theories were tested in real-world situations rather than in the laboratory tasks in which Atkinson's theory was tested (Wigfield, Tonks & Eccles, 2004).

Defining the expectancy and value constructs, Eccles and her colleagues broadened Atkinson's original definitions. Specifically, they defined expectancies for success as children's beliefs about how well they will do on an upcoming task. As far as value is concerned, they proposed four components of subjective values: attainment value (the importance of doing well on a given task), intrinsic value (the enjoyment one gains from doing a task), utility value (the usefulness referring to how a task fits into an individual's future plans) and cost (refers to what the individual has to give up to do a task). According to their expectancy-value model, expectancies and values influence directly performance and task choice. Expectancies and values themselves are influenced by task specific beliefs (such as competence perceptions, perceptions of task difficulty, individuals' goals and self-schemata) and by the person's affective memories. These beliefs, goals and affective memories are influenced by individuals' perceptions of other peoples' attitudes and expectations for them and by their own interpretations of their previous achievement outcomes. Students' perceptions and interpretations are influenced by various social and cultural factors (parents and teachers beliefs and behaviours), their specific achievement experiences and the cultural context in which they live.

### *Attribution Theory*

The basic role of Weiner's attribution theory (Weiner, 1979; 1986; 2004) is to understand achievement behaviour by analyzing the person's cognitions about the causes of success and failure. These causal attributions contribute to the formation of persons' expectancies and beliefs about future performance and thus are key motivational beliefs. Weiner's



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attribution theory is composed of both an intrapersonal and an interpersonal framework.

The intrapersonal theory of motivation is composed by the self-directed thoughts. The interpersonal theory of motivation is composed by all the other-directed thoughts and feelings that give rise to help or neglect and positive and negative feedback (Weiner, 2004). These two motivational systems are closely intertwined and interactive. The motivational process in the intrapersonal framework begins with an expected outcome leading to an outcome-dependent affective reaction. If the outcome is positive and related to goal attainments then the individual is happy. If the outcome is negative the person is feeling frustrated and sad. These feelings lead to certain behavioural consequences that affect the intensity, latency and persistence of the achievement striving in similar situations. If the outcome is unexpected or important it will evoke an attributional process: the "why" question. The answers to this "why" question, which is a causal attribution, are influenced by many sources of evidence, including past personal history, social norms, rules about the relations between causes, biasing and so forth (Weiner, 2004). Guided by these sources of information a cause is selected such as lack of ability or effort, bad luck or task difficulty. The next stage, which according to Weiner (2004) is the very heart and soul of the attributional approach to motivation, concerns the underlying characteristics of the selected cause (the causal dimensions). There are three causal dimensions: locus (the location of the cause, either intrinsic or extrinsic to the person), stability (duration of a cause) and controllability (degree of control an individual has over the cause). All causes can be located in this three-dimensional causal space. The significance of these causal properties is that they map the determinants of motivated action: expectancy and value. Expectancy refers to the likelihood of future success, while value considers the emotional consequences of goal attainment or nonattainment.

The interpersonal conception of motivation from the attributional perspective is again initiated by an achievement outcome. And similarly, a causal explanation is reached. The cause is placed in the three-dimensional space with the dimension of controllability to have the greatest importance. If the failing student is not held personally responsible, then the negative achievement outcome tends to elicit sympathy that in turn evokes prosocial reactions (withhold reprimand, no condemnation, help, no retaliation). If the failing student is held personally responsible then the negative outcome elicits anger which leads to reprimand, condemnation, neglect and retaliation.

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Perceptions of competence and related self constructs have been implicated in motivation and learning and several theories focus on these. From this perspective enhancing students' perceived competence or academic self-concept increases their motivation and learning.

Self-worth theory (Covington, 1984) states that in achievement situations individuals strive to protect their sense of self-worth or personal value. Basically, self-worth theory argues that fundamentally all individuals are motivated to establish and maintain a sense of personal worth, approval by others and acceptance of oneself, a goal that in turn depends on being perceived as competent (Covington, 2004). This theory emphasizes perceptions of ability and the importance in today's society of ability and proof of ability through accomplishments. In learning environments the dynamic of this theory is represented as Grades (G) =Ability (A) = Worth (W). That is, top grades imply competence and on the contrary poor grades imply a sense of being incompetent. These feelings of competence or incompetence determine one's feelings of worthiness or worthlessness. Consequently, individuals strive for success to gain the social and personal rewards of high performance but also to benefit a reputation for high ability, and hence worthiness.

Researchers have investigated a number of defensive tactics that students use in attempts to avoid the implications of inability, that they are unworthy. One group of such plots have been named self-handicapping strategies such as procrastination (McInerney & Van Etten, 2004), that is the postponement of studying for a test until is too late or at the last minute. One second group of tactics has to do with an attempt to guarantee success through "a slavish devotion to study and a deep commitment to a work ethic" (Covington, 2004, p. 95). These individuals can accomplish a great deal of accomplishments, although they remain self-doubting because of the essentially defensive nature of these achievement strategies.

Bandura's self-efficacy theory (Bandura, 1986) emphasizes individuals' beliefs concerning their capabilities to achieve particular outcomes. Specifically, self-efficacy is a multidimensional construct that varies in strength, generality and level of difficulty and refers to "people's judgments of their capabilities to organize and execute courses of action required to attain designated types of performances" (Bandura, 1986, p. 391). Self-efficacy is not an isolated construct but rather an integral component of social-cognitive theory that views human functioning as involving interactions between behaviours, beliefs,



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environmental events and cognitions.

The above theory focuses on two kinds of expectancies for success: outcome expectations (beliefs that certain behaviours will lead to certain outcomes) and efficacy expectations (beliefs about whether one can effectively perform the behaviours necessary to produce the outcome). These two kinds of expectancy beliefs are different because individuals can believe that a certain behaviour will produce a certain outcome (outcome expectation), but may not believe that they can perform that behaviour (efficacy expectation). Indeed, Bandura proposed that individuals' efficacy expectations are the major determinant of goal setting, activity choice, willingness to expend effort and persistence (Eccles & Wigfield, 2002).

Self-efficacy affects the choice of activities, effort, persistence and therefore achievement. People can acquire information concerning their self-efficacy from tangible indicators of their capabilities such as their actual performance and from intangible indicators such as past experiences, physiological indexes (sweating and heart rate) and social forms (knowledge of how others perform). All the information acquired from these sources does not influence self-efficacy directly and automatically, but rather is cognitively appraised (Bandura, 1982). Self-efficacy appraisal is an inferential process in which persons weigh and combine the contributions of personal, environmental and behavioural factors (Schunk & Pajares, 2004), such as perceptions of their ability, effort expended, task difficulty, assistance from others and number and pattern of successes. The interaction between self-efficacy and the environment is evident in school settings. A number of teaching methods and practices affect students' self-efficacy beliefs such as the types of questions that teachers ask students, the grouping practices, the kind of feedback that teachers give to students about their performances and teachers' perceptions of students' self-efficacy.

### *Intrinsic Motivation Theories*

Harter's (1981) approach to intrinsic vs. extrinsic motivation is characterized as an orientation towards: learning and mastery vs. dependence on the teacher; curiosity and interest vs. gaining teacher approval and grades; preference for challenge vs. preference for easy work; independent judgment vs. dependence on teacher's judgments; and internal criteria vs. external criteria. Harter considers the first three dimensions to be motivational



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whereas the latter two dimensions tap more cognitive-informational structures. Intrinsic and extrinsic motivation is considered as opposite ends of a continuum.

Deci and Ryan (1987, 1992) working within an intrinsic motivation framework approached motivation through self-determination theory. According to self-determination theory, motivation highlights people's intrinsic motivational resources in explaining the development of the personality and the autonomous self-regulation. More specifically, it addresses how people's growth tendencies and psychological needs interact with sociocultural conditions that nurture or hinder these inner resources, resulting in various levels of effective functioning and well-being (Reeve, Deci & Ryan, 2004).

Self-determination theory integrated two perspectives on human motivation: (a) humans are motivated to maintain an optimal level of stimulation; and (b) humans have a basic need for competence. People seek out optimal stimulation and challenging activities and find these activities intrinsically motivating because they have a basic need for competence. When individuals are self-determined their reasons for engaging in behaviour are fully internalized. Deci and Ryan (2000) defined several levels in the process of internalization that is the process of transferring the regulation of behaviour from outside to inside the individual. These are external (regulation coming from outside the individual), introjected (internal regulation based on feelings that one has to do the behaviour), identified (internal regulation based on the utility of that behaviour) and integrated regulation (regulation based on what the individual thinks is valuable and important to the self).

Four mini theories (Basic Needs Theory, Cognitive Evaluation Theory, Organismic Integration Theory and Causality Orientations Theory) were formulated by Deci and Ryan (2000) based on the fact that different motivational phenomena can emerge during the study of the above motivational processes.

Basic Needs Theory focuses on the fundamental psychological needs for autonomy, competence and relatedness as the basis of students' intrinsic motivation and autonomous self-regulation. When environmental conditions support these needs, students experience satisfaction and show active engagement and growth. Through Basic Needs Theory, self-determination theory explains why students sometimes show passivity and alienation (because social conditions don't meet with their basic needs).

Cognitive Evaluation Theory explains how external events such as rewards sometimes support but other times interfere with students' intrinsic motivation. According to this theory, external events have two aspects that affect students' intrinsic motivation: a



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controlling aspect (that pressures students towards a specific outcome) and an informational aspect (positive or negative feedback). How controlling an event is perceived to be and whether the event communicates competence (positive feedback) or incompetence (negative feedback) affects intrinsic motivation because it affects satisfaction of the students' need for autonomy. Cognitive Evaluation Theory specifies how sociocultural conditions can foster or impair students' intrinsic motivation.

Organismic Integration Theory focuses on extrinsic motivational processes and on the development of internalized motivation. It proposes that external regulations can be internalized and become internal regulations and thus extrinsic motivation can become self-determined motivation. To illustrate how extrinsic motivation can become self-determined, this theory proposes that four types of extrinsic motivation exist that differ in the degree of autonomy that provide to the person (external regulation, introjected regulation, identified regulation and integrated regulation) which fall along a continuum of self-determination between amotivation (the state in which a person lacks an intention to act) and intrinsic motivation. Organismic Integration Theory investigates how students acquire, internalize and integrate extrinsic motivational processes. The theory proposes that students are naturally inclined to internalize aspects of their social environments and to integrate these values into the self-system. To the extent that students internalize and integrate healthy external regulations, they experience greater autonomy and well-being. Organismic integration theory, clarifies how students become increasingly able to generate self-determined, extrinsically motivated actions.

Causality Orientations Theory concerns the contribution of personality orientations to the quality of students' autonomous motivation. To the extent that students regulate themselves in accord with their needs, interests and values, they embrace an autonomous causality orientation (Reeve et al., 2004). Causality orientations reflect the extent of self-determination in the personality and therefore add the personality perspective to the overall framework of self-determination theory.

### *Goal Approaches to Motivation*

One of the most prominent developments in motivation research in the past decades has been the emergence of goal approaches to motivation. As the label implies, goal theories emphasize goals and include the work of many researchers such as Ames, Nicholls, Dweck



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and Maehr. In their view, a person's goal or goals in a particular setting creates the focus of motivation, where goals refer to "qualitatively different purposes or intentions in pursuing a task" (Maehr, 1989, p. 304).

According to Anderman and Maehr (1994) goal theory is composed of a set of hypotheses which define the causal link between specific cognitions and the nature and quality of investment in a given course of action. Firstly, emphasis is placed on the psychological environment as determinant of the personal goals that individuals adopt. Secondly, a range of actions and affective responses are associated with goal beliefs. The goals that students adopt have been shown to be related to cognitive strategies, achievement and affect. Lastly, goals are seen as super-ordinate to judgments of self in acting that is one's competence and self-efficacy beliefs figure into the motivation differentially depending on the type of goal that dominates.

By using the word goal, these approaches suggest that individuals are aware of their purposes or intentions and actively plan how to attain them. Goal approaches to motivation, focus on the reasons why students engage in learning. Students are viewed as choosing to participate in academic activities for a number of different reasons named goals. Goal theory has focused primarily on two types of goals, although these goals have been labelled in different ways by different authors. On the one hand there are the task-focused goals in which students are focused on task mastery and learning for purely intrinsic reasons. On the other hand there are the ability-focused goals in which students are interested in demonstrating their ability or outperforming others. The various terms which have been used to label these two goal orientations are: task and ego involvement (Nicholls, 1989), mastery and ability focused (Ames & Ames, 1984), learning and performance goal (Dweck, 1986) and accomplishment and power goals (Maehr, 1989).

The literature suggests that these goals are orthogonal and not simply the opposite ends of a continuum (Maehr & Pintrich, 1991). That means that they may grow or diminish simultaneously. Each goal orientation directs students' attention to different aspects of the learning situation. If the students' purpose is to develop their knowledge and skills, the process of learning is valued and the evaluation of their competence is conducted in terms of self-improvement. Alternatively, if the students' purpose is to demonstrate ability, ability is valued and students focus on their performance and the evaluation of their competence is relied on social comparisons.

There are other versions of goal approaches that considered more than these two main goals. Other goals identified are: social solidarity and extrinsic rewards (Maehr,



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1989); work avoidance, ego and social goals (Nicholls, Patashnick & Nolen, 1985). With the exception of work avoidance most have been omitted as empirical investigation has modified the theoretically derived notions (MacCallum, 1997).

Maehr and Braskamp's (1986) formulation of goal theory is set in a wider context than those discussed previously. Goals for which a person is striving are one facet of his Theory of Personal Investment.

*Personal Investment Theory*

Maehr and Braskamp's (1986) original Personal Investment model of achievement built upon and integrated various dimensions from earlier conceptualizations of the nature of motivation. The work of Maehr and Braskamp is included into the goal theory perspective of motivation since is a multiple goal-oriented theory from its inception which emphasizes goals (Ames & Archer, 1988), although it includes sense of self and action possibility dimensions that make it, potentially, a far richer and more sensitive source of information on the motivational determinants of behaviour (Maehr & McInerney, 2004).

Personal Investment Theory (PIT) stresses that the study of motivation must begin and end with the study of behaviour specifying very carefully the behaviour that leads to motivational inferences. PIT is concerned with how persons choose to invest their energy, talent and time in particular activities (Maehr & McInerney, 2004). These patterns associated with motivation are termed personal investment and the theory of personal investment seeks to explain these somewhat disparate patterns of behaviour in terms of the qualitatively different ways people invest their personal resources. PIT also emphasizes the role played by social and cultural contexts in determining motivational patterns in performing achievement tasks. This emphasis on the sociocultural context stems from cross-cultural research (Fyans, Salili, Maehr & Desai, 1983).

PIT is a social-cognitive theory as it assumes that the primary antecedents of choice, persistence and variations in activity levels are thoughts, perceptions and beliefs that are embedded in cultural and social beliefs about the self and the situation (Maehr & McInerney, 2004).

The notion that PIT proposes as central is the meaning of the situation to a person. The sources of meaning are multiple, diverse and exceedingly complex (Maehr, 1984). The theory designates three basic components of meaning as critical to determining personal



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investment in specific situations. These three components are:

a) Beliefs about self (sense of self) referring to the more or less organized collections of perceptions, beliefs and feelings related to who one is.

b) Perceived goals of behaviour in given situations, referring to the motivational focus of the activity importantly what the person defines as success and failure in this situation. The theory proposes the consideration of mastery, performance and social goals in the educational context.

c) Perceived alternatives for pursuing these goals (action possibilities) referring to the behavioural alternatives and facilitative conditions that a person perceives to be available and appropriate in a given situation. These dimensions that are believed to facilitate or inhibit the performance of students at school include among others teacher and parent support and peer help.

Each of these components of PIT may be influenced differentially by the structure of tasks and situations, personal experience and access to information and importantly the sociocultural context in which tasks, situations and persons are embedded (Maehr & McInerney, 2004). By sociocultural context, Personal Investment theory specifically highlights the factors that make some behavioural options more salient and acceptable than others.

PIT is more interactionist in the relationships between the person and the environment. Competence judgements interact with goals to bring about different aspects of behaviour. In distinguishing different aspects of meaning, PIT points to the possibility that motivational change may involve change in one or more of the aspects of meaning.

PIT was further developed by the different formulation of the concept of culture McInerney and his colleagues provided (McInerney & Sinclair, 1991; McInerney & Swisher, 1995; McInerney, Yeung & McInerney, 2001). Following a trend of time, the concept of culture was applied to organizations: places of work as well as schools. Not surprisingly the general Personal Investment framework was increasingly applied to the study of organizational culture in general and school culture in particular (Maehr & Midgley, 1991; 1996). This eventuated in a serious and systematic consideration of whether there was an "optimum culture" for personal development (Maehr & McInerney, 2004). Most of this concern focused on schools and there the specific issue was whether a school that stressed mastery goals was preferable to a school or classroom that stressed performance goals as far as the degree and quality of personal investment was concerned.



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Thus, recent studies suggest that the psychological environment of the classroom may have a strong influence on the goals that students adopt (Anderman & Young, 1993; Lohaus et al., 2004; Roeser, Midgley & Urdan, 1996). If the activities in a class emphasize ability, grades and performance then students are likely to adopt ability-focused goals. In contrast, in classrooms where task, mastery, effort, persistence and improvement are stressed students are more likely to adopt task-focused goals. Studies indicated that students adopt different goals in different classrooms and that the adoption of goals is related to specific instructional practices such as grouping, recognition, evaluation, the nature of tasks and students' perceptions of goal stresses (Nolen, 1993). Other research suggested that the school as a whole influences the goals that students adopt (Maehr, 1991; Maehr & Midgley, 1991; Maehr, Midgley & Urdan, 1992). Research on school culture and climate suggested that schools emphasize different goals and that these school-wide goal stresses influence individuals students' goals and motivation. A school that places high value on grades and performance is likely to create an environment that encourages students to focus on grades as the focus of learning. Such school-wide practices that emphasize ability-focused goals often interfere with classroom-level practices that foster task goals (Maehr & Midgley, 1991).

The largest program of research utilizing the full Personal Investment Model has been conducted by McInerney and his colleagues (McInerney & Sinclair, 1991; McInerney & Swisher, 1995; McInerney et al., 2001) who have not only tested the full model utilizing the Inventory of School Motivation (ISM) and the Facilitating Conditions Questionnaire (FCQ) but in particular extended the application of Personal Investment theory to a variety of cultural groups. The results of the studies conducted by McInerney and his colleagues (McInerney, 2000; McInerney & Sinclair, 1991; McInerney & Swisher, 1995; McInerney, Yeung & McInerney, 2000; McInerney et al., 2001) indicated that the scales appear broadly valid and reliable across very diverse sociocultural groups. The study of McInerney et al. (2000) also revealed that the multidimensional school motivation structure of ISM could be categorized into three major dimensions referring to mastery, performance and social goal orientations.

Motivation in this study is viewed through Personal Investment Theory. This theory formed the theoretical background of the study because of the multidimensional consideration of motivation through the simultaneous consideration of students' personal goals (both cognitive and social) and their affective responses through their self-beliefs. Furthermore PIT provides a complete framework for studying motivational change with

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the consideration of the environment either at school or at home. In this way, a broader conceptualization of motivational change and of the interaction between motivation, classroom and social background across the transition to secondary school can be formed.

## Motivational Change

The literature reveals that the conceptualization of the term "change" is better understood via the definitions of stability and continuity (Asendorpf & Weinert, 1990). Stability concerns the degree to which an individual retains the same relative rank or position on a dimension over time, whereas continuity concerns whether the quality or the meaning of a variable remains the same with development (Kagan, 1980; Lerner, 1986; Moss & Susman, 1980). As stability is a special case of change (i.e., no change) these definitions of stability and continuity can contribute to the construction of a framework for the conceptualization of change.

The issue of how motivation research has considered change is more difficult to address. Many research studies in the motivation literature have been carried out at a single point in time and therefore did not address change directly. The consideration of motivation constructs over time appeared in the literature in the last decades. At the beginning, motivational change was examined through cross-sectional studies and it was motivation across grades, age or subject domains that was examined (e.g., Anderman, Eccles, Yoon, Roeser, Wigfield & Blumenfeld, 2001; Clayton-Jones, Rodwell, Kehan, Archer, Chan & Moore, 1992; Harter et al., 1992; Rogers, 1996a, 1996b). Longitudinal studies concerning motivational change appeared in the last few years (e.g., Eccles et al., 1993b; Lipps, 2005; Urdan & Midgley, 2003; Wigfield et al., 1991; Zanobini & Usai, 2002). In these studies, motivational change was conceptualized in a number of different ways taking account of a different aspect and type of change and thus leading to diverse research methodologies for examining change (MacCallum, 1997).

More specifically, as far as the conceptualization of change is concerned, longitudinal research is divided into studies that addressed change in the form of a motivational construct i.e., qualitative change (e. g., Urdan & Midgley, 2003; Zanobini & Usai, 2002) and studies that addressed change in the level of a motivational dimension i.e., quantitative change (e. g., Barber & Olsen, 2004; Gottfried et al., 2007). In the studies



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examining qualitative change, development was conceptualized as a process of differentiation reflecting qualitative changes in conceptualizations and not quantitative changes in a construct, whereas in the studies examining quantitative change the concern was on the change in the level or magnitude of one or more dimensions.

Furthermore, longitudinal studies are divided into studies examining absolute and studies examining relative change. In the studies examining absolute change the concern is on intraindividual change: on individual's level on a certain dimension and to the extent to which it remains the same across situations or measurement occasions (e.g., Lohaus et al., 2004; Zanobini & Usai, 2002). In the studies examining relative change the concern is on interindividual patterns of intraindividual change: on the extent to which individuals in a group retain their relative positions on a dimension (e.g., Gutman & Eccles, 2007; Wigfield et al., 1991).

Finally, another difference of the studies examining motivational change is the operationalization of context (classroom and school culture). Many of the studies conducted, conceptualize change as independent of the context in which change is situated (Gottfried et al., 2007; Pajares & Graham, 1999; Zanobini & Usai, 2002). These studies applied variable-oriented methodologies, examining context-free change. In these studies the interest was on the examination of motivational variables and their change without any reference to the changing school culture and context which might have an influence on motivation. On the contrary, other studies applied person-oriented methodologies, examining context-specific change with the consideration of the complex interplay between individuals and their environments (Anderman & Anderman, 1999; Barber & Olsen, 2004; Rice, 1997; Urdan & Midgley, 2003). In these studies the interest was on the student-environment interaction and on the effect of the changes in context on the change in students' motivation and functioning.

## The Transition from Primary to Secondary School and the School Culture

Students experience numerous transitions as they move through the educational system. Some transitions are developmental, resulting from the aging process and are marked by considerable individual physical, intellectual and emotional change (e.g., puberty). Others are systemic (Rice, 1997). Rice (1997) defined systemic transitions as "those built into the typical structure of school systems in such a way that all students at a particular time point



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move from one segment of education to another" (p. 2). These transitions can exist within schools (e.g., changing teachers and classmates across academic years in primary school) as well as across schools (e.g., moving from primary to secondary school).

To complicate matters for the researchers, developmental and systemic transitions are often closely related (Anderson et al., 2000). For example, many students traverse puberty at the same time they move from primary to secondary school. Until the late 1980s, students' problems with school transitions were believed to result from developmental changes. In the past decades, however, there has been a shift in focus. Researchers have begun to examine the impact of contextual factors on students' abilities to handle systemic transitions (Barber & Olsen, 2004; Schumacher, 1998; Urdan & Midgley, 2003). Therefore, the transition from primary to secondary school is considered by many researchers as an ideal period during which to examine change in students' motivation in various subjects, including mathematics (Anderson et al., 2000).

It has been suggested that primary and secondary schools are very different organizations with respect to "ethos" and that this influences students' motivation and performance (Midgley et al., 1995). Across this transition there are "institutional discontinuities" (Rice, 1997). Two types of institutional discontinuities were observed: organizational and social. Organizational discontinuities include changes in the environment and educational practices, that is changes in school size, departmentalization, tracking, academic standards, working to an ability level, teacher expectations and student autonomy. Social discontinuities include changes in the social structures such as changes in the diversity of the student population, relations with teachers and sense of belonging. More specifically, from the research that focused on systematic differences in the classroom environment from primary to secondary school in various subjects including mathematics, six patterns have emerged.

Firstly, children move from a relatively small, more personalized primary school environment to a larger, more departmentalized, impersonal secondary school (Chung et al., 1998). In the new school they loose the sense of school belonging (Roeser et al., 1996). In primary school children usually have one main teacher and remain in their given classrooms, whereas in secondary school this changes dramatically: students' are taught by many different teachers and in some schools are moving from classroom to classroom for each lesson (Barber & Olsen, 2004).

Another difference that is connected to the exposure to many different teachers in secondary school is that secondary school classrooms as compared with elementary school



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classrooms are characterized by less personal and less positive teacher-student relationships (Tobbell, 2003). It is difficult for teachers to maintain warm, positive relationships with students if they have to teach many different students each hour of the day.

Thirdly, secondary school classrooms as compared with elementary school classrooms are characterized by a greater emphasis on teacher control and discipline and fewer opportunities for student decision making, choice, and self-management (Eccles et al., 1993b; Ferguson & Fraser, 1998).

Furthermore, the shift to secondary school is associated with a dramatic change in instructional practises: an increase in practices such as whole-class task organization, between classroom ability grouping, emphasis on performance instead of mastery goals and public evaluation of the correctness of work with higher standards (Anderman & Midgley, 1997; Midgley et al., 1995; Urdan & Midgley, 2003). In addition there is evidence that class work during the first year of secondary school requires lower level cognitive skills than does class work at the elementary level (Mitman, Mergendoller, Packer & Marchman, 1984).

Fifth, secondary school teachers were observed to feel less effective as teachers especially with low ability students. In mathematics, seventh grade teachers in middle schools reported much less confidence in their teaching efficacy than did sixth-grade elementary school teachers in the same school districts (Midgley, Feldlaufer & Eccles, 1989b). This was true even though the seventh-grade math teachers were math specialists (math degree holders), which was not the case for the sixth-grade math teachers teaching at the elementary school.

Lastly, differences in the development of the curriculum were observed with the study of Sdrolias & Triandafillidis (2008) indicating that across the transition from primary to secondary school there was not a link between and within the chain of school mathematics that is between the mathematical ideas and procedures taught in the two school contexts.

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## The Transition from Primary to Secondary School in Cyprus

Primary school in Cyprus spans grades from 1 to 6 when students are 6 to 12 years old. In primary school students are assigned to a single classroom for the complete school day with twenty-five students as the maximum number in each class and are taught by a single teacher trained in education. Secondary school follows primary school and spans grades from 7 to 9 with students from 13 to 15 years of age (education in Cyprus is obligatory until the age of 15). In secondary school students receive their education from a number of teachers who are specialists in the academic subjects they teach (such as mathematics) and not in education, having a subject-centered approach. Furthermore, students in secondary school change classrooms to receive instruction in various topics as their school day progresses. The maximum number of students in each class in secondary school is thirty students. In both school contexts the classes include students with different abilities in language and mathematics (mixed-ability classes). The transition from primary to secondary school in Cyprus involves changing school institutions and moving to a new school building. Each secondary school is fed at least by three primary schools.

In Cyprus, a long term transition program that would provide appropriate and multifaceted approaches to facilitate the transition process is not available from the Education of Ministry and Culture. In fact the organizational structure of the Ministry of Education and Culture entails two separate departments that is the Department of Primary and the Department of Secondary Education with no constructive cooperation among them. Consequently, there are no norms of collaboration and collegiality between the teachers in the two school levels. In order to facilitate this crucial process the majority of the schools in Cyprus operate an informal transition support program that takes the form of primary pupils visiting the secondary school they will be attending, thereby gaining the opportunity to meet new teachers, talk with older pupils and tour the new school building.

## Motivational Change and the Transition from Primary to Secondary school

As analysed above, primary and secondary schools are very different organizations with differences in organizational structure, instructional practices and social relationships. Therefore, these differences could account for the changes in students' motivation across



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the transition from primary to secondary school. Drawing on person-environment fit theory, in examining motivational change it is the fit between the developmental needs of the adolescent and the educational environment that is important (Eccles et al., 1993b). If it is true that different types of educational environments may be needed for different age groups to meet developmental needs and to foster continued developmental growth, then it is also possible that some types of changes in educational environments may be inappropriate at certain stages of development (e.g., the early adolescent period). In fact, some types of changes in the educational environment may be developmentally regressive. Exposure to such changes is likely to lead to a particularly poor person-environment fit, and this lack of fit could account for some of the declines in motivation seen at this developmental period. Therefore, the environmental changes often associated with the transition to secondary school seem especially harmful in that they emphasize competition, social comparison and ability self-assessment at a time of heightened self-focus; they decrease decision making and choice at a time when the desire for control is growing; they emphasize lower level cognitive strategies at a time when the ability to use higher level strategies is increasing; and they disrupt social networks at a time when adolescents are especially concerned with relationships.

For the examination of motivational change in mathematics during the transition from primary to secondary school, which is the aim of the present study, the Phase Model of Transitions (Ruble, 1994) will be applied. This model allows the examination of motivational change as it unfolds, without considering only the immediate effect of the transition on students' motivation. According to this model, the transition goes through three phases:

(a) The construction phase. This phase begins immediately upon entering the new environment and is characterized by active information seeking to construct new categories, expectations and standards for the new environment.

(b) The consolidation phase. This phase is reached once the fundamental knowledge about the new environment has been acquired. At this stage, individuals are still actively seeking out information because they are trying to draw firm, specific conclusions about their new environment.

(c) The integration phase. In this phase the cognitive processes are focused on maintaining and elaborating upon the conclusions drawn. This allows the person to integrate the new conclusion with his or hers pre-existing knowledge.

Based on the above model, students' motivational change in mathematics in this



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study is examined using a long-term longitudinal design with one measurement prior the transition and three measurements after the transition to secondary school. These three measurements were situated in each trimester of the school year and corresponded to the three phases of Ruble's model of transitions.

## Motivational Change in Mathematics across the Transition to Secondary School and Students' Social Backgrounds

Besides the dramatic shift in school and classroom contexts, the transition from primary to secondary school is also characterized by significant changes in the family and peer contexts (Wargo-Aikins et al., 2005; Gutman & Eccles, 2007). These changes include a shift in the relations within the family and in peer group exposure and experiences, and are likely to undermine adolescents' mental health and behavioural outcomes (Eccles, Lord & Roeser, 1996). According to the person-environment fit perspective, adolescents whose social environments change in developmentally regressive ways are more likely to experience difficulties. In contrast, adolescents whose social environments respond to their changing needs are more likely to experience positive outcomes (Gutman & Eccles, 2007).

More specifically, relationships with parents often undergo a stressful period during adolescence (Smetana, 2000), a period in which the transition to secondary school occurs. Students' relationships with their parents in terms of power and authority evolve, with adolescents' becoming more and more independent and ultimately taking primary responsibility for their own lives (Smetana, 2000). Parents, on the other hand, in response to their adolescents' emerging sexuality and increased involvement with peers may become more concerned about their safety and provide fewer opportunities for autonomous decision making (Eccles et al., 1996). Furthermore, researchers have noted that emotional closeness and time spent with parents decrease (Larson, Richards, Moneta, Holmbeck & Duckett, 1996), whereas family conflict increases during the adolescent years (Laursen, Coy & Collins, 1998).

Substantial evidence has highlighted the link between peer relations and children's emotional and cognitive functioning (for a review see Parker, Rubin, Price & DeRosier, 1995). Researchers have recognized that in addition to family relationships, peer relationships provide an increasingly important context for social learning and a source of



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support across the course of development (Wargo-Aikins et al., 2005). High quality friendships characterized by high levels of self-disclosure, companionship, intimacy, validation and low levels of conflict may promote increased coping with transition demands, providing a secure relationship base from which to comfortably explore the new environment and may foster greater competence and security (Ladd, Kochenderfer & Coleman, 1996). In particular, previous research has demonstrated that across the junior high school transition specific friendship features such as intimacy and amount of interaction as well as general peer acceptance prior the transition predicted more positive self-esteem, social self-perceptions, school integration and overall transition adjustment (Berndt, Hawkins & Jiao, 1999; McDougall & Hymel, 1998).

Very few studies examined the influence of parents and peers simultaneously and these studies yielded contradictory findings that can be attributed to the structure of the societies in which the studies were located. Studies conducted in Europe (the European culture is more family-oriented) indicated that parent social support was strongly related to successful transition, whereas the support by friends was weaker (Schneider et al., 2008). On the contrary, studies conducted in the US, where the American culture is less family-oriented) indicated that friends provided more emotional support after the transition than parents (Kurita & Janzen, 1996).

The Cypriot culture is family-oriented: support comes primarily from parents and family. Academic achievement is valued in families, especially in subjects like language and mathematics, with parents providing support and advising in order to encourage their children's academic motivation. Nevertheless, the Cypriot society with a strong family life is not a society with impoverished peer relations. As it has been suggested by Schneider et al. (2008), strong family bonds provide models for harmonious interpersonal functioning that might be reflected in relationships with peers.

Therefore, in order to graph a detailed picture of motivational change in mathematics across the transition to secondary school, students' social backgrounds should also be considered in terms of parent help and advising and peer help. These dimensions provide important but under-researched resources which can aid students' progress through the transition. Studies indicated that students supported by trusted adults are better at retaining information (Vallerand, Fortier & Guay, 1997), display better academic achievement (Boggiano, Flink, Shields, Seelbach & Barrett, 1993) and are more intrinsically motivated (Deci, Nezlek & Sheinman, 1981), although these aspects of parent support and advising were not investigated across the transition to secondary school.

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Friendship features are amongst the greatest worries for children even if making new friends is one aspect that many anticipate with excitement across the transition to secondary school (Pratt & George, 2005). But, the adaptational contribution of friendship may be also influenced however by the amount of peer help across the transition to secondary school.

## Review of the Literature

The transition from primary to secondary school has been identified by many researchers as a time of significant personal and contextual change and hence a useful starting point for examining motivational change in mathematics (Urdan & Midgley, 2003). Many studies throughout the world have addressed that issue. In the next section of this chapter the related literature is presented. The research studies are illustrated in two parts corresponding to the differences in methodologies applied by researchers that is, cross-sectional and longitudinal studies. In each part the studies that conceptualized change independently of context (context-free) are presented firstly, followed by studies examining context-specific change with the consideration of the school and social structure and their influence on students' functioning across the transition.

### *Cross-sectional Studies*

#### *Context-free Studies*

The cross-sectional study of Clayton et al. (1992) examined students' goal orientations and attributions to success and failure over grades 4 to 11. Mastery goals decreased over years 4 to 9 increasing again in year 11, whereas performance goals tended to increase especially for girls. These researchers also found that as time at school increased, students were more likely to attribute their success to the use of learning strategies and failure to lack of effort, and less likely to attribute success to ability and failure to bad luck.

Harter et al. (1992) considered the developmental trends in intrinsic vs. extrinsic orientation of students in grades 3 to 9. They found that each of the motivation dimensions changed over years from more intrinsic to more extrinsic motivation. Preference for



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challenge decreased gradually up to grade 6 and decreased sharply over the transition to secondary school with little positive change after grade 7. Curiosity and interest decreased sharply between grades 3 and 8 but increased for the grade 9 group.

Studies examined motivational change across transitions for specific subject domains, including mathematics. Rogers and his colleagues (Galloway, Leo, Rogers & Armstrong, 1995; Rogers, 1996a; 1996b) investigated the motivation of students in grades 7, 9 and 11 in English and mathematics. They found that the percentage of students exhibiting a mastery style gradually increased over the secondary school years (following a decrease over the secondary school transition), but remained higher in mathematics than in English. The reverse effect was observed for students with maladaptive styles such as learned helplessness and low self-worth.

Eccles, et al. (1993b) detailed the cross-sectional changes in the mean level of children's beliefs across grades 1, 2 and 4 in mathematics, reading, music and sports. They found that children's competence perceptions decreased in the activity domain of mathematics, reading and music but not in sports, while subjective value decreased in reading and music and increased in sports, with no change in mathematics.

*Context-specific Studies*

Midgley et al. (1995) examined the differences between elementary and middle school teachers and students using a goal theory approach. The comparisons indicated that middle school teachers and students perceived the school culture as more performance-focused and less task-focused than elementary teachers and students. In addition, elementary school teachers used instructional practices that emphasized task goals, and endorsed task-focused achievement goals for their students, more than middle school teachers. As a result, the middle school students endorsed performance goals more and task goals less than elementary school students. A perceived stress in the school on task goals predicted self-efficacy both for teachers and students, whereas a perceived stress on performance goals was unrelated to self-efficacy.

The study of Anderman et al. (2001) examined the relations between mastery and performance-oriented instructional practices and changes in students' reported valuing of mathematics and reading in third, fourth and sixth graders. The results indicated that at the student level, positive changes in students' achievement values were associated positively



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with self-concept of ability and the previous year's achievement values in both reading and mathematics. The data analysis also revealed that after controlling for prior valuing of mathematics/reading and individual difference variables, classroom practices predicted changes in students' overall valuing of mathematics and reading. Students experienced declines in the valuing of both reading and mathematics in classrooms where performance-oriented instructional practices were used. Interestingly, the use of mastery-oriented instructional practices was found to be unrelated to changes in achievement values in both reading and mathematics.

Zeedyk et al. (2003) examined the views of primary and secondary school students and of their parents and teachers in regard to the transition from primary to secondary school process. These researchers sought to determine the concerns and expectations of respondents and also to establish the extent to which the views of the four groups were in accordance with one another. The views of primary school students and their parents were highly similar reporting that the most common worries about the transition to secondary school is bullying, fears of getting lost, increased workload, peer relationships and new environments. Furthermore, teachers in the study rarely identified children's individual abilities as making a difference to the transition process, focusing instead on institutional initiatives.

### *Longitudinal Studies*

During the 1970s and 1980s, longitudinal studies were rare and only a few of them were specifically designed to examine change in motivation constructs in school settings. During this period, most studies focused on self-constructs, such as general self-concept and self-esteem (Dusek & Flaherty, 1981; Simmons & Blyth, 1987) or on perceived competence (Nottelmann, 1987). Only a few studies were concerned with other constructs such as attitudes towards school (Jennings & Hargreaves, 1981) or attitudes towards specific school subjects (Eccles et al., 1983) and peer support or classroom environment (Berndt & Hawkins, 1985).

It is very well acknowledged that the most significant longitudinal research in motivation to date begun in the mid 1980s by Eccles, Midgley, Wigfield and their associates, who conducted two large scale projects. The first project was The Michigan Adolescence Study in which they examined motivation over the transition from primary to

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secondary school across several activity areas such as mathematics, English, social activities and sports at two time points in each school year (Eccles, Wigfield, Flanagan, Miller, Reuman & Yee, 1989; Wigfield et al., 1991) as well as a more detailed study of the area of mathematics (Eccles, et al., 1993b; Feldlaufer, Midgley & Eccles, 1988; Midgley & Feldlaufer, 1987; Midgley, Feldlaufer & Eccles, 1988). The second project was the Michigan Childhood Development Study in which they examined motivation with students in grades 1, 2 and 4 in the activity domains of mathematics, reading, sports and music (Eccles, et al., 1993a). These researchers applied an expectancy-value framework of motivation and added dimensions concerning students' achievement values in several academic areas as well as teachers' beliefs and the perceptions of the classroom environment in mathematics from the perspectives of students, teachers and observers.

In the majority of the above studies the Patterns of Adaptive Learning Scales (PALS) was used. PALS has been developed and refined over time reaching its final form in 2000 by Midgley and her colleagues (Midgley, Maehr, Hruda, Anderman, Anderman, Freeman, Gheen, Kaplan, Kumar, Middleton, Nelson, Roeser & Urdan, 2000) using goal orientation theory. PALS is briefly described below since is an instrument used in this study.

PALS is comprised of 135 items used to examine the relation between the learning environment and students' motivation, affect and behaviour. Student scales assess: (a) personal achievement goal orientations (mastery, performance-approach and performance-avoid goal orientations); (b) perceptions of the teacher's goals (teacher mastery, teacher performance-approach and performance-avoid goals); (c) perceptions of the goal structures in the classroom (classroom mastery, performance-approach and performance-avoid goal structures); (d) achievement-related beliefs, attitudes and strategies (academic efficacy, academic press, academic self-handicapping strategies, avoiding novelty, cheating behaviour, disruptive behaviour, self-presentation of low achievement and skepticism about the relevance of school for future success) ; and (e) perceptions of parents and home life (parent mastery, performance goal, dissonance between home and school and neighbourhood space). Teacher scales assess: (a) their perceptions of the goal structure in the school (mastery, performance goal structure); (b) their goal-related approaches to instructions (mastery, performance approaches): and (c) personal teaching efficacy.

During the past decade, the Patterns of Adaptive Learning Scales have been used in nine school districts in three Midwestern states in the US measuring general and domain-specific perceptions (e.g., mathematics), revealing that the scales are valid and reliable



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(Midgley et al., 2000). Furthermore many other cross-sectional and longitudinal studies (for a list of selected publications using scales from PALS see Midgley et al., 2000), have used the PALS instrument indicating that the scales demonstrate concurrent, construct and discriminant validity, are reasonably stable over time, have good internal consistency and appear to operate similarly with students of different grade levels, genders and ethnicities.

More recently, others have reported longitudinal studies to examine aspects of change related to motivation. These studies are reported in detail in the next section of this chapter. The studies presented include short-term longitudinal studies (two time-point measurements, one prior and one after the transition) and long-term longitudinal studies (three or more time-point measurements).

*Context-free Studies*

The transition from primary to secondary school can be accompanied by changes in children's psychological adjustment. Some longitudinal studies have shown negative effects on children's immediate and later psychological and behavioural adjustment and a significant increase in psychological distress across the transition. Chung et al. (1998) in their short-term longitudinal study examining the patterns of individual adjustment changes during the transition to middle school reported that there was a significant increase in psychological distress following the transition. The results of their study, also indicated some differences between genders in psychological distress, with girls reporting higher degree of psychological distress than did boys.

The study of Lohaus et al. (2004) yielded a contradictory finding in comparison to the above study. Their longitudinal study examined the changes in children's psychological adjustment associated with the transition from elementary to secondary school (transition from fourth to fifth grade in Germany where the study was conducted) with two waves of measurement. In order to compare these changes with possible changes in psychological adjustment that are independent of school transition, the effects of the school break on children's adjustment over the transition from grades three to four and over the transition from grades five to six were examined in two control groups using the same methodological design. The results of the study did not indicate increases in the levels of stress experiences and symptoms as reported by the children and their parents, when children experience a school transition. In fact, the results, showed decreases in



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psychological adjustment which were comparable to those of children changing from grades three to four and from grades four to five but experiencing no school transition. These decreases were a recovery effect after the summer school break therefore it can be assumed that the time before the school break may be a stressful period for the children of all samples. The results also revealed that the general level of stress experiences and stress symptoms increases over time as the differences between children changing from grades three to four and four to five in comparison to those changing from grades five to six, before and after the school break indicate. Thus, the increases may be spiral-like over grades with periods of relaxation which do not outweigh, however the stress experiences and stress symptoms produced by increasing performance demands over time.

Similarly, the study of Lipps (2005), in which students were interviewed once prior and once after the transition indicated that the transition from an elementary school to a middle school or to a comprehensive high school (staying in elementary school and transfer to a high school around the age of 14 or 15) in Canada had little systematic association to students' academic outcomes. Similarly, transferring to a middle school had little negative association to adolescents' emotional and behavioural outcomes. On the contrary, transferring from an elementary school to a comprehensive high school appeared to have some negative emotional consequences such as the increase of symptoms of physical stress. These physical stress symptoms appeared to be greater for girls.

Other studies examined the change of self-perceptions such as self-concept, self-esteem and self-competence over the transition to middle school. In the short-term longitudinal study of Zanobini and Usai (2002), self-concept was treated as a multidimensional construct consisting of social self-concept, competence self-concept, academic self-concept and physical self-concept. These researchers explored the changes in specific aspects of self-concept, aspects of motivation (intrinsic, extrinsic motivation and amotivation) and school achievement after the transition from primary to secondary school. Of special interest was the examination of the changes in self-concept and motivation that remain after an initial period of adaptation to the new school environment (the second measurement took place six months after the transition) and the identification of the components of self-concept and motivation that have the larger effect on academic achievement. The results of the study indicated that the aspect of self-concept that was directly affected (declined) by the transition was the academic self-concept. The other domain-specific self-concepts (social and physical self-concept) remained stable during the transition. Students' competence self-concept declined temporarily following the impact

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with the new setting and then recovered completely in a few months. Intrinsic motivation and school grades declined after the transition. Finally, the results indicated that the academic self-concept and the competence self-concept were correlated significantly with school grades, whereas school grades did not appear to correlate with the different motivational aspects.

The short-term longitudinal study of Rudolph et al. (2001) examined the role of maladaptive self-regulatory beliefs as vulnerability factors for academic and emotional difficulties during the transition to middle school. In this study, two cohorts of students' participated: the one cohort experienced the transition from primary to secondary school, whereas the second did not experience a school transition. The results of the study revealed that maladaptive self-regulatory beliefs (such as decreased perceptions of academic control and importance) were more strongly predictive of increases in perceptions of school-related stress and depressive symptoms over the course of the middle school transition but were not associated with academic and emotional difficulties in adolescents who remained in a stable school environment.

Lepper, Corpus and Iyengar (2005) examined age differences in intrinsic and extrinsic motivation from 3$^{rd}$ to 8$^{th}$ grade children. The results of the study indicated that intrinsic motivation showed a significant linear decrease from 3$^{rd}$ through 8$^{th}$ grade and proved positively correlated with children's grades at all grade levels. Extrinsic motivation showed few differences across grade levels and proved negatively correlated with academic outcomes.

Specifically for mathematics, Rogers, Galloway, Armstrong, Jackson and Leo (1994) examined motivational style and motivational orientation over the transition from primary to secondary school once before and once after the transition, in two subject areas (mathematics and English). With respect to motivational style, the percentage of students exhibiting mastery style decreased and that of the two maladaptive styles (ego and work avoidance) increased. Task, ego and work avoidance orientations in mathematics increased over the transition, with only ego orientation increasing in English. The relationship between ego orientation and work avoidance was stronger after the transition for both subjects.

Pajares and Graham (1999), in their two-wave longitudinal study, examined the extent to which mathematics self-beliefs (task-specific self-efficacy, domain-specific self-concept, self-efficacy for self-regulated learning and value of mathematics) begin to change during the first year of middle school. The results showed that by the end of the



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first academic year in middle school, students described mathematics as less valuable and they reported decreased effort and persistence in mathematics. The only variable that did not decrease during the year was students' mathematics self-concept, suggesting that students' domain-specific mathematics beliefs had not been altered.

The longitudinal studies of Wigfield et al. (1991) and Wigfield and Eccles (1994), examined the change across the junior high school transition in early adolescents' general self-esteem, as well as changes in their competence beliefs and subjective valuing for mathematics, English, social and sports activities. These variables were assessed at two time points before students made the transition to junior high school and two time points after the transition. The results indicated that students' self-esteem decreased immediately following the transition and increased during the first year in middle school, although it remained lower in the end of the first year in middle school than in the end of the last year in primary school. Children's competence beliefs became more negative across the first year in middle school as students gained more experience with the different kinds of teaching practices characterizing middle school. Math importance decreased over time with the largest change coming between the first and the second measurement during the first year in middle school, indicating a strong transition effect, whereas students' interest in mathematics activities declined steadily. The results of the Wigfield et al. (1991) study indicated gender differences with boys reporting higher self-esteem than girls across the elementary to middle school transition. They found also gender differences in self-concept of ability with higher self-perceptions for boys in sport and mathematics and for girls in English. The results of the study also indicated that the pattern of change in students' self-concept of ability in mathematics over the transition to high school differed by ability level. The students rated as high in mathematics ability showed a greater decrease over the transition than the students rated as average, and the low ability students showed an increase in self-concept of mathematics over the transition.

The study of Watt (2004) examined the development of adolescents' self-perceptions, values and task perceptions in $7^{th}$ through $11^{th}$ grade in two subject domains: mathematics and English. The results of the study indicated that self-perceptions and values declined through adolescence and ratings about difficulty and effort required increased. Gender differences favoured boys for mathematics and girls for English.

The study of Jacobs, Lanza, Osgood, Eccels and Wigfield (2006) examined the changes in children's self-competence and values across grades one through twelve within the domains of mathematics, language arts and sports. The results indicated that self-



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perceptions of competence and subjective task values declined in all domains as children got older. Furthermore, change in competence beliefs accounted for much of the age-related decline in task values.

Fredricks and Eccles (2002) investigated changes in children's competence and value beliefs in mathematics and sports from the beginning of elementary school (1st grade) to the end of high school (12th grade). Their analyses indicated that children's self-perceptions declined from 1st to 12th grade indicating a consistent downward trend. Gender differences in competence and value beliefs were found, with boys reporting higher ability and value of mathematics and sports than girls. This gap was found to decrease over time in mathematics, whereas in sports it remained relatively stable from childhood to adolescence.

The long-term longitudinal study of MacCallum (1997), examined motivational change over the transition from primary to secondary school and over the transition from one grade level to the next within primary school in two subject areas: English and mathematics. The results indicated that task orientation increased over the within-primary transition but was stable over the transition to secondary school, whereas work avoidance and extrinsic-factor beliefs decreased within primary school and increased over the secondary transition. Over both the transition within primary school and the transition to secondary school, students' theories of success were dominated by task goals and beliefs that success is caused by interest and effort, trying to understand, and using strategies. However, over the transition to secondary school these theories were tempered by wanting to invest less effort and the belief that extrinsic factors (such as the teacher liking them, behaving nicely and having neat work) are important causes of success. In order to provide a further elaboration of motivational change concerning individual students, MacCallum (2004) interviewed ten students twice: in their last year of primary school and in their first year of secondary school. The interviews indicated that students with different goal patterns focused on different aspects of the transition. Students with task and ego goals mainly focused on aspects about themselves and the students expressing social goals focused on issues concerning relationships with their peers or the school facilities which facilitated interaction with peers.

Examining the development of intrinsic motivation in four subject domains (mathematics, science, reading and social studies), Gottfried et al. (2001) indicated a decline of academic intrinsic motivation for mathematics, science and reading and an absence of decline for social studies. Although this study was not focusing on the transition



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to secondary school per se (it examined motivation from childhood through late adolescence when children were 9 to 17 years old) it provided evidence of the decline in intrinsic motivation in mathematics across adolescence showing at the same time that the greatest decline among all four subject domains examined occurred in mathematics. In the study of Gottfried et al. (2007) the longitudinal relationship between academic intrinsic motivation in mathematics and mathematics achievement among participants aged 9-17 year was examined. The results indicated that both motivation and achievement in mathematics decrease over time. Furthermore mathematics achievement was found to be a significant contributor to the developmental decline in intrinsic motivation in mathematics from childhood through adolescence. In addition, academic intrinsic mathematics motivation was found to be related to initial and later levels of mathematics achievement. Therefore, children's level of mathematics achievement as early as age 9 is a significant factor for their ultimate level of achievement as well as motivation through the end of high school.

*Context-specific Studies*

A number of studies documented changes in students' motivation as they move from elementary to middle level schools. These changes have been linked to changes in the school and classroom environment, with researchers suggesting that there may be systematic differences between typical primary and secondary classrooms and schools and that these differences may account for some of the motivational changes seen among early adolescents as they make the transition into secondary school. Eccles and Midgley (1989) concluded that students show lower achievement motivation after the transition to a junior high school or middle school. However, they found that this drop in motivation depended on the school and the classroom environments of the schools the students attended.

Kvalsund (2000) examined students' perceptions of the transition from primary to secondary schools through interviews. The results of the study indicated that the transition to secondary school is to a small degree a transition to a more demanding learning situation. The transition to secondary level appeared to take time with the students reporting that it took them until the middle of the second term before things begun to fall into place.

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Similarly, Pietarinen (2000) examined students' perceptions of the transfer to secondary school and the ways in which students' experiences of schooling can contribute to the development and planning of an undivided school system. The results of the study showed that students were able to assess the qualities of their school as a learning environment and to cope with the changes that result from the transfer to secondary school. Pupils were also ready to participate in developing a more unified school system, but expressed their school experiences in a manner reflecting their developmental stage of adolescence and the prevailing school cultures.

Sirsch (2003) examined children's concerns and expectations about the new school prior the transition to secondary school in terms of a perceived challenge and threat. The analyses revealed that the majority of the students felt that the new school represents an academic and social challenge for them, whereas half of the children saw the transition to secondary school as a threat concerning the academic domain and fewer students viewed it as a social threat. In addition, self-worth, anxiety and predictability of new school situation and academic achievement in primary school were found to be predictors of the perceived threat with regard to the transition to secondary school.

Blumenfeld (1992) suggested further that the content within the classroom and the school environment may be important, pointing to the need of further research on student motivation that carefully describes the classroom and school environment and explores the possibility that students may react differently to similar classroom and school structures (Mizelle, Hart, Pate, Jordan, Matthews, Matthews, Scott, Brown, Christian, Hardy & Porter, 1993).

The study of Barber and Olsen (2004) examined patterns of change in the perceived school environment and youth's academic, personal and interpersonal functioning and the extent to which the perceived change in the school environment predicted changed youth functioning across grades 5 through 9. Across these grades four consecutive transitions emerged, two of which involved the transition to a new school (from primary to secondary school across $5^{th}$ to $6^{th}$ grade and from secondary to high school across $8^{th}$ to $9^{th}$ grade). These researchers indicated that youth reported decreased quality of the school environment and decreased academic/personal/interpersonal functioning at every grade transition. This pattern was most pronounced at the transition from $6^{th}$ to $7^{th}$ grade, a transition that did not correspond to the transition to middle school but did correspond to the move from small family ponds during the first year of middle school to the more typical middle school environment in $7^{th}$ grade. The results of the study also indicated that



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perceived change in several elements of the school environment (most strongly perceived change in teacher support) significantly explained changes in the levels of student academic, personal and interpersonal functioning.

Recently researchers have been considering the relation between students' perceptions of the goal structures in their classrooms and their personal motivational traits and constructs. In some classrooms, policies and practices are perceived as emphasizing competition and the demonstration of ability relative to others (performance goal structure), whereas in others the perceived emphasis is on task mastery, improvement and intellectual development (task goal structure). The two-wave longitudinal study of Anderman and Midgley (1997), examined changes in students' perceptions of the classroom goal structure, in motivation variables (personal achievement goals and perceived academic competence) and in year-end grades as students move from elementary to middle school in two subject domains (mathematics and English). The results of the study indicated that students perceive that their classrooms stress relative ability more and mastery and improvement less after they moved to middle school. In addition, these students reported endorsing personal task goals less after the transition than they did before the transition to middle school. As far as the perceived academic competence is concerned, there was a dramatic decline in the perceived academic competence after students moved to middle school. The strong decline in perceptions of competence for high ability students suggested that high ability students appear to be particularly vulnerable to declines in perceptions of academic competence across the transition. In the study of Anderman and Midgley (1997) there was no significant effect for grades over time, suggesting that grades do not uniformly decrease over the transition for all students. However, there were found complex relations among year, ability and gender, revealing a decrease in grades for low ability females and high ability males, and an increase in grades for high ability female students.

Although previous research has demonstrated that students in elementary school perceive their classrooms to be more mastery goal oriented and less performance oriented than their middle school classrooms, there are undoubtedly some students who perceive little difference in the goal structure of their classrooms before and after the transition. There are also likely to be some students who perceive a greater emphasis on mastery goals or a lesser emphasis on performance goals after the transition to middle school.

The longitudinal study of Urdan and Midgley (2003) examined whether changes in students' perceptions of the mastery and performance classroom goal structures were



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associated with changes in their motivation (personal achievement goals, self-efficacy), affect (positive and negative affect at school) and performance at the general level and to the mathematics domain, both when making the transition from elementary to middle school and within the first two years of middle school. The results showed that the association between changes in the perceived classroom goal structure and changes in motivation, affect and achievement were stronger and more consistent in those analyses involving the classroom mastery goal structure than the classroom performance goal structure. Specifically, the results suggested that whereas a perceived increase in the mastery goal structure from one year to the next had benefits, the costs associated with a perceived decrease in the mastery goal structure were even stronger. The strongest results were associated with a perceived decrease in the classroom mastery goal structure. The results also revealed a significant difference between boys and girls in their membership in the mastery goal structure change groups from elementary to middle school, with boys being slightly over-represented in the mastery-decrease group and girls being slightly under-represented in this group.

The longitudinal study of Anderman and Midgley (2004) examined the changes in self-reported academic cheating in mathematics across the transition from middle to high school. These researchers specifically examined the effect of the classroom environment (in terms of the motivational goal structures perceived by students in their classrooms) on cheating behaviour. The results of the study indicated that self-reported cheating increased more after the high school transition than before the transition. Additional analyses of the survey data indicated that self-reported cheating in mathematics increased for students who moved from high mastery to low mastery-oriented classes after the transition and for students who moved from low performance to high performance-oriented classes. In contrast, self-reported cheating decreased for students who moved from low to high mastery-oriented math classrooms.

Other studies examined differences regarding the teachers across primary and secondary school, such as the level of support provided by the teacher, the instructional practices that are used and the teachers' efficacy beliefs. The study of Midgley, Feldlaufer and Eccles (1989a), examined the relation between students' beliefs in mathematics (students' expectancies, perceived performance and perceived task difficulty) and their teachers' sense of efficacy before and after the transition to middle school. The results indicated that the rate of change within the school year in students' expectancies, perceived performance and perceived task difficulty in math differed at the last year of primary

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school and at the first year of secondary school depending on teacher efficacy before and after the transition. More specifically, students who moved from high-to-low efficacy math teachers during the transition ended the middle school year with the lowest expectancies and perceived performance (even lower than students who had low efficacy teachers in both years) and the highest perceptions of task difficulty. On the contrary, students who moved from low-to-high efficacy math teachers during the transition ended the middle school year with the highest expectancies and perceived performance and the lowest perceptions of task difficulty.

Eccles et al. (1989) examined the relationship between students' mathematics self-concepts of ability and their teachers' rating of their mathematics ability after the transition to junior high school. On the contrary of what it was expected, these researchers found no change in the relationship after the transition. The finding of a stronger relationship towards the end of the first year in high school supported the notion that students' self-concepts of ability increase in accuracy (closer to their teachers' estimates) with age. These researchers also examined gender differences in terms of individual differences and found that the relationship was stronger for boys than for girls on each measurement occasion. This was interpreted as boys' ability self-concepts being more closely tied to indicators of their school performance.

Eccles and her associates (Eccles et al., 1993b; Feldlaufer et al., 1988; Midgley & Feldlaufer, 1987; Midgley et al., 1989a; 1989b) found that students were more aware of comparing their abilities relative to others after the transition, but thought that the elementary school was more competitive with respect to students trying to be first to answer questions or to be the first who finish class work. This latter finding may have more to do with the perceived teacher-student relationship than with competition per se as students thought their middle school teachers cared less about them, were less friendly and graded them less fairly than their elementary school teachers. Students perceived their elementary school teachers treated students more differentially and criticized them more often for poor work. Although students thought that their middle school teachers liked mathematics more than they thought their elementary school teachers did, the latter tried harder to make mathematics interesting for students and told them why mathematics was important more than their middle school teachers.

In the analysis of the Eccles et al. transition study (1993b) particular changes in the characteristics of students' classroom environments were linked to changes in their task value and competence perceptions. These researchers found that students who moved from



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the mathematics classroom of a high-support teacher (with respect to friendliness and fairness) to a classroom of a low-support teacher, showed a decrease in their ratings of the intrinsic value and the perceived usefulness and importance of mathematics, whereas students who experienced a change from low-to-high support teacher showed an increase in their ratings of intrinsic value. Also, if students moved from a classroom where the teacher had high efficacy to one where the teacher had low efficacy, the students developed lower expectancies for success in mathematics, lower perceptions of their performance in mathematics and higher perceptions of the difficulty of mathematics than students who experienced other changes in teacher efficacy. This analysis assumed that all students in the same classroom perceive the classroom environment in the same way. This is not necessarily the case and recent research in the area of students' perceptions of classroom environments added credence to the view that students do not all perceive the same environment in the same way at least on some dimensions. Other research by Eccles and her associates also provided evidence of different interpretations within the same classroom environment. In their longitudinal study of the perceptions of the students, the teacher and independent observers in the same mathematics classrooms, Feldlaufer et al. (1988) found that these perceptions differed considerably across the groups. A limitation of this research was that the students were treated as a single homogeneous group, not as individuals.

The Longitudinal Study of American Youth (Rice, 1997) aimed at identifying the specific discontinuities that aggravated the transitional experience and at discovering the support structures that buffered the effect of the transition from middle to high school on the mathematics and science progress of students. The findings indicated that decreases in safety and quality of the learning environment had significantly negative effects on achievement across the transition for both mathematics and science. A decrease in the degree to which teachers pushed students to achieve had a positive effect on student progress and an increase in the level of autonomy granted to students and their parents to choose courses had a negative effect on student performance. Also the results indicated that students from more stable and supportive home environments showed less academic difficulty as they progressed through the transition. Finally, the study indicated the need for supplemental programming during the transition between middle and high school levels.

Ferguson and Fraser (1998) used learning environment variables in investigating changes occurring as students transfer from primary to secondary school, including the role

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of student sex and school size path way in a short-term longitudinal study. The results indicated that although the classroom climate in secondary schools was perceived more favourably than in primary schools (especially in terms of less friction and competitiveness), the quality of teacher-student interaction was perceived to deteriorate. Furthermore, changes in environment perceptions across transition varied with sex and school pathway. Perceptions of class satisfaction across transition deteriorated for girls but improved for boys, whereas the least favourable changes were found for students moving from small primary schools to either medium or large secondary schools.

Studies also focused on the continuity of the mathematics curriculum across the transition to secondary school. Sdrolias and Triandafillidis (2008) examined the discontinuities and continuities in the teaching of geometry between primary and secondary school. They indicated that the transition to secondary school did not encourage the construction of mathematically connected ideas in geometry and that the logical steps that lead to rigor in secondary school are stripped from children's past experiences from primary school.

Other studies focused on the differences in the organizational structure of the classrooms across the transition to secondary school. The study of Pointon (2000) involved interviewing thirteen students at the end of their first year at secondary school about their preferred learning environments and their perceptions of the main differences between classroom environments in primary and secondary schools regarding four topics: freedom of movement, room, seating and classroom display. As far as moving around is concerned one of the main difference in students' experiences of the physical environment of their new schools, was studying different subjects in different classrooms and the consequent movement around school it entailed. The majority of students in the study indicated that they liked moving from classroom to classroom for a variety of reasons such as the changes in the social environments, the sense of becoming "professional students" which strengthened their sense of different subjects and the different learning styles associated with them and the feeling of freedom. Despite the above advantages, the students in the study confirmed their feelings that in secondary school there were no spaces they felt were their own. Students were also clear about which rooms in secondary schools they did not like working in, mentioning size, temperature, colour and tidiness as contributing to the quality of the working environment. Specifically for the mathematics room, students stated that it was dense and stuffy, concluding that that was the reason they didn't like mathematics. Regarding the classroom displays, the students mentioned that a key

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difference between the primary and secondary school was that of ownership of the classroom environment. In primary school the students felt that the classroom was "theirs", whereas in secondary school the classroom arrangement was up to the teacher. Finally for seating, students reported that the secondary school offered the possibility not only of experiencing a range of different seating patterns during the school day (sitting with other students and working effectively together) but also for independence (the chance to sit alone).

Midgley and Feldlaufer (1987) examined student and teacher perceptions of actual and preferred student decision-making opportunities in mathematics classrooms once before and once after the transition to secondary school. This study indicated that students and teachers perceive fewer actual student decision-making opportunities after than before the transition. Furthermore, students expressed a preference for more decision-making opportunities while teachers believed students should have fewer opportunities after than before the transition. Lastly the results of Midgley and Feldlaufer's study showed that the congruency between students' actual and preferred perceptions decline after the transition while teacher perceptions both before and after the transition were highly congruent

The focus of all the above research has been on characteristics of the academic environment of schooling. However, students' social perceptions and goals can also be expected to influence their motivation within a new school setting. Particularly during early adolescence, students' perceptions of the social context of their schools also may be important influences on their academic goal orientations. Few empirical studies have examined social and achievement motives simultaneously.

Indicators of students' achievement motivation have been associated with their sense of school belonging (Goodenow, 1993) and with their endorsement of social responsibility goals (Hicks, Murphy & Patrick, 1995; Patrick, Hicks & Ryan, 1997). Students who reported a sense of belonging were shown to have higher levels of achievement motivation, although in goal theory terms it is not clear whether such motivation reflects an orientation toward task or ability goals. Students' endorsement of social responsibility goals also may be related to their achievement motivation (Wentzel, 1991). Students who reported high levels of pursuing responsibility goals have been shown to receive higher grades in school (Wentzel, 1993).

The longitudinal study of Anderman and Anderman (1999), examined the hypothesis that the decline in students' achievement motivation across the transition to middle school may be explained not only by the characteristics of the academic



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environment (classroom goal structure) but by the characteristics of the social environment of the new school as well (sense of belonging, endorsement of social responsibility goals or peer relationships and status goals). Their study examined the extent to which students' perceptions of the classroom goal structure, school belonging and social goals predicted changes in their personal goal orientations. The findings of the study supported the notion that students' perceptions of the goals emphasized in the classroom predict their adoption of personal goal orientations. Students reported lower levels of task goal orientation following the transition to middle school. The study also indicated that students' social perceptions made significant unique contributions to their achievement goal orientations. More specifically, feeling a sense of psychological belonging in one's school and the endorsement of social responsibility goals were associated with an increased focus on academic tasks and predicted an increased task goal orientation, whereas endorsement of social goals for forming peer relationships and maintaining social status were associated with an increased focus on the self and predicted an increased ability goal orientation.

Tobbell (2003) allowed to the subjects of the transition process, the children themselves, to talk about what happened to them and how they felt about it. Whilst a few of the participants had experienced the process as being very positive, the majority of them did not. The students reported that relationships were extremely important and that the structure of the secondary school seemed to work against the development of effective learning relationships.

The study of Berndt and Mekos (1995) examining adolescents' perceptions of the stressful and desirable aspects of the transition to secondary school in three waves of measurement (one prior and two after the transition) yielded contradictory to the above findings. Their results indicated that students' made more positive than negative comments about secondary school at all three times, which suggests that they perceived the transition as more desirable than stressful. In examining individual differences, these researchers indicated that sixth grades who engaged in more misconduct were less concerned about moving to secondary school. However, after entering seventh grade, they perceived the new school less positively than other students. Also, it was found that sixth graders higher in achievement were more concerned about moving to a new school; but once there, they viewed the new school more positively than other students.

Furthermore some studies focused on the influence of students' social environment outside of school on motivational change across the transition to secondary school. In these studies the focus was on parents and peers.



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The study of Wargo-Aikins et al. (2005) examined the influence of pre-transition friendship and self-system characteristics on secondary school transition adjustment. Transition adjustment was defined in terms of youth's post-transition friendship quality, emotional distress and school adjustment. The results of the study indicated that pre-transition friendship characteristics were directly linked with both post-transition friendship quality and school adjustment, while youth's self-system made additional unique contributions to the prediction of youth's emotional distress and school adjustment.

Berndt and Hawkins (1985), investigated the contribution of friendships to children's adjustment once prior and twice after the transition to secondary school. Their analyses indicated that students' competence beliefs, their social self-esteem and their attitudes toward school decreased significantly after the transition to secondary school and did not increase across seventh grade. Although students reported fewer close friendships after the transition than before, the quality of student friendships seemed to increase after the transition. Furthermore, there were no significant correlations between friendship stability and the measures of adjustment but there were significant correlations between measures of friends' context and closeness and measures of adjustment. These findings suggested that the formation of close friendships during the early part of seventh grade could contribute to students' adjustment.

The study of Weller (2007) examined the significance of change and continuity in children's friendships across the transition from primary to secondary school. The results indicated that those children who transferred to a new school either with a stable base of bonds or with the confidence to make new friends were more able to expand their social networks in secondary school. Similarly, the study of Wargo-Aikins et al. (2005) revealed that the influence of quality and maintenance of friendships across the transition to secondary school on youth's post-transition cognitions and behaviour appeared to bolster their ability to meet transition challenges and take advantage of new opportunities.

The study of Gutman and Eccles (2007) examined the contribution of family relations to adolescent outcomes (depression and self-esteem) during adolescence. Their analyses indicated that negative family interactions as well as positive identification with parents were highest in early adolescence. Furthermore these researchers found that more negative family interactions were related to more depression and less self-esteem, whereas more positive identification was related to less depression for adolescents.

The study of Schneider et al. (2008), examined how pupils' school bonding and academic motivation changed after the shift in the educational environment across the



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transition to secondary school. These researchers were concerned with the relative contributions of social support and negative interactions with parents and peers to school bonding and academic motivation after the transition to secondary school. The results of their study indicated that school bonding and academic motivation declined sharply after the transition and that social support by parents, but not friends, was a predictor of school bonding and academic motivation. Support by a friend did not generally compensate for negative relationships with parents, however a positive relationship with one parent compensated for negative interactions with the other parent. These findings suggested that parental social support has a unique function in bolstering school bonding and academic motivation after the transition to secondary school.

In examining students' perceptions of the types or amount of support they received from parents, friends and teachers and whether or not different types of support (informational, tangible, emotional and social companionship) mediated secondary school transition, Kurita and Janzen (1996) applied a long term methodological design with one measurement before the transition and two measurements after entering secondary school. They found that parents provided more tangible support than teachers and friends and more emotional support than teachers. Furthermore, they indicated that informational support from friends best predicted social adjustment to seventh grade, a finding which suggests that having friends who provide help coping with problems is an important predictor of group interaction and social adjustment.

Cook, Herman, Phillips and Settersten (2002) examined ways in which schools, neighbourhoods, families and friendship groups jointly contribute to positive change during early adolescence. Their two-wave longitudinal study was not conducted across the transition from primary to secondary school but across the transition from the first to the second grade in middle school. Analyses revealed that each of the four contexts facilitated individual change in a success index that tapped into student academic performance, mental health and social behaviour. The study also revealed that the combination of all four contexts results in a large effect size. As early adolescents moved through middle school they came to fail in almost one more domain on the average. However, students living in four consistently better contexts did not really experience this normative decline, whereas adolescents living in four consistently worse contexts did worse over time.

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## Summary

In the first part of this chapter the different perspectives on motivation were presented and the Personal Investment Theory which provided the theoretical background of the study was illustrated in detail. This theory is a conceptualization of goal approaches in motivational research and it was selected because of the multidimensional consideration of motivation and of the consideration of the environment either at school or at home. In this way, a broader conceptualization of motivational change and of the interaction between motivation, classroom culture and students' social background across the transition to secondary school can be formed.

School transitions have become the focus of a number of cross-sectional and longitudinal studies examining students' motivational change. Especially the transition from childhood to adolescence was identified as a time of personal and contextual change and hence a useful starting point for examining motivational change. As the transition from primary to secondary school often occurs at this time, many studies examined students' motivation as they progress from elementary to secondary school. These two contexts were found to be different by many researchers in terms of their organizational, instructional and climate culture. The differences between the environments of primary and secondary schools highlighted by the literature were also presented in this chapter.

Lastly the studies examining motivational change across transitions and especially across the transition from primary to secondary school were also reported. These studies operationalized motivation in very different ways including various motivational constructs, whereas other studies elaborated on the impact of school, classroom and social structures on students' motivation and motivational change over that systemic transition.

Based on the literature review one can identify the need for further examination of motivational change through the consideration of (a) motivation as a multidimensional construct, (b) the cognitive and social aspects of the classroom culture, and (c) the students' social background perceptions. Furthermore, the review of relevant studies in examining motivational change in transition contexts indicated that the area of the examination of the fit between the actual and the preferred classroom environment in mathematics is under-researched. Drawing on person-environment fit theory the examination of the fit between students' perceptions of the actual and the preferred classroom environment is important, since this lack of fit could account for some of the declines in mathematics motivation seen across the transition to secondary school.



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# CHAPTER III

# METHODOLOGY

## Introduction

In this chapter the methodology used in the study is presented. The research design is described followed by a discussion of general methodological issues such as the participating students, the research methods and the data analysis.

This study involved the analyses of quantitative and qualitative data. The quantitative data were collected through administered questionnaires, whereas the qualitative data through semi-structured interviews. The interviews were designed in order to elaborate information from the questionnaires and to complement the information gained from the analyses of the group data. According to Tashakkori and Teddlie (2002), in the modern social sciences the application of a single research methodology is not enough in order to address a study's research questions. Rather a multiple research design involving quantitative and qualitative methodologies is more adequate.

## Design of Study

The study was longitudinal in design and aimed to examine student motivation in relation to school context. Change in students' motivation over different school contexts was investigated by including three cohorts of students: one cohort who made the transition from one school context to the next, that is from primary to secondary school (Cohort T-CT), and two cohorts who moved from one grade level to the next within the same school context (within primary school for Cohort E-CE, and within secondary school for Cohort S-CS). Change in students' motivation across the time of school year was investigated by gathering questionnaire data at four time points: eight months into the first school year under investigation (in April of 2006), two months into the second school year (in October of 2006), five months into the second school year (in January of 2007), and eight months into the second school year under investigation (in April of 2007). The exact timing of the

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measurements was based on the organization of the school year in combination with the Phase Model of Transitions by Ruble (1994) explained in detail in chapter II. More specifically, the school year in Cyprus begins in early September and ends in late June, and is divided in three terms. In primary school the first term is generally a setting-in period usually with a new teacher, whereas the second and third terms are the periods of most intensive work. In the first year in secondary school, however, it is possible that the setting-in period would extend over the first and second terms. Furthermore, in secondary school formal school reports are sent home at the end of each term, whereas in primary school the information regarding students' performance is informal. Therefore, having a measurement in each trimester in secondary school would help to examine motivational change as it unravels, that is not only right after the transition but across the first year in the new school setting as well.

The analyses were carried out on data from those students who participated throughout the whole period of the research study. The participants who were not present on all four occasions were excluded from the longitudinal analyses. That issue posed a methodological dilemma. To include only the students who participated throughout the project would effectively remove a rich array of information but to include everyone would add to the complexity of the analyses and the discussion of results. The latter point prevailed.

The main data set was self-report data that was collected through questionnaires administered to students. There is some discussion about the validity and reliability of data collected by such means (McCallum, 1997), but in order to find out what others feel and think, asking questions through questionnaires is one of the few means available. The inclusion of semi-structured interviews with a small number of students making the transition from primary to secondary school, addressed some issues of the validity of the questionnaire data. The selected students were interviewed once, four months after the transition to secondary school (in December of 2006).

## Participants

Three cohorts of students participated in the longitudinal study. Students in CT experienced the transition from the last year of primary school to the first year in



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secondary school over the time of the study. In Cyprus where the study was conducted, the transition to secondary school occurs after grade 6 (that is from grade 6 to 7), when the students are 12 to 13 years of age. Students in CE were studied across the transition from the second last year of elementary school to the last year of elementary school (grade 5 to 6), whereas students in CS were studied over the first two years in secondary school (grade 7 to 8). Although the transition from elementary to secondary school was the major research interest, the other two cohorts were included to provide comparative information and to take account of cohort effects. Table 3.1 presents the number of students in each cohort with full data sets for the four waves of measurement.

Table 3.1

*Number of Students in Each Cohort by Gender*

| COHORT | BOYS | GIRLS | TOTAL |
|---|---|---|---|
| CT | 97 | 123 | 220 |
| CE | 22 | 20 | 42 |
| CS | 26 | 43 | 69 |

All the students participating in CT were drawn from two secondary schools (one urban and one suburban school) and all the five primary schools feeding those secondary schools. Students in CE and CS were drawn from the same primary and secondary schools as the students in CT. Permission was obtained from the Ministry of Education and Culture to approach the principals of the schools, all of whom agreed to participate in the study.

Eight students (four boys and four girls) from CT were selected for individual interviews. As the interviews were designed to explore more fully students' views of the change in their motivation in mathematics and of the influence of the school culture on their motivation, there were two bases for the selection of the students to be interviewed. The first was students' gender, and the second was their responses to the Motivational Goal Orientations scale included in the survey questionnaire.

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## Research Methods

There were two main methods of collecting data, the survey questionnaire and the interview. The survey questionnaire was used to collect quantitative data and assessed the selected variables for a representative group of students in specific school contexts. A copy of the research questionnaire is presented in Appendix A. The individual semi-structured interview was designed to explore more fully the interrelationships and contexts for a selected group of students and therefore collected qualitative data.

### *Instrumentation*

All the scales comprising the questionnaire administered to students were adapted from instruments used in previous cross-sectional and longitudinal studies. These instruments included the: (a) Inventory of School Motivation questionnaire-ISM which includes the Facilitative Conditions Questionnaire-FCQ (McInerney & Sinclair, 1991; McInerney, et al., 2000), (b) Patterns of Adaptive Learning Survey-PALS (Midgley et al., 2000), (c) Student Classroom Environment Measure-SCEM (Eccles et al., 1993b), and (d) Individualized Classroom Environment Questionnaire-ICEQ (Fraser, 1990). All the above questionnaires have been used in many studies, revealing that the scales have discriminate validity, are reasonably stable over time, have good internal consistency and appear to operate similarly with students of different grade levels, genders and ethnicities (Eccles et al., 1993b; Fraser, 1990; Goodenow, 1993; McInerney et al., 2000; Midgley et al., 2000; Wheldall, Beaman & Mok, 1999). The scales selected and adapted from each of the above questionnaires are described in the next section of this chapter where the variables of the study are presented in detail.

### *Procedure for the Questionnaires*

After permission was obtained from the school principals, the teachers of mathematics were supplied with a brief outline of the purpose of the study and the types of questions to



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be asked in both the questionnaire and the interviews. A brief letter was sent to students' parents explaining the purpose of the research. The students' parents completed a reply slip indicating if they wanted their child to participate in the study. Less than 3% of the parents returned the slip withdrawing their child from the research.

As the same students completed the questionnaires on a number of occasions, it was necessary for them to write their names on each questionnaire. This meant that the students weren't going to be anonymous as it has been the case in most of the other research on motivation when the data was collected on only one occasion. It was explained to students that their name was necessary in order to match the questionnaires they would complete on different occasions. The students were assured that their answers would be confidential and that nobody at their school would see their individual answers. Teachers would be given a summary of the results for their own classes if they wished, but no details of individual responses.

On each measurement occasion, questionnaires were completed in two 40-minute sessions in class group. It was explained to students that there were no right and wrong answers to the questions and that often different people have different ideas and that they might have different ideas to the person next to them. They were asked to give their own perceptions and to be as honest as they could. The rating system was explained with some worked examples. Students were shown how to change an answer if they changed their minds.

*Procedure for the Interview*

In order to explore further the analysis of the group data, semi-structured interviews were undertaken. Eight students (4 boys and 4 girls) who experienced the transition from primary to secondary school (CT) were selected for individual interviews.

The students were selected for the interviews on the basis of their gender (in order to examine whether students' motivational change perceptions differ by gender) and on the basis of their responses to the Motivational Goal Orientations scale included in the survey questionnaire. This particular scale focused on four types of goal orientations: (a) a mastery, indicating how much students valued motivation for the learning of mathematics; (b) a performance-approach orientation, measuring students' performance in terms of



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demonstrating ability; (c) a performance-avoid orientation, indicating how much performance-oriented students were in terms of their need not to demonstrate lack of ability; and (d) a social goal orientation, measuring students' perceptions of how much socially-oriented they were. This particular scale formed the criterion for the selection of the participating students because it allowed a multiple goal orientations perspective to be examined. More specifically, the Motivational Goal Orientations scale considered the approach-avoidance distinction and its central place in the conceptualizations of motivation. According to Elliot & Covington (2001), "the distinction between approach and avoidance motivation has deep intellectual roots, is instigated immediately in response to most stimuli humans encounter and concords with the intuitively based knowledge of how humans are motivated in their daily lives" (p. 82). Furthermore, the inclusion of a social orientation dimension allowed the drafting of a more complete picture of the students' motivational change stories, since students' social perceptions were found to influence their motivation within a new school setting and thus are a significant part of motivation (Anderman & Anderman, 1999).

All the students were interviewed once, nearly four months after the transition to secondary school (two months after the students in CT completed the survey questionnaire at wave 2). This time point was selected because it allowed the examination of motivational change as it unfolded, since by that time the fundamental knowledge about the new environment had been acquired and the immediate effect of the transition on students' motivation was no longer present. Furthermore, at the time of the interview students had just completed a full trimester in secondary school and received their first secondary school report.

For all the participating students, a suitable interview time was arranged and the interview was conducted individually in a room at their own school. All interviews were audio taped and later transcribed. Prior to the interview, letters were sent to the parents of the selected students requesting permission for an interview with the student during school time. Permission slips were returned from all the selected students.

As the main aim of the interviews was to examine students' different perceptions of motivational change, students' expressing different patterns of change in their goal orientations were chosen for the in-depth qualitative study. Therefore, according to the changes in students' motivational goal orientations as they were tapped by the questionnaire data at waves 1 and 2, four groups of students were created. Each of the four groups included one boy (B) and one girl (G) from CT who after the transition from

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primary to secondary school experienced: (a) the biggest increase in performance-approach goal orientation (B1, G1); (b) the biggest increase in performance-avoid orientation (B2, G2); (c) the biggest decrease in social goal orientation (B3, G3); and (d) the biggest increase in mastery goal orientation (B4, G4). All the participating students attended two different secondary schools, whereas prior the transition they attended four different elementary schools (eight different classrooms at both school levels). The majority of the selected students were considered by their teachers to be at least average with respect to their school work and mathematics ability, whereas two students (B1 and G4) were perceived as talented students in mathematics.

The interview questions were designed to explore more fully students' views of the change in their motivation, of the changes in classroom culture and in peer and parent variables across the transition and of students' perceptions of how their motivation in mathematics could be enhanced. Specifically, the main themes of the interviews were:

(a) Students' motivational profiles in elementary and middle school and their motivational change stories after the transition. In order to chart each student's motivational geography, students were asked questions about their motives during mathematics in elementary and secondary school. Although the students chosen had specific motivational orientations prior and after the transition, the interviews aimed to examine the existence of more than one predominant orientation as well. The combination of different orientations allowed a multiple motivational perspective to be examined. Furthermore, questions about the change in their motivation were addressed to the participating students in order to unravel their motivational change stories across the transition.

(b) Students' perceptions of the differences between primary and secondary school and their views of the effects of these changes on their motivation in mathematics. Students were asked questions in order to highlight aspects that they thought were different across the transition (including teacher, classroom, peer and parent aspects). Students' perceptions about positive or negative dimensions of secondary school were also examined. Furthermore, the questions addressed to students' were designed to link these concerns to their motivational orientation patterns, allowing the examination of whether students with different motivational goal orientation patterns focused on different aspects of the transition.

(c) Students' perceptions of how their motivation in mathematics can be enhanced after the transition to secondary school. The questions addressed to students aimed to explore their views about how their self and the classroom environment should be in order their



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motivation to be increased; in other words what they would expect to happen either personally or in the environment to facilitate positive change in their motivation.

More specifically, the questions that guided the semi-structured interviews according to the three main themes analyzed above were:

(a) Students' motivational profiles and their motivational change stories

1. What were the students' reasons for engaging in math work in elementary school?
2. What are the students' reasons for engaging in math work in secondary school?
3. Did students perceive a change in their motivation in mathematics after the transition from primary to secondary school?
4. How did students' motivation in mathematics change after the transition?
5. How did students explain their experiences of their changing motivation in mathematics?

(b) Students' perceptions of the differences between primary and secondary school

1. What differences regarding the teacher did students perceive across the transition?
2. What was the role of the teacher in the change in their motivation?
3. What dimensions of the classroom environment did students perceive as contributing to the change in their motivation in mathematics?
4. How do students explain their experiences of changing context and changing motivation?
5. How did students perceive the fit of the actual and the preferred classroom environment before and after the transition?

(c) Students' views of how their motivation in mathematics could be enhanced

1. How did students perceive the transition? Had they faced difficulties? In what aspects?
2. Do students believe that their motivation in mathematics can be enhanced?
3. What dimensions of the classroom contexts and activities do students perceive as enhancing their motivation in mathematics?

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4. What dimensions of the classroom culture do students perceive that could enhance their motivation in mathematics?

## Variables

The questionnaire of the study was comprised of different instruments adapted from previous studies to assess the selected variables. The variables of the study referred to three dimensions: (a) the motivational variables, (b) the classroom culture and environment variables, and (c) the social background variables. The selection of the variables was determined through an analysis of the research literature and the rationale discussed in chapter II. The variables of the study and the questionnaires from which the scales were adapted are presented in detail in Table 3.2.

Table 3.2

*The Variables of the Study and the Questionnaires from which the Scales were Adapted*

| Variables | Questionnaires |
|---|---|
| Motivational variables | |
| Motivational goal orientations | Inventory of School Motivation-ISM |
| Self-efficacy | Inventory of School Motivation-ISM |
| Classroom culture variables | |
| Classroom goal structure | Patterns of Adaptive Learning Survey-PALS |
| Classroom social dimensions | Student Classroom Environment Measure-SCEM |
| Classroom environment | Ind. Classroom Environment Questionnaire-ICEQ |
| Social background variables | |
| Parent help | Facilitative Conditions Questionnaire-FCQ |
| Parent advising | Facilitative Conditions Questionnaire-FCQ |
| Peer help | Facilitative Conditions Questionnaire-FCQ |

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The items in all scales followed the Likert format with students responding on a five-point scale ranging from strongly disagree to strongly agree (1=*Strongly disagree*, 2=*Disagree*, 3=*Not sure*, 4=*Agree*, 5=*Strongly agree*).

### *Motivational Variables*

The motivational instrument was comprised of 22 items measuring two dimensions referring to students': (a) motivational goal orientations, and (b) self-efficacy regarding their mathematics ability.

#### *Motivational Goal Orientations Questionnaire*

The questionnaire assessing students' motivational goal orientations in mathematics was comprised of 16 items measuring four general goal orientations referring to: (a) performance–approach, that is students' perceptions of how performance-oriented they were in terms of demonstrating ability e.g., "I would to like to show to my teachers that I am smarter than the other students in my classroom in mathematics" (4 items); (b) performance-avoid referring to students' perceptions of how performance-oriented they were in terms of the avoidance to demonstrate lack of ability e.g., "One of my main goals is to avoid looking like I can not do my work in mathematics" (5 items); (c) mastery, that is how much students value motivation for the learning of mathematics and of their perceptions of how much mastery-oriented they were e.g., "I am most motivated when I see my math work improving" (3 items); and (d) social goal orientation, that is students' perceptions of how socially-oriented they were e.g., "I am most motivated when I work with others in mathematics" (4 items).

In the ISM instrument there is only one performance goal orientation which in the present study was substituted by the performance goal orientation scale from the Patterns of Adaptive Learning Survey-PALS (Midgley et al., 2000). In PALS, the performance goals are distinguished in two categories (performance-approach and performance-avoidance goals). The literature reveals that a dichotomous model of goals (mastery vs.



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performance goals) appearing in the ISM instrument is not enough in order to graph students' motivation (Elliot & Covington, 2001; Radosevich, Vaidynathan, Yeo & Radosevich, 2003), leading to the consideration of the approach and avoidance goal orientations. A performance goal orientation was sometimes found to be associated with adaptive and sometimes with maladaptive patterns of learning (Midgley et al., 1998). This inconsistency is related to the failure until recently to distinguish between the approach and avoidance of performance goals. Therefore, using the scales from the PALS instrument, allowed the clarification of whether a performance goal orientation is associated with adaptive or maladaptive patterns of learning.

*Self-efficacy Questionnaire*

The self-efficacy instrument was comprised of 6 items measuring students' perceptions of their math ability e.g., "I think I am as good as everybody else in mathematics" (4 items).

*Classroom Culture Variables*

The classroom culture instrument was comprised of 54 items measuring three dimensions: the (a) classroom goal structure, (b) classroom social dimensions, and (c) actual and the preferred classroom environment in mathematics.

*Classroom Goal Structure Questionnaire*

The classroom goal structure scale was comprised of 14 items measuring students' perceptions of the reasons for engaging in math work that were emphasized in their classroom referring to three dimensions: (a) classroom mastery goal structure, that is students' perceptions that the purpose of engaging in academic work in the classroom is to develop competence in mathematics e.g., "In our class trying hard in mathematics is very



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important" (6 items); (b) classroom performance-approach goal structure, that is students' perceptions that the purpose of engaging in academic work in the classroom is to demonstrate competence e.g., "In our class getting good grades in mathematics is the main goal" (3 items); and (c) classroom performance-avoid goal structure, that is students' perceptions that the purpose of engaging in academic work in the classroom is to avoid demonstrating incompetence e.g., "In our class it is very important not to look dumb in mathematics" (5 items).

*Classroom Social Dimensions Questionnaire*

The instrument measuring students' perceptions of different classroom social dimensions was comprised of 16 items eliciting information about students' perceptions of: (a) their teacher's fairness and friendliness e.g., "The teacher is friendly to us" (6 items); (b) the cooperation and interaction during learning mathematics e.g., "The teacher encourages us to say what we feel about mathematics" (5 items); and (c) the competition and social comparison among students e.g., "Some kids try to be the first ones to answer math questions the teacher asks" (5 items).

*Classroom Environment Questionnaire*

The scale assessing students' perceptions of their classroom environment in mathematics was comprised of 12 items regarding four classroom dimensions referring to: (a) personalization, that is students' perceptions of the emphasis on opportunities for individual students to interact with the teacher and to the extent to which students are encouraged to participate rather than be passive listeners e.g., "The teacher talks with each student in mathematics" (3 items); (b) independence, that is students' perceptions regarding the extent to which they are allowed to make decisions and have control over their own leaning and behaviour e.g., "The teacher decides which students should work together in mathematics" (3 items); (c) investigation, that is students' perceptions of the emphasis on the skills and processes of inquiry and their use in problem-solving and

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investigation e.g., “Students carry out investigations to answer questions which puzzle them in mathematics” (3 items); and (d) differentiation, that is students’ perceptions of the emphasis on the selective treatment of students on the basis of ability, learning style, interests and rate of working e.g., “All students in the class do the same work at the same time in mathematics” (3 items).

The questionnaire was used in two different forms (total 24 items) assessing the actual and the preferred classroom environment. The instrument assessing the preferred classroom environment was the same as the instrument assessing the actual classroom environment with the addition of the words “I would prefer” in each item (e.g., the item regarding personalization in the preferred version was “I would prefer the teacher to talk with each student in mathematics”). Both questionnaires were completed only by students in CT.

### *Social Background Variables*

#### *Parent Help and Advising and Peer Help Questionnaire*

The questionnaire was comprised of 10 items measuring three dimensions referring to students’ perceptions of their: (a) parent help e.g., “My mother helps me with my mathematics work” (4 items); (b) parent advising e.g., “My father advises me to work hard in mathematics” (2 items); and (c) peer help e.g., “It is important for me to have my friend’s help in mathematics” (4 items).

## The Present Study and the Proposed Models

As stated in chapter II, in this study five a-priori structures were posited. The first structure concerns students’ motivation in mathematics, the second students’ classroom culture perceptions, the third students’ social background perceptions, whereas the last two models students’ classroom environment perceptions (the actual and the preferred classroom



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environment perceptions in mathematics). All the models are described in the next section of this chapter.

*The Proposed Motivational Model*

The a-priori motivational model consists of five first-order factors and one second-order factor. Figure 3.1 makes easy the conceptualization of how the various components of motivation relate to each other. The first-order factors represent the cognitive, affective and social aspects of motivation. The cognitive aspect was measured by students' performance-approach, performance-avoid and mastery goal orientations, the social aspect by students' social goal orientation, while the affective aspect was measured by students' self-efficacy perceptions. The first-order factors were hypothesized to construct the second-order factor "students' motivation in mathematics", which was hypothesized to account for any correlation or covariance between the first-order factors.

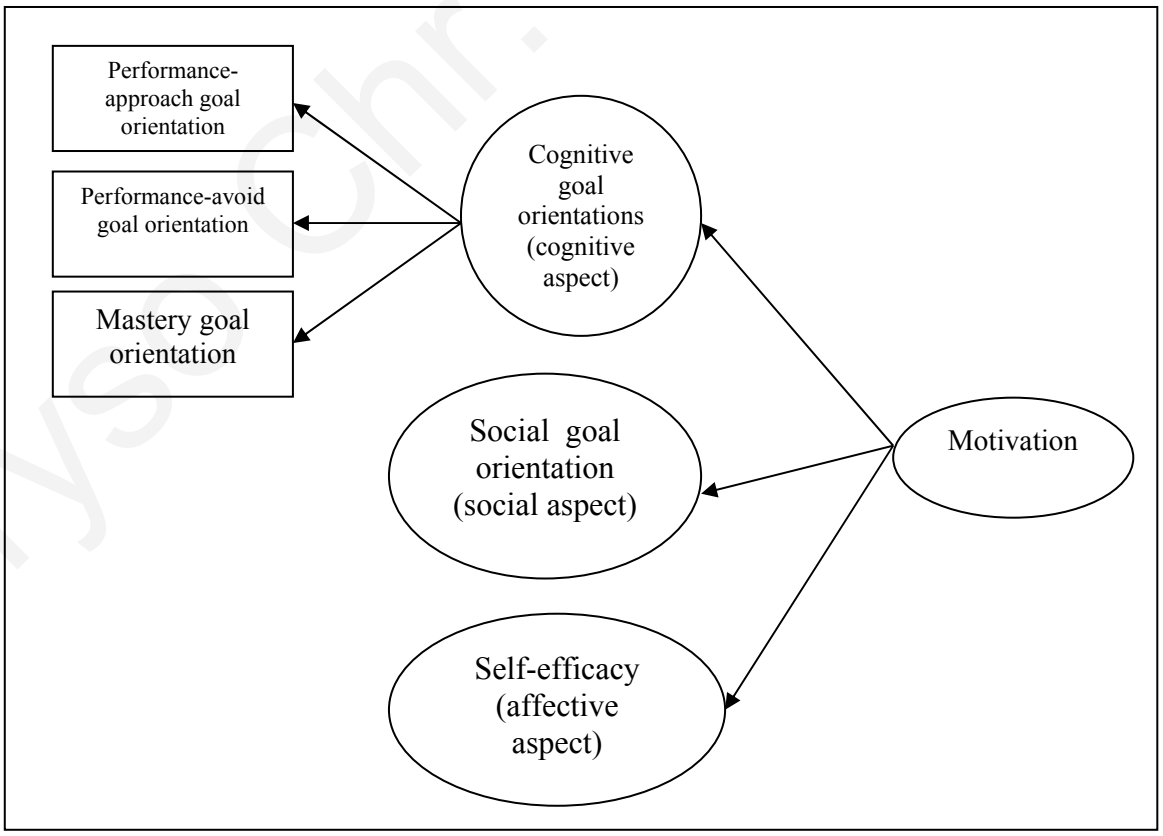


*Figure 3.1*. The Proposed Motivational Model.

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*The Proposed Classroom Culture Model*

The initial classroom culture model consists of six first-order factors, two second-order factors and one third-order factor as indicated in Figure 3.2. The six first-order factors represent the mastery, performance-approach and performance-avoid classroom goal structure, teacher friendliness, cooperation and competition. The first three first-order factors were hypothesized to construct the second-order factor "classroom goal structure", whereas the last three factors the second-order factor "classroom social dimensions". The two second-order factors were hypothesized to construct the third-order factor "students' classroom culture perceptions".

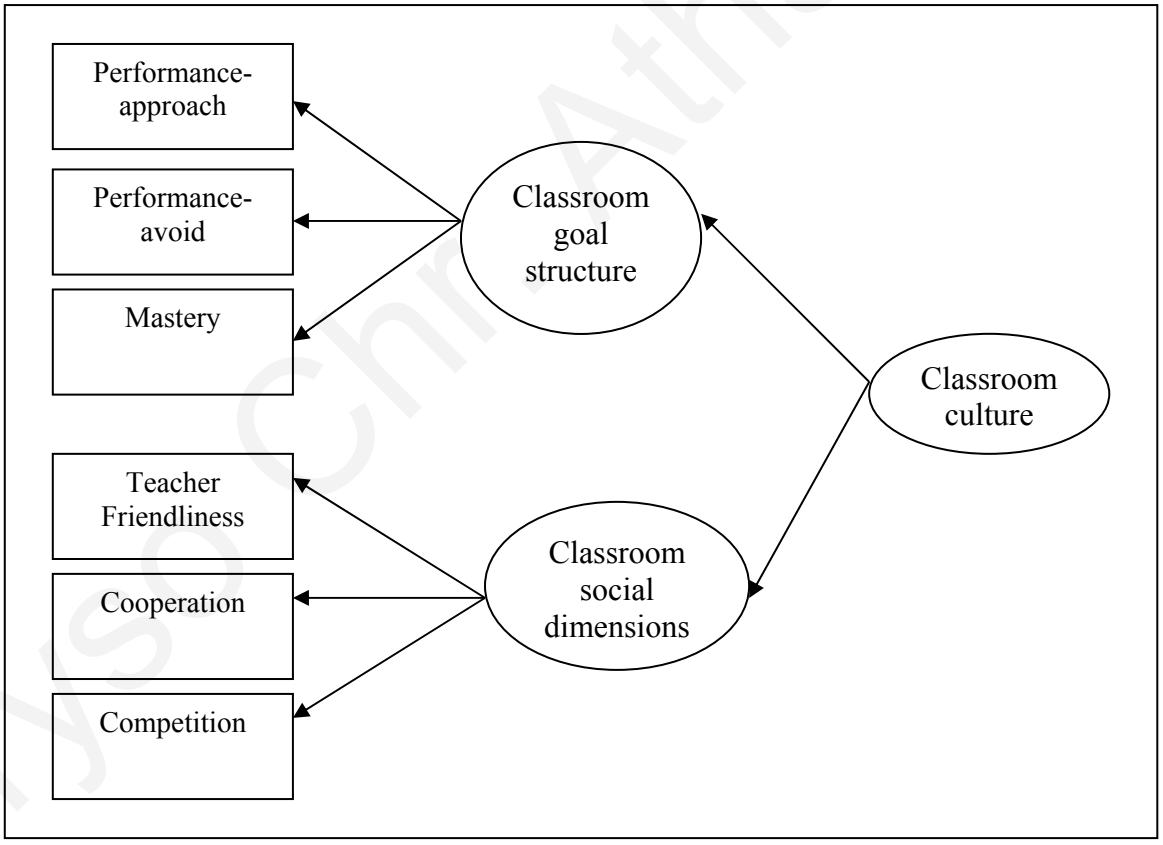


*Figure 3.2.* The Proposed Classroom Culture Model.

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*The Proposed Classroom Environment Models*

The a-priori classroom environment models consist of four first-order factors and one second-order factor as indicated in Figure 3.3. The four first-order factors represent the personalization, investigation, independence and differentiation dimensions. The first-order factors were hypothesized to construct the second-order factor "classroom environment perceptions". Two models were proposed. The first model concerned students' perceptions of the actual classroom environment, whereas the latter concerned students' perceptions of the preferred classroom environment in mathematics.

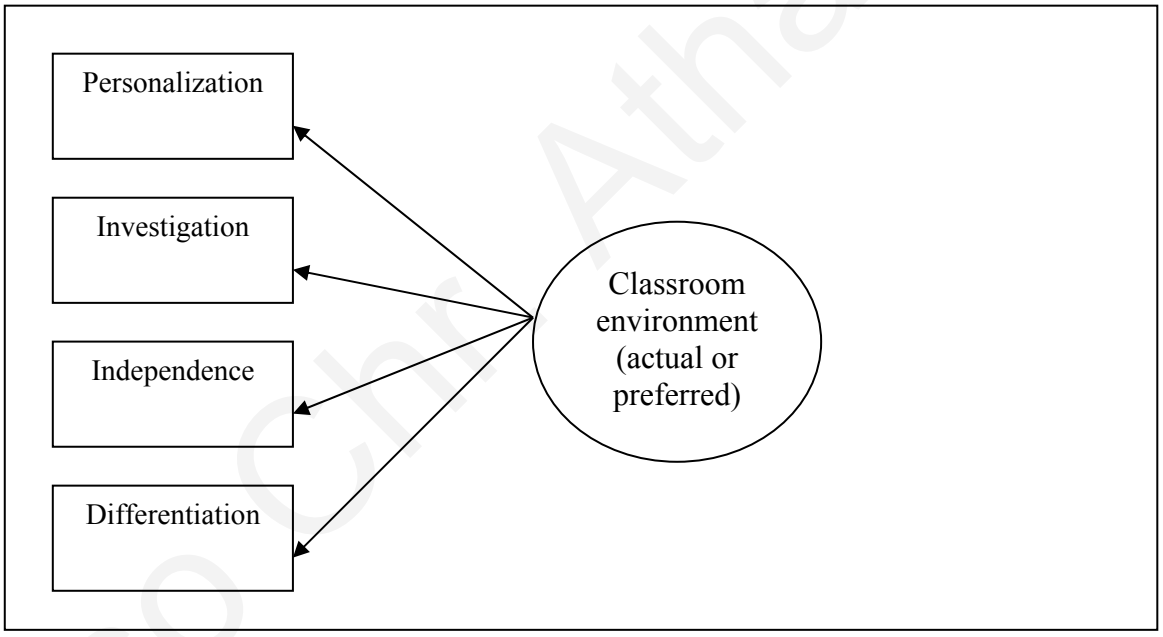


*Figure 3.3.* The Proposed Classroom Environment Models.

*The Proposed Social Background Model*

The a-priori students' social background model consists of three first-order factors and one second-order factor as indicated in Figure 3.4. The three first-order factors represent the



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parent help, parent advising and peer help dimensions. The first-order factors were hypothesized to construct the second-order factor "students' social background".

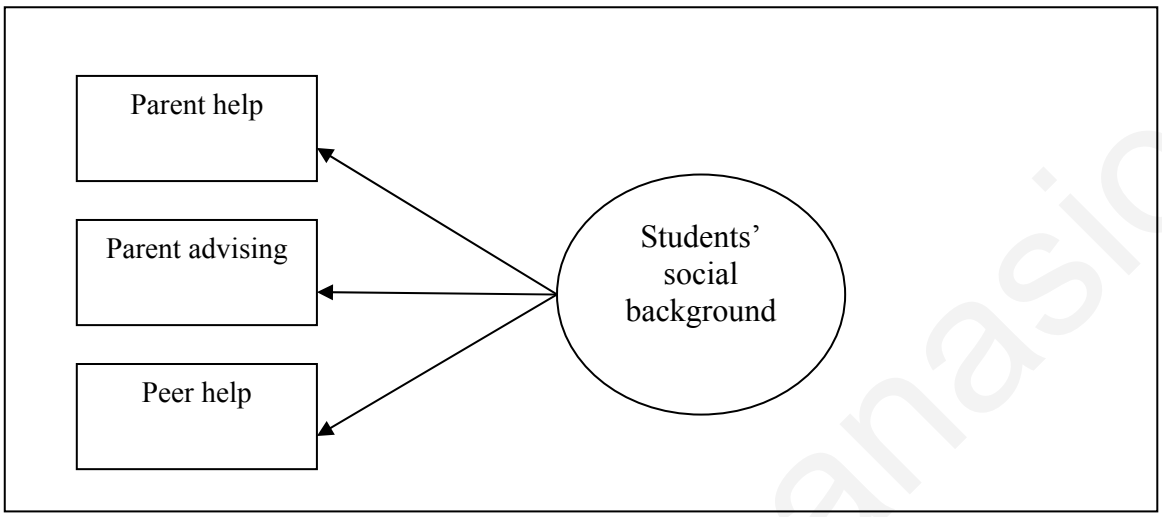


*Figure 3.4.* The Proposed Social Background Model.

## Data Analysis

This study involved the analysis of quantitative and qualitative data in order to address the research questions more fully. Different techniques were applied for the data analysis obtained with different methodologies. These techniques are presented in the next sections.

### *Quantitative Data Analysis*

In order to maximize the number of students in the transition groups, the data of students who missed out a few items in the questionnaire (no more than one item per scale) were included in the analyses using the imputation procedure carried out with the Lisrel Structural Equation Modeling Package. According to imputation the value of each missing item is calculated from the scores of all students in the same year for the relevant scale. Furthermore, the data sets were perused for data that conformed to a regular pattern or a single repeated response. These data sets were removed from the group level analyses,

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since in any study the willingness of the participants to complete the questionnaires honestly and seriously is extremely important.

The methods of the quantitative data analysis used in the study corresponded to the three research questions as stated in chapter I, that is concerning: (a) the validation of the proposed models (the motivational, the classroom culture, the classroom environment and the social background models); (b) motivational, classroom culture and social background change across transitions; and (c) change of the fit between the actual and the preferred classroom environment in mathematics across the transition from primary to secondary school. The methods of data analysis in each dimension are presented in the following sections. All the analyses were conducted using the MPlus software (Muthen & Muthen, 2004).

*The Validation of the Proposed Models*

The assessment of fit of the hypothesized models to the data was tested using Confirmatory Factor Analysis (CFA), which is part of a more general class of approaches called structural equation modeling. CFA is used to test measurement models in which observed variables define latent constructs or latent variables.

In order to evaluate model fit, three fit indices were computed: the chi-square to its degree of freedom ratio ( $\chi^2/df$), the comparative fit index (CFI) and the root mean-square error of approximation (RMSEA). In order to support model fit, the observed values for $\chi^2/df$ should be less than 2, the values for CFI should be higher than .9, and the RMSEA values should be close to or lower than .08 (Marcoulides & Schumacker, 1996).

Furthermore, the relation between (a) students' motivation in mathematics and their perceptions of the classroom culture, (b) students' motivation in mathematics and their perceptions of their social background, and (c) students' perceptions of the actual classroom environment and their perceptions of the preferred classroom environment were tested. More specifically, the validity of a structural model in which students' perceptions of the classroom culture in mathematics predict their motivation in mathematics and vice versa, of a model in which students' perceptions of their social background predict their motivation in mathematics and vice versa and of a structural model in which students' perceptions of the actual classroom environment predict their perceptions of the preferred environment and vice versa were examined.



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The motivational, the classroom culture and the social background data for students in CT were analysed using growth modelling, an analytical tool that can be used to represent trajectories across different phases of individuals' development (Benner & Graham, 2009), such as the transition from primary to secondary school. A benefit of growth modelling is its ability to capture nonlinear growth. The examination of whether students' perceptions of their motivation in mathematics, of classroom culture and of their social background changed in nonlinear ways over time was conducted, delineated in the models by the inclusion of quadratic or cubic terms. The motivational, the classroom culture and the social background models were not run separately for each construct of interest. Rather a unified model for motivation, a unified model for classroom culture and a unified model for social background were examined each time in order to address the issues of collinearity. The proposed social background, motivational and classroom culture growth models are presented in Figures 3.5, 3.6 and 3.7 respectively.

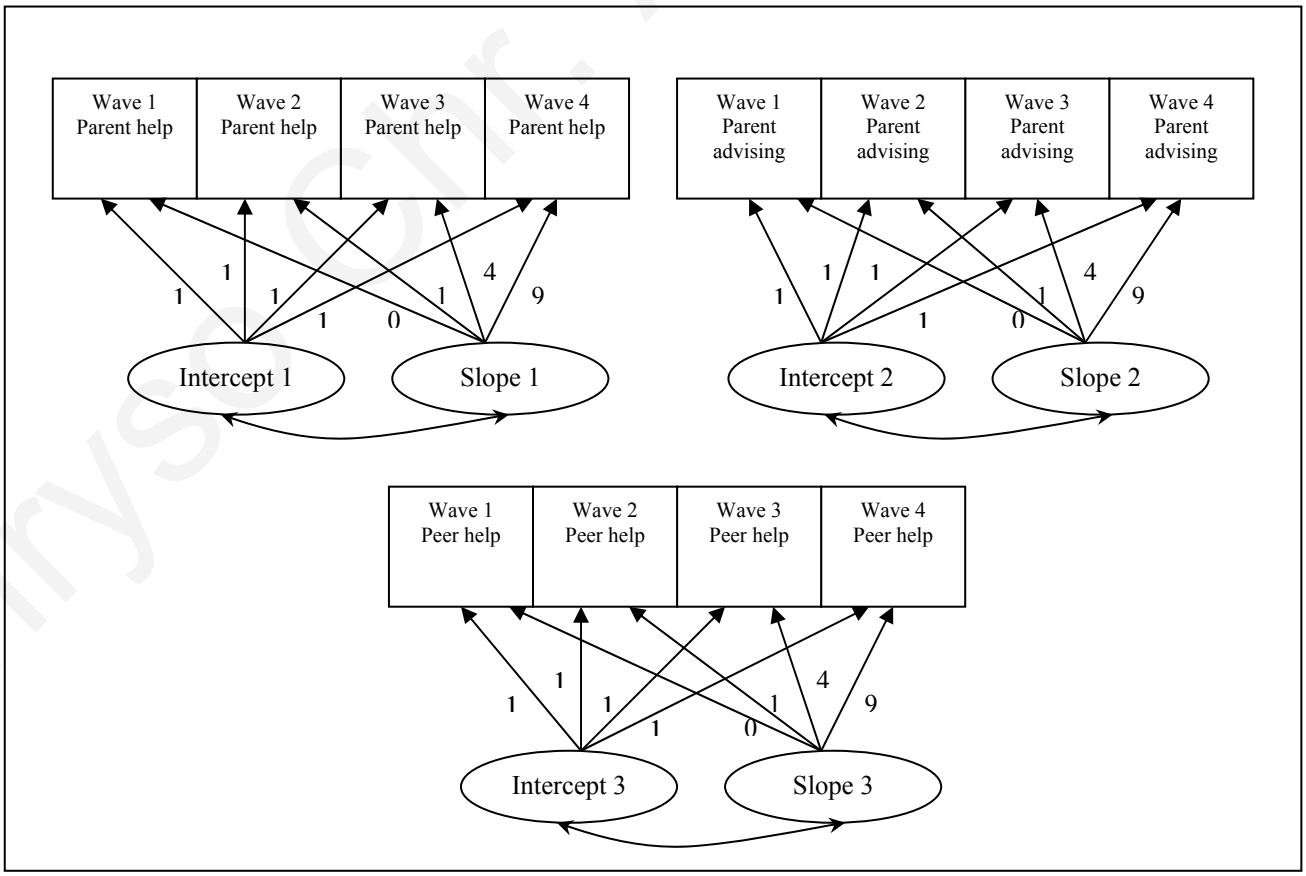


*Figure 3.5.* The Proposed Social Background Growth Model.



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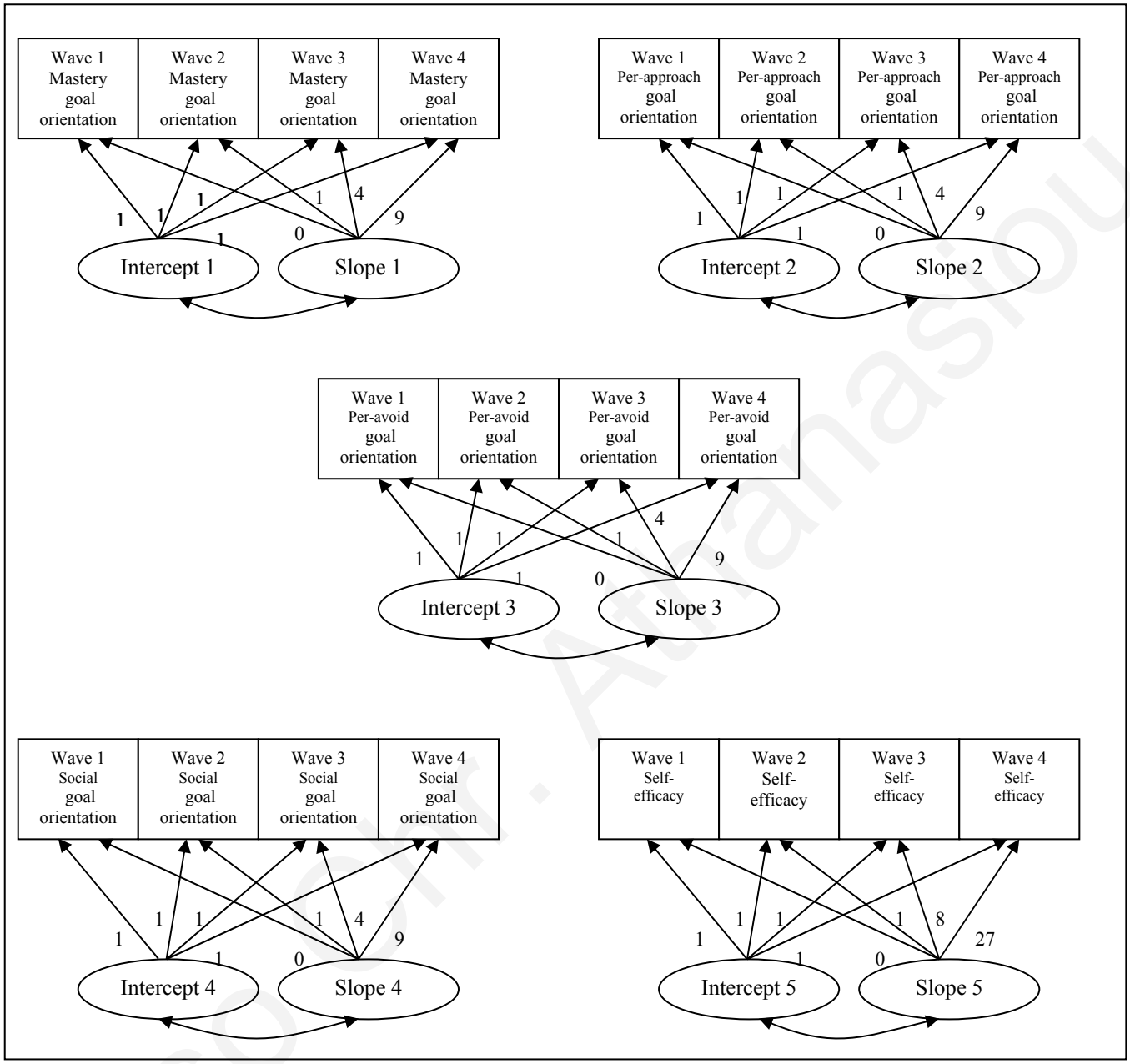


*Figure 3.6.* The Proposed Motivational Growth Model.

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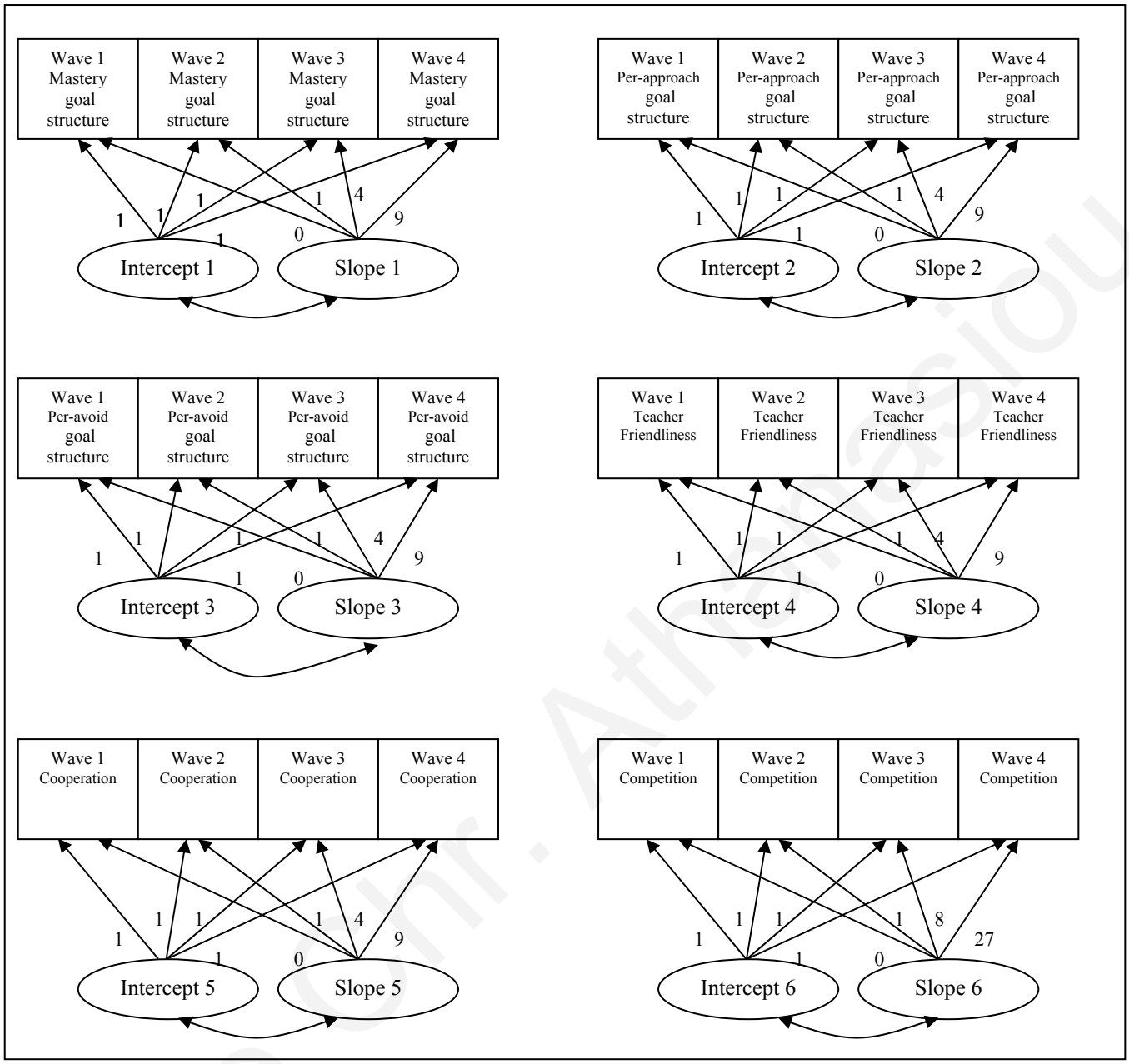


*Figure 3.7.* The proposed Classroom Culture Growth Model.

Another aim of the study concerns the extent to which students in the sample vary according to their perceptions of the change in classroom culture or of the social background across the transition to secondary school and whether these differences reflect differences in the change in their motivation across the transition. Mixture growth modeling (latent class analysis) was used to answer this question (Muthen & Muthen, 2004) because it enables specification of models in which one model applies to one subset of the data and another model applies to another set. The analysis was conducted on the



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basis of the change in students' perceptions of the classroom culture in mathematics across the transition as it was tapped on the spring semesters of each school year (the first and the fourth waves of measurement). These two waves of measurement were selected because by that time students' perceptions are well developed and established. The classroom culture or social background change score was derived from the students' means at waves 1 and 4 (Wave 4 – Wave 1). A positive value of the change score indicates that students reported increase across the transition, whereas a negative value denotes decrease in the specific dimension.

The models were tested under the assumption that there are two, three and four categories of subjects. The best fitting models were the ones with the smallest AIC and BIC and the biggest Entropy value.

*Change in the Actual and Preferred Classroom Environment and of the Fit between the Actual and the Preferred Environment across the Transition to Secondary School*

To assess whether there is a mismatch between the actual and the preferred classroom environment in mathematics as it is perceived by students in CT, pairwise *t*-tests were performed to compare the means in the respective forms of the questionnaire at each of the four waves of measurement in each scale dimension. The .01 level of significance was adopted for these paired comparisons.

The examination of the developmental changes in students' perceptions of the actual and the preferred classroom environment across the transition to secondary school was conducted with growth modeling. The analyses were conducted separately for each construct of interest for the actual and the preferred classroom environment. Therefore, issues of collinearity were not germane for these analyses.

For the examination of the change in students' perceptions of the fit between the actual and the preferred classroom environment in mathematics across the transition, the total fit score was derived as the difference between students' fit scores at waves 1 and 4. The fit scores at each of the two waves of measurement were calculated as the differences between the respective means in the two formats of the questionnaire in each scale dimension (actual minus preferred classroom environment). A negative value of the fit score indicates that students reported that they did not experience but they would expect



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the classroom environment mentioned. A positive value indicates that students reported that they actually had experienced the classroom environment but they should not have, whereas a zero value of the fit score indicates that students reported that the classroom environment they actually had coincides with what they have expected to have or that they actually did not and should not have the classroom environment mentioned.

*Motivational, Classroom Culture and Environment and Social Background Change across Transitions within Primary and within Secondary School*

Due to the small number of participants in CE and CS, growth analyses could not be conducted. Therefore, the change in students' perceptions across transitions within the same school was considered through the descriptive statistics and the change in students' means across the four waves of measurement.

*Qualitative Data Analysis*

The interviews were analyzed in three stages. Firstly, students' responses to the interview questions about their motivation and their change stories were systematically compared with their responses to the related questionnaire items. In this way, students' different combinations of goal orientations were related to their broader motivational theories. Secondly, students' responses relating to their perceptions of the differences between primary and secondary school were collated and then compared with the students' initial motivational patterns and the changes in their motivation. At this stage the analysis involved an exploration of the different contexts or different interactions with others within these contexts that students implicated in their perceptions of difference and change. Lastly, students' perceptions of how their motivation can be enhanced were compared with their motivational profiles after the transition and with their perceptions of secondary school.

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## Implementation of Study

The implementation of this study was conducted in five phases. The first phase involved the literature review, whereas the second phase concerned the pilot study. In the third phase the questionnaires were administered to the participating students and in the fourth phase the selected students' participated in the clinical interviews. Lastly, in the fifth phase the data analyses were conducted and the conclusions of the study were drawn.

More specifically, in the first phase of the study the literature review aimed to provide the theoretical background of the study. The overview of the perspectives of motivation used in previous research lead to the consideration of motivation as a multidimensional construct involving cognitive, social and affective dimensions through the perspective of Personal Investment Theory.

In the second phase, the pilot study was conducted. The questionnaire of the study was administered to 44 students in primary school (21 students in grade 5 and 23 students in grade 6) and 47 students in secondary school (23 students in grade 7 and 24 students in grade 8). The questionnaires were administered to students in two 40-minute sessions. The aim of the pilot study was to determine the validity of the translated instruments in different contexts and whether the items conformed to the scales as stated in the literature. Exploratory Factor Analyses (EFA) using the SPSS software were undertaken for all students' responses. The factor analyses conformed to the expected patterns and all items clustered in the expected factor with loadings between .547 and .891. The internal consistency of the scales was quite high with Cronbach's Alphas ranging from .67 to .88.

In the third phase the implementation of the research took place. The questionnaires were administered to students in four time-points following a longitudinal design covering two consecutive school years.

In the fourth phase the selection of the students for the clinical interviews was conducted. The selected students were interviewed once after the transition to secondary school in a private room at their own school.

Lastly, in the fifth phase of the study the statistical analyses of the study were conducted using the Mplus statistical package and the conclusions of the study were derived from the analyses. At this point, the limitations of the study and the recommendations for future research were also considered.

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Summary

The purpose of the study was to examine the validity of the proposed motivational, classroom culture, classroom environment and social background models and to investigate the change in students' motivation and their perceptions of the classroom culture and social background across transitions and especially across the transition from primary to secondary school. Three cohorts of students were included in the study, experiencing the transition from primary to secondary school and the transition from one grade level to the next within the same school context (primary and secondary school).

The study was longitudinal in design with the same students participating over a period of two consecutive school years. Questionnaire data were gathered at four time points, including one measurement prior the transition and three measurements after the transition. Eight students experiencing the transition from primary to secondary school were selected for semi-structured interviews in order to complement the information gained from the analyses of the group data.

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# CHAPTER IV

# RESULTS

## Introduction

In this chapter, the results of the study are presented in four sections according to the research questions of the study as stated in chapter I. The first three sections refer to the quantitative analyses, whereas the latter in the qualitative data derived from clinical interviews. More specifically, in the first section the analyses addressing the structure of motivation, classroom culture and social background focus on the validation of the proposed models for students experiencing the transition from primary to secondary school (students in CT) and from one grade level to the next within the same school (students in CE and CS). Furthermore, the relation between students' motivation and their perceptions of the classroom culture in mathematics and their social background are also examined.

In the second section, the analyses addressing the issue of motivational, classroom culture and social background change across the transition from primary to secondary school are presented. Change is analyzed using growth modelling through the investigation of whether students' perceptions change in nonlinear ways over time. The results of latent class analyses are also presented in this section. The analyses focus on the examination of whether the students in the sample vary according to the direction of change they perceive in the classroom culture or in their social background across the transition to secondary school and whether the motivation of students in the different categories changes in different ways.

Thirdly, the validation of two classroom environment models is presented. The first model refers to students' perceptions of the actual classroom environment and the second to students' perceptions of the preferred classroom environment in mathematics across the transition to secondary school. Next, the developmental changes of the perceived as actual and the preferred classroom environment in mathematics across the transition to secondary school are presented. The results of growth analyses focusing on the examination of change in students' perceptions of the actual and the preferred classroom environment and of the fit between the perceived as actual and the preferred classroom environment across the transition to secondary school are reported.

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Lastly, in the fourth part of this chapter the qualitative analyses for individual students are presented based on students' responses to semi-structured interviews. The main themes of the interviews were students' motivational profiles in primary and secondary school and their motivational change stories across the transition, their perceptions of the differences between primary and secondary school and of the effects of these changes on their motivation and students' perceptions of how their motivation in mathematics can be enhanced in secondary school.

## The Structure of Motivation, Classroom Culture in Mathematics and Students' Social Background across Transitions

In order to estimate the relative strength of the proposed motivational, classroom culture and social background models across transitions, the motivational instruments adapted from ISM and PALS, the classroom culture instruments adapted from PALS and SCEM and the social background instruments adapted from FCQ were used. In the next section the descriptive statistics for the motivational, the classroom culture and the social background instruments used are presented. Next, the assessment of the fit of the hypothesized a priori models to the data is illustrated. Confirmatory factor analysis (CFA) was used to test the three measurement models. All analyses are reported firstly for students in CT, followed by students in CE and CS.

### *Descriptive Statistics for the Motivational, Classroom Culture and Social Background Instruments for Students in CT*

Table 4.1 presents the descriptive statistics for the motivational, classroom culture and social background dimensions in each of the four waves of measurement. As far as motivation is concerned, primary school students' mean ratings regarding mastery and social goal orientations and self-efficacy appeared to be higher than their mean ratings in all the secondary school measurements. On the contrary, all the secondary school students' mean ratings regarding performance-approach and performance-avoid goal orientations



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were higher than their mean ratings in primary school. For the classroom culture, primary school students' mean ratings regarding classroom mastery goal structure, teacher friendliness and cooperation were higher than their mean ratings in secondary school. All the secondary school students' mean ratings for performance-approach, performance-avoid classroom goal structure and competition were higher than their mean ratings in primary school. Lastly, for the social background dimensions primary school students' mean ratings regarding all dimensions were higher than their mean ratings in secondary school. The values of skewness and kurtosis were within the expected range, that is less than the value of 2 standard errors regardless of sign (the standard error for skewness was .164 and for kurtosis was .327), indicating a distribution with no significant skewness and kurtosis problems.

Tables 4.2, 4.3, 4.4 and 4.5 present the correlations between the items used to examine the validity of the motivational model, whereas Tables 4.6, 4.7, 4.8 and 4.9 illustrate the correlations between the items used to examine the validity of the classroom culture model in Waves 1, 2, 3 and 4 respectively. Tables 4.10 and 4.11 present the correlations between the items used to examine the validity of the students' social background model in Waves 1 and 2, 3 and 4 respectively. Across all waves, high correlations between items measuring the same motivational, classroom culture or social background dimension according to the pre-established theory were observed, indicating that the items seem to measure the same motivational, classroom culture or social background aspect.

The correlations between the five motivational variables across waves are presented in Table 4.12, whereas Table 4.13 illustrates the correlations between the six classroom culture variables and Table 4.14 shows the correlations between the three social background dimensions in Waves 1, 2, 3 and 4 respectively. Across all waves, high correlations between performance-approach and performance avoid-goal orientation variables and between mastery, social goal orientations and self-efficacy were found. For the classroom culture variables, high correlations were observed between the performance-approach and the performance-avoid goal structure and between the classroom social dimensions (teacher friendliness, cooperation and competition), whereas for the social background variables high correlations were observed between parent advising and parent help.

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Table 4.1

*Descriptive Statistics for Motivational, Classroom Culture and Social Background Dimensions Across Waves for Students in CT*

| | Wave 1 (grade 6) | | | | Wave 2 (grade 7a) | | | | Wave 3 (grade 7b) | | | | Wave 4 (grade 7c) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Variables | M(SD) | RNG | SKN | KRT | M (SD) | RNG | SKN | KRT | M (SD) | RNG | SKN | KRT | M (SD) | RNG | SKN | KRT |
| Mastery goal orientation | 4.22(.70) | 2.67 | -.311 | -.312 | 4.01(.87) | 3.33 | -.251 | -.248 | 4.05(.75) | 3.67 | -.255 | .190 | 3.88(.82) | 4.00 | -.319 | .300 |
| Perf-approach orientation | 2.41(1.08) | 4.00 | .343 | -.543 | 2.55(1.05) | 4.00 | .305 | -.621 | 2.57(1.09) | 4.00 | .317 | -.641 | 2.68(1.18) | 4.00 | .166 | -.646 |
| Perf-avoid orientation | 2.13(.98) | 4.00 | .219 | .015 | 2.34(.96) | 4.00 | .388 | -.580 | 2.29(1.14) | 4.00 | .287 | -.578 | 2.30(.98) | 4.00 | .300 | -.629 |
| Social goal orientation | 3.24(.90) | 4.00 | -.296 | -.216 | 3.09(.98) | 4.00 | -.156 | -.312 | 3.15(1.08) | 4.00 | -.175 | -.639 | 3.09(1.02) | 4.00 | -.133 | -.570 |
| Self-efficacy | 3.90(.83) | 4.00 | -.326 | -.123 | 3.61(.84) | 4.00 | -.156 | -.312 | 3.82(.78) | 4.00 | -.287 | .210 | 3.76(.85) | 4.00 | -.294 | .470 |
| Mastery goal structure | 4.18(.67) | 3.00 | -.294 | .173 | 3.90(.89) | 4.00 | -.247 | .620 | 3.89(.93) | 4.00 | -.288 | -.309 | 3.84(1.07) | 4.00 | -.338 | -.220 |
| Perf-approach structure | 3.07(.86) | 4.00 | -.039 | -.220 | 3.32(.93) | 4.00 | -.324 | -.168 | 3.22(.93) | 4.00 | -.216 | -.293 | 3.39(1.09) | 4.00 | -.241 | -.418 |
| Perf-avoid structure | 2.30(.86) | 3.50 | .328 | -.256 | 2.44(.90) | 4.00 | .323 | -.075 | 2.66(.97) | 4.00 | .201 | -.514 | 2.62(1.12) | 4.00 | .261 | -.607 |
| Teacher Friendliness | 3.80(.97) | 4.00 | -.304 | -.100 | 3.62(1.08) | 4.00 | -.327 | -.335 | 3.62(1.00) | 4.00 | -.218 | -.451 | 3.44(1.05) | 4.00 | -.133 | -.660 |
| Cooperation | 3.14(.95) | 4.00 | -.294 | -.340 | 2.99(.91) | 4.00 | -.102 | -.394 | 3.06(1.02) | 4.00 | -.170 | -.495 | 3.07(1.05) | 4.00 | -.017 | -.546 |
| Competition | 3.54(1.00) | 4.00 | -.308 | -.619 | 3.99(.88) | 3.67 | -.293 | .198 | 3.75(1.08) | 4.00 | -.275 | -.276 | 3.77(1.08) | 4.00 | -.247 | -.244 |
| Parent help | 2.78(1.01) | 4.00 | -.036 | -.626 | 2.61(1.15) | 4.00 | .257 | -.659 | 2.58(1.13) | 4.00 | .160 | -.517 | 2.34(1.07) | 4.00 | .332 | -.566 |
| Parent advising | 4.15(.97) | 4.00 | -.023 | .339 | 4.12(.94) | 4.00 | .004 | .612 | 4.10(.95) | 4.00 | .170 | .294 | 4.03(.99) | 4.00 | -.291 | .164 |
| Peer help | 3.09(.99) | 4.00 | -.175 | -.540 | 2.73(.99) | 4.00 | .018 | -.599 | 2.69(.96) | 4.00 | .214 | -.420 | 2.63(.92) | 3.67 | .069 | -.590 |

*Note*. N=220 for all waves and measures M(SD)=Mean (Standard Deviation) RNG=Range SKN=Skewness KRT = Kurtosis

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Table 4.2

*Correlations among Motivational Items for Wave 1 (grade 6)*

| | PA.1 | PA.2 | PA.3 | PA.4 | PV.1 | PV.2 | PV.3 | PV.4 | MA.1 | MA.2 | MA.3 | SO.1 | SO.2 | SO.3 | SE.1 | SE.2 | SE.3 | SE.4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PA.1 | 1 | | | | | | | | | | | | | | | | | |
| PA.2 | .42** | 1 | | | | | | | | | | | | | | | | |
| PA.3 | .43** | .69** | 1 | | | | | | | | | | | | | | | |
| PA.4 | .37** | .51** | .57** | 1 | | | | | | | | | | | | | | |
| PV.1 | .19* | .42** | .39** | .39** | 1 | | | | | | | | | | | | | |
| PV.2 | .19* | .43** | .42** | .42** | .61** | 1 | | | | | | | | | | | | |
| PV.3 | .10 | .21* | .26** | .26** | .41** | .35** | 1 | | | | | | | | | | | |
| PV.4 | .05 | .33** | .28** | .28** | .42** | .32** | .43* | 1 | | | | | | | | | | |
| MA.1 | .08 | .07 | .14* | .14* | .09 | .07 | -.02 | .09 | 1 | | | | | | | | | |
| MA.2 | .10 | .01 | .06 | .06 | -.08 | -.06 | -.08 | .05 | .27** | 1 | | | | | | | | |
| MA.3 | -.03 | -.02 | -.07 | -.07 | -.10 | .01 | -.11 | .15* | .29** | .37** | 1 | | | | | | | |
| SO.1 | -.04 | .00 | .04 | .04 | .13* | .12 | .18* | .04 | .13* | .06 | -.00 | 1 | | | | | | |
| SO.2 | -.00 | .06 | .13* | .13* | .06 | .05 | -.12 | -.00 | .08 | .08 | .05 | .39** | 1 | | | | | |
| S0.3 | .10 | .09 | .15* | .15* | -.04 | .05 | -.04 | -.07 | .03 | .16* | .23* | .29** | .44** | 1 | | | | |
| SE.1 | -.04 | -.01 | -.02 | -.02 | -.07 | .02 | -.17* | -.00 | .23** | .17* | .25** | .06 | .13 | .20* | 1 | | | |
| SE.2 | .07 | .06 | .03 | .03 | -.04 | .01 | -.12 | -.00 | .14* | .23** | .17* | .03 | .03 | .08 | .38** | 1 | | |
| SE.3 | .06 | .11 | -.00 | -.00 | -.05 | .01 | -.11 | -.06 | .15* | .11 | .25** | -.10 | .05 | .09 | .42** | .34** | 1 | |
| SE.4 | .02 | -.04 | -.08 | -.08 | -.09 | -.05 | -.09 | .10 | .20** | .36** | .32** | .05 | .06 | .19* | .31** | .15* | .17* | 1 |

*Note*. PA=Items measuring performance-approach goal orientation PV=Items measuring performance-avoid goal orientation
MA=Items measuring mastery goal orientation S0=Items measuring social goal orientation SE=Items measuring self-efficacy
*, $p< 0.05$: **, $p< 0.01$

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Table 4.3

*Correlations among Motivational Items for Wave 2 (grade 7a)*

| | PA.1 | PA.2 | PA.3 | PA.4 | PV.1 | PV.2 | PV.3 | PV.4 | MA.1 | MA.2 | MA.3 | SO.1 | SO.2 | SO.3 | SE.1 | SE.2 | SE.3 | SE.4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PA.1 | 1 | | | | | | | | | | | | | | | | | |
| PA.2 | .42** | 1 | | | | | | | | | | | | | | | | |
| PA.3 | .41** | .61** | 1 | | | | | | | | | | | | | | | |
| PA.4 | .37** | .46** | .50** | 1 | | | | | | | | | | | | | | |
| PV.1 | .25* | .28** | .19* | .29** | 1 | | | | | | | | | | | | | |
| PV.2 | .15* | .39** | .32** | .21* | .46** | 1 | | | | | | | | | | | | |
| PV.3 | .26** | .17* | .11 | .06 | .28** | .23* | 1 | | | | | | | | | | | |
| PV.4 | .16* | .12 | .14* | .05 | .25** | .32** | .29* | 1 | | | | | | | | | | |
| MA.1 | -.03 | .01 | -.05 | .03 | -.04 | .04 | -.03 | .02 | 1 | | | | | | | | | |
| MA.2 | -.00 | -.01 | -.01 | .03 | -.12 | .02 | -.04 | .01 | .59** | 1 | | | | | | | | |
| MA.3 | .02 | -.03 | -.08 | -.00 | -.02 | .04 | -.00 | .08 | .61** | .61** | 1 | | | | | | | |
| SO.1 | -.08 | .12 | .05 | .03 | .17* | .20* | .12 | .18* | .08 | .05 | .07 | 1 | | | | | | |
| SO.2 | .03 | .12 | .06 | .03 | .13* | .19* | .01 | .05 | .14* | .12 | .15* | .41** | 1 | | | | | |
| S0.3 | .05 | .17* | .11 | .11 | .17* | .15* | .03 | .04 | .07 | .07 | .09 | .40** | .63** | 1 | | | | |
| SE.1 | .04 | .00 | .12 | .07 | .12 | .15* | .05 | .00 | .21* | .22* | .24** | .13* | .16* | .05 | 1 | | | |
| SE.2 | .05 | .03 | .09 | -.07 | -.00 | .01 | .03 | -.06 | .23* | .19* | .19* | .03 | .13* | .11 | .41** | 1 | | |
| SE.3 | .02 | .03 | .08 | .09 | .05 | .03 | .02 | .04 | .10 | .19* | .19* | .06 | .12 | .06 | .20* | .34** | 1 | |
| SE.4 | .01 | -.01 | .10 | .01 | .09 | .11 | .10 | .09 | .24** | .20* | .30** | .17* | .19* | .15* | .18* | .12 | .21* | 1 |

*Note*. PA=Items measuring performance-approach goal orientation PV=Items measuring performance-avoid goal orientation
MA=Items measuring mastery goal orientation S0=Items measuring social goal orientation SE=Items measuring self-efficacy
*, $p< 0.05$: **, $p< 0.01$

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Table 4.4

*Correlations among Motivational Items for Wave 3 (grade 7b)*

| | PA.1 | PA.2 | PA.3 | PA.4 | PV.1 | PV.2 | PV.3 | PV.4 | MA.1 | MA.2 | MA.3 | SO.1 | SO.2 | SO.3 | SE.1 | SE.2 | SE.3 | SE.4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PA.1 | 1 | | | | | | | | | | | | | | | | | |
| PA.2 | .53** | 1 | | | | | | | | | | | | | | | | |
| PA.3 | .51** | .62** | 1 | | | | | | | | | | | | | | | |
| PA.4 | .42** | .43** | .56** | 1 | | | | | | | | | | | | | | |
| PV.1 | .24** | .38** | .31** | .19* | 1 | | | | | | | | | | | | | |
| PV.2 | .35** | .48** | .42** | .35** | .61** | 1 | | | | | | | | | | | | |
| PV.3 | .18* | .26** | .21* | .08 | .35** | .30** | 1 | | | | | | | | | | | |
| PV.4 | .30** | .35** | .40** | .18* | .26** | .34** | .27* | 1 | | | | | | | | | | |
| MA.1 | .01 | .06 | .11 | .18* | .07 | .11 | -.04 | -.09 | 1 | | | | | | | | | |
| MA.2 | -.06 | .08 | .04 | .06 | .00 | .06 | -.16* | .03 | .33** | 1 | | | | | | | | |
| MA.3 | -.10 | -.02 | .05 | .10 | .03 | .08 | -.12 | -.03 | .34** | .42** | 1 | | | | | | | |
| SO.1 | .04 | .01 | .13* | .13* | .16* | .18* | .05 | .13* | .17* | .19* | .19* | 1 | | | | | | |
| SO.2 | -.11 | .02 | -.02 | .08 | .12 | .14* | .00 | .04 | .33** | .32** | .26** | .44** | 1 | | | | | |
| S0.3 | .04 | .18* | .22* | .32** | .17* | .23* | .01 | .19* | .23** | .28** | .32** | .50** | .51** | 1 | | | | |
| SE.1 | .10 | .03 | .08 | .17* | -.06 | .02 | -.15* | -.03 | .32** | .33** | .32** | .10 | .20** | .25** | 1 | | | |
| SE.2 | .05 | .14* | .14* | .10 | .00 | .05 | -.09 | .01 | .32** | .28** | .13 | .10 | .16* | .15* | .42** | 1 | | |
| SE.3 | .10 | .05 | .12 | .17* | -.04 | .03 | -.09 | -.10 | .24** | .24** | .20* | .19* | .31** | .24** | .54** | .46** | 1 | |
| SE.4 | .07 | .05 | .01 | .12 | .00 | .00 | -.00 | -.00 | .39** | .29** | .34** | .13* | .23* | .21* | .41** | .38** | .32** | 1 |

*Note*. PA=Items measuring performance-approach goal orientation PV=Items measuring performance-avoid goal orientation
MA=Items measuring mastery goal orientation S0=Items measuring social goal orientation SE=Items measuring self-efficacy
*, $p < 0.05$: **, $p < 0.01$

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Table 4.5

*Correlations among Motivational Items for Wave 4 (grade 7c)*

| | PA.1 | PA.2 | PA.3 | PA.4 | PV.1 | PV.2 | PV.3 | PV.4 | MA.1 | MA.2 | MA.3 | SO.1 | SO.2 | SO.3 | SE.1 | SE.2 | SE.3 | SE.4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PA.1 | 1 | | | | | | | | | | | | | | | | | |
| PA.2 | .55** | 1 | | | | | | | | | | | | | | | | |
| PA.3 | .56** | .72** | 1 | | | | | | | | | | | | | | | |
| PA.4 | .56** | .62** | .67** | 1 | | | | | | | | | | | | | | |
| PV.1 | .25** | .32** | .27** | .33** | 1 | | | | | | | | | | | | | |
| PV.2 | .32** | .47** | .41** | .36** | .54** | 1 | | | | | | | | | | | | |
| PV.3 | .25** | .23** | .22* | .27** | .40** | .41** | 1 | | | | | | | | | | | |
| PV.4 | .28** | .31** | .35** | .32** | .34** | .41** | .40* | 1 | | | | | | | | | | |
| MA.1 | .05 | -.03 | -.03 | .11 | .10 | .04 | -.05 | .03 | 1 | | | | | | | | | |
| MA.2 | .08 | .04 | .07 | .11 | .14* | .07 | .04 | .01 | .28** | 1 | | | | | | | | |
| MA.3 | .03 | -.05 | -.07 | -.01 | .05 | -.09 | -.13* | -.04 | .36** | .38** | 1 | | | | | | | |
| SO.1 | .03 | .08 | .01 | .16* | .18* | .15* | .11 | .05 | .16* | .14* | .15* | 1 | | | | | | |
| SO.2 | .03 | .04 | .03 | .09 | .22* | .21* | .09 | .07 | .22* | .10 | .14* | .64** | 1 | | | | | |
| S0.3 | .10 | .08 | .04 | .17* | .27* | .16* | .16* | .16* | .24** | .19* | .23* | .49** | .49** | 1 | | | | |
| SE.1 | .10 | .09 | .20* | .12 | .11 | .11 | -.11 | .03 | .20* | .19* | .28** | .08 | .14* | -.00 | 1 | | | |
| SE.2 | .06 | .03 | .03 | .07 | .13* | .05 | -.04 | .07 | .28** | .17* | .29** | .13* | .17* | .12 | .30** | 1 | | |
| SE.3 | .06 | .02 | -.01 | -.00 | -.01 | .00 | -.07 | .06 | .35** | .16* | .28** | .11 | .15* | .12 | .40** | .44** | 1 | |
| SE.4 | .01 | -.02 | .03 | .12 | .03 | .01 | .00 | .05 | .26** | .30** | .34** | .17* | .23* | .17* | .23** | .25** | .26** | 1 |

*Note*. PA=Items measuring performance-approach goal orientation PV=Items measuring performance-avoid goal orientation
MA=Items measuring mastery goal orientation S0=Items measuring social goal orientation SE=Items measuring self-efficacy
*, $p < 0.05$: **, $p < 0.01$

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Table 4.6

*Correlations among Classroom Culture Items for Wave 1 (grade 6)*

| | MA.1 | MA.2 | MA.3 | MA.4 | PA.1 | PA.2 | PA.3 | PV.1 | PV.2 | PV.3 | TF.1 | TF.2 | TF.3 | TF.4 | CP.1 | CP.2 | CP.3 | CP.4 | CM.1 | CM.2 | CM.3 | CM.4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MA.1 | 1 | | | | | | | | | | | | | | | | | | | | | |
| MA.2 | .28** | 1 | | | | | | | | | | | | | | | | | | | | |
| MA.3 | .33** | .26** | 1 | | | | | | | | | | | | | | | | | | | |
| MA.4 | .12 | .14* | .20* | 1 | | | | | | | | | | | | | | | | | | |
| PA.1 | .07 | .13* | .09 | -.03 | 1 | | | | | | | | | | | | | | | | | |
| PA.2 | .03 | .09 | .08 | -.06 | .38** | 1 | | | | | | | | | | | | | | | | |
| PA.3 | .12 | .05 | .06 | -.02 | .48** | .50** | 1 | | | | | | | | | | | | | | | |
| PV.1 | .04 | .02 | -.02 | -.17* | .16* | .19* | .31** | 1 | | | | | | | | | | | | | | |
| PV.2 | -.05 | -.00 | -.02 | -.13* | .20* | .20* | .30** | .22* | 1 | | | | | | | | | | | | | |
| PV.3 | .06 | -.01 | -.06 | -.13 | .20* | .31* | .34** | .32** | .33** | 1 | | | | | | | | | | | | |
| TF.1 | -.01 | -.02 | -.05 | .00 | -.13* | -.10 | -.13* | -.12 | -.17* | -.08 | 1 | | | | | | | | | | | |
| TF.2 | .03 | .10 | .03 | .04 | -.03 | -.01 | -.04 | -.05 | -.09 | -.12 | .16* | 1 | | | | | | | | | | |
| TF.3 | .04 | .02 | .10 | -.09 | -.02 | -.12 | -.05 | -.11 | -.00 | -.02 | .27** | .11 | 1 | | | | | | | | | |
| TF.4 | .14* | .06 | .15* | .03 | -.06 | -.18* | -.16* | -.07 | -.17* | -.05 | .33** | .27* | .32** | 1 | | | | | | | | |
| CP.1 | .06 | .13* | .06 | -.09 | -.00 | -.11 | -.08 | .03 | .05 | .02 | .03 | .14* | .24** | -.04 | 1 | | | | | | | |
| CP.2 | .09 | .06 | .10 | -.03 | .04 | -.03 | .04 | .02 | .00 | .18* | .17* | .00 | .31** | .17* | .35** | 1 | | | | | | |
| CP.3 | -.05 | .08 | .00 | -.12 | .00 | -.07 | -.05 | .06 | .07 | -.06 | -.07 | .04 | .15* | .01 | .24** | .16* | 1 | | | | | |
| CP.4 | .16* | .13* | .09 | .08 | .11 | -.09 | .00 | -.01 | -.04 | .05 | .06 | -.05 | .03 | .12 | .19* | .33** | .08 | 1 | | | | |
| CM.1 | -.07 | .08 | -.07 | .05 | .05 | .09 | .06 | .05 | .15* | .02 | -.06 | -.02 | -.01 | -.15* | -.12 | -.11 | -.07 | -.01 | 1 | | | |
| CM.2 | -.09 | .08 | -.03 | -.06 | .11 | .06 | .06 | .08 | .17* | .13* | -.12 | -.11 | -.03 | -.17* | -.02 | -.09 | .01 | .00 | .61** | 1 | | |
| CM.3 | -.09 | .02 | -.04 | -.04 | .01 | .11 | -.03 | -.02 | -.01 | -.00 | -.07 | -.08 | -.00 | -.19* | -.02 | -.02 | -.01 | .02 | .19* | .26** | 1 | |
| CM.4 | -.00 | -.00 | -.14* | -.09 | -.00 | .17* | .08 | .10 | .01 | -.03 | -.01 | -.02 | .03 | -.08 | -.04 | .00 | .00 | -.10 | .21* | .21* | .18* | 1 |

*Note*. MA=Items measuring mastery goal structure PA=Items measuring performance-approach goal structure
PV=Items measuring performance-avoid goal structure TF=Items measuring teacher friendliness
CP=Items measuring cooperation CM=Items measuring competition *, $p< 0.05$: **, $p< 0.01$

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Table 4.7

*Correlations among Classroom Culture Items for Wave 2 (grade 7a)*

| | MA.1 | MA.2 | MA.3 | MA.4 | PA.1 | PA.2 | PA.3 | PV.1 | PV.2 | PV.3 | TF.1 | TF.2 | TF.3 | TF.4 | CP.1 | CP.2 | CP.3 | CP.4 | CM.1 | CM.2 | CM.3 | CM.4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MA.1 | 1 | | | | | | | | | | | | | | | | | | | | | |
| MA.2 | .46** | 1 | | | | | | | | | | | | | | | | | | | | |
| MA.3 | .38** | .36** | 1 | | | | | | | | | | | | | | | | | | | |
| MA.4 | .19* | .26** | .20** | 1 | | | | | | | | | | | | | | | | | | |
| PA.1 | -.02 | .02 | -.02 | .01 | 1 | | | | | | | | | | | | | | | | | |
| PA.2 | -.03 | .09 | .06 | .02 | .49** | 1 | | | | | | | | | | | | | | | | |
| PA.3 | -.02 | .12 | .06 | .02 | .53** | .59** | 1 | | | | | | | | | | | | | | | |
| PV.1 | .07 | .06 | .04 | -.00 | .25** | .32** | .32** | 1 | | | | | | | | | | | | | | |
| PV.2 | -.02 | .01 | -.00 | -.06 | .19* | .19* | .21* | .24** | 1 | | | | | | | | | | | | | |
| PV.3 | -.00 | .00 | .02 | .01 | .28** | .37** | .33** | .49** | .29** | 1 | | | | | | | | | | | | |
| TF.1 | .04 | .17* | .14* | .11 | -.15* | -.11 | -.14* | -.08 | .00 | -.14* | 1 | | | | | | | | | | | |
| TF.2 | .04 | .05 | .03 | .02 | -.10 | -.10 | -.10 | -.08 | -.14* | -.15* | .28** | 1 | | | | | | | | | | |
| TF.3 | .09 | .11 | .14* | .13* | -.11 | -.09 | -.11 | -.03 | -.07 | -.04 | .22* | .29* | 1 | | | | | | | | | |
| TF.4 | .12 | .15* | .15* | .04 | -.14* | -.22* | -.20* | -.12 | -.01 | -.12 | .54** | .37* | .36** | 1 | | | | | | | | |
| CP.1 | -.03 | .01 | .08 | .01 | .10 | .10 | .05 | .06 | .02 | .05 | -.00 | .04 | .12 | .01 | 1 | | | | | | | |
| CP.2 | .03 | .09 | .12 | .14* | -.00 | .06 | .03 | .11 | .02 | .10 | .14* | .15* | .35** | .22* | .27** | 1 | | | | | | |
| CP.3 | -.07 | -.04 | .04 | -.06 | .17* | .10 | .16* | -.00 | .16* | .00 | -.05 | -.05 | -.00 | -.04 | .24** | .08 | 1 | | | | | |
| CP.4 | .03 | .02 | .10 | .01 | -.00 | -.09 | .00 | .03 | .06 | -.02 | .08 | .14* | .20* | .18* | .22** | .22* | .23** | 1 | | | | |
| CM.1 | -.02 | .01 | -.04 | -.01 | .06 | .08 | .04 | .00 | .00 | .10 | -.08 | .00 | -.06 | -.06 | .03 | .13* | .03 | -.16* | 1 | | | |
| CM.2 | .04 | .03 | .00 | -.02 | -.03 | .09 | .00 | -.06 | -.06 | -.05 | -.14* | .00 | -.10 | -.12 | .05 | -.03 | .05 | -.18* | .61** | 1 | | |
| CM.3 | .06 | .14* | .03 | .08 | -.00 | .04 | .10 | -.06 | -.04 | .14* | -.05 | -.00 | .02 | .02 | .10 | .12 | .05 | -.03 | .27** | .22* | 1 | |
| CM.4 | .03 | .04 | .00 | .00 | .10 | .10 | .13 | -.09 | -.06 | -.03 | -.07 | -.03 | -.13* | -.02 | .00 | -.06 | .06 | -.10 | .17* | .27** | .23** | 1 |

*Note*. MA=Items measuring mastery goal structure PA=Items measuring performance-approach goal structure
PV=Items measuring performance-avoid goal structure TF=Items measuring teacher friendliness
CP=Items measuring cooperation CM=Items measuring competition *, $p< 0.05$: **, $p< 0.01$

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Table 4.8

*Correlations among Classroom Culture Items for Wave 3 (grade 7b)*

| | MA.1 | MA.2 | MA.3 | MA.4 | PA.1 | PA.2 | PA.3 | PV.1 | PV.2 | PV.3 | TF.1 | TF.2 | TF.3 | TF.4 | CP.1 | CP.2 | CP.3 | CP.4 | CM.1 | CM.2 | CM.3 | CM.4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MA.1 | 1 | | | | | | | | | | | | | | | | | | | | | |
| MA.2 | .36** | 1 | | | | | | | | | | | | | | | | | | | | |
| MA.3 | .24** | .50** | 1 | | | | | | | | | | | | | | | | | | | |
| MA.4 | .32** | .32** | .36** | 1 | | | | | | | | | | | | | | | | | | |
| PA.1 | .13 | -.03 | -.09 | -.02 | 1 | | | | | | | | | | | | | | | | | |
| PA.2 | .15* | .16* | .09 | .03 | .28** | 1 | | | | | | | | | | | | | | | | |
| PA.3 | .15* | .06 | .04 | -.00 | .42** | .44** | 1 | | | | | | | | | | | | | | | |
| PV.1 | .11 | .15* | .11 | -.00 | .14* | .21* | .38** | 1 | | | | | | | | | | | | | | |
| PV.2 | -.04 | .00 | -.01 | -.12 | .09 | .20* | .23** | .19* | 1 | | | | | | | | | | | | | |
| PV.3 | -.05 | .06 | .08 | -.06 | .07 | .25** | .25** | .28** | .37** | 1 | | | | | | | | | | | | |
| TF.1 | .03 | .02 | .00 | .06 | -.08 | -.11 | -.14* | -.08 | -.13* | -.11 | 1 | | | | | | | | | | | |
| TF.2 | .08 | .10 | .02 | .13* | .01 | -.06 | -.06 | -.03 | -.10 | -.05 | .20* | 1 | | | | | | | | | | |
| TF.3 | .10 | .06 | .07 | .15* | -.04 | -.06 | -.03 | .06 | -.04 | -.04 | .21* | .18* | 1 | | | | | | | | | |
| TF.4 | .05 | .07 | .10 | .20* | -.14* | -.11 | -.14* | -.05 | -.08 | -.03 | .50** | .24** | .29** | 1 | | | | | | | | |
| CP.1 | .09 | -.00 | .16* | .06 | .10 | .16* | .10 | .09 | .09 | .11 | -.14* | .07 | .19* | .00 | 1 | | | | | | | |
| CP.2 | .16* | .03 | .11 | .12 | .09 | .11 | .05 | .00 | -.00 | .08 | .07 | .04 | .14* | .08 | .36** | 1 | | | | | | |
| CP.3 | .14* | .00 | .04 | .04 | .16* | .16* | .09 | .07 | .10 | .05 | -.25** | .05 | .10 | -.22* | .31** | .28** | 1 | | | | | |
| CP.4 | .15* | -.01 | -.00 | -.12 | .21* | .11 | .11 | .13 | .06 | .06 | -.19* | .00 | -.03 | -.13* | .29** | .25** | .27** | 1 | | | | |
| CM.1 | .09 | .21* | .13 | .02 | .12 | .19* | .20* | .18* | .08 | .10 | -.10 | -.02 | .11 | -.17* | .14* | .11 | .13* | -.09 | 1 | | | |
| CM.2 | -.00 | .14* | .10 | .00 | .09 | .18* | .14* | .14* | .05 | .00 | -.10 | -.08 | .07 | -.27** | .13* | .13 | .09 | -.08 | .74** | 1 | | |
| CM.3 | -.01 | .03 | .11 | -.01 | .05 | .19* | .14* | .23** | .07 | .18* | -.10 | .02 | .08 | -.15* | .11 | .06 | .10 | -.09 | .36** | .31** | 1 | |
| CM.4 | .07 | .03 | -.01 | .02 | .03 | .01 | .09 | .11 | -.07 | -.06 | -.08 | -.02 | .02 | -.07 | .07 | -.11 | .07 | -.14* | .20* | .13 | .21* | 1 |

*Note*. MA=Items measuring mastery goal structure PA=Items measuring performance-approach goal structure
PV=Items measuring performance-avoid goal structure TF=Items measuring teacher friendliness
CP=Items measuring cooperation CM=Items measuring competition *, $p< 0.05$: **, $p< 0.01$

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Table 4.9

*Correlations among Classroom Culture Items for Wave 4 (grade 7c)*

| | MA.1 | MA.2 | MA.3 | MA.4 | PA.1 | PA.2 | PA.3 | PV.1 | PV.2 | PV.3 | TF.1 | TF.2 | TF.3 | TF.4 | CP.1 | CP.2 | CP.3 | CP.4 | CM.1 | CM.2 | CM.3 | CM.4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MA.1 | 1 | | | | | | | | | | | | | | | | | | | | | |
| MA.2 | .29** | 1 | | | | | | | | | | | | | | | | | | | | |
| MA.3 | .21* | .27** | 1 | | | | | | | | | | | | | | | | | | | |
| MA.4 | .25** | .21* | .43** | 1 | | | | | | | | | | | | | | | | | | |
| PA.1 | .26** | .22* | -.14* | -.26** | 1 | | | | | | | | | | | | | | | | | |
| PA.2 | .27** | .39** | -.12 | -.16* | .36** | 1 | | | | | | | | | | | | | | | | |
| PA.3 | .16* | .15* | -.19* | -.19* | .52** | .51** | 1 | | | | | | | | | | | | | | | |
| PV.1 | .03 | .17* | -.05 | -.11 | .34** | .31** | .33** | 1 | | | | | | | | | | | | | | |
| PV.2 | .16* | .09 | -.15* | -.09 | .25** | .30** | .25** | .51** | 1 | | | | | | | | | | | | | |
| PV.3 | .13 | .15* | -.12 | -.01 | .29** | .34** | .35** | .51** | .48** | 1 | | | | | | | | | | | | |
| TF.1 | -.07 | -.07 | .11 | .12 | -.27** | -.28** | -.26** | -.11 | -.20* | -.19* | 1 | | | | | | | | | | | |
| TF.2 | -.02 | -.01 | -.00 | .10 | -.12 | -.09 | -.13* | -.07 | -.17* | -.14* | .16* | 1 | | | | | | | | | | |
| TF.3 | .22* | .17* | .22* | .22* | -.08 | .06 | -.06 | -.09 | -.05 | .04 | .18* | .27** | 1 | | | | | | | | | |
| TF.4 | .08 | .02 | .15* | .24* | -.22* | -.17* | -.22* | -.11 | -.18* | -.16* | .60** | .33** | .32** | 1 | | | | | | | | |
| CP.1 | .14* | .26** | -.01 | .03 | .08 | .08 | .06 | -.04 | .07 | .05 | -.03 | .13 | .20* | .10 | 1 | | | | | | | |
| CP.2 | .17* | .13 | .05 | .05 | -.04 | -.03 | -.08 | -.09 | .01 | -.06 | .14* | .07 | .20* | .26** | .29** | 1 | | | | | | |
| CP.3 | .14* | .05 | -.10 | -.13* | .22* | .15* | .27** | .11 | .15* | .10 | -.20* | -.13* | -.05 | -.12 | .26** | .07 | 1 | | | | | |
| CP.4 | .14* | .10 | -.06 | .04 | .12 | .10 | .03 | .15* | .15* | .17* | -.06 | -.10 | -.02 | -.04 | .14* | .17* | .30** | 1 | | | | |
| CM.1 | .06 | .04 | .03 | .10 | .13* | .15* | .20* | .01 | .14* | .10 | -.16* | -.05 | .13* | -.17* | -.05 | -.13 | .15* | -.13* | 1 | | | |
| CM.2 | .10 | .14* | -.03 | .08 | .19* | .25** | .24** | .10 | .18* | .13* | -.22* | -.08 | .11 | -.20* | -.02 | -.09 | .22* | .03 | .70** | 1 | | |
| CM.3 | .14* | .02 | .01 | .02 | .04 | .08 | .15* | .11 | .27* | .21* | -.07 | -.10 | .19* | -.12 | -.03 | .03 | .02 | -.05 | .34** | .33** | 1 | |
| CM.4 | -.12 | .01 | .08 | .20* | .09 | -.00 | .04 | .03 | -.01 | .09 | -.09 | .08 | .19* | .00 | .12 | -.00 | .05 | .01 | .26** | .19* | .20* | 1 |

*Note*. MA=Items measuring mastery goal structure PA=Items measuring performance-approach goal structure
PV=Items measuring performance-avoid goal structure TF=Items measuring teacher friendliness
CP=Items measuring cooperation CM=Items measuring competition *, $p < 0.05$: **, $p < 0.01$

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Table 4.10

*Correlations among Social Background Items for Wave 1 (grade 6) and Wave 2 (grade 7a)*

| | Wave 1 | | | | | | | | | Wave 2 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PAH.1 | PAH.2 | PAH.3 | PAH.4 | PAD.1 | PAD.2 | PEH.1 | PEH.2 | PEH.3 | PAH.1 | PAH.1 | PAH.3 | PAH.4 | PAD.1 | PAD.2 | PEH.1 | PEH.2 | PEH.3 |
| PAH.1 | 1 | | | | | | | | | 1 | | | | | | | | |
| PAH.2 | .45** | 1 | | | | | | | | .57** | 1 | | | | | | | |
| PAH.3 | .57** | .18** | 1 | | | | | | | .66** | .41** | 1 | | | | | | |
| PAH.4 | .15* | .60** | .52** | 1 | | | | | | .38** | .74** | .63** | 1 | | | | | |
| PAD.1 | .07 | .12 | .05 | .10 | 1 | | | | | -.09 | .12 | .01 | .17** | 1 | | | | |
| PAD.2 | .19** | .05 | .24** | .04 | .64** | 1 | | | | .05 | -.05 | .15* | .01 | .58** | 1 | | | |
| PEH.1 | .01 | .02 | .11 | .12 | .01 | .03 | 1 | | | .24** | .15* | .22** | .13 | .02 | .11 | 1 | | |
| PEH.2 | .00 | .02 | .08 | .11 | .03 | .02 | .56** | 1 | | .17** | .09 | .21** | .11 | .21** | .27** | .54** | 1 | |
| PEH.3 | -.06 | -.09 | .05 | .00 | -.01 | .00 | .56** | .54** | 1 | .05 | .11 | .12 | .10 | .04 | .05 | .32** | .47** | 1 |

*Note*. PAH=Items measuring parent help PAD=Items measuring parent advising PEH= Items measuring peer help
*, $p < 0.05$: **, $p < 0.01$

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Table 4.11

*Correlations among Social Background Items for Wave 3 (grade 7b) and Wave 4 (grade 7c)*

| | Wave 3 | | | | | | | | | Wave 4 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PAH.1 | PAH.2 | PAH.3 | PAH.4 | PAD.1 | PAD.2 | PEH.1 | PEH.2 | PEH.3 | PAH.1 | PAH.1 | PAH.3 | PAH.4 | PAD.1 | PAD.2 | PEH.1 | PEH.2 | PEH.3 |
| PAH.1 | 1 | | | | | | | | | 1 | | | | | | | | |
| PAH.2 | .59** | 1 | | | | | | | | .55** | 1 | | | | | | | |
| PAH.3 | .70** | .45** | 1 | | | | | | | .71** | .38** | 1 | | | | | | |
| PAH.4 | .42** | .70** | .67** | 1 | | | | | | .45** | .63** | .73** | 1 | | | | | |
| PAD.1 | .04 | .15* | .09 | .19** | 1 | | | | | -.10 | .10 | -.00 | .12 | 1 | | | | |
| PAD.2 | .17** | .00 | .28** | .07 | .65** | 1 | | | | .04 | .08 | .10 | .12 | .66** | 1 | | | |
| PEH.1 | .16* | .06 | .26** | .14* | -.00 | .06 | 1 | | | .26** | .20** | .19** | .19** | .09 | .22** | 1 | | |
| PEH.2 | .07 | .03 | .16* | .12 | .03 | .03 | .38** | 1 | | .23** | .22** | .23** | .26** | .14* | .21** | .50** | 1 | |
| PEH.3 | -.01 | -.06 | .05 | -.00 | .06 | .05 | .30** | .35** | 1 | .14* | .15* | .13 | .19** | .19** | .19** | .36** | .44** | 1 |

*Note*. PAH=Items measuring parent help PAD=Items measuring parent advising PEH= Items measuring peer help

*, $p < 0.05$: **, $p < 0.01$

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Table 4.12

*Correlations among Motivational Variables Across Waves*

| | Wave 1 (grade 6) | | | | | Wave 2 (grade 7a) | | | | | Wave 3 (grade 7b) | | | | | Wave 4 (grade 7c) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PA | PV | MA | SO | SE | PA | PV | MA | SO | SE | PA | PV | MA | SO | SE | PA | PV | MA | SO | SE |
| PA | 1 | | | | | 1 | | | | | 1 | | | | | 1 | | | | |
| PV | .44** | 1 | | | | .39** | 1 | | | | .48** | 1 | | | | .44** | 1 | | | |
| MA | .06 | -.04 | 1 | | | -.03 | -.03 | 1 | | | .02 | .08 | 1 | | | .03 | .08 | 1 | | |
| SO | .09 | .09 | .16* | 1 | | .11 | .22* | .14* | 1 | | .14* | .24** | .35** | 1 | | .07 | .26** | .27** | 1 | |
| SE | .01 | -.09 | .33** | .14* | 1 | .06 | .04 | .25** | .14* | 1 | .10 | -.01 | .50** | .28** | 1 | .04 | .01 | .37** | .19* | 1 |

*Note*. PA=Performance-approach goal orientation PV=Performance-avoid goal orientation MA=Mastery goal orientation
SO=Social goal orientation SE=Self-efficacy *, $p < 0.05$: **, $p < 0.01$

Table 4.13

*Correlations among Classroom Culture Variables Across Waves*

| | Wave 1 (grade 6) | | | | | | Wave 2 (grade 7a) | | | | | | Wave 3 (grade 7b) | | | | | | Wave 4 (grade 7c) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | MA | PA | PV | TF | CP | CM | MA | PA | PV | TF | CP | CM | MA | PA | PV | TF | CP | CM | MA | PA | PV | TF | CP | CM |
| MA | 1 | | | | | | 1 | | | | | | 1 | | | | | | 1 | | | | | |
| PA | .14* | 1 | | | | | .04 | 1 | | | | | -.00 | 1 | | | | | -.27** | 1 | | | | |
| PV | -.02 | .36** | 1 | | | | .04 | .38** | 1 | | | | .09 | .33** | 1 | | | | -.13 | .38** | 1 | | | |
| TF | .03 | -.12 | -.18* | 1 | | | .12 | -.15* | -.13* | 1 | | | .09 | -.04 | -.04 | 1 | | | .13 | -.30** | -.27** | 1 | | |
| CP | .11 | -.05 | .07 | .09 | 1 | | .05 | .15* | .12 | .17* | 1 | | .07 | .16* | .14* | .16* | 1 | | -.08 | .23** | .14* | -.11 | 1 | |
| CM | -.05 | .10 | .12 | -.14* | -.09 | 1 | .05 | .07 | -.06 | -.03 | .12 | 1 | .18* | .18* | .16* | .02 | .16* | 1 | .05 | .23** | .17* | -.19* | .11 | 1 |

*Note*. MA=Mastery goal structure PA=Performance-approach goal structure PV=Performance-avoid goal structure
TF=Teacher friendliness CP=Cooperation CM=Competition *, $p < 0.05$: **, $p < 0.01$

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Table 4.14

*Correlations among Social Background Variables Across Waves*

| | Wave 1 (grade 6) | | | Wave 2 (grade 7a) | | | Wave 3 (grade 7b) | | | Wave 4 (grade 7c) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PAH | PAD | PEH | PAH | PAD | PEH | PAH | PAD | PEH | PAH | PAD | PEH |
| PAH | 1 | | | 1 | | | 1 | | | 1 | | |
| PAD | .16*. | 1 | | .07 | 1 | | .17** | 1 | | .08 | 1 | |
| PEH | .06 | .02 | 1 | .22** | .16* | 1 | .13* | .05 | 1 | .68** | .22** | 1 |

*Note*. PAH=Parent help PAD=Parent advising PEH=Peer help *, $p< 0.05$: **, $p< 0.01$

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The internal consistency of the motivational and classroom culture scales was quite high, with Alpha Coefficients ranging from α = .65 to α = .85. Table 4.15 presents the Cronbach's Alpha measures of internal consistency separately for the motivational, classroom culture and social background dimensions at each wave of measurement.

Table 4.15

*Internal Consistency Coefficients for the Motivational, Classroom Culture and Social Background Measures Across Waves*

| | Wave 1 (grade 6) | Wave 2 (grade 7a) | Wave 3 (grade 7b) | Wave 4 (grade 7c) |
|---|---|---|---|---|
| *Motivational Dimensions* | | | | |
| Motivational Goal orientations | .81 | .83 | .78 | .82 |
| Self-efficacy | .65 | .71 | .78 | .71 |
| *Classroom Culture Dimensions* | | | | |
| Classroom Goal Structure | .67 | .72 | .78 | .74 |
| Classroom Social Dimensions | .69 | .73 | .79 | .80 |
| *Social Background Dimensions* | | | | |
| Parent Help | .73 | .84 | .85 | .84 |
| Parent Advising | .78 | .73 | .79 | .80 |
| Peer Help | .78 | .70 | .69 | .69 |

*Note. N=220 for all waves and measures*

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*Descriptive Statistics for the Motivational, Classroom Culture and Social Background Instruments for Students in CE and CS*

Table 4.16 presents the means of the motivational, classroom culture and social background dimensions in each of the four waves of measurement for students in CE and CS. Students' mean ratings regarding all the motivational and classroom culture dimensions appeared to change very little across the within the same school transition in both school contexts, that is primary school for students in CE and secondary school for students in CS. Furthermore, students' mean ratings appeared to be different by cohort. More specifically, as far as motivation is concerned, students in CS reported higher performance-approach and performance-avoid goal orientations than students in CE, whereas students in CE had higher mastery and social orientations and self-efficacy than students in CS. Observing the means across all Cohorts (CT, CE and CS), there are indications that primary school students' mean ratings (CE for all waves and CT for Wave 1) regarding mastery and social orientations and self-efficacy were higher than students' mean ratings in secondary school (CS for all waves and CT for Waves 2, 3 and 4). On the contrary, secondary school students' mean ratings regarding performance-approach and performance-avoid orientations were higher than primary school students' mean ratings.

For the classroom culture dimensions, CE students' mean ratings regarding classroom mastery goal structure, teacher friendliness and cooperation were higher than CS students' mean ratings. On the contrary, CS students' mean ratings for performance-approach, performance-avoid classroom goal structure and competition were higher than CE students' mean ratings. Across all Cohorts, primary school students' mean ratings regarding mastery goal structure, teacher friendliness and cooperation were higher than the mean ratings of students in secondary school. Secondary school students' mean ratings concerning performance-approach and performance-avoid goal structure and competition were higher than the mean ratings of students in primary school.

For social background dimensions, CE students' mean ratings regarding parent help, parent advising were higher than CS students' mean ratings. Across all Cohorts, primary students' mean ratings regarding parent help and advising were higher than the secondary school students' mean ratings.

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Table 4.16

*Means of Motivational, Classroom Culture and Social Background Dimensions across Waves for Students in CE and CS*

| | CE | | | | CS | | | |
|---|---|---|---|---|---|---|---|---|
| | Wave 1 (grade 5) M(SD) | Wave 2 (grade 6a) M (SD) | Wave 3 (grade 6b) M (SD) | Wave 4 (grade 6c) M (SD) | Wave 1 (grade 7) M(SD) | Wave 2 (grade 8a) M (SD) | Wave 3 (grade 8b) M (SD) | Wave 4 (grade 8c) M (SD) |
| Mastery goal orientation | 4.28(.58) | 4.26(.70) | 4.24(.75) | 4.18(.87) | 3.85(.79) | 3.70(.73) | 3.82(.80) | 3.87(.75) |
| Perf-approach orientation | 2.30(.96) | 2.35(.71) | 2.37(.75) | 2.38(.86) | 3.10(1.04) | 3.23(.86) | 3.11(1.01) | 3.06(1.02) |
| Perf-avoid orientation | 2.08(.97) | 2.14(.93) | 2.16(.96) | 2.19(.98) | 2.57(.91) | 2.45(.92) | 2.45(1.02) | 2.57(1.10) |
| Social goal orientation | 3.48(.74) | 3.41(.69) | 3.38(.59) | 3.44(.62) | 3.18(.84) | 3.05(.84) | 2.96(.98) | 3.01(.96) |
| Self-efficacy | 3.86(.77) | 3.82(.56) | 3.86(.78) | 3.84(.78) | 3.52(.86) | 3.41(.95) | 3.40(.97) | 3.35(.92) |
| Mastery goal structure | 4.51(.56) | 4.57(.49) | 4.45(.52) | 4.50(.51) | 3.99(.89) | 3.93(.83) | 3.90(.97) | 3.92(.93) |
| Perf-approach structure | 2.76(.85) | 2.99(.97) | 2.86(.82) | 2.91(1.01) | 3.47(1.08) | 3.38(1.02) | 3.33(1.01) | 3.30(1.10) |
| Perf-avoid structure | 2.15(.81) | 2.10(.98) | 2.14(.91) | 2.12(.64) | 2.51(1.00) | 2.53(.81) | 2.62(.84) | 2.59(1.09) |
| Teacher Friendliness | 3.98(1.08) | 3.81(.87) | 3.82(.97) | 3.87(.85) | 3.40(.85) | 3.39(.90) | 3.41(.77) | 3.34(.90) |
| Cooperation | 3.27(.82) | 3.35(1.16) | 3.33(1.05) | 3.42(.90) | 3.12(.90) | 3.04(.55) | 3.06(.88) | 3.01(.74) |
| Competition | 3.48(.80) | 3.54(1.06) | 3.56(.91) | 3.52(.75) | 3.70(.77) | 3.84(.66) | 3.91(.84) | 3.79(.83) |
| Parent help | 3.00(.97) | 2.97(.90) | 2.77(1.03) | 2.99(.98) | 2.11(.96) | 2.06(.52) | 1.99(.23) | 1.78(.94) |
| Parent advising | 3.95(.51) | 4.05(.73) | 3.90(1.03) | 4.01(.78) | 3.56(.52) | 3.50(.93) | 3.55(.85) | 3.49(.41) |
| Peer help | 2.79(.63) | 2.81(.80) | 2.98(1.24) | 2.93(.64) | 2.82(.49) | 2.63(.35) | 2.64(.61) | 2.52(.72) |

*Note*. N=42 for CE and N=69 for CS

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In this study, three a-priori structures (one for motivation, one for classroom culture and one for social background) were posited. The ability of a solution based on each of these structures to fit the data was tested using Confirmatory Factor Analysis (CFA).

The a-priori motivational model consists of three first-order factors and one second-order factor. Figure 4.1 makes easy the conceptualization of how the various components of motivation relate to each other. The first-order factors represent the cognitive, affective and social aspects of motivation. The cognitive aspect was measured by eleven items, the social by three items and the affective aspect was measured by four items. The five first-order factors were hypothesized to construct the second-order factor "students' motivation in mathematics", which was hypothesized to account for any correlation or covariance between the first-order factors.

The structural equation motivational model with the latent variables and their indicators across the four waves of measurement is presented in Figure 4.1. The first number indicates the factor loading for Wave 1 and the numbers in the parentheses the factor loadings for Waves 2, 3 and 4 respectively. Table 4.17 summarizes the model-fit statistics for the confirmatory motivational model across waves. The descriptive-fit measures indicated support for the hypothesized first and second-order latent factors, since CFI>.95, RMSEA≤.06 and $\chi^2/df$<1.95.

Table 4.17

*Fit Indices for the CFA Motivational Model across Waves*

| Waves | CFI | RMSEA | $\chi^2$ | df | $\chi^2$/df |
|---|---|---|---|---|---|
| Wave 1 (grade 6) | .976 | .058 | 127.66 | 73 | 1.74 |
| Wave 2 (grade 7a) | .984 | .056 | 120.61 | 71 | 1.69 |
| Wave 3 (grade 7b) | .972 | .060 | 111.62 | 61 | 1.82 |
| Wave 4 (grade 7c) | .984 | .059 | 101.72 | 58 | 1.75 |

*Note.* CFI=Comparative Fit Index RMSEA=Root Mean Square Error of Approximation



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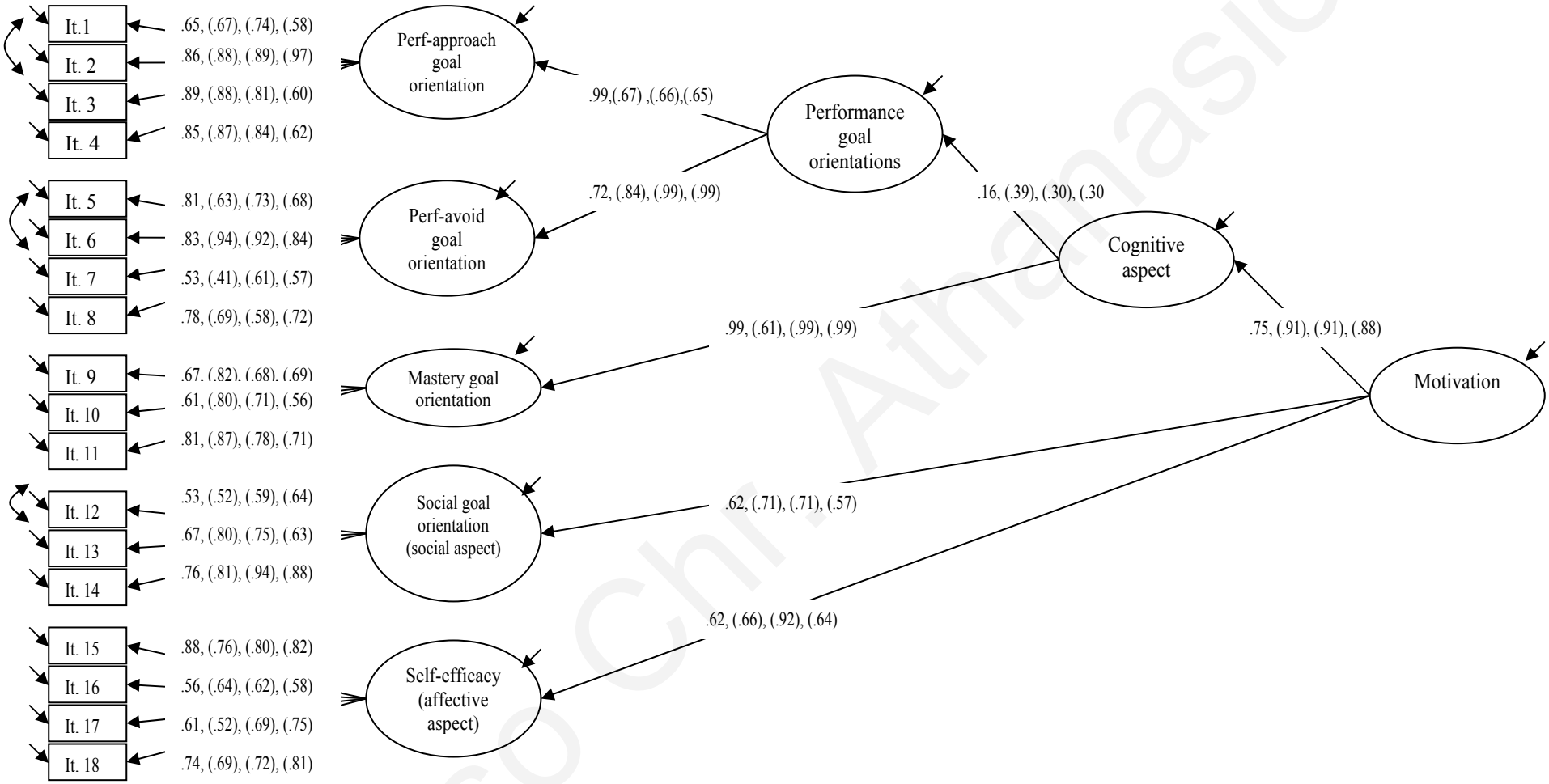


*Figure 4.1*. Motivational model for students in CT.

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Specifically, the analysis showed that each of the items employed in the present study loaded adequately on each motivational dimension (see the first-order factors in Figure 4.1), indicating that the cognitive, affective and social dimensions represent three distinct aspects of students' motivation in mathematics. Furthermore, the r-squares (shown in Figure B1 in Appendix) also indicated that modest to large amounts of variance are accounted for all items corresponding to each motivational dimension. This means that the three dimensions can model students' motivation in mathematics.

The structure of the proposed motivational model also addressed the differential predictions of the three dimensions for students' motivation. The consideration of the effects among the motivational dimensions revealed that the cognitive dimension was the primary source explaining students' motivation in mathematics across all waves of measurement (see Figure B1). The affective and the social dimensions had a moderate significant effect in students' motivation in mathematics across all waves (see Figure B1).

In the analyses, four items out of twenty two had to be removed across all waves because the inclusion of these items in the analyses resulted in a poor fit. The items removed included 1 item from the performance-avoid, 1 item from the social goal orientations and 2 items from the self-efficacy scale. Furthermore, only for Wave 4 three statistically significant correlations were included in the model between error terms for items that loaded on the same factors. More specifically, a statistically significant correlation was found between the error of items 1 and 3 ($\underline{r}$=.14, both items belonged to the performance-approach goal orientation factor), items 5 and 7 ($\underline{r}$=.12, both items belonged to the performance-avoid goal orientation factor) and items 12 and 13 ($\underline{r}$=.31, both items belonged to the social goal orientation factor). These statistically significant correlations can be attributed to the common measurement error of items that belonged to the same factor.

The initial classroom culture model consists of six first–order factors, two second-order factors and one third-order factor as indicated in Figure 4.2. The six first-order factors represent the mastery, performance-approach and performance-avoid classroom goal structure, teacher friendliness, cooperation and competition. The mastery, performance-approach and performance-avoid goal structure first-order factors were hypothesized to construct the second-order factor "classroom goal structure", whereas the teacher friendliness, cooperation and competition factors the second-order factor "classroom social dimensions". The two second-order factors were hypothesized to construct the third-order factor "students' classroom culture perceptions".



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Figure 4.2 presents the structural equation model for classroom culture with the latent variables and their indicators. The first number indicates the factor loading for Wave 1 and the numbers in the parentheses the factor loadings for Waves 2, 3 and 4 respectively. Table 4.18 summarizes the model fit statistics across waves. The descriptive-fit measures indicated support for the hypothesized first, second and third order latent factors, since CFI>.95, RMSEA≤.06 and $\chi^2/df$<1.95.

Table 4.18

*Fit Indices for the CFA Classroom Culture Model across Waves*

| Waves | CFI | RMSEA | $\chi^2$ | df | $\chi^2$/df |
|---|---|---|---|---|---|
| Wave 1 (grade 6) | .964 | .060 | 188.39 | 100 | 1.88 |
| Wave 2 (grade 7a) | .964 | .060 | 180.35 | 95 | 1.89 |
| Wave 3 (grade 7b) | .990 | .048 | 74.06 | 49 | 1.51 |
| Wave 4 (grade 7c) | .979 | .060 | 87.60 | 49 | 1.78 |

*Note.* CFI=Comparative Fit Index RMSEA=Root Mean Square Error of Approximation

Specifically, the analysis showed that each of the items employed in the present study loaded adequately on each of the first-order factors, indicating that these factors represent six distinct dimensions of classroom culture in mathematics. Furthermore, the r-squares shown in Figure B2 in Appendix also illustrated that modest to large amounts of variance are accounted for all items corresponding to each classroom culture dimension. This means that the six dimensions can model students' perceptions of classroom culture in mathematics.

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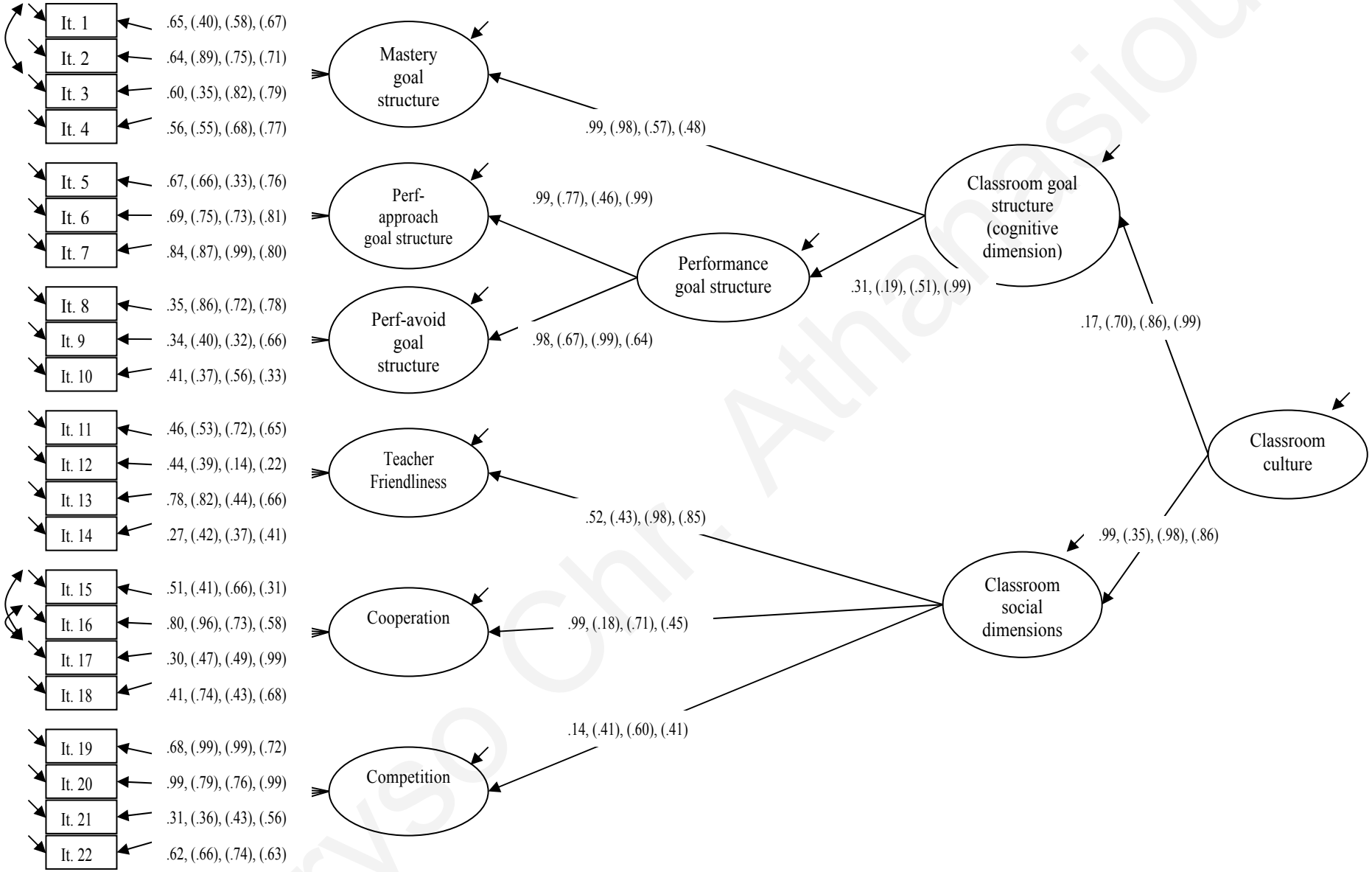


*Figure 4.2*. Classroom culture model for students in CT.

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The structure of the proposed model also addressed the differential predictions of the two dimensions for students' classroom culture perceptions. The consideration of the effects among the dimensions revealed that the classroom social dimensions were the primary source explaining students' perceptions of classroom culture across all waves of measurement. The classroom goal structure dimension had a moderate significant effect on students' classroom culture perceptions across all four waves.

In the analyses, eight items out of thirty had to removed across all waves because the inclusion of these items resulted in a poor fit. The items removed included 2 items from the performance-avoid, 2 items from the mastery goal structure scales, 1 item from the competition, 1 item from cooperation and 2 items from teacher friendliness scales. Furthermore, only for Wave 2 three statistically significant correlations were included in the model between error terms for items that loaded on the same factors. More specifically a statistically significant correlation was found between the error of items 1 and 3 ($\underline{r}$=.40, both items belonged to the mastery goal structure factor), items 15 and 17 ($\underline{r}$=.12, both items belonged to the cooperation factor) and items 16 and 17 ($\underline{r}$=.22, both items belonged to the cooperation factor). These statistically significant correlations can be attributed to the common measurement error of items that belonged to the same factor.

The a-priori social background model consists of three first-order factors and one second-order factor. Figure 4.3 makes easy the conceptualization of how the various components of social background relate to each other. The first-order factors represent the parent help, parent advising and peer help dimensions. The three first-order factors were hypothesized to construct the second-order factor "students' social background in mathematics", which was hypothesized to account for any correlation or covariance between the first-order factors.

The structural equation social background model with the latent variables and their indicators across the four waves of measurement is presented in Figure 4.3. The first number indicates the factor loading for Wave 1 and the numbers in the parentheses the factor loadings for Waves 2, 3 and 4 respectively. Table 4.19 summarizes the model-fit statistics for the confirmatory motivational model across waves. The descriptive-fit measures indicated support for the hypothesized first and second-order latent factors, since $\underline{\text{CFI}}$>.95, $\underline{\text{RMSEA}}\leq$.06 and $\underline{\chi^2/df}$<1.95.

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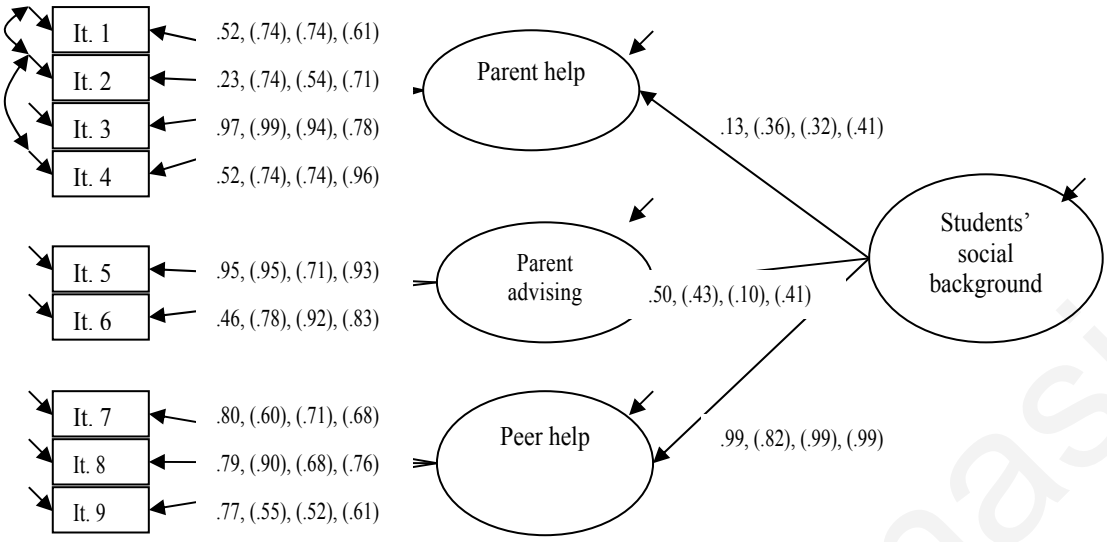


*Figure 4.3*. Social background model for students in CT.

Table 4.19

*Fit Indices for the CFA Social Background Model across Waves*

| Waves | CFI | RMSEA | $\chi^2$ | df | $\chi^2$/df |
|---|---|---|---|---|---|
| Wave 1 (grade 6) | .998 | .028 | 25.77 | 22 | 1.17 |
| Wave 2 (grade 7a) | .994 | .060 | 38.98 | 20 | 1.94 |
| Wave 3 (grade 7b) | .998 | .048 | 31.47 | 21 | 1.49 |
| Wave 4 (grade 7c) | .997 | .052 | 33.65 | 21 | 1.60 |

*Note.* CFI=Comparative Fit Index RMSEA=Root Mean Square Error of Approximation

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Specifically, the analysis showed that each of the items employed in the present study loaded adequately on each of the first-order factors, indicating that these factors represent three distinct dimensions of students' social background in mathematics. Furthermore, the r-squares shown in Figure B3 in Appendix also illustrated that modest to large amounts of variance are accounted for all items corresponding to each social background dimension. This means that the three dimensions can model students' perceptions of their social backgrounds regarding mathematics.

The structure of the proposed model also addressed the differential predictions of the three dimensions for students' social background perceptions. The consideration of the effects among the dimensions revealed that the peer help dimension was the primary source explaining students' perceptions of their social background across all waves of measurement. The parent help and advising dimensions had a moderate significant effect on students' social background perceptions across all four waves.

In the analyses, one item from the peer help scale had to be removed across all waves because the inclusion of that item resulted in a poor fit. Furthermore, across all waves two statistically significant correlations were included in the model between error terms for items that loaded on the same factors. More specifically a statistically significant correlation was found between the error of items 1 and 2 ($\underline{r}$=.41 for Wave 1, $\underline{r}$=.18 for Wave 2, $\underline{r}$=.28 for Wave 3 and $\underline{r}$=.30 for Wave 4) and items 2 and 4 ($\underline{r}$=.57 for Wave 1, $\underline{r}$=.28 for Wave 2, $\underline{r}$=.34 for Wave 3 and $\underline{r}$=.36 for Wave 4). These statistically significant correlations can be attributed to the common measurement error of items that belonged to the same factor.

### *The Validation of the Motivational, Classroom Culture and Social Background Models for Students in CE and CS*

The a-priori models were tested for students in CE and CS. The Confirmatory Factor Analyses indicated that the three models had a poor fit to the data for students in CE and CS. The descriptive-fit measures did not indicate support for the hypothesized models for both Cohorts, since CFI<.90, RMSEA>.06 and $\chi^2/df>2$. The poor fit of the models may be attributed to the small number of students in each Cohort (42 students in CE and 69 students in CS).



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For the examination of the relation between students' motivation in mathematics and their perceptions of the classroom culture across the transition to secondary school, the validity of two structural models was tested: (a) The first model assumes that the latent third-order factor "class structure in mathematics" predicts the factor "students' motivation in mathematics" and (b) the second model assumes that the latent second-order factor "students' motivation in mathematics" predicts the factor "classroom culture in mathematics".

The results of the structural analyses provided support for the first model across all waves, since the descriptive-fit measures were within the expected range and the correlation coefficients were statistically significant. On the contrary, the analyses for the second model indicated a poor fit across all waves with the correlation coefficients being below the statistically significant level. Therefore the second model could not be accepted.

Based on these findings students' perceptions of the classroom culture in mathematics have a direct effect and therefore are a strong predictor of their motivation in mathematics across the transition from primary to secondary school. Table 4.20 summarizes the first models' fit statistics across waves.

Table 4.20

*Fit Indices for the First Model across Waves*

| Waves | CFI | RMSEA | $\chi^2$ | df | $\chi^2$/df |
|---|---|---|---|---|---|
| Wave 1 (grade 6) | .955 | .058 | 9.397 | 5 | 1.87 |
| Wave 2 (grade 7a) | .923 | .060 | 10.801 | 6 | 1.80 |
| Wave 3 (grade 7b) | .957 | .060 | 9.809 | 5 | 1.96 |
| Wave 4 (grade 7c) | .926 | .052 | 9.662 | 5 | 1.93 |

*Note.* CFI=Comparative Fit Index RMSEA=Root Mean Square Error of Approximation



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Table 4.21 indicates the correlation coefficients between students' motivation in mathematics and their perceptions of the classroom culture across the transition to secondary school.

Πίνακας 4.21

*Classroom Culture Correlation Coefficients on Students' Motivation in Mathematics across Waves*

| Factors | Wave 1 | | Wave 2 | | Wave 3 | | Wave 4 | |
|---|---|---|---|---|---|---|---|---|
| Classroom culture correlation coefficients on students' motivation | r | z | r | z | r | z | r | z |
| | .96 | 2.72 | .98 | 5.68 | .98 | 4.95 | .98 | 4.20 |

*The Relation between Students' Motivation and their Perceptions of their Social Background across the Transition from Primary to Secondary School*

For the examination of the relation between students' motivation in mathematics and their perceptions of their social background across the transition to secondary school, the validity of two structural models was tested: (a) The first model assumes that the latent second-order factor "students' social background" predicts the factor "students' motivation in mathematics" and (b) the second model assumes that the latent second-order factor "students' motivation in mathematics" predicts the factor "students' social background".

The results of the structural analyses provided support for the first model across all waves, since the descriptive-fit measures were within the expected range and the correlation coefficients were statistically significant. On the contrary, the analyses for the second model indicated a poor fit across all waves with the correlation coefficients being below the statistically significant level. Therefore the second model could not be accepted.

Based on these findings students' perceptions of their social background have a direct effect and therefore are a strong predictor of their motivation in mathematics across the transition from primary to secondary school. Table 4.22 summarizes the first models' fit statistics across waves.



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Table 4.22

*Fit Indices for the First Model across Waves*

| Waves | CFI | RMSEA | $\chi^2$ | df | $\chi^2$/df |
|---|---|---|---|---|---|
| Wave 1 (grade 6) | .965 | .032 | 9.769 | 8 | 1.22 |
| Wave 2 (grade 7a) | .940 | .058 | 11.76 | 7 | 1.66 |
| Wave 3 (grade 7b) | .950 | .060 | 11.05 | 6 | 1.84 |
| Wave 4 (grade 7c) | .975 | .060 | 11.53 | 6 | 1.92 |

*Note.* CFI=Comparative Fit Index RMSEA=Root Mean Square Error of Approximation

Table 4.23 indicates the correlation coefficients between students' motivation in mathematics and their perceptions of their social background across the transition to secondary school.

Πίνακας 4.23

*Social Background Correlation Coefficients on Students' Motivation in Mathematics Across Waves*

| Factors | Wave 1 | | Wave 2 | | Wave 3 | | Wave 4 | |
|---|---|---|---|---|---|---|---|---|
| Social Background correlation coefficients on students' motivation | r | z | r | z | r | z | r | z |
| | .86 | 2.24 | .61 | 2.14 | .58 | 1.99 | .42 | 3.63 |

## Change in Motivation, Classroom Culture and Social Background across the Transition from Primary to Secondary School

The motivational, classroom culture and social background data for students in CT were analysed using growth modelling. The examination of whether students' perceptions of



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their motivation, of classroom culture and of their social background changed in nonlinear ways over time was conducted, delineated in the three models by the inclusion of quadratic terms. For some variables a cubic factor was included in the model to capture the S-shaped growth observed in students' raw data. All models were not run separately for each construct of interest. Rather a unified model for motivation, for classroom culture and for social background was examined each time in order to address the issues of collinearity.

*The Validation of the Motivational Growth Model*

The motivational model's fit statistics indicated that the growth model fits the data well (CFI=.953, RMSEA=.046, $\chi^2$=122.369, *df*=84, $\chi^2/df$=1.45). The motivational growth model is illustrated in Figure 4.4, whereas the results of the motivational model are presented in Table 4.24. The performance-avoid dimension of motivation was removed from the growth model because of a poor fit. For the variable self-efficacy, a cubic factor was included in the motivational model.

Table 4.24

*Motivational Growth Model*

| Motivational Variables | Intercept | Slope (quadratic growth) |
|---|---|---|
| Mastery goal orientation | 9.08 | -1.81 |
| Performance-approach goal orientation | 3.40 | 1.83 |
| Social goal orientation | 6.80 | -0.10 |
| Self-efficacy | 10.32 | 1.66[a] |

*Note*. [a]=Cubic growth

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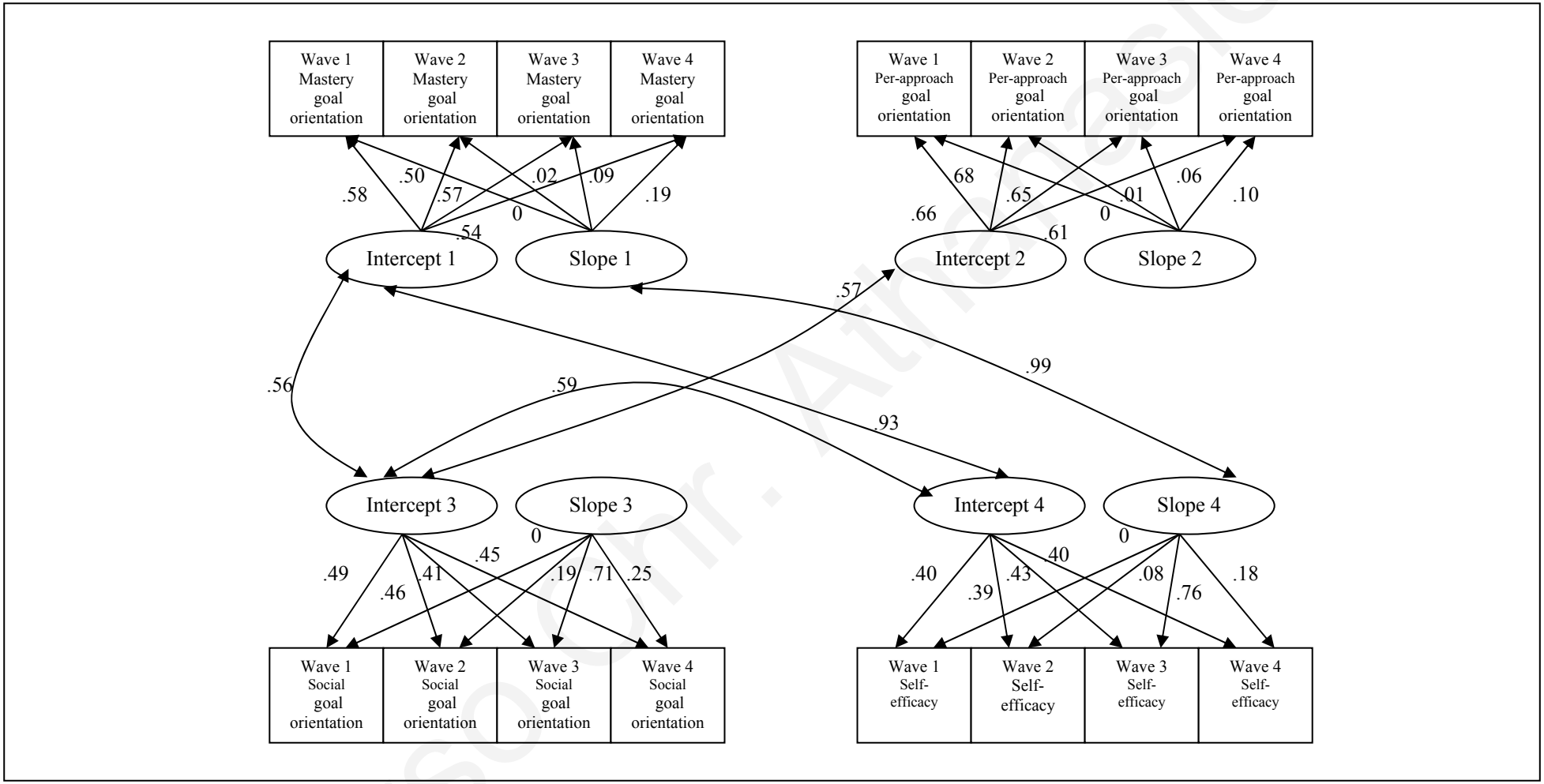


*Figure 4.4*. The Motivational Growth Model.

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Figure 4.5 shows the pattern of change for mastery goal orientation across waves. Students' mastery orientation was highest in primary school and the decline was the dominant trend right after the transition to secondary school. Across seventh grade (between the first and second trimesters) students' mastery orientation appeared to stabilize, whereas by the end of seventh grade their perceptions declined even more. The quadratic term of the growth curve indicates decelerated growth in students' mastery goal orientation across the transition to secondary school and by the end of seventh grade.

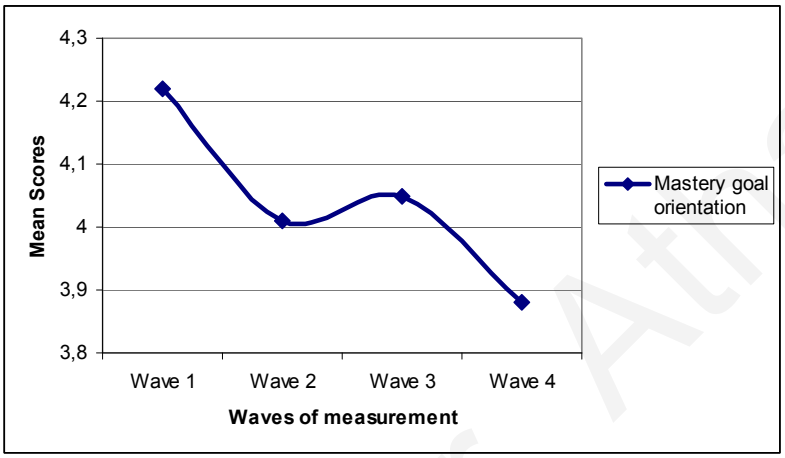


*Figure 4.5.* Growth Curve for Mastery Goal Orientation across Waves

Figure 4.6 shows the pattern of change for performance-approach goal orientation. Students' performance-approach goal orientation was lowest in primary school. As shown in Figure 4.6, the incline was clearly the dominant trend for students' performance-approach goal orientation across the transition from primary to secondary school. During seventh grade (between the first and second trimesters) students' performance-approach orientation appeared to stabilize, but by the end of seventh grade students' perceptions inclined even more. More specifically, the quadratic aspect of the growth curve indicates accelerated growth in students' performance-approach orientation across the transition to secondary school and by the end of seventh grade.

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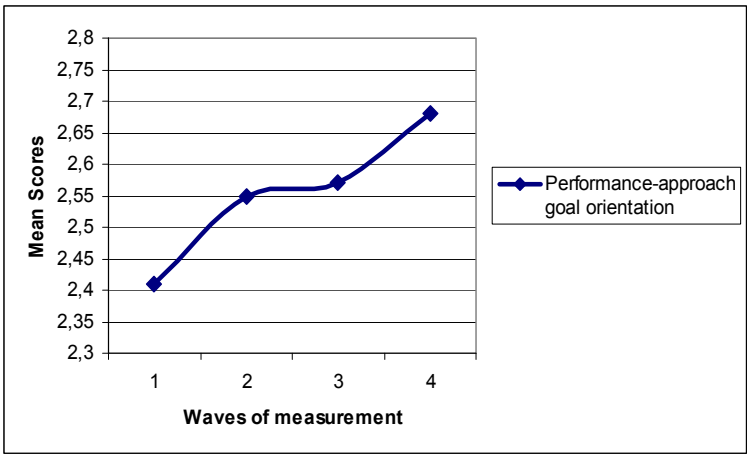


*Figure 4.6.* Growth Curve for Performance-Approach Goal Orientation across Waves

As indicated in Figure 4.7 students' social goal orientation was highest in primary school and the decline was the dominant trend across the transition to secondary school. The quadratic factor indicates decelerated growth across the transition to secondary school. The rate of decline slowed by the end of 7$^{th}$ grade, indicating a stabilization of students' social goal orientation by the end of the first grade in secondary school.

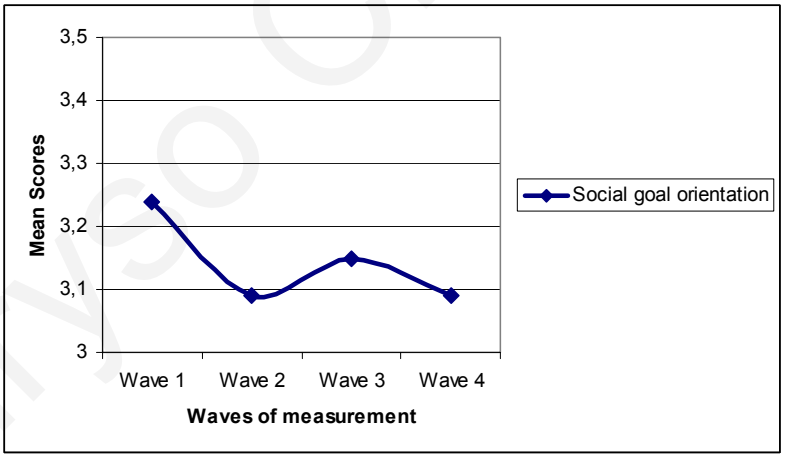


*Figure 4.7.* Growth Curve for Social Goal Orientation across Waves

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The change in self-efficacy is shown in Figure 4.8. Students' self-efficacy perceptions were highest in primary school and the decline was the dominant trend right after the transition to secondary school. After a trimester in secondary school students' self-efficacy perceptions inclined but by the end of seventh grade their perceptions declined again. The cubic term in the growth model indicated decelerated growth in students' self-efficacy perceptions right after the transition and accelerated growth through seventh grade.

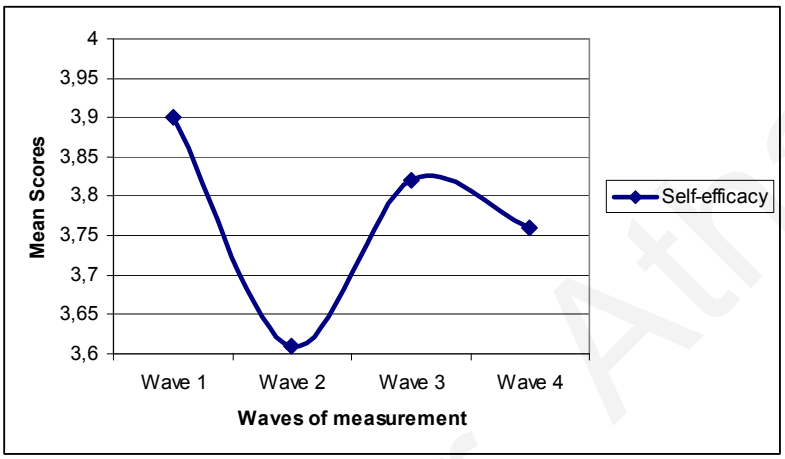


*Figure 4.8.* Growth Curve for Self-Efficacy across Waves

*The Validation of the Classroom Culture Growth model*

The model fit statistics indicated that the classroom culture growth model fits the data well (CFI=.928, RMSEA=.042, $\chi^2$=286.393, *df*=205, $\chi^2/df$=1.39). The classroom culture growth model is illustrated in Figure 4.9. The results of the model are presented in Table 4.25. For the competition dimension a cubic factor was included in the growth model.

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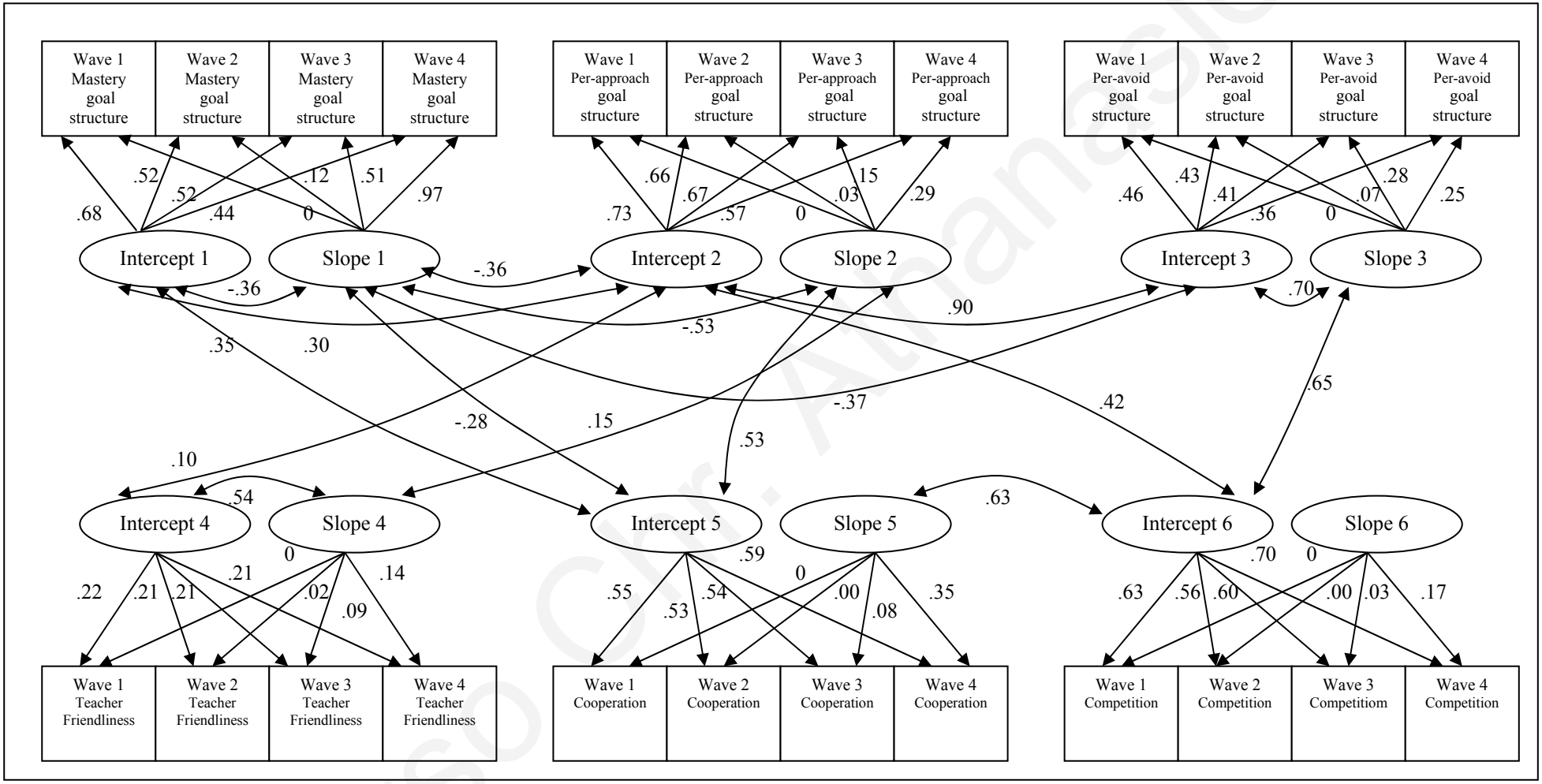


*Figure 4.9*. The Classroom Culture Growth Model.

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Table 4.25

*Classroom Culture Growth Model*

| Classroom Culture Variables | Intercept | Slope (quadratic growth) |
|---|---|---|
| Mastery goal structure | 8.62 | -0.26 |
| Performance-approach goal structure | 5.00 | 0.83 |
| Performance-avoid goal structure | 5.79 | 1.19 |
| Teacher Friendliness | 53.01 | -1.79 |
| Cooperation | 5.69 | -0.34 |
| Competition | 5.76 | 2.28[a] |

*Note*. [a]=Cubic growth

Figure 4.10 shows the pattern of change for students' classroom mastery goal structure perceptions. Students' mastery goal structure perceptions were highest in primary school and the decline was the dominant trend across the transition to secondary school. The quadratic factor indicated decelerated growth across the transition. The rate of decline slowed by the end of 7th grade indicating a stabilization of students' perceptions regarding classroom mastery goal structure by the end of the first grade in secondary school.

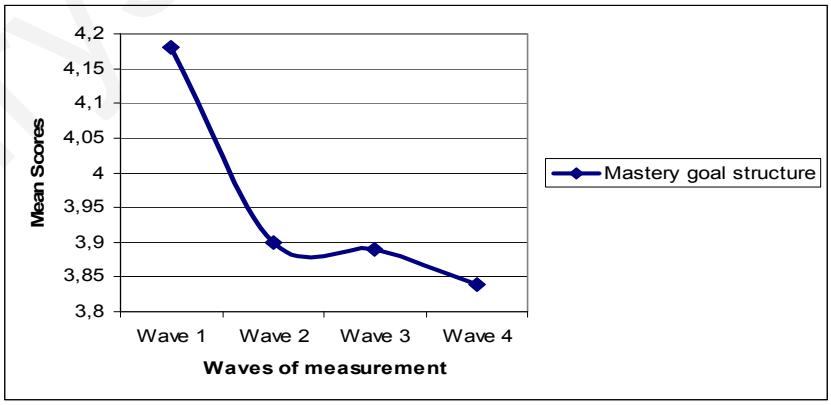


*Figure 4.10.* Growth Curve for Classroom Mastery goal Structure across Waves

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Figure 4.11 shows the pattern of change for classroom performance-approach goal structure. Students' perceptions were lowest in primary school. As shown in Figure 4.10, the incline was clearly the dominant trend for students' performance-approach goal structure perceptions across the transition from primary to secondary school. During seventh grade (between the first and second trimesters) students' performance-approach goal structure perceptions appeared to stabilize, but by the end of seventh grade students' perceptions inclined even more. More specifically, the quadratic aspect of the growth curve indicated accelerated growth in students' performance-approach goal structure perceptions across the transition to secondary school and by the end of seventh grade.

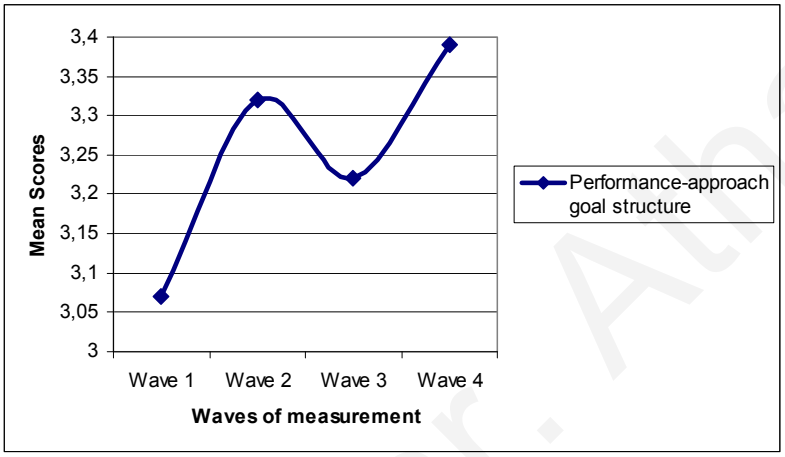


*Figure 4.11.* Growth Curve for Performance-Approach Goal Structure across Waves

For students' performance-avoid classroom goal structure perceptions the change is indicated in Figure 4.12. Students' perceptions were lowest in primary school. As shown in Figure 4.12, the incline was clearly the dominant trend for students' performance-avoid goal structure perceptions across the transition to secondary school and through seventh grade. The quadratic aspect of the growth curve indicated accelerated growth in students' performance-avoid orientation across the transition to secondary school. The rate of incline slowed by the end of 7$^{th}$ grade indicating a stabilization of students' perceptions regarding classroom performance-avoid goal structure by the end of the first grade in secondary school.

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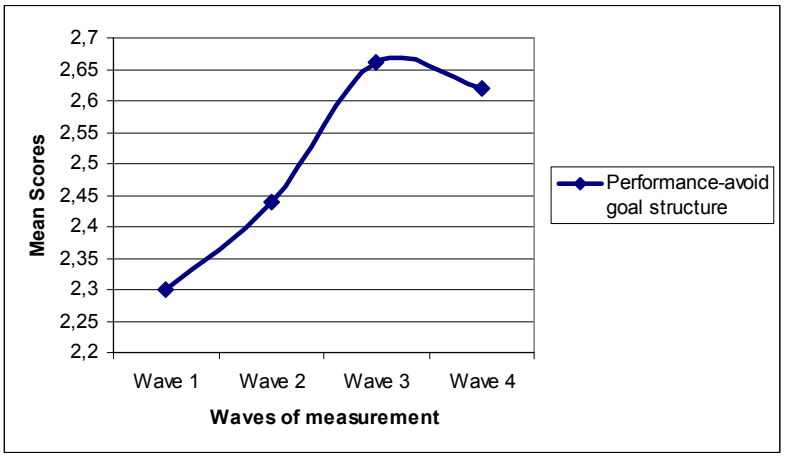


*Figure 4.12.* Growth Curve for Performance-Avoid Goal Structure across Waves

Figure 4.13 shows the pattern of change for students' teacher friendliness perceptions across waves. Students' teacher friendliness perceptions were highest in primary school and the decline was the dominant trend right after the transition to secondary school. Across seventh grade (between the first and second trimesters) students' perceptions appeared to stabilize, whereas by the end of seventh grade their perceptions declined even more. The quadratic term of the growth curve indicated decelerated growth in students' teacher friendliness perceptions across the transition to secondary school and by the end of seventh grade.

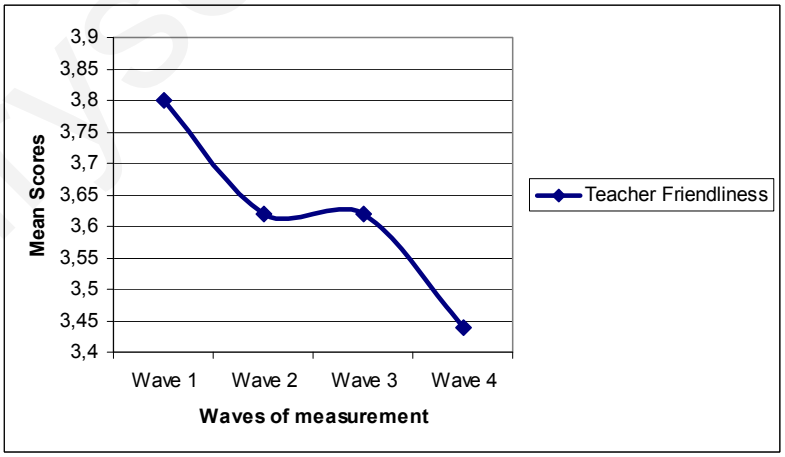


*Figure 4.13.* Growth Curve for Teacher Friendliness across Waves



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As indicated in Figure 4.14 students' cooperation perceptions were highest in primary school and the decline was the dominant trend across the transition to secondary school. The quadratic factor indicated decelerated growth across the transition to secondary school. The rate of decline slowed during seventh grade indicating a stabilization of students' perceptions regarding cooperation by the end of the first grade in secondary school.

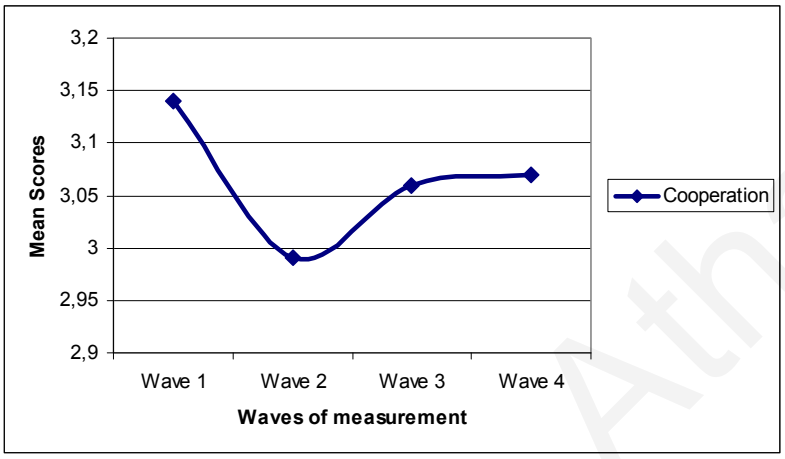


*Figure 4.14.* Growth Curve for Cooperation across Waves

The change for competition classroom environment is shown in Figure 4.15. Students' competition perceptions were lowest in primary school and the incline was the dominant trend right after the transition to secondary school. After a trimester in secondary school students' classroom competition environment perceptions declined and remained on the same level until the end of seventh grade. The cubic term in the growth model indicated accelerated growth in students' competition perceptions right after the transition and decelerated growth through seventh grade. The rate of decline slowed by the end of seventh grade indicating a stabilization of students' perceptions regarding competition by the end of the first grade in secondary school.

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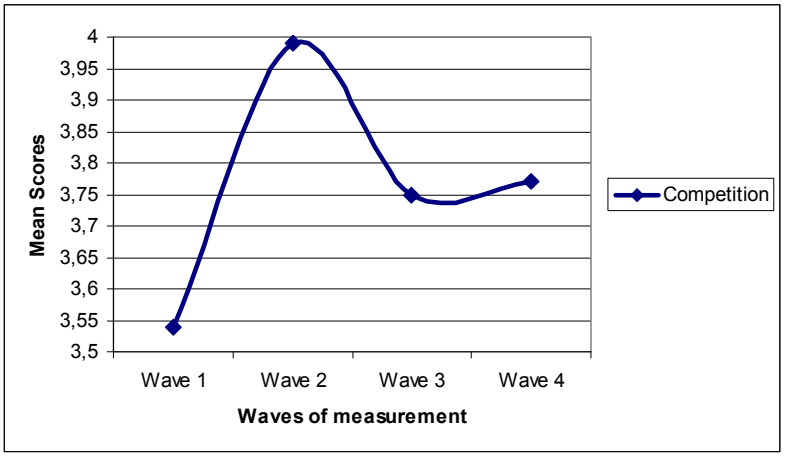


*Figure 4.15.* Growth Curve for Competition across Waves

*Differences in Students' Perceptions of the Change in Classroom Culture across the Transition to Secondary School*

Another aim of the study concerned the extent to which students in the sample vary according to the direction of change they perceive in classroom culture across the transition to secondary school and whether these differences reflected differences in the direction of change in their motivation across the transition. Latent Class Analysis was used to answer this question. The best fitting model with the smallest AIC and BIC and the biggest Entropy value was the one involving four categories as presented in Table 4.26.

Table 4.26

*Fit Indices of Models with Different Number of Classes*

| Indices | AIC | BIC | Entropy |
|---|---|---|---|
| Model with 2 classes | 4302.18 | 4366.66 | .46 |
| Model with 3 classes | 4305.99 | 4394.22 | .64 |
| Model with 4 classes | 4206.78 | 4218.77 | .73 |

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Taking into consideration the average latent class probabilities as shown in Table 4.27, it can be concluded that the four categories of students are quite distinct, indicating that each category has its own characteristics. 61.8% of students belonged to Category 1 (136 students), 24.1% to Category 2 (53 students), 12.7% to Category 3 (28 students) and 1.4% to Category 4 (3 students).

Table 4.27

*Average Latent Class Probabilities for Most Likely Latent Class Membership*

| Probabilities for latent class membership | Class 1 | Class 2 | Class 3 | Class 4 |
|---|---|---|---|---|
| Category 1 | .908 | .060 | .031 | .000 |
| Category 2 | .143 | .890 | .045 | .002 |
| Category 3 | .188 | .101 | .891 | .000 |
| Category 4 | .029 | .131 | .001 | .940 |

The means and standard deviations of each classroom culture dimension across the four categories of students are shown in Table 4.28. Students in Category 1 experienced differences mostly in the cognitive aspect of the classroom culture. More specifically, these students experienced the biggest increase in the classroom performance-approach goal structure. Category 2 students also experienced differences in the cognitive aspects of the classroom culture, with the biggest increase in the classroom performance-avoid goal structure and the biggest decrease in the classroom mastery goal structure. Students in Category 3 experienced mostly differences in the social aspect of the classroom culture, and reported the biggest decrease in teacher friendliness and cooperation and the biggest increase in competition. Category 4 students experienced differences in both the cognitive and the social dimensions of the classroom context. More specifically, students in this



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category reported the biggest increase in classroom mastery goal structure and in cooperation. Students in Category 4 were the only subjects in this study who reported increase in mastery goal structure and in cooperation across the transition to secondary school.

Table 4.28

*Means and Standard Deviations of the Four Classes of Students in the Classroom Culture Dimensions*

| Classes | MA | PA | PV | TF | CP | CM |
|---|---|---|---|---|---|---|
| Category 1 | -0.17(.07) | 0.36(.13) | 0.23(.15) | -0.12(.09) | -0.05(.01) | 0.20(.18) |
| Category 2 | -1.10(.23) | 0.32(.18) | 0.58(.11) | -0.54(.20) | -0.11(.08) | 0.27(.05) |
| Category 3 | 0.05(.02) | 0.13(.01) | 0.31(.08) | -1.18(0.34) | -0.31(.17) | 0.35(.06) |
| Category 4 | 1.55(.61) | 0.31(.14) | 0.37(.20) | -0.28(.16) | 1.68(.49) | 0.17(.03) |

*Note*. M(SD) MA=Mastery goal structure PA=Performance-approach goal structure PV=Performance-avoid goal structure TF=Teacher friendliness CP=Cooperation CM=Competition

Table 4.29 presents the means and the standard deviations of the motivational variables for the four categories of students. Students in different categories reported a different direction of change in their motivation in mathematics across the transition to secondary school. Generally, the change in students' motivation in mathematics reflected the changes students perceived in the classroom culture across the transition. More specifically, students in Category 1 experienced the biggest increase in their performance-approach goal orientation, whereas Category 2 students experienced the biggest decrease in their mastery goal orientation and the biggest increase in their performance-avoid orientation. Students in Category 3 experienced the biggest decrease in their social orientation and self-efficacy, whereas Category 4 students experienced the biggest increase in their mastery and social orientations and in self-efficacy.



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Table 4.29

*Means and Standard Deviations of the Four Classes of Students in the Motivational Dimensions*

| Classes | MA | PA | PV | SO | SE |
|---|---|---|---|---|---|
| Category 1 | -0.28(.17) | 0.33(.11) | 0.14(.05) | -0.10(.09) | -0.02(.01) |
| Category 2 | -0.53(.13) | 0.25(.18) | 0.30(.03) | -0.21(.02) | -0.13(.08) |
| Category 3 | -0.31(.28) | 0.11(.01) | 0.13(.08) | -0.38(.14) | -0.18(.07) |
| Category 4 | 0.50(.21) | 0.07(.04) | 0.03(.01) | 0.38(.06) | 0.35(.09) |

*Note*. M(SD) MA=Mastery goal orientation PA=Performance-approach goal orientation PV=Performance-avoid goal orientation SO=Social goal orientation SE=Self-efficacy

*The Validation of the Social Background Growth Model*

The social background model's fit statistics indicated that the growth model fits the data well (CFI=.955, RMSEA=.060, $\chi^2$=40.165, *df*=21, $\chi^2/df$=1.91). The social background growth model is illustrated in Figure 4.16, whereas the results of the model are presented in Table 4.30. The parent advising dimension was removed from the model because of a poor fit (there was actually no change in students' means across the four waves of measurement).

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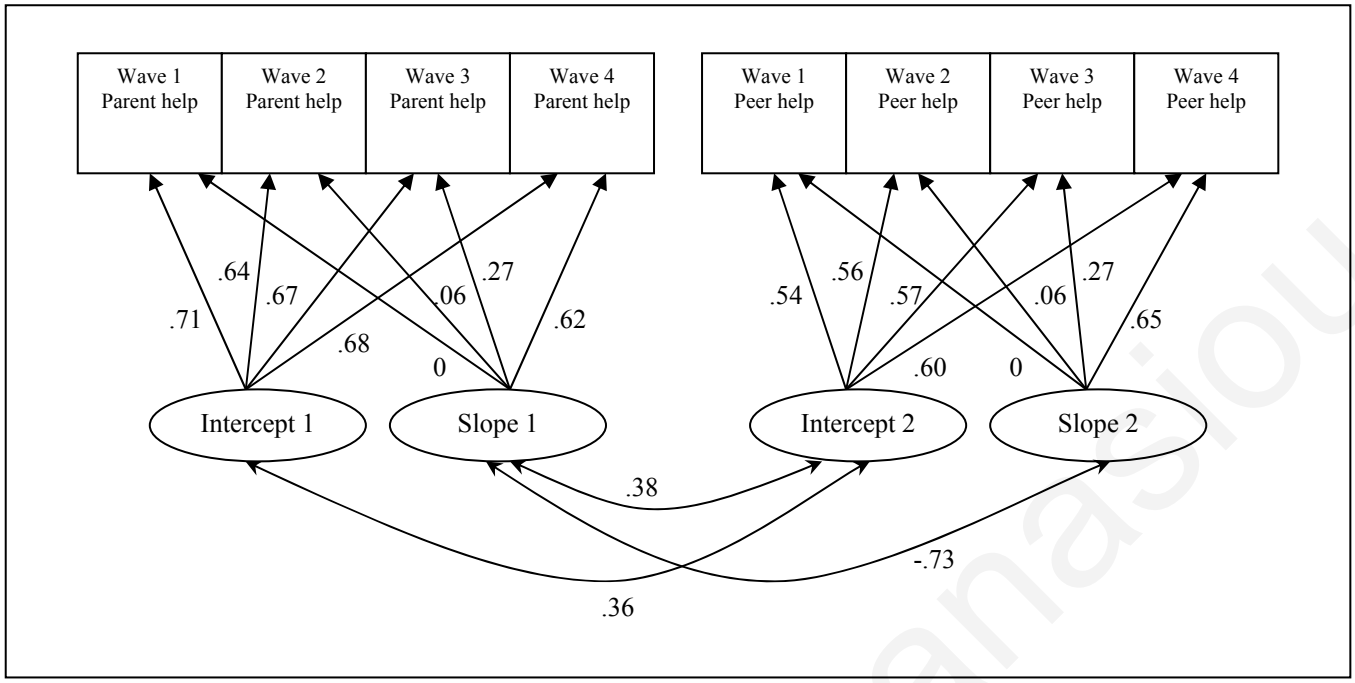


*Figure 4.16*. The Social Background Growth Model.

Table 4.30

*Social Background Growth Model*

| Social Background Variables | Intercept | Slope (quadratic growth) |
|---|---|---|
| Parent help | 3.70 | -0.59 |
| Peer help | 4.85 | -0.40 |

Figure 4.17 shows the pattern of change for students' parent help perceptions across waves. Students' perceptions were highest in primary school and the decline was the dominant trend right after the transition to secondary school. Across seventh grade (between the first and second trimesters) students' perceptions regarding parent help appeared to stabilize, whereas by the end of seventh grade their perceptions declined even more. The quadratic term of the growth curve indicated decelerated growth in students' parent help perceptions across the transition to secondary school and by the end of seventh grade.

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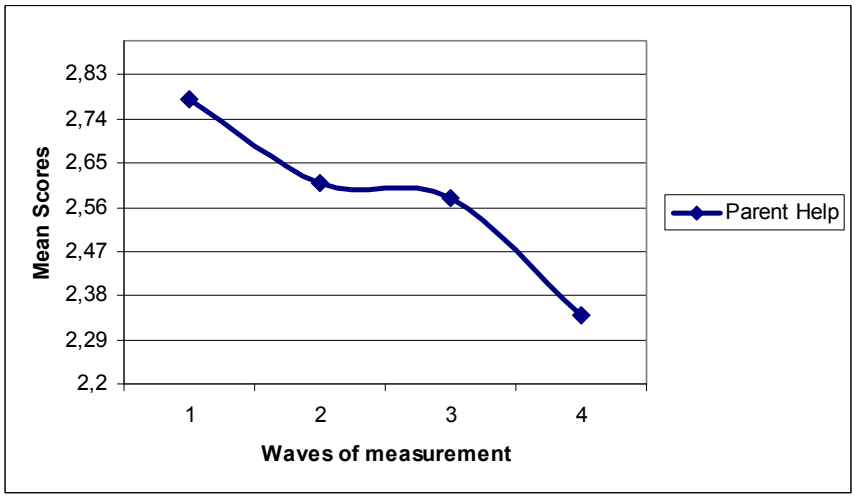


*Figure 4.17.* Growth Curve for Parent Help across Waves

Figure 4.18 shows the pattern of change for students' peer help perceptions. Students' perceptions were highest in primary school and the decline was the dominant trend across the transition to secondary school. The quadratic factor indicated decelerated growth across the transition. The rate of decline slowed by the end of 7$^{th}$ grade indicating a stabilization of students' perceptions regarding peer help by the end of the first grade in secondary school.

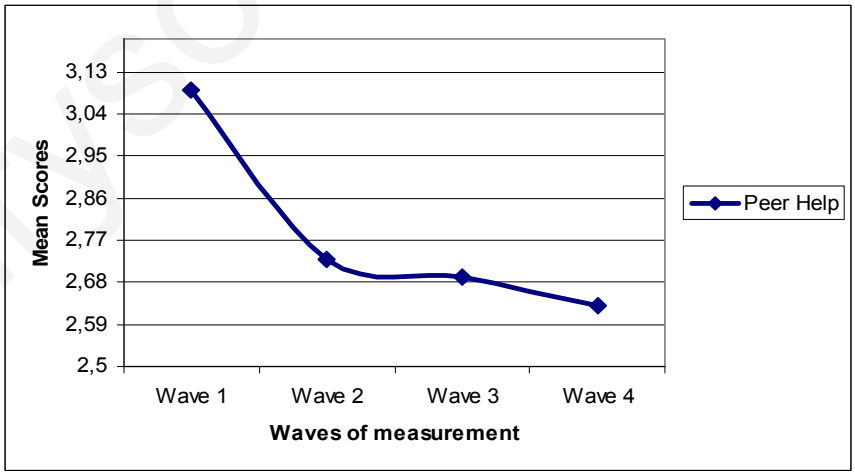


*Figure 4.18.* Growth Curve for Peer Help across Waves

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*Differences in Students' Perceptions of the Change in their Social Background across the Transition to Secondary School*

In order to examine whether students in the sample vary according to the direction of change they perceive in their social background across the transition to secondary school and whether these differences reflected differences in the direction of change in their motivation across the transition, Latent Class Analysis was conducted. The best fitting model with the smallest AIC and BIC and the biggest Entropy value was the one involving three categories as presented in Table 4.31.

Table 4.31

*Fit Indices of Models with Different Number of Classes*

| Indices | AIC | BIC | Entropy |
|---|---|---|---|
| Model with 2 classes | 1976.19 | 2022.13 | .67 |
| Model with 3 classes | 1974.36 | 2010.04 | .80 |
| Model with 4 classes | 1974.53 | 2036.08 | .63 |

Taking into consideration the average latent class probabilities as shown in Table 4.32, it can be concluded that the three categories of students are quite distinct, indicating that each category has its own characteristics. 77.7% of students belonged to Category 1 (171 students), 19.1% to Category 2 (42 students), and 3.2% to Category 3 (7 students).

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Table 4.32

*Average Latent Class Probabilities for Most Likely Latent Class Membership*

| Probabilities for latent class membership | Class 1 | Class 2 | Class 3 |
|---|---|---|---|
| Category 1 | .893 | .105 | .122 |
| Category 2 | .020 | .896 | .284 |
| Category 3 | .007 | .151 | .942 |

The means and standard deviations of each social background dimension across the three categories of students are shown in Table 4.33. Students in Category 1 experienced decrease in all social background dimensions. These students reported the biggest decrease in their parent help and advising perceptions across the transition to secondary school. Category 2 students also reported decrease in all dimensions and showed the biggest decrease in their peer help perceptions across the transition. Category 3 students reported the biggest increase in all social background dimensions. Students in Category 3 were the only subjects in this study who reported increase in their peer, parent help and parent advising perceptions across the transition to secondary school.

Table 4.33

*Means and Standard Deviations of the Three Classes of Students in Social Background Dimensions*

| Classes | Parent help | Parent advising | Peer help |
|---|---|---|---|
| Category 1 | -0.54(.21) | -0.17(.17) | -0.39(.09) |
| Category 2 | -0.25(.11) | -0.05(.02) | -0.92(.59) |
| Category 3 | 0.76(.61) | 0.85(.49) | 0.87(.03) |

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Table 4.34 presents the means and standard deviations of the motivational variables across the three categories of students. Students in different categories reported a different direction of change in their motivation in mathematics across the transition to secondary school. Generally, the students in the first two categories who reported decrease in parent and peer help and parent advising reported decreases in their mastery and social goal orientations and in their self-efficacy and the biggest increase in performance orientations. Category 1 students (who reported the biggest decrease in their parent help perceptions across the transition) also reported the biggest decrease in their self-efficacy perceptions. The students in Category 2 who reported the biggest decrease in peer help perceptions across the transition also reported the biggest decrease in their social goal orientations and the biggest increase in their performance-avoid goal orientation. On the contrary, Category 3 students experienced the biggest increase in their mastery and social orientations and in self-efficacy.

Table 4.34

*Means and Standard Deviations of the Three Classes of Students in the Motivational Dimensions*

| Classes | MA | PA | PV | SO | SE |
|---|---|---|---|---|---|
| Category 1 | -0.39(.17) | 0.29(.11) | 0.15(.05) | -0.16(.09) | -0.20(.01) |
| Category 2 | -0.36(.13) | 0.25(.18) | 0.30(.03) | -0.31(.02) | -0.10(.08) |
| Category 3 | 0.80(.21) | 0.13(.04) | 0.01(.01) | 0.78(.06) | 0.85(.09) |

*Note*. M(SD) MA=Mastery goal orientation PA=Performance-approach goal orientation PV=Performance-avoid goal orientation SO=Social goal orientation SE=Self-efficacy

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## Change in the Actual and the Preferred Classroom Environment across the Transition from Primary to Secondary School

In this section the validation of the two a-priori classroom environment models is presented firstly (the first model refers to the actual classroom environment, whereas the latter on the preferred classroom environment). Next, the changes in students' perceptions of the actual and the preferred classroom environment in mathematics and of the fit between the actual and the preferred environment across the transition to secondary school are investigated through growth analyses. Prior to the Confirmatory Factor Analyses and the growth modelling, the descriptive statistics for the classroom environment instrument used are presented.

### *Descriptive Statistics for the Classroom Environment Instrument for Students in CT*

Table 4.35 presents the descriptive statistics for the actual and the preferred classroom environment dimensions in each of the four waves of measurement. For the actual classroom environment, primary school students' mean ratings regarding personalization, investigation and differentiation were higher than their mean ratings in all the secondary school measurements. On the contrary, primary school students' mean ratings regarding independence were lower than their mean ratings in all the secondary school measurements. For the preferred classroom environment, primary school students' mean ratings regarding personalization, investigation and independence were lower than their mean ratings in secondary school, whereas for differentiation students' perceptions were higher in primary school than in all the secondary school measurements. The values of skewness and kurtosis were within the expected range, that is less than the value of 2 standard errors regardless of sign (the standard error for skewness was .164 and for kurtosis was .327), indicating a distribution with no significant skewness and kurtosis problems.

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Table 4.35

Descriptive Statistics for Classroom Environment Dimensions across Waves for Students in CT

| | Wave 1 (grade 6) | | | | Wave 2 (grade 7a) | | | | Wave 3 (grade 7b) | | | | Wave 4 (grade 7c) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Variables | M(SD) | RNG | SKN | KRT | M (SD) | RNG | SKN | KRT | M (SD) | RNG | SKN | KRT | M (SD) | RNG | SKN | KRT |
| *Actual Class Environment* | | | | | | | | | | | | | | | | |
| Personalization | 4.05(1.00) | 4.00 | .164 | .327 | 3.82(.96) | 4.00 | -.316 | -.162 | 3.84(1.05) | 4.00 | -.276 | .583 | 3.82(1.07) | 4.00 | -.296 | .088 |
| Investigation | 3.45(.80) | 4.00 | -.125 | -.143 | 3.33(.77) | 4.00 | -.018 | -.182 | 3.39(.81) | 4.00 | -.118 | -.316 | 3.37(.99) | 4.00 | -.361 | -.441 |
| Independence | 2.95(1.05) | 4.00 | .095 | -.225 | 3.19(1.01) | 4.00 | -.333 | -.510 | 3.43(.90) | 4.00 | -.241 | -.281 | 3.29(1.01) | 4.00 | -.200 | -.430 |
| Differentiation | 2.51(.84) | 4.00 | .566 | -.217 | 1.72(.76) | 3.33 | .128 | .650 | 2.24(.75) | 4.00 | .332 | .620 | 2.29(.90) | 4.00 | -.116 | -.519 |
| *Preferred Class Environment* | | | | | | | | | | | | | | | | |
| Personalization | 4.19(.82) | 3.67 | -.299 | -504 | 4.32(.74) | 3.00 | -.139 | .010 | 4.23(.62) | 4.00 | -.259 | .427 | 4.19(.68) | 3.33 | -.205 | -.328 |
| Investigation | 3.53(.96) | 4.00 | .239 | .286 | 3.56(1.01) | 4.00 | -.295 | -.599 | 3.58(.92) | 4.00 | -.315 | -.257 | 3.57(.98) | 4.00 | -.251 | -.335 |
| Independence | 3.32(1.22) | 4.00 | -.241 | -.446 | 3.63(1.11) | 4.00 | -.203 | -.584 | 3.29(1.09) | 4.00 | -.279 | -.499 | 3.36(1.09) | 4.00 | -.148 | -.626 |
| Differentiation | 2.30(.93) | 4.00 | .239 | .286 | 1.77(.93) | 4.00 | .076 | .323 | 2.08(.80) | 3.33 | .252 | -.546 | 1.98(.94) | 4.00 | .318 | -.338 |

*Note.* N=220 for all waves and measures M(SD)=Mean (Standard Deviation) RNG=Range SKN=Skewness KRT=Kurtosis

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Tables 4.36, 4.37, 4.38 and 4.39 present the correlations between the items used to examine the validity of the actual classroom model, whereas Tables 4.40, 4.41, 4.42 and 4.43 illustrate the correlations between the items used to examine the validity of the classroom preferred model in Waves 1, 2, 3 and 4 respectively. Across all waves, high correlations between items measuring the same actual or preferred classroom environment dimension according to the pre-established theory were observed indicating that the items seem to measure the same classroom environment aspect.

The correlations between the four actual classroom variables across waves are presented in Table 4.44, whereas Table 4.45 illustrates the correlations between the four preferred classroom environment variables in Waves 1, 2, 3 and 4 respectively. Across all waves, high correlations between the factors were observed.

The internal consistency of the motivational and classroom culture scales was quite high, with Alpha Coefficient ranging from α=.69 to α=.93. Table 4.46 presents the Cronbach's Alpha measures of internal consistency for the actual and the preferred scales at each wave of measurement.

Table 4.46

*Internal Consistency Coefficients for the Actual and the Preferred Classroom Environment Measures across Waves*

| | Wave 1 (grade 6) | Wave 2 (grade 7a) | Wave 3 (grade 7b) | Wave 4 (grade 7c) |
|---|---|---|---|---|
| Actual classroom environment | .63 | .75 | .81 | .78 |
| Preferred classroom environment | .79 | .93 | .89 | .72 |

*Note.* N=220 for all waves and measures

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Table 4.36

*Correlations among Actual Classroom Environment Items for Wave 1 (grade 6)*

| | IND.1 | IND.2 | IND.3 | INV.1 | INV.2 | INV.3 | DIF.1 | DIF.2 | DIF.3 | PER.1 | PER.2 | PER.3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| IND.1 | 1 | | | | | | | | | | | |
| IND.2 | .42** | 1 | | | | | | | | | | |
| IND.3 | .28** | .32** | 1 | | | | | | | | | |
| INV.1 | -.03 | .05 | -.01 | 1 | | | | | | | | |
| INV.2 | .00 | -.08 | .01 | .09 | 1 | | | | | | | |
| INV.3 | .01 | -.06 | .02 | .19* | .25** | 1 | | | | | | |
| DIF.1 | -.02 | -.06 | -.10 | -.19* | .04 | -.01 | 1 | | | | | |
| DIF.2 | -.14* | -.13* | -.01 | -.17* | -.03 | -.00 | .28** | 1 | | | | |
| DIF.3 | -.02 | -.13 | -.12 | -.08 | -.00 | .05 | .19* | .15* | 1 | | | |
| PER.1 | .00 | .01 | .00 | .18* | .15* | .32** | -.06 | -.02 | -.11 | 1 | | |
| PER.2 | .05 | .18* | .14* | .20* | .08 | .13 | -.21** | -.24** | -.21** | .44** | 1 | |
| PER.3 | -.01 | .00 | -.12 | .15* | .17** | .28** | -.07 | -.10 | -.07 | .48** | .34** | 1 |

*Note*. IND=Items measuring actual independence environment INV=Items measuring actual investigation environment
DIF=Items measuring actual differentiation environment PER=Items measuring actual personalization environment
*, $p < 0.05$: **, $p < 0.01$

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Table 4.37

*Correlations among Actual Classroom Environment Items for Wave 2 (grade 7a)*

| | IND.1 | IND.2 | IND.3 | INV.1 | INV.2 | INV.3 | DIF.1 | DIF.2 | DIF.3 | PER.1 | PER.2 | PER.3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| IND.1 | 1 | | | | | | | | | | | |
| IND.2 | .42** | 1 | | | | | | | | | | |
| IND.3 | .24** | .32** | 1 | | | | | | | | | |
| INV.1 | -.07 | -.09 | .03 | 1 | | | | | | | | |
| INV.2 | -.33** | -.11 | -.13 | .13* | 1 | | | | | | | |
| INV.3 | .02 | .10 | -.00 | -.01 | .06 | 1 | | | | | | |
| DIF.1 | -.05 | -.03 | -.03 | -.13* | .00 | .02 | 1 | | | | | |
| DIF.2 | -.03 | -.10 | .06 | -.08 | .06 | .00 | .32** | 1 | | | | |
| DIF.3 | .00 | -.00 | .10 | .02 | -.03 | -.04 | .14* | .27** | 1 | | | |
| PER.1 | -.08 | -.02 | -.02 | .06 | .17* | .06 | -.15* | -.01 | -.18** | 1 | | |
| PER.2 | -.20** | -.00 | -.07 | .03 | .22** | .15* | -.11 | .00 | -.21** | .58** | 1 | |
| PER.3 | -.04 | -.05 | -.04 | -.00 | .15* | -.06 | -.06 | -.04 | -.17** | .35** | .34** | 1 |

*Note*. IND=Items measuring actual independence environment INV=Items measuring actual investigation environment
DIF=Items measuring actual differentiation environment PER=Items measuring actual personalization environment
*, $p < 0.05$: **, $p < 0.01$

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Table 4.38

*Correlations among Actual Classroom Environment Items for Wave 3 (grade 7b)*

| | IND.1 | IND.2 | IND.3 | INV.1 | INV.2 | INV.3 | DIF.1 | DIF.2 | DIF.3 | PER.1 | PER.2 | PER.3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| IND.1 | 1 | | | | | | | | | | | |
| IND.2 | .45** | 1 | | | | | | | | | | |
| IND.3 | .27** | .33** | 1 | | | | | | | | | |
| INV.1 | .07 | -.02 | -.00 | 1 | | | | | | | | |
| INV.2 | -.11 | -.08 | -.15* | -.01 | 1 | | | | | | | |
| INV.3 | -.03 | -.11 | -.12 | .26** | .33** | 1 | | | | | | |
| DIF.1 | -.01 | -.06 | -.06 | -.02 | .05 | .07 | 1 | | | | | |
| DIF.2 | -.10 | -.17** | -.13* | -.07 | .07 | .09 | .41** | 1 | | | | |
| DIF.3 | -.09 | .03 | -.09 | -.01 | .00 | .00 | .28** | .10 | 1 | | | |
| PER.1 | -.14* | -.21** | -.15* | .09 | .31** | .18* | -.22** | -.11 | -.14** | 1 | | |
| PER.2 | -.07 | -.19** | -.08 | .05 | .26** | .11 | -.14* | -.12 | -.11 | .59** | 1 | |
| PER.3 | -.03 | -.10 | -.12 | -.02 | .25** | .07 | -.11 | -.02 | -.06 | .64** | .57** | 1 |

*Note*. IND=Items measuring actual independence environment INV=Items measuring actual investigation environment
DIF=Items measuring actual differentiation environment PER=Items measuring actual personalization environment
*, $p< 0.05$: **, $p< 0.01$

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Table 4.39

*Correlations among Actual Classroom Environment Items for Wave 4 (grade 7c)*

| | IND.1 | IND.2 | IND.3 | INV.1 | INV.2 | INV.3 | DIF.1 | DIF.2 | DIF.3 | PER.1 | PER.2 | PER.3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| IND.1 | 1 | | | | | | | | | | | |
| IND.2 | .49** | 1 | | | | | | | | | | |
| IND.3 | .32** | .44** | 1 | | | | | | | | | |
| INV.1 | -.13* | -.13 | -.17** | 1 | | | | | | | | |
| INV.2 | -.09 | -.07 | -.07 | .35** | 1 | | | | | | | |
| INV.3 | -.09 | -.11 | -.06 | .37** | .66** | 1 | | | | | | |
| DIF.1 | -.21** | -.18** | -.05 | .10 | .15* | .16* | 1 | | | | | |
| DIF.2 | -.20** | -.34** | -.03 | .09 | .03 | -.02 | .32** | 1 | | | | |
| DIF.3 | -.04 | -.18** | -.14* | -.00 | .08 | .04 | .26** | -.08 | 1 | | | |
| PER.1 | -.08 | -.06 | -.11 | .22** | .19* | .13* | -.11 | .10 | -.00 | 1 | | |
| PER.2 | -.08 | .06 | -.08 | .31** | .22** | .18** | -.09 | -.09 | -.04 | .55** | 1 | |
| PER.3 | -.01 | -.05 | -.08 | .32** | .19* | .18** | -.00 | -.04 | .05 | .55** | .59** | 1 |

*Note*. IND=Items measuring actual independence environment INV=Items measuring actual investigation environment
DIF=Items measuring actual differentiation environment PER=Items measuring actual personalization environment
*, $p < 0.05$: **, $p < 0.01$

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Table 4.40

*Correlations among Preferred Classroom Environment Items for Wave 1 (grade 6)*

| | IND.1 | IND.2 | IND.3 | INV.1 | INV.2 | INV.3 | DIF.1 | DIF.2 | DIF.3 | PER.1 | PER.2 | PER.3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| IND.1 | 1 | | | | | | | | | | | |
| IND.2 | .55** | 1 | | | | | | | | | | |
| IND.3 | .38** | .53** | 1 | | | | | | | | | |
| INV.1 | -.23** | -.26** | -.18** | 1 | | | | | | | | |
| INV.2 | -.11 | -.11 | -.04 | .26** | 1 | | | | | | | |
| INV.3 | -.15* | -.25** | -.17* | .43** | .15* | 1 | | | | | | |
| DIF.1 | .10 | .12 | .21** | -.07 | -.13 | -.17** | 1 | | | | | |
| DIF.2 | .09 | .10 | .01 | -.10 | -.09 | -.07 | .15* | 1 | | | | |
| DIF.3 | .05 | .16* | .12 | -.03 | -.02 | -.05 | .37** | .07 | 1 | | | |
| PER.1 | -.05 | -.10 | -.21** | .08 | .04 | .17** | -.16* | .13* | -.10 | 1 | | |
| PER.2 | -.02 | -.16* | -.19** | .11 | .11 | .22** | -.34** | -.09 | -.17** | .20** | 1 | |
| PER.3 | -.00 | -.08 | -.04 | .10 | .18* | .13* | -.11 | -.10 | -.07 | .12 | .29** | 1 |

*Note*. IND=Items measuring preferred independence environment INV=Items measuring preferred investigation environment
DIF=Items measuring preferred differentiation environment PER=Items measuring preferred personalization environment
*, $p < 0.05$: **, $p < 0.01$

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Table 4.41

*Correlations among Preferred Classroom Environment Items for Wave 2 (grade 7a)*

| | IND.1 | IND.2 | IND.3 | INV.1 | INV.2 | INV.3 | DIF.1 | DIF.2 | DIF.3 | PER.1 | PER.2 | PER.3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| IND.1 | 1 | | | | | | | | | | | |
| IND.2 | .66** | 1 | | | | | | | | | | |
| IND.3 | .38** | .39** | 1 | | | | | | | | | |
| INV.1 | -.09 | -.14* | -.18** | 1 | | | | | | | | |
| INV.2 | -.12 | -.06 | -.03 | .21* | 1 | | | | | | | |
| INV.3 | -.12 | -.18** | -.31** | .58** | .15* | 1 | | | | | | |
| DIF.1 | -.00 | -.06 | .04 | -.18** | -.19** | -.12 | 1 | | | | | |
| DIF.2 | .09 | .11 | .06 | -.03 | -.06 | -.08 | .20** | 1 | | | | |
| DIF.3 | .01 | .00 | .16* | -.31** | -.14* | -.21** | .30** | .09 | 1 | | | |
| PER.1 | .13* | .02 | -.00 | .13* | .36** | .12 | -.22** | -.06 | -.23** | 1 | | |
| PER.2 | .03 | .03 | -.00 | .01 | .10 | .09 | -.19** | -.01 | -.14* | .22** | 1 | |
| PER.3 | .01 | .01 | .07 | .19** | .20** | .20** | -.15* | .05 | -.25** | .24** | .29** | 1 |

*Note*. IND=Items measuring preferred independence environment INV=Items measuring preferred investigation environment
DIF=Items measuring preferred differentiation environment PER=Items measuring preferred personalization environment
*, $p< 0.05$: **, $p< 0.01$

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Table 4.42

*Correlations among Preferred Classroom Environment Items for Wave 3 (grade 7b)*

| | IND.1 | IND.2 | IND.3 | INV.1 | INV.2 | INV.3 | DIF.1 | DIF.2 | DIF.3 | PER.1 | PER.2 | PER.3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| IND.1 | 1 | | | | | | | | | | | |
| IND.2 | .55** | 1 | | | | | | | | | | |
| IND.3 | .40** | .44** | 1 | | | | | | | | | |
| INV.1 | -.08 | -.02 | -.04 | 1 | | | | | | | | |
| INV.2 | -.12 | -.11 | -.15* | .25** | 1 | | | | | | | |
| INV.3 | -.17** | -.09 | -.03 | .60** | .30** | 1 | | | | | | |
| DIF.1 | .01 | .06 | .16* | -.07 | -.17** | -.09 | 1 | | | | | |
| DIF.2 | -.12 | -.19** | -.21** | .02 | .06 | .00 | .01 | 1 | | | | |
| DIF.3 | .00 | .00 | .05 | -.19** | -.24** | -.20** | .28** | .16* | 1 | | | |
| PER.1 | -.08 | -.05 | -.14* | .25** | .23** | .24** | -.20** | -.00 | -.32** | 1 | | |
| PER.2 | -.08 | -.01 | -.08 | .19** | .31** | .27** | -.17** | -.13 | -.27** | .14* | 1 | |
| PER.3 | -.11 | -.06 | -.04 | .22** | .33** | .28** | -.13** | -.06 | -.19** | .36** | .34** | 1 |

*Note*. IND=Items measuring preferred independence environment INV=Items measuring preferred investigation environment
DIF=Items measuring preferred differentiation environment PER=Items measuring preferred personalization environment
*, $p< 0.05$: **, $p< 0.01$

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Table 4.43

*Correlations among Preferred Classroom Environment Items for Wave 4 (grade 7c)*

| | IND.1 | IND.2 | IND.3 | INV.1 | INV.2 | INV.3 | DIF.1 | DIF.2 | DIF.3 | PER.1 | PER.2 | PER.3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| IND.1 | 1 | | | | | | | | | | | |
| IND.2 | .54** | 1 | | | | | | | | | | |
| IND.3 | .43** | .53** | 1 | | | | | | | | | |
| INV.1 | -.02 | -.05 | -.14* | 1 | | | | | | | | |
| INV.2 | -.04 | -.08 | -.18** | .29** | 1 | | | | | | | |
| INV.3 | -.00 | -.05 | -.14* | .53** | .36** | 1 | | | | | | |
| DIF.1 | -.08 | -.26** | -.10 | .02 | .01 | -.00 | 1 | | | | | |
| DIF.2 | -.14* | -.20** | -.14* | .10 | .07 | .12 | .21** | 1 | | | | |
| DIF.3 | .07 | .03 | .14* | -.33** | -.16* | -.47** | .09 | .08 | 1 | | | |
| PER.1 | .10 | .01 | -.08 | .09 | .20** | .08 | -.05 | -.05 | -.10 | 1 | | |
| PER.2 | .16* | .15* | -.06 | .13* | .21** | .17* | .00 | -.01 | -.13* | .22** | 1 | |
| PER.3 | .02 | -.00 | -.19** | .24** | .16* | .28** | -.04 | -.00 | -.26** | .22** | .31** | 1 |

*Note*. IND=Items measuring preferred in.dependence environment INV=Items measuring preferred investigation environment
DIF=Items measuring preferred differentiation environment PER=Items measuring preferred personalization environment
*, $p< 0.05$: **, $p< 0.01$

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Table 4.44

*Correlations among Actual Classroom Environment Variables across Waves*

| | Wave 1 (grade 6) | | | | Wave 2 (grade 7a) | | | | Wave 3 (grade 7b) | | | | Wave 4 (grade 7c) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | IND | INV | DIF | PER | IND | INV | DIF | PER | IND | INV | DIF | PER | IND | INV | DIF | PER |
| IND | 1 | | | | 1 | | | | 1 | | | | 1 | | | |
| INV | -.21* | 1 | | | -.14* | 1 | | | -.12 | 1 | | | -.16* | 1 | | |
| DIF | -.16* | -.10 | 1 | | -.01 | -.04 | 1 | | -.13* | .04 | 1 | | -.29** | .07 | 1 | |
| PER | .05 | .36** | -.23** | 1 | -.11 | .19** | -.21** | 1 | -.23** | .27** | -.18** | 1 | -.08 | .32** | .04 | 1 |

*Note*. IND=Independence environment INV=Investigation environment DIF=Differentiation Environment
PER=Personalization environment *, $p< 0.05$: **, $p< 0.01$

Table 4.45

*Correlations among Preferred Classroom Environment Variables across Waves*

| | Wave 1 (grade 6) | | | | Wave 2 (grade 7a) | | | | Wave 3 (grade 7b) | | | | Wave 4 (grade 7c) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | IND | INV | DIF | PER | IND | INV | DIF | PER | IND | INV | DIF | PER | IND | INV | DIF | PER |
| IND | 1 | | | | 1 | | | | 1 | | | | 1 | | | |
| INV | -.29** | 1 | | | -.23** | 1 | | | -.15* | 1 | | | -.13* | 1 | | |
| DIF | .19** | -.17** | 1 | | .04 | -.33** | 1 | | -.04 | -.20** | 1 | | -.25** | .09 | 1 | |
| PER | -.16** | .26** | -.24** | 1 | .06 | .34** | -.34** | 1 | -.13* | .46** | -.36** | 1 | .07 | .24** | -.04 | 1 |

*Note*. IND=Independence environment INV=Investigation environment DIF=Differentiation Environment
PER=Personalization environment *, $p< 0.05$: **, $p< 0.01$

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To assess whether there is a mismatch between the actual and the preferred classroom environment as it is perceived by students, pairwise *t*-tests were performed to compare the means in the respective forms of the questionnaire at each of the four waves of measurement in each scale dimension. The results of the *t*-test analyses are presented in Table 4.47.

Table 4.47

*T Scores of Actual and Preferred Classroom Environment Dimensions across Waves*

| | Wave 1 | | Wave 2 | | Wave 3 | | Wave 4 | |
|---|---|---|---|---|---|---|---|---|
| | t | df | t | df | t | df | t | df |
| *Personalizaton* | | | | | | | | |
| Actual Preferred | -1.93* | 219 | -6.39*** | 219 | -5.07*** | 219 | -4.32*** | 219 |
| *Investigation* | | | | | | | | |
| Actual Preferred | -.098 | 219 | -3.45** | 219 | -2.87* | 219 | -3.51** | 219 |
| *Independence* | | | | | | | | |
| Actual Preferred | -3.60*** | 219 | -5.73*** | 219 | 1.81 | 219 | -.869 | 219 |
| *Differentiation* | | | | | | | | |
| Actual Preferred | 2.79** | 219 | -.812 | 219 | 2.71* | 219 | 3.50** | 219 |

*,p<0.05: **,p<0.01: ***,p<0.001

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Across all four waves, students reported that the actual classroom environment was significantly lower than the preferred on personalization. With respect to investigation there was no significant difference between the actual and the preferred classroom environment in the pre-transition period (Wave 1) indicating that in primary school students' expectations are in this respect well met, while in secondary school (Waves 2, 3 and 4) students perceived the actual investigation classroom environment as being below their expectations. For independence students reported that the actual classroom environment was significantly lower than the preferred only in Waves 1 and 2, indicating that in the last two trimesters in secondary school students' independence expectations are being met. For differentiation, students reported that the actual classroom environment was significantly higher than the preferred in primary school (Wave 1) and in the last two trimesters in secondary school (Waves 3 and 4) but not right after the transition to secondary school (Wave 2).

*The Validation of the Classroom Actual and the Classroom Preferred Environment Models*

The two models were tested with Confirmatory Factor Analysis (CFA). Each of the models consisted of four first-order factors and one second-order factor. The four first-order factors represented the personalization, investigation, independence and differentiation classroom environment (the actual environment for the actual classroom environment model and the preferred environment for the preferred classroom environment model). Each of the factors was measured by three items. The four factors were hypothesized to construct the second-order factor "actual environment" for the actual classroom environment model and "preferred environment" for the preferred classroom environment model respectively. These factors were hypothesized to account for any correlation or covariance between the first-order factors in each model. Figures 4.19 and 4.20 make easy the conceptualization of how the various components of the actual and the preferred classroom environment respectively relate to each other.

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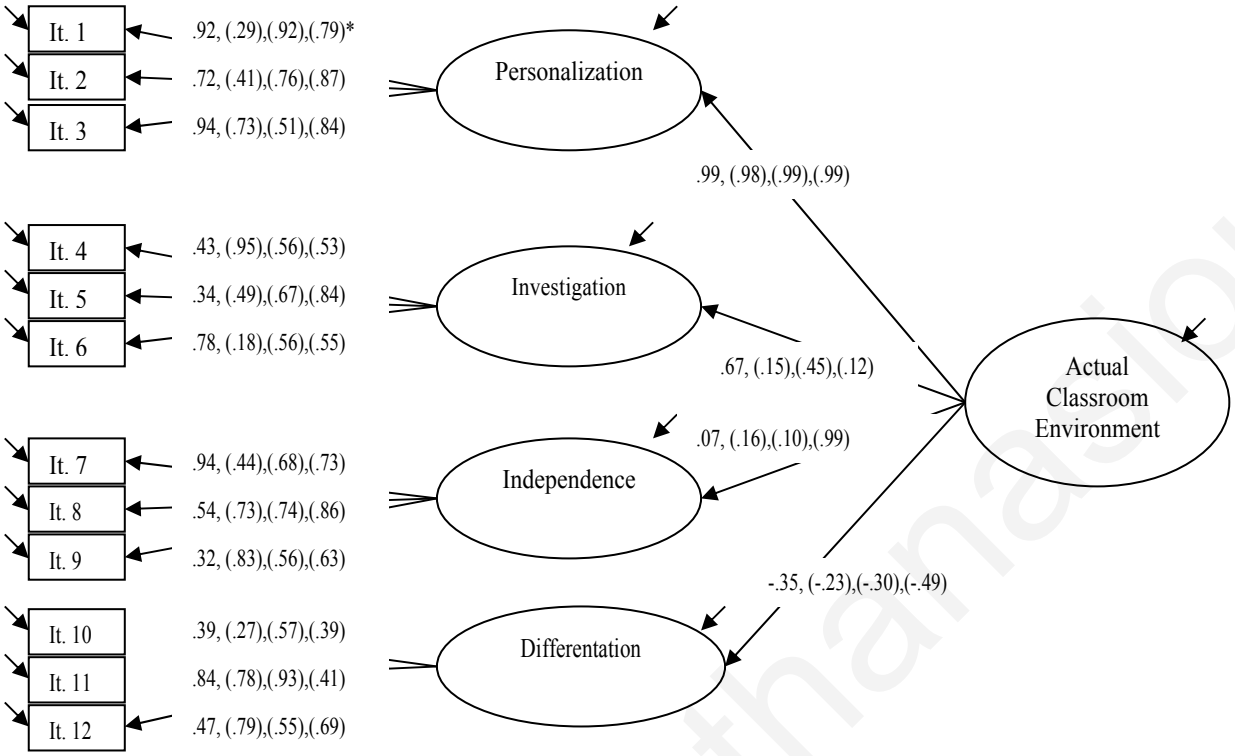


**The first number indicates the factor loading for Wave 1 and the numbers in the parentheses the factor loadings for Waves 2, 3 and 4 respectively.*

*Figure 4.19*. Actual Classroom Environment Model.

The structural equation models with the latent variables and their indicators across the four waves of measurement are presented in Figures 4.19 for the actual classroom environment model and 4.20 for the preferred classroom environment model respectively. Table 4.48 summarizes the model-fit statistics for the confirmatory actual and preferred classroom environment models across waves. The descriptive-fit measures indicated support for the hypothesized first and second-order latent factors for both models, since CFI>.90, RMSEA≤.06 and $\chi^2/df$<1.95.

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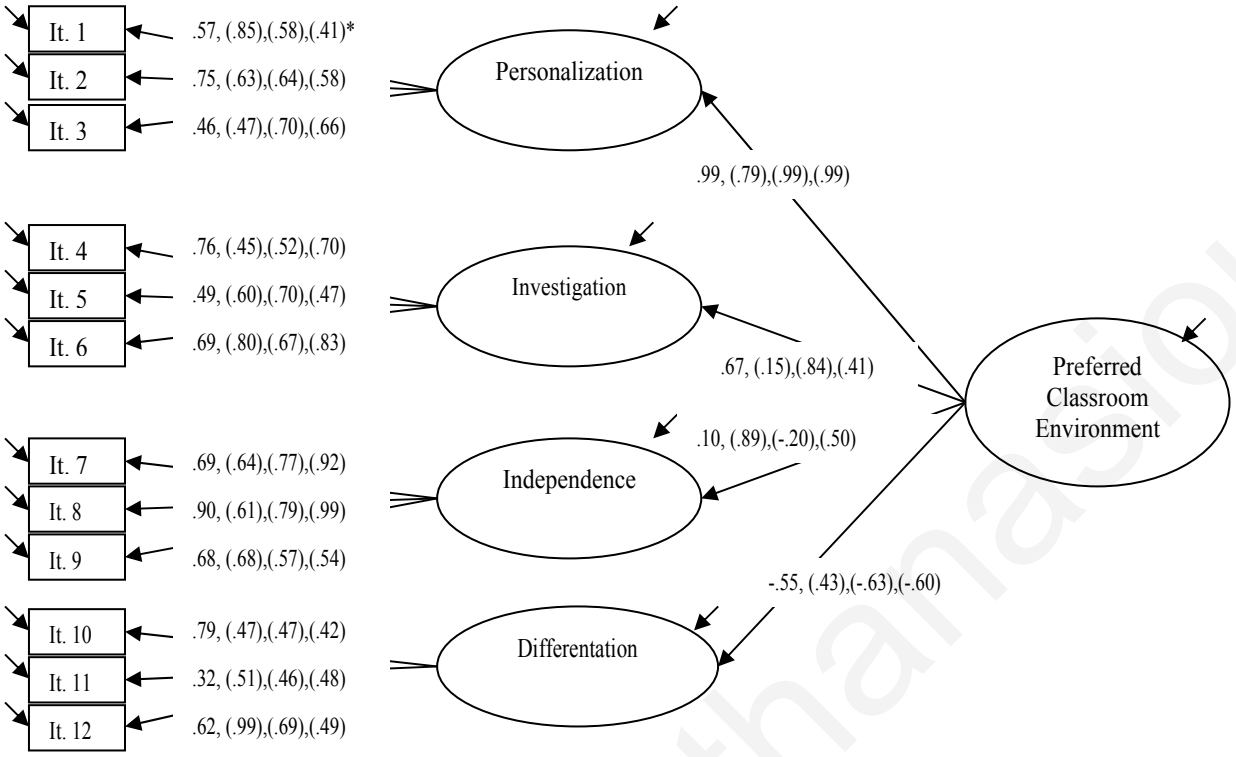


**The first number indicates the factor loading for Wave 1 and the numbers in the parentheses the factor loadings for Waves 2, 3 and 4 respectively.*

*Figure 4.20*. Preferred Classroom Environment Model.

Specifically, the analysis showed that each of the items employed in the present study loaded adequately on each motivational dimension (see the first-order factors in Figures 4.19 and 4.20), indicating that personalization, investigation, independence and differentiation dimensions represent four distinct aspects of students' perceptions of the actual and the preferred classroom environment in mathematics. Furthermore, the r-squares (shown in Figures B4 and B5 in Appendix) also indicated that modest to large amounts of variance are accounted for all items corresponding to each classroom environment dimension for both models. This means that the four dimensions can model students' perceptions of the actual and their perceptions of the preferred classroom environment in mathematics.

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Table 4.48

*Fit Indices for the CFA Actual and Preferred Classroom Environment Models across Waves*

| | CFI | RMSEA | $\chi^2$ | df | $\chi^2$/df |
|---|---|---|---|---|---|
| Actual Model | | | | | |
| Wave 1 (grade 6) | .937 | .060 | 90.39 | 47 | 1.92 |
| Wave 2 (grade 7a) | .942 | .060 | 83.39 | 43 | 1.93 |
| Wave 3 (grade 7b) | .986 | .040 | 59.39 | 44 | 1.34 |
| Wave 4 (grade 7c) | .992 | .040 | 51.57 | 38 | 1.35 |
| Preferred Model | | | | | |
| Wave 1 (grade 6) | .953 | .060 | 85.94 | 47 | 1.82 |
| Wave 2 (grade 7a) | .926 | .060 | 58.02 | 30 | 1.93 |
| Wave 3 (grade 7b) | .955 | .060 | 87.20 | 47 | 1.85 |
| Wave 4 (grade 7c) | .958 | .060 | 56.13 | 29 | 1.93 |

*Note.* CFI=Comparative Fit Index RMSEA=Root Mean Square Error of Approximation

Furthermore, statistically significant correlations were included in the model between error terms for items that loaded on the same factors. More specifically, for Wave 1, a statistically significant correlation was found between the error of items 1 and 3 (r=.23, both items belonged to the personalization factor), and 8 and 9 (r=.26, both items belonged to the independence factor) only for the actual classroom environment. For Wave 2, a statistically significant correlation was found between the error of items 1 and 3 (r=.22, both items belonged to the personalization factor) only for the actual environment. For Wave 3, a statistically significant correlation was found between the error of items 4 and 5 (r=.35, both items belonged to the investigation factor), 11 and 12 (r=.36, both items



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belonged to the differentiation factor), 1 and 3 (r=.22, both items belonged to the personalization factor) and items 2 and 3 (r=.25, both items belonged to the personalization factor) for the actual environment, whereas for the preferred classroom environment a statistically significant correlation was found between the error of items 4 and 6 (r=.31, both items belonged to the investigation factor) and items 1 and 2 (r=.24, both items belonged to the personalization factor). For Wave 4, a statistically significant correlation was found between the error of items 5 and 6 (r=.45, both items belonged to the investigation factor) for the actual classroom environment. These statistically significant correlations can be attributed to the common measurement error of items that belonged to the same factor.

*The Relation between Students' Perceptions of the Actual and the Preferred Classroom Environment across the Transition to Secondary School*

For the examination of the relation between students' perceptions of the actual and the preferred classroom environment in mathematics across the transition to secondary school, the validity of two structural models was tested: (a) The first model assumes that the latent second-order factor "actual classroom environment in mathematics" predicts the factor "preferred classroom environment in mathematics" and (b) the second model assumes that the latent second-order factor "preferred classroom environment in mathematics" predicts the factor "actual classroom environment in mathematics".

The results of the structural analyses indicated a poor fit across all waves for both models, with the correlation coefficients being below the statistically significant level. Therefore, the two models could not be accepted. Based on these findings students' perceptions of the actual classroom environment in mathematics do not have a direct effect and are not a predictor of their preferred classroom environment perceptions and vice versa.

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The actual and the preferred classroom environment data for students in CT were analysed using growth modelling. The examination of whether students' perceptions of the classroom environment changed in nonlinear ways over time was conducted, delineated in all models by the inclusion of quadratic terms. For some variables a cubic factor was included in each model to capture the S-shaped growth observed in students' raw data. The analyses were conducted separately for each construct of interest. Therefore, issues of collinearity were not germane for these analyses.

Table 4.49 presents the results of the growth models for the eight outcome variables. The model fit statistics indicated that all growth models fit the data well (CFI>.95, RMSEA<.06, and $\chi^2/df$<1.95). The growth model for preferred investigation environment resulted in a poor fit because there was actually no change in students' means across the four waves of measurement.

Table 4.49

*Summary of Growth Models for Students' Perceptions of the Actual and the Preferred Classroom Environment in Mathematics*

| | CFI | RMSEA | $\chi^2$ | df | $\chi^2$/df | Intercept | Slope |
|---|---|---|---|---|---|---|---|
| Actual Class Environment | | | | | | | |
| Personalization | .951 | .038 | 9.028 | 5 | 1.80 | 5.95 | -0.10 |
| Investigation | .995 | .039 | 2.661 | 2 | 1.33 | 14.62 | -0.50 |
| Independence | .989 | .043 | 5.654 | 4 | 1.41 | -0.30 | 0.47 |
| Differentiation | .993 | .031 | 4.833 | 4 | 1.20 | 7.38 | -0.22[a] |
| Preferred Class Environment | | | | | | | |
| Personalization | .983 | .045 | 7.182 | 5 | 1.43 | 6.08 | -0.51[a] |
| Independence | .979 | .059 | 5.267 | 3 | 1.75 | 7.32 | 0.26[a] |
| Differentiation | .937 | .050 | 7.379 | 4 | 1.84 | 4.98 | 0.78[a] |

*Note*. [a]=Cubic factor



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As indicated in Figures 4.21 and 4.22 students' perceptions of the actual personalization and investigation classroom environment were highest in primary school and the decline was the dominant trend across the transition to secondary school. The quadratic factor indicated decelerated growth across the transition to secondary school. The rate of decline slowed during and by the end of 7$^{th}$ grade indicating a stabilization of students' perceptions regarding the actual personalization and investigation environment by the end of the first grade in secondary school.

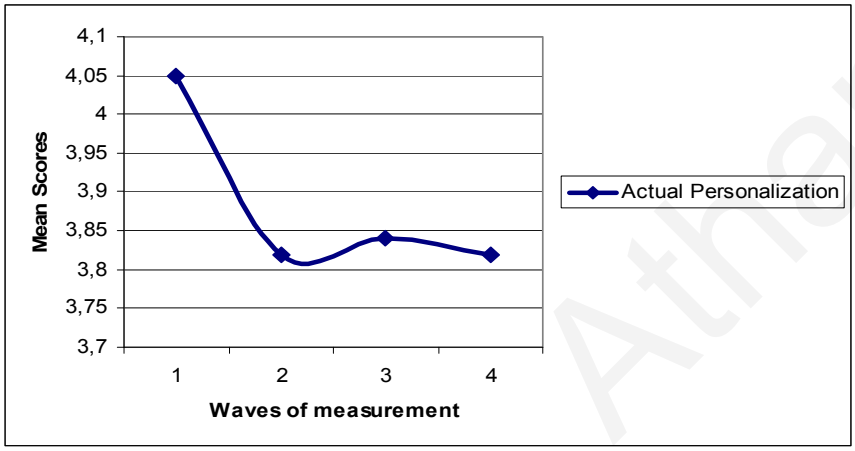


*Figure 4.21*. Growth Curve for Actual Personalization Environment across Waves

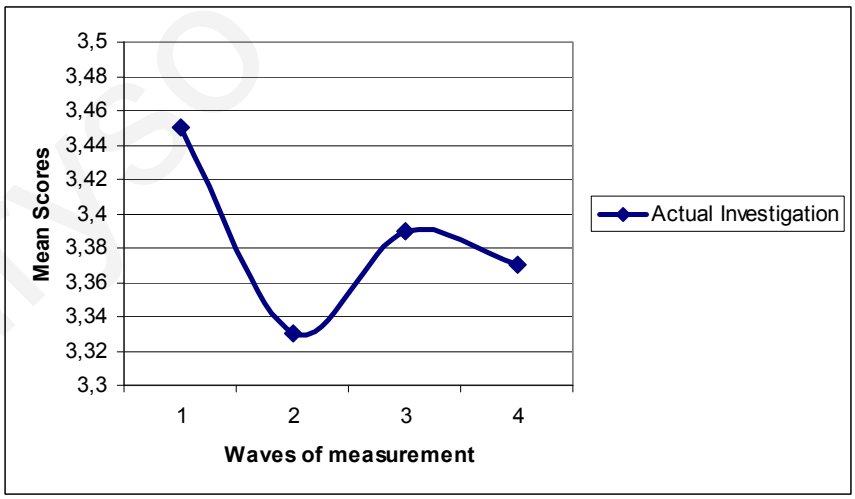


*Figure 4.22*. Growth Curve for Actual Investigation Environment across Waves

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For students' actual independence classroom environment perceptions the change is indicated in Figure 4.23. Students' perceptions were lowest in primary school and the incline was clearly the dominant trend for students' actual independence classroom perceptions across the transition to secondary school and through seventh grade. The quadratic aspect of the growth curve indicated accelerated growth in students' actual independence perceptions across the transition to secondary school. The rate of incline slowed by the end of 7th grade indicating a stabilization of students' perceptions by the end of the first grade in secondary school.

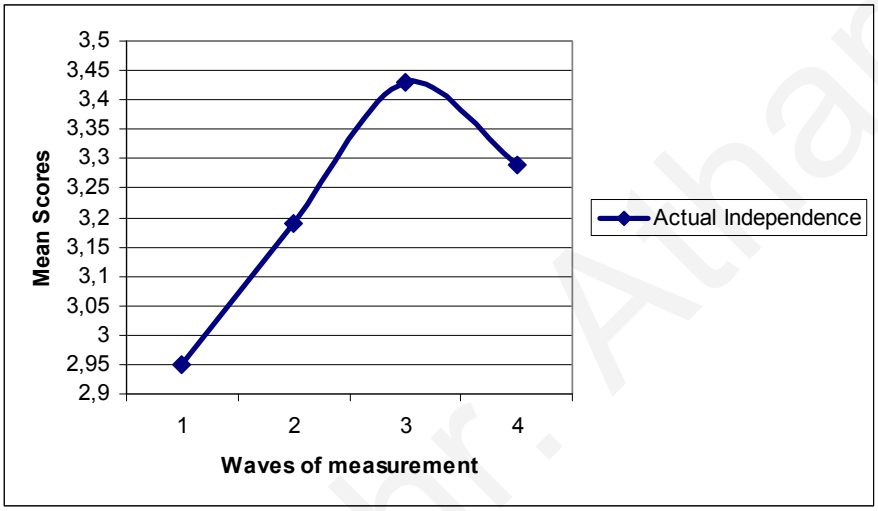


*Figure 4.23*. Growth Curve for Actual Independence Environment across Waves

The change for the actual differentiation environment is shown in Figure 4.24. Students' perceptions were highest in primary school and the decline was the dominant trend right after the transition to secondary school. After a trimester in secondary school students' perceptions regarding the actual differentiation environment inclined without reaching the high level apparent at sixth grade. The cubic term in the growth model indicated decelerated growth in students' actual differentiation environment perceptions right after the transition, accelerated growth through seventh grade and a stabilization by the end of seventh grade.

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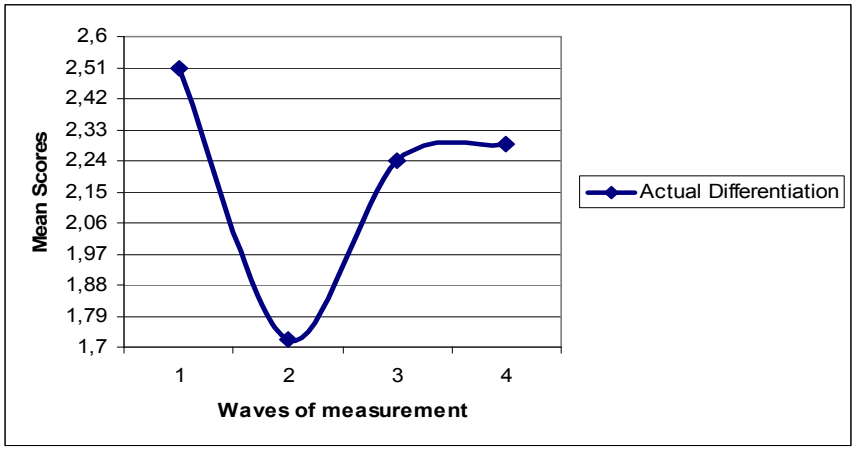


*Figure 4.24*. Growth Curve for Actual Differentiation Environment across Waves

The change for the preferred personalization and independence environment is shown in Figures 4.25 and 4.26. Students' preferred personalization and independence perceptions were lowest in primary school and the incline was the dominant trend right after the transition to secondary school. After a trimester in secondary school students' preferred personalization and independence classroom perceptions declined and by the end of seventh grade reached the sixth grade's level. The cubic term in the growth model indicates accelerated growth in students' preferred personalization and independence perceptions right after the transition and decelerated growth through seventh grade. The rate of decline slowed by the end of seventh grade indicating a stabilization of students' perceptions regarding the preferred personalization and independence environment by the end of the first grade in secondary school.

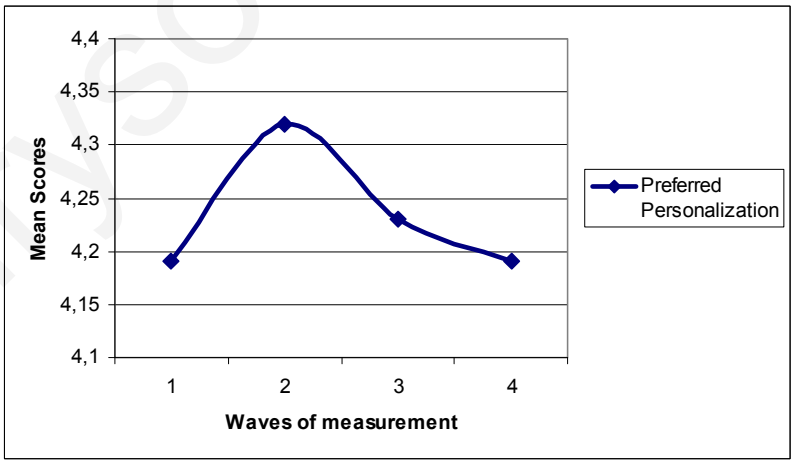


*Figure 4.25*. Growth Curve for Preferred Personalization Environment across Waves

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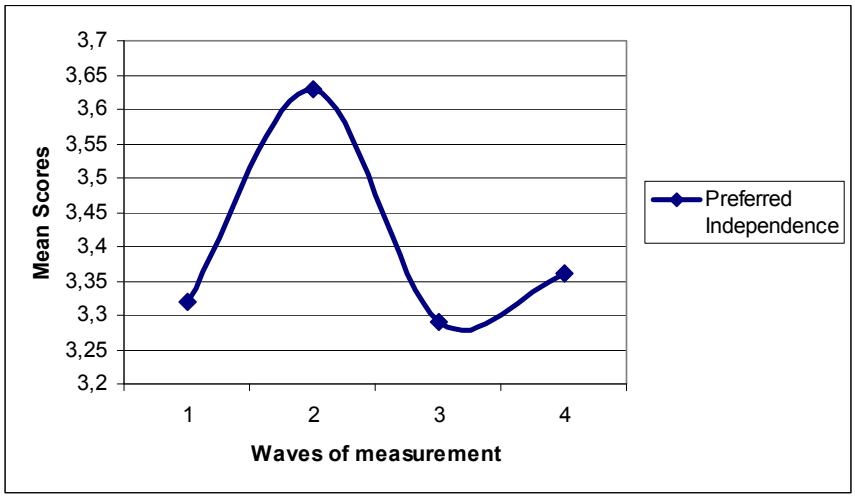


*Figure 4.26*. Growth Curve for Preferred Independence Environment across Waves

The change for the preferred differentiation classroom environment is shown in Figure 4.27. Students' perceptions were highest in primary school and the decline was the dominant trend right after the transition to secondary school. After a trimester in secondary school students' preferred differentiation environment perceptions inclined. The cubic term in the growth model indicated decelerated growth in students' preferred differentiation perceptions right after the transition and accelerated growth through seventh grade.

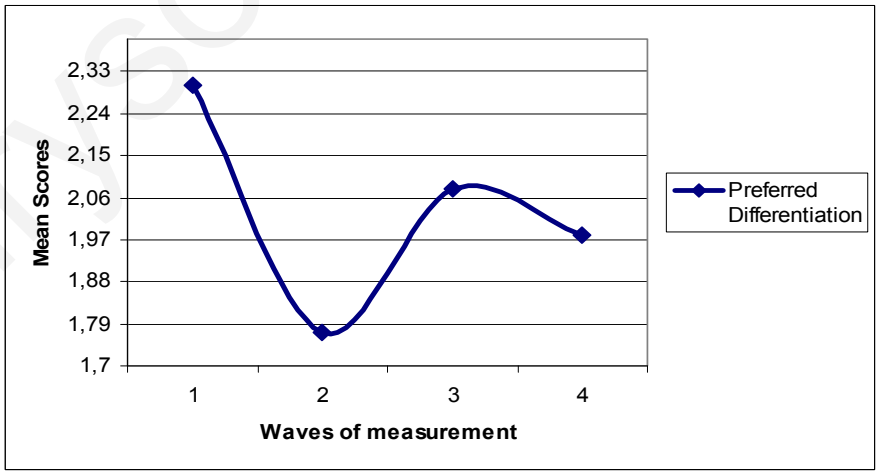


*Figure 4.27*. Growth Curve for Preferred Differentiation Environment across Waves



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*Change in the Fit between the Actual and the Preferred Classroom Environment across the Transition from Primary to Secondary School*

Table 4.50 presents the results of the growth models for the four outcome variables. The model fit statistics indicated that all growth models fit the data well (CFI>.95, RMSEA≤.06, and $\chi^2/df$<1.95).

Table 4.50

*Summary of Growth Models for Students' Perceptions of the Fit between the Actual and the Preferred Classroom Environment in Mathematics*

| | CFI | RMSEA | $\chi^2$ | df | $\chi^2$/df | Intercept | Slope |
|---|---|---|---|---|---|---|---|
| Personalization | .950 | .060 | 7.100 | 4 | 1.77 | -3.72 | -0.26 |
| Investigation | .976 | .042 | 2.545 | 3 | 0.84 | -4.10 | -0.41 |
| Independence | .951 | .059 | 5.332 | 3 | 1.77 | -1.08 | 1.61[a] |
| Differentiation | .970 | .023 | 2.229 | 2 | 1.11 | -1.55 | 3.55[a] |

*Note*. [a]=Cubic factor

Figures 4.28 and 4.29 present the change in students' fit scores regarding personalization and investigation across the transition. Clearly, the mismatch between students' actual and preferred personalization and investigation environment perceptions increased after students enter middle school, since the fit had the most negative value immediately after the transition. The quadratic factor indicated decelerated growth across the transition to secondary school. The rate of decline in students' personalization and investigation fit scores slowed during seventh grade indicating a stabilization of students' perceptions regarding the fit of the actual and the preferred personalization and investigation environment by the end of the first grade in secondary school.

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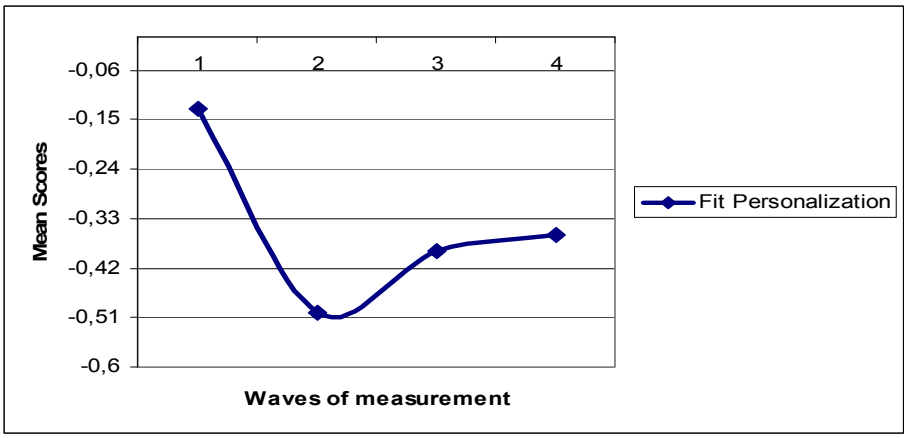


*Figure 4.28*. Growth Curve for Personalization Fit Scores across Waves

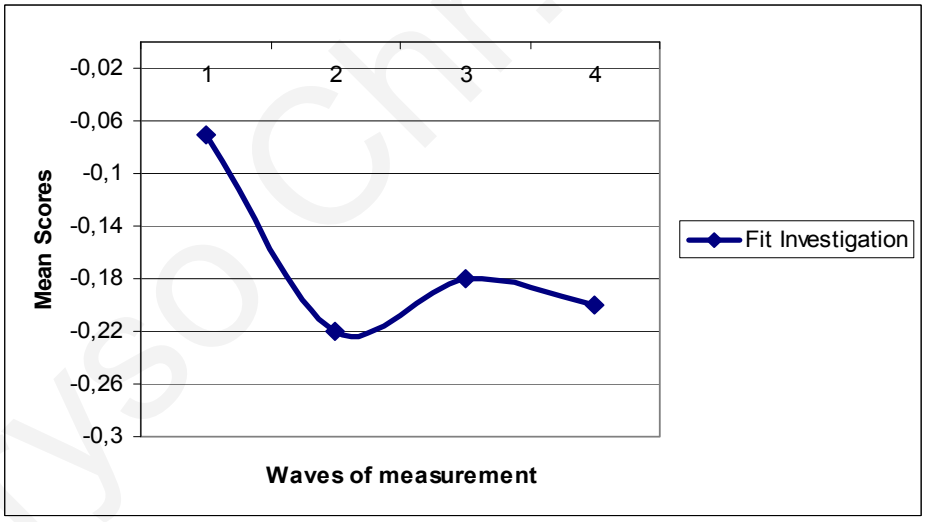


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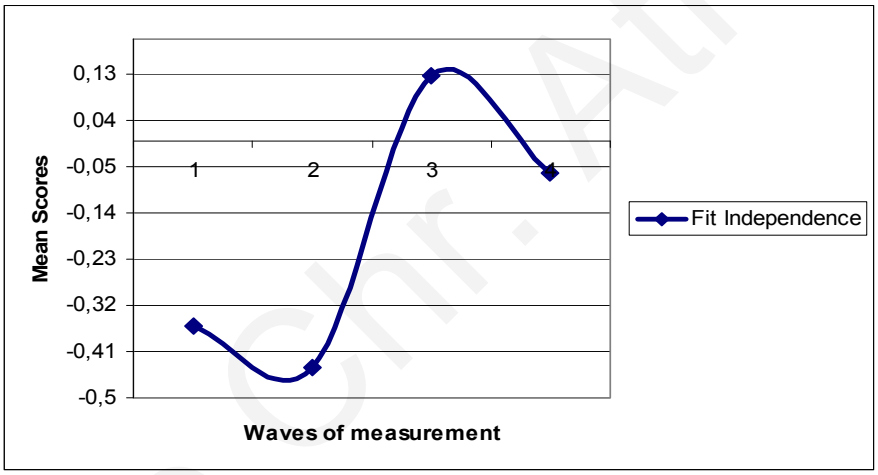
*Figure 4.29*. Growth Curve for Investigation Fit Scores across Waves




For the change in the independence fit scores across waves, Figure 4.30 indicates that the mismatch between students' actual and preferred independence environment increases after students enter middle school, since the fit had the most negative value immediately after the transition. However, through seventh grade students' independence fit score increased and reached the highest positive value. The cubic factor indicated decelerated growth across the transition to secondary school, accelerated growth through seventh grade and decelerated growth by the end of the first grade in secondary school.

*Figure 4.30*. Growth Curve for Independence Fit Scores across Waves

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Figure 4.31 shows the change in students' differentiation fit scores across waves. Clearly, the mismatch between students' actual and preferred differentiation environment increased after students enter middle school, since the fit had the most negative value immediately after the transition. However, after a trimester in secondary school, the mismatch decreases and by the end of seventh grade reached the highest positive value. The cubic factor indicated decelerated growth across the transition to secondary school and accelerated growth through seventh grade.

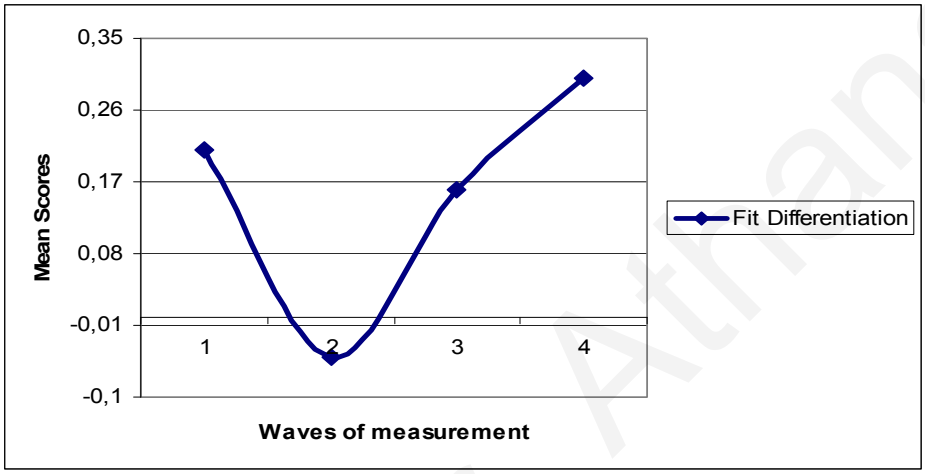


*Figure 4.31*. Growth Curve for Differentiation Fit Scores across Waves

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## Analyses of the Interview Data for Students Experiencing the Transition from Primary to Secondary school

In order to elaborate information from the questionnaires and to complement the information gained from the analysis of the group data, semi-structured interviews were undertaken. Eight students (4 boys and 4 girls) who experienced the transition from primary to secondary school (CT) were selected for individual interviews.

According to the changes in students' motivational goal orientations as they were tapped by the questionnaire data at waves 1 and 2, four groups of students were created. The four groups included one boy (B) and one girl (G) who after the transition from primary to secondary school experienced (i) the biggest increase in their performance-approach goal orientation (B1, G1); (ii) the biggest increase in performance-avoid orientation (B2, G2); (iii) the biggest decrease in social goal orientation (B3, G3); and (iv) the biggest increase in mastery and social goal orientations (B4, G4).

Although the interviews were scheduled before the latent class analyses presented in previous sections, the four groups of students corresponded to the four classes of students as they were found from the analyses regarding the differences in the direction of change in classroom culture across the transition. More specifically B1 and G1 belonged to Category 1, B2 and G2 belonged to Category 2, B3 and G3 belonged to Category 3 and B4 and G4 to Category 4.

The findings of the analyses of the students' responses are presented in the next section, separately for each of the four groups of students mentioned above. In each group students' motivational profiles and their stories of motivational change are presented firstly. Secondly, the differences between primary and secondary school are examined in terms of the contexts of concern and students' motivational goal orientations. Lastly, students' perceptions of how their motivation can be enhanced are presented. Characteristic extracts from the interviews are presented in each section in order to illustrate the contexts of change more fully.

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*Views of the Students with the Biggest Increase in Performance-approach Goal Orientation after the Transition*

*Students' Motivational Profiles and their Motivational Change Stories*

Prior the transition to secondary school B1 and G1 had a high mastery goal orientation. They both reported that they liked trying hard because they considered that their efforts would improve their abilities in mathematics. Along with the mastery orientation both students endorsed a high social orientation as well, since they enjoyed working with other pupils and helping them with their difficulties in mathematics. In their own words:

> *G1: I liked mathematics a lot when I was in sixth grade. I enjoyed learning new things. I remember that sometimes I tried hard to solve problems. It was fun, especially when working with my friends to solve problems.*
>
> *B1: In elementary school I liked mathematics especially when I was working with my friends. It was nice to try and solve difficult problems.*

In elementary school, the performance-approach and performance-avoid orientations of these two students were at a low level. On the contrary, after the transition to secondary school they expressed predominantly a high performance-approach goal orientation; they wanted to perform well and receive high grades in order to impress others. Both students appeared to be aware of the changes in their motivation in mathematics across the transition from primary to secondary school.

> *B1: Things are different in secondary school than in primary school. I see them differently. In secondary school I have to be the best in mathematics. I try hard because I want to get high grades; I want to be a straight A student.*
>
> *G1: I want to be a good student in secondary school. I don't want to be the best, I just want to be good and take good grades.*
>
> *R (researcher): Did you feel the same way when you were in elementary school?*
>
> *G1: No, things have changed this year. I guess I am thinking more about my grades than in sixth grade.*

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Both students wanted to perform well to impress others but the persons they wanted to impress differed significantly from one another. They boy wanted to enjoy the status of the best achiever among his friends, whereas the girl wanted to perform at reasonable standards in order to please her teacher and parents.

> *B1: I like showing to my friends my high grades at the tests in mathematics. I want all my classmates to recognize how smart I am. It is very important for me. I am feeling great when they come to me for help because that means that they respect me. They know that I can do difficult things in mathematics.*
>
> *G1: It makes me feel nice when I am performing well in mathematics. My teacher and my parents would be proud of me. Therefore I would be proud of myself.*

Both students had clearly experienced a decline in their mastery orientation right after the transition. In secondary school they were not willing to put much effort when doing mathematics and did not focused on interest and doing ones best, despite the fact that they liked being recognized for their ability.

> *G1: Mathematics is now more difficult than in primary school, but I will not try harder because I don't like it any more. I am not willing to put effort on something I do not like very much. I am just doing what my teacher is telling me and that is all.*

The boy reported that he was prepared to put in the necessary effort to secure a top performance but thought that being smart was the main ingredient for being good and getting high grades.

> *B1: I don't want to study for a long time, unless I really have to. I think that I am smart, so I don't need to try hard. I just have to be careful at school and do my homework and that is enough. I do not want to be called a nerd.*

Furthermore, student G1 reported that her social goal decreased right after the transition since she wasn't looking forward to group work. She actively made comparisons of the work and grades between herself and her classmates.

> *G1: I would rather work on my own this year. I am a better student than my friends. They do not get high grades because they have difficulties in math. So I do not want to lose time explaining the problems to them.*

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*R: What about if your friends were good students? Would you consider working with them?*

*G1: No, I think not. I can concentrate better when I am alone. They would talk to me and I would not finish my exercises. My teacher would not be happy then.*

The boy experienced a different pattern with his social orientation increasing after a trimester in seventh grade since it was in line with his performance-approach orientation and his desire for status.

*B1: At first (right after the transition to secondary school) I did not like working with others. It was just a waste of time. I had a lot of worries for myself and I did not want to worry for others when they did not understand mathematics. Now I like working with friends. I can help them. In this way they know that I am good and they will recognize that our successes were because of me.*

*Students' Perceptions of the Differences between Primary and Secondary School*

Both B1 and G1 mentioned a number of differences between primary and secondary school regarding the teacher of mathematics and the classroom environment during teaching and they expressed them in both positive and negative terms. The two students reported that their middle school classroom was more performance oriented than their primary classroom but considered it as a characteristic of secondary school and thought that it had a positive side along with the negative one.

*B1: In sixth grade the classroom environment was so different.*

*R: Different in what sense?*

*B1: The teacher insisted that we had to do our best to understand the new material. He never mentioned anything about grades. Just trying and improving. Now all we think about is grades. The teacher is telling us how important is to get a good grade in the test and a high grade at the report in each trimester. But I think that it is pretty logical for that to happen. It is just they way things are anymore. We will have exams at the end of the year so we have to perform well.*

*G1: The teacher now wants us to answer all questions correctly. And he is telling us about our grades, that we have to get higher grades. But to get high grades you have to try.*

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*R: What about the elementary school?*

*G1: Totally different.*

*R: In what ways?*

*G1: The teacher focused on our improvement, the importance of getting better in mathematics. And it was ok when we made mistakes. She was always telling us that mistakes were part of the learning process.*

The two students also reported that in secondary school there was less interaction and support from the teacher and almost no relationship with him, whereas there was much more press. Both students were very concerned with liking the teacher or the teacher liking them. At the same time they emphasized the skill and knowledge of their teachers in secondary school and thought that their secondary school teachers explained things better.

*B1: When we do mathematics this year we never talk to the teacher or to each other about anything else beyond mathematics. The teacher is not friendly. And sometimes he is pushing us to get high grades. But I know that my teacher is an expert in mathematics this year. And sometimes he explain things better than the teacher last year.*

*R: Do you like the mathematics teacher you have this year?*

*B1: Well, I don't care; I know that the teachers in secondary and high school are different from the teachers in primary school. But I am concerned whether he likes me. Because I want all my teachers to like me.*

*G1: In sixth grade the teacher was perfect; I liked her and she liked me. She was prepared to help us understand everything. This year the teacher does not do the same. He is not friendly. But I do not mind. He is strict but fair. And sometimes that is good.*

Both students mentioned that the competition among students was higher in secondary school than in primary school. B1 and G1 reported that in seventh grade they actively made comparisons of the work and student grades between themselves and their classmates.

*B1: This year all the students are very competitive with each other. Every time we have a test I want to take the highest grade, just like everyone in my class.*

*G1: When we have a test in mathematics we compare grades with classmates. We also compare the work we do in mathematics. Our*

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*teacher compares it so we do it as well. It is interesting to know who completed all the math exercises and has a nice workbook. I am really glad when my work or my grade is among the best.*

As far as the fit between the actual and the preferred classroom environment is concerned both students reported that in elementary school the investigation environment met their expectations whereas in secondary school was below what they had expected.

*G1: In sixth grade we used to work with classmates, to figure out how to solve problems or even to construct problems ourselves. This year we do not carry out investigations in mathematics. We have many things that puzzle us but we never solve them. We just do exercises from our textbooks.*

*B1: We carried out a lot of investigations in sixth grade. I still remember a problem about fractions that was difficult and it took us a long time to solve it. This year we do not investigate and we do not have the chance to show to the teacher or to other pupils how smart we are.*

The students reported that they expected more personalization and participation in both sixth and seventh grade, whereas the fit between the actual and the preferred personalization classroom environment in mathematics decreased in seventh grade.

*B1: I have always wanted to have friendly teachers who would consider our feelings in mathematics. And I have always wanted to be given the opportunity to participate in discussions in class. In elementary school we did that, but I wouldn't mind having more opportunities to participate in mathematics.*

*R: What about this year?*

*B1: This year the teacher is not friendly and comes into class and lectures. He does not give us the opportunity to offer some suggestions and ideas about mathematics. And I have some really nice ideas.*

*G1: We do not participate in class this year as much as we did in sixth grade. I always wanted to participate more but this year things are worse.*

The students commented that they liked the sense of independence given to them in secondary school although they preferred some more.

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*G1: We are now more independent than in primary school. And I like that because I can choose the person who is sitting next to me and I can choose who to work with. I think it would be great if it was the same in elementary school.*

*R: Would you like to be more independent?*

*G1: Yes, of course. It would be nice if we could choose ourselves how to behave in class or to be able to move freely without taking the teacher's permission.*

*B1: We are allowed to choose with whom to sit with this year. Last year we did not have that opportunity.*

*R: How do you feel about that?*

*B1: It is great. I like it.*

*R: Would you like to be more independent?*

*B1: Who would not like it?*

As far as differentiation is concerned both students mentioned that differentiation was not welcomed in secondary school since it could harm their status among classmates, whereas in sixth grade they did not mind if the teacher treated them differently.

*B1: I do not want to be treated differently. Others would know that I have difficulties and I hate that. I feel really sorry for my classmates who leave the classroom and go with a teacher to do private work. It means that they are not smart. Other students make fun of them. I do not like to be treated differently because of that.*

*R: How about primary school? Were you treated differently?*

*B1: Very rarely, … When I faced difficulties.*

*R: How did you feel about that then?*

*B1: I did not mind. It was ok then because classmates did not make fun of me. This year they make fun of the students who are treated differently.*

Peers and parents were also an issue of concern across the transition. Family and peers played a part in helping to create specific expectations for secondary school. Both students had siblings already at secondary and high school and therefore heard stories about more homework and assignments and of teachers with specific knowledge in mathematics.

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*B1: I knew that in secondary school we would get grades in mathematics every three months. My brother is in high school and so I knew.*

*G1: I heard from my sister that in secondary school we would have more homework in mathematics.*

The students mentioned that they had experienced a decline in the amount of their parent help in mathematics after the transition to secondary school, whereas their parents advised them more to study hard in mathematics to get high grades in seventh grade than in sixth grade.

*G1: I studied with my mother when I was in primary school because my dad was working. This year my mother cannot help me because mathematics is more difficult than in sixth grade. Therefore I study alone and a few times I study with my dad. And he is always telling me that I have to perform well.*

*B1: My parents rarely helped me in sixth grade. Now they do not help me at all. They say that I have grown up and I have to take care of myself and study by myself. They just remind me that I have to be good.*

Furthermore, the help of peers decreased after the transition to secondary school but as the students reported they were not seeking peer help because of their concern with their status.

*B1: I am not asking my friends to help me anymore when I have difficulties. I would rather try to figure it out by myself. I do not want them to think that I am not good at mathematics.*

*G1: I am not seeking help from my friends. I would rather work alone and if I have difficulties I try to solve them alone. It is better for me.*

*Students' Views about how their Motivation can be Enhanced*

Neither B1 nor G1 admitted having difficulties in mathematics across the transition, although they were not looking forward to going to secondary school. After the transition they found out that it was not as bad as they had expected but were still hesitant about secondary school.



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*B1: The transition was not difficult. I did not have difficulties in math. It was not as difficult as I thought it would be. Prior the transition I was very concerned.*

*R: About what?*

*B1: I did not know how the environment would be. It is weird being the oldest student at school in sixth grade where everyone knew how good you were in mathematics and suddenly being the youngest in secondary school where no one knows how good you are. I still feel weird about it.*

*G1: The transition was not so bad. I thought it was going to be worse. I was very worried whether the teachers of mathematics would like me. I am still wondering whether she does.*

Both students realized the shift in their motivation but considered it as a result of the process of changing schools and getting older.

*B1: I know that I engage in math work for different reasons this year than last year. Now I want to be the best and you can be the best only of you receive high grades.*

*R: Do you think that there are some problems in this shift;*

*B1: No, I think that it is all natural. I have grown up and by this year I will have to take exams in mathematics. We did not have exams in sixth grade. So I did not care about grades.*

*G1: Things have changed this year in mathematics. I work for different reasons this year than last year. But I think that that is a sign of getting older.*

The two students had quite definite ideas about what the classroom environment needed to be like for them to want to learn mathematics and be successful. Especially B1 wanted the school and the classroom organized in ways that enabled him to have status or impress particular people. Although these two students perceived themselves to have some role in their own motivation, they both were less reflective about themselves, since they seemed to think teachers or the way the classroom was organized had the major role.

*B1: I think that I would be more interested in mathematics if the teacher recognized the good work I do in mathematics more. If he knew and expressed it to other people that I am the best student in mathematics. Like when we do team work, he could say to my classmates that I will be the leader because I am the best.*

*R: So you think that is up to your teacher to help you enhance your interest in mathematics?*

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*B1: Yes, definitely.*

*R: Don't you think that you have to do something yourself?*

*B1: I think that the only thing I can do is trying to be good. And I am already doing that. I think all the rest is up to my teacher.*

*G1: I think I would be willing to work harder if I took feedback from my teacher more often. I do not think that I could do many things to enhance my motivation. I think that the teacher could help me enhance my motivation in mathematics by giving me feedback.*

### *Views of the Students with the Biggest Increase in Performance-avoid Goal Orientation after the Transition*

#### *Students' Motivational Profiles and their Motivational Change Stories*

Students B2 and G2 had a mixture of motivational goal orientations prior the transition to secondary school. Both students endorsed high mastery and performance-approach orientations in mathematics. They reported that they demanded challenging tasks and enjoyed mathematics so much that when they begun to solve problems they were carried away with the activity.

*B2: I enjoyed mathematics in elementary school. It was really nice. Especially I liked the difficult problems because they made me think. And I liked that because it gave me the opportunity to perform well.*

*G2: I always liked mathematics in elementary school. It was so exciting. I remember that sometimes when we solved problems the time went by so quickly and I thought that time was flying.*

Student G2 endorsed a high social orientation as well; she enjoyed working with other students because they could exchange ideas and solve difficult exercises.

*G2: It was nice to work together. Sometimes when the exercises were hard we discussed them and we were able to reach to the solution easier because of the team-work.*

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At elementary school both students endorsed a performance-avoid orientation but not at a high level; they reported that the fear of failure was in their minds a few times.

> *B2: I did not want others to think that I am dump. I did not want to fail in mathematics.*
>
> *R: Did you think that should not look unable when you solved problems?*
>
> *B2: No. I had that thought at the back of my head but I was not thinking about it all the time. I focused on myself and the exercise and I tried hard. I was not thinking all the time that I had to solve it so I would not appear stupid.*
>
> *G2: Sometimes I thought that I could not handle failure. But not too often.*

After the transition to secondary school, both students' orientations changed dramatically. More specifically, both students endorsed high performance-approach and performance-avoid orientations. The two types of orientations were totally different. On the one hand both students wanted to perform well in order to gain the social status of a high achiever yet at the same time they expressed an intense concern about not appearing dump.

> *B2: This year I want to be good at mathematics by getting high grades. But I am very afraid of failure because I do not want my friends to get the impression that I can not do mathematics.*

G2 reported that during the first year in secondary school she became extremely anxious about failure and that this situation was really stressful for her.

> *G2: I am so nervous this year about mathematics. I do not want to appear dump. I try a lot but I am always thinking that I must look smart. When we are dealing with something new in mathematics I am so afraid because I might not be able to understand it and this stresses me because I do not want to look stupid. Sometimes I am not participating in class because of that.*

The two individuals with the performance-avoid orientation construed the achievement setting as a threat and therefore tried to escape the situation if such an option was readily available.

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*G2: Often I think of the problem as a monster I have to fight with and I must win because I need to look good. Most of the times I want to run away but I cannot. I want to try and solve it but failure is in my mind all the time.*

*B2: I hate it when I am feeling unable in mathematics. I want to give up everything.*

This uncertainty in mathematics appeared to be really stressful for the two students. The performance-avoidance orientation appeared to be a motivator in the sense that it could elicit investment and action resulting in successful accomplishments but this process had costs on persistence in the face of failure and on task choice. Also, the prospect of failure elicited anxiety, encouraged self-protective withdrawal and disrupted concentration and task involvement. Both students reported that they were unable to "loose themselves" in the task expressing an inability to become absorbed in the activity resulting in a less enjoyable experience.

*B2: This year I pray that I will always get easy exercises in mathematics because I do not want difficult ones. I am so afraid I might be unable to complete them so I always prefer easy ones…I cannot concentrate that much in mathematics any more because I am always thinking that I must not fail. That I must look good. And I am so anxious and tired. I am not enjoying it anymore.*

*G2: I do not like mathematics as much as I did in elementary school. I am trying so much not to fail this year and it looks like all the magic is gone…I am continuously thinking that I must not look like I cannot do my work in mathematics. Sometimes that thought is in my head all the time and I cannot think of how to solve a problem.*

Lastly, G2 students' social goal orientation decreased right after the transition since working with others entailed the danger of appearing dump.

*G2: I do not like working with others any more because they might understand that I am not so clever in mathematics. I would rather do the exercises myself so if I do not know something I will just stay quiet and nobody will notice it.*

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The two students tended to be critical of the teacher and the classroom environment in mathematics after the transition to secondary school. They reported that the classroom goal structure in mathematics in secondary school was more performance-oriented than in elementary school; they perceived their classroom goal structure to be both performance-approach and performance-avoid oriented. The students experienced a decline in classroom mastery goal structure after the transition.

> *B2: The teacher this year is telling us that we have to be good in mathematics and that we should not fail because mathematics is a very important subject in life. He is not telling us to try to improve ourselves, just that we have to look good and not fail.*
>
> *G2: Our teacher is emphasizing how good we must be in mathematics and how important is not to fail. That we have to get good grades and that we have to answer questions correctly. Sometimes I get the impression that mistakes are not welcomed in our class. That is the reason why I do not want to appear dump, to fail in mathematics this year.*

Both students reported that there was less interaction with the teacher and classmates in secondary school than in primary school and that the teacher was less friendly.

> *B2: We do not participate a lot in mathematics this year. The teacher usually lectures. He is not giving us the opportunity to participate in class.*
>
> *G2: Our teacher is not friendly. She usually does not allow us to participate in class or to express our opinions and ideas in mathematics.*

The students mentioned that the classroom environment in secondary school was more competitive than in sixth grade but the two students were not willing to show their grades to their classmates to avoid looking like they could not be high achievers in mathematics.

> *B2: This year the classroom environment is more competitive. But I do not show the grades I get at the tests to my classmates because I do not want them to know that sometimes I fail.*

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*G2: I try to be the best and not fail this year. The environment is encouraging us to do so. But I am not showing my grade to other students in my class. I do not want them to know when I am failing or when I am good.*

B2 and G2 reported that the teacher was less supportive in secondary school, whereas he/she was pushing them to perform well and not to make mistakes.

*G2: The teacher is not very helpful this year. She is just pressing us to do good work and find the correct answers but she does not do something to help us to do so.*

*B2: My mathematics teacher this year is pushing us to do good work and get high grades. I have the feeling that he wants us to do everything correctly. When we make mistakes he gets angry.*

The level of personalization, investigation, independence and differentiation classroom environment in elementary school met their expectations. In secondary school the differentiation and investigation classroom environment was above what they had expected and wanted. They reported that they preferred less differentiation and investigation than they actually experienced. They thought that investigations were difficult and dangerous since they could easily fail, whereas differentiation was not welcomed since the selective treatment would reveal to classmates the difficulties they experienced in mathematics.

*B2: I do not want to be treated differently than other students despite the fact that I face difficulties sometimes. I do not want my classmates to know that I find mathematics difficult…I do not like investigations anymore because they are hard. And hard problems are dangerous because I can easily fail.*

*G2: I do not want the teacher to explain to me personally in front of others the things that I do not understand in mathematics. I do not want anybody to know how many difficulties I face. I want them to know that I am good in mathematics…We do not carry out so many investigations this year. But that is fine, because investigations are hard and I can easily make mistakes.*

B2 reported that he experienced much more independence in secondary school than in sixth grade, although he would not mind having some more. On the contrary, G2 reported that the actual independence environment was above the preferred. She

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appeared to be very conscious of others being disruptive and making it hard for her to work and succeed in mathematics.

> *B2: It is nice that this year we have more opportunities to select the student next to us and to sit anywhere we want. Independence is always welcomed and I would not mind if I had more freedom of movement when we do mathematics.*
>
> *G2: I do not like the fact that this year we choose with whom to sit with. I think that I would prefer the teacher to tell us with whom to sit with as in elementary school.*
>
> *R: Why is that?*
>
> *G2: Because this way some students in my class are very naughty and they make too much noise. They sit together or close by and they make it hard for me to concentrate and be good. In elementary school it was better. The teacher always told us with whom to sit with and the classroom environment was more quiet.*

B2 and G2 reported that they experienced a decline in the amount of their peer's help across the transition to secondary school. They mentioned the decline in their parents support as well but talked more about the loss of their peer's support.

> *B2: My parents do not help me this year as last year. Neither do my friends. We used to do mathematics together last year but this year is everyone for himself. But it is ok because I do not want to look incompetent in mathematics in their eyes.*
>
> *G2: My friends do not support me this year. I do not ask for their support. It is better to work alone. If you cannot do mathematics then no one would know.*
>
> *R: How about your parents; Do they support you this year;*
>
> *G2: Not as much as last year. Very rarely now.*

*Students' Perceptions of how their Motivation can be Enhanced*

The two students admitted facing difficulties over the transition to secondary school although they both expressed that they kept them for themselves because they did not want other students to know that they faced difficulties.

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*B2: Math is more difficult this year. There are a lot of new things that I have a difficulty understanding them. But I never told anyone that I had difficulties. Not even to my friends.*

*G2: The work we do in mathematics this year is much more difficult than in sixth grade. We do not have time to understand the new material taught and the teacher teaches us new things. The whole teaching is going very fast and this is hard for me.*

*R: Have you told anyone that you faced difficulties during the transition in mathematics?*

*G2: Oh no. I do not want anyone to know that I cannot do things in mathematics because I have difficulties.*

Both of the students were not thinking that improving their motivation in mathematics was basically dependent on themselves. On the contrary they focused on what the teacher could do for them and they wanted their teachers to motivate them in order to respond.

*B2: I do not think that there is much I can do as a student to persuade myself to work harder. I think that the teacher must do all the work. I want my mathematics teacher to make me interested, to tell me that I have to be study and be good in mathematics. If the teacher could do that for me I would respond and I could be more interested in mathematics.*

*G2: I believe that it is up to my teacher. If she tried to encourage me I think that I would respond and therefore try harder in mathematics.*

### *Views of the Students with the Biggest Decrease in Social Goal Orientation after the Transition*

#### *Students' Motivational Profiles and their Motivational Change Stories*

B3 and G3 were the students that prior the transition to secondary school endorsed a high mastery orientation. Both students felt that the success they had in mathematics was a result of working hard. They focused more on interest and doing one's best in mathematics and were aware of their teacher's expectations.



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*B3: I was always working hard in mathematics when I was in primary school. I knew that I had to try a lot in order to be good. And my teacher wanted me to be good. She was expecting from me to try.*

*G3: I was trying to solve all the problems we had in mathematics in sixth grade. My teacher told me so. And when I tried I solved even the most difficult problems.*

In elementary school both students endorsed a high social goal orientation as well since they liked working with friends and helping other students when they faced difficulties in mathematics. Prior the transition B3 and G3 were very concerned about the possible lack of social support after the transition to secondary school.

*G3: I liked working with friends as much as possible in mathematics. I was happy that I could do that in primary school. And I remember that I was very anxious whether we would be able to work together in secondary school. I was very stressed about it.*

*B3: I liked exchanging ideas with classmates in sixth grade. It was nice when we helped each other out and solved difficult problems. I remember I was thinking whether we could do the same in secondary school.*

In elementary school both students enjoyed the status given to them by their attitude in mathematics although their performance-approach goal orientation was not at a high level. On the contrary, after the transition to secondary school B3 and G3 students endorsed a high performance-approach orientation; they reported that they enjoyed being recognized for their work in mathematics.

*B3: I want to get high grades in tests and I want to be one of the first students to answer the teacher's questions in mathematics. I want my teacher and my friends to know how good I am in mathematics.*

*G3: I want to be good at mathematics because I feel great when others know that I can do difficult things. It makes me feel important.*

After the transition to secondary school both students' social goal decreased dramatically. The students did not like working in groups and did not perceive that seeking help from others was a natural way to improve.

*G3: Now I like working alone in mathematics. Because I can depend on myself. I never ask for help. Not from the teacher nor from my*



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*friends. I am not happy when we work in small groups during mathematics. We can not learn from each other this way.*

*B3: We do not work in groups a lot this year but when we do I do not like it because I don't want to help others or others help me. I prefer to do my work by myself.*

B3 and G3 students enjoyed the status given to them by their attitude in mathematics but at the same time they expressed an intense concern about not appearing unable in mathematics in secondary school. This concern sometimes made them question their ability in mathematics.

*G3: I want to be good at mathematics because I feel great when I can do difficult things. But I am so afraid that sometimes I will not be able to make it. And sometimes I believe that I am not good.*

*B3: I want to get high grades this year. I like it when I am performing well. And I hate it when I am failing. It is so frightening. Because I think that I will not be good ever again.*

*Students' Perceptions of the Differences between Primary and Secondary School*

The two students were extremely critical of the teacher and the classroom environment in mathematics after the transition to secondary school and reported that they were happier in elementary school. They appeared to be dissatisfied with the teachers and nearly everything to do with the classroom environment in mathematics in secondary school. Both students reported that the classroom goal structure in mathematics in secondary school was more performance-oriented than in elementary school.

*B3: This year the teacher of mathematics is telling us how important is to get good grades. In elementary school we never thought of getting high grades just doing well.*

*G3: In sixth grade the emphasis was on trying hard and becoming a better student in mathematics. In seventh grade the emphasis is on getting high grades.*

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The two students reported that there was less participation and interaction with the teacher and they expressed an intense concern whether their mathematics teacher cared about them.

> *G3: We do not participate in class so much as in sixth grade; the teacher usually talks and lectures. And he is not friendly at all. In primary school things were much better. The teacher liked us. This year I do not think that the teacher we have in mathematics cares about us.*
>
> *B3: I do mind that the teacher this year is not so friendly as the teacher in elementary school. It makes me feel stressed and sometimes unhappy.*

The students mentioned that the classroom environment in secondary school was more competitive than in sixth grade. The two students compared class work and grades with other classmates and expressed a relief when other students performed worse than them.

> *B3: This year the environment in mathematics is more competitive. All the students want to perform well…When we have tests in mathematics I usually have a look at my classmates' grades. And I am really happy when I am performing better than them.*
>
> *G3: Everyone is trying to be the best in mathematics this year. Everyone wants to be the one to answer the teacher's questions first…I see the grades of my friends. I do not show them my grade unless is higher than their grade. And I am relieved when I get higher grades than them.*

B3 and G3 also reported that the classroom investigation and personalization environment was below their expectations at both the elementary and secondary school, whereas they mentioned that the gap between the actual and the preferred personalization/participation and investigation classroom environment increased in secondary school.

> *G3: We did not investigate enough when we were in sixth grade. This year things are even worse. We rarely carry out investigations and we never work with classmates. I am very disappointed about that.*
>
> *R: How about participation?*
>
> *G3: We did not participate as much as I would like in sixth grade. And this year we hardly participate as well.*

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*B3: I think that investigations are the heart of mathematics. We did not carry out investigations last year.*

*R: How about this year?*

*B3: Oh, no, never. We just solve the exercises in our textbooks.*

*R: Do you participate in class? Can you exchange ideas?*

*B3: Very rarely this year.*

*R: How about last year?*

*B3: It was better but we could participate some more.*

As far as the differentiation and the independence classroom environment are concerned, the two students reported that the classroom environment met their expectations at both the elementary and secondary school.

*G3: I did not mind if the teacher treated me differently than other students when I had difficulties. It was for my own good. The teacher did that in elementary school and it was ok. This year I do not like it. And fortunately it does not happen.*

*B3: I like the fact that we are more independent this year in secondary school than we were in elementary school. But I would not prefer more independence. I think is good to know that we have some sort of control. Some students might over do it otherwise.*

Both students reported a decline in peer and parent support after the transition and mentioned that they are not seeking support and help either from parents or peers in secondary school.

*G32: I do not have much help from my parents and peers. And I am not asking them for help.*

*B3: We do not help each other anymore. Each one works for himself this year in mathematics. No one cares if his friend has problems in mathematics. Not even his parents.*

*Students' Views about how their Motivation can he Enhanced*

The two students admitted facing difficulties during the transition. They expressed these concerns in terms of the self and their response to the new situation. B3 student had difficulty working out what the mathematics teacher expected with regard to work



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and behaviour, whereas G3 student faced difficulty understanding some of the new work in mathematics.

> *B3: The transition was difficult. At first I did not know what the teacher expected from me. I did not know how to study in mathematics and how to do my homework or how to behave in class. Now I am beginning to understand what the teacher wants.*
>
> *G3: The transition was difficult because mathematics is much more difficult this year than in sixth grade. Many times the new material taught is really hard to understand. Like geometry. It is so hard this year.*

Both students were aware of the changes in their motivation and expressed them in negative terms.

> *B3: I understand that this year I think about grades very much. It is all grades, grades, grades. It is not nice.*
>
> *G3: I know that this year I am thinking much more about my grades than last year. And this is making me so anxious.*
>
> *R: How do you feel about that? Are you concerned?*
>
> *G3: Yes and sometimes I do not know how to handle my fears in mathematics.*

B3 and G3 students focused both on the school and classroom environment as means of enhancing their motivation in mathematics. The two students tended to be critical of the teacher-student interaction and had ideas of how they thought it should be in order their motivation in mathematics to be enhanced. The students thought that their relationships with the teacher accounted for student motivation over and above everything else. They reported that they should try harder in mathematics, if the teacher is more helpful and supportive.

> *B3: I think that if I could communicate better with my teacher I could be more interested in mathematics.*
>
> *R: What do you mean?*
>
> *B3: To be friendlier to us. To help us understand mathematics and not get mad when we make mistakes.*
>
> *G3: I think that I could be more interested in mathematics if I had a better relationship with my mathematics teacher. If I knew that he is going to be there for me when I need help.*

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*Views of the Students with the Biggest Increase in Mastery Goal Orientation after the Transition*

*Students' Motivational Profiles and their Motivational Change Stories*

B4 and G4 were the students that prior the transition to secondary school endorsed a high mastery motivational goal orientation. Both students saw poor result in a test or their inability to understand the new material taught in mathematics as a signal to work harder and if necessary seek help from a peer, teacher or parent.

> *B4: I was always trying hard in mathematics. If I could not do well on a test I knew I had to try more. If I continued to have difficulties I asked my teacher or my parents or sometimes my best friend for help in order to overcome the difficulties.*
>
> *G4: I was always thinking that trying is important in math. If I did not understand the new material taught in class I studied harder. I knew that the hard work would eventually help me understand.*

The two students appeared to be very well aware of how important self-improving in mathematics is. They reported that they endorsed some strategies for improving in mathematics like concentration and trying to do your best.

> *B4: I know now that since things are more difficult in seventh grade in mathematics I have to try more. I know that I have to try over and over again. It is just something you must do in secondary school. I tried in elementary school as well but mathematics there was easier.*
>
> *G4: I am always concentrated when we do math in secondary school because I do not want to miss anything the teacher says. If I listen to all of his instructions and try hard I will be good in mathematics. And I want to be good.*

Along with the valuing/mastery orientation B4 and G4 had a high social orientation as well. The two students reported that in elementary school they enjoyed working with friends and they liked exchanging ideas when solving problems and when carrying out investigations.

> *B4: It was great when we worked with classmates. We solved together the problems and we cooperated very well.*

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*G4: I liked working with my friends. We worked together a lot in sixth grade, in investigations. It was nice because we shared ideas and we solved all the problems we had to solve.*

Both students endorsed a performance-approach orientation in elementary school although not at a high level. They wanted to perform well but as they reported getting a high grade was not their primary goal.

*B4: I liked it when I received high grades as well. But when we had a test I was not focusing on getting a high grade. My thought was on trying and doing my best. If you tried hard and studied I believed that you would get a high grade as well.*

*G4: Of course I liked it when I was performing well. But that was not my primary goal. I wanted to try and improve my abilities in mathematics firstly. I was working hard therefore I received high grades.*

Students' motivational profile did not change after the transition to secondary school, since the mastery and social orientations predominated in seventh grade. Both students thought that improving was basically dependent on themselves so they knew how organized they were and how much effort they applied.

*G4: I am trying hard this year as always. I know that if I want to continue to be good and learn new things in mathematics I have to study a lot and work hard. I always did and I will always do.*

*B4: When we are learning something new this year I am always concentrated and organized. When I do my homework I am always studying what we did in class and I am trying hard.*

Along with the mastery orientation the two students endorsed a high performance-orientation after the transition to secondary school showing that a tension was developed between looking good and doing well with putting in too much effort. The two students enjoyed the status of high achievers but at the same time they were prepared to do what was expected of high achieving students since they reported that they were able to forget about themselves and their reasons for task engagement and dive into the mathematics activity.

*G4: I enjoy working hard this year as well because I enjoy getting high grades. That is why I am not thinking of anything else when I*

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*am solving problems in mathematics. Only how the problem can be solved.*

*B4: This year I want to get high grades. And to get them I know that I have to try hard. I am always trying to figure out the math problems. Usually when I do mathematics I forget about anything and it is just me and the problem.*

They both mentioned that liking mathematics was preferable but not essential in order to try hard and succeed in mathematics.

*G4: I like mathematics. But I think that if I did not like them I would try hard as well anyway. I believe that whether you like something or not if you want to learn new things you have to try, to try hard.*

*B4: Mathematics is not my favorite subject. I like it but I do not adore it as other students in my classroom. But anyway I am trying hard. I want to learn everything we are doing this year.*

Also the two students appeared to have a social orientation that needed to be met at the same time as the academic one. For B4 student the fact that he worked with friends in the math classroom compensated for not liking either the math teacher or mathematics.

*G4: It is nice when we work in groups this year in seventh grade. Mathematics is more difficult this year so we learn a lot from each other.*

*B4: When we work with friends it is like I like the teacher and mathematics more. It is better. We get to try harder when we solve problems together.*

*Students' Perceptions of the Differences between Primary and Secondary School*

After the transition to secondary school G4 and B4 reported that the two school contexts were different as far as the teacher and the classroom environment in mathematics is concerned, whereas they expressed most of these differences in very positive terms and appeared to be less critical of them.

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More specifically the two students experienced an incline in the performance-approach classroom goal structure but they reported that the mastery goal structure was evident as well. They appeared to be aware that they should be high achievers but were also prepared to do what was expected from high achieving students such as studying a lot and working hard.

> *B4: I know that this year the classroom environment is more performance-oriented than in sixth grade but I think that it is still mastery–oriented as well. I mean I know that I have to be good but I also know that to be good I have to put in as much effort as it is needed.*
>
> *G4: I know that there is an emphasis this year to be good. But to be good you have to try and work hard. So I think that these two aspects exist together anymore.*

The two students were less inclined to be critical of the teacher as well and focused on the positive aspects of the teacher-student interactions. They did not perceive the teacher to be less supportive and friendly, whereas they emphasized the skill or the knowledge of their teachers. Student G4 thought that her secondary school mathematics teacher explained things better than her sixth grade teacher.

> *B4: I think that my math teacher this year is as friendly and supportive as the teacher I had last year in primary school. When we need help he is always willing to help us and he cares about our feelings regarding mathematics.*
>
> *G4: My teacher this year is friendly. She cares about us and she helps us when we need help. She has a pretty good knowledge of the subject and I think that she teaches mathematics a lot better than the teacher we had in sixth grade.*

Both students perceived the classroom environment in seventh grade to be more competitive than in sixth grade but they reported that this encouraged them to be competitive with themselves and not with their classmates.

> *B4: I think that we are a little bit more competitive than last year. I want to get a high grade but I do not care if it is better than the grade of my classmates. I am not comparing my grades with others. I just want to see how I have improved from one test to the next.*
>
> *G4: We show the grades we receive at the tests to the rest of the class. But I do not compare them. Some of my classmates are doing that. I focus on myself and that is all.*

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The two students' wanted more opportunities to participate and interact with teachers and classmates and carry out investigations in mathematics since they reported that the classroom environment regarding these aspects was below their expectations at both school levels.

> *G4: I like when we are having the chance to discuss things about mathematics in class. But unfortunately we are not doing it as much as I prefer this year.*
>
> *R: How about in sixth grade?*
>
> *G4: Not there either. Both teachers were so concerned with the knowledge that we have to learn in mathematics and we had no time to talk about mathematics and investigate ideas we think worthy doing. This year we carry out investigations occasionally, but I would like to do that more often.*
>
> *B4: This year we participate in class discussions and investigations but not so often. I would prefer if we were able to have the opportunity to investigate more and talk in class about our investigations because in these discussions I think that you can learn a lot of things about mathematics.*

The classroom environment about differentiation met their expectations in primary school, whereas in secondary school the actual classroom environment was below their expectations.

> *G4: I sixth grade the teacher always explained mathematics to the students who faced difficulties. To me as well sometimes. When I did not understand something he explained it to me so I could master the new knowledge.*
>
> *R: How about this year in seventh grade?*
>
> *G4: The teacher explains difficult things in mathematics when we have difficulties but not often. Sometimes she is telling us that we do not have time for further explanations and that we have to study by ourselves.*
>
> *B4: In primary school the teacher treated differently the students who faced difficulties in mathematics. Sometimes he gave them different work, different worksheets to solve. He tried this way to help them overcome their difficulties.*
>
> *R: In seventh grade the teacher treats students differently?*
>
> *B4: No, not often. Very few times but he did not give them other work. He just explained to them again the material in mathematics. Personally, I want to know that when I have a difficulty in mathematics my teacher would help me. And this year I am not sure*

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*that every time I do not understand something he is going to help me.*

The two students mentioned that the independence classroom environment met their expectations at both school levels, whereas they said that the actual independence classroom environment in seventh grade was significantly higher than in sixth grade. They reported that they liked the sense of freedom that they had in secondary school although they would not prefer some more because they wanted to feel the control of the teacher.

*B4: We are more independent this year than last year. We can choose where to sit and with whom to sit with. We could not do this in primary school. It is nice but I think that I do not want more independence. I can handle it but some of my classmates cannot so I want the teacher to have some sort of control as well in order to keep us quiet and organized.*

*G4: We can choose where to sit this year. Last year the teacher told us where to sit.*

*R: How do you feel about that?*

*G4: It is nice. But I did not mind that I was not independent in sixth grade. It is good to have some control otherwise some students might get very naughty.*

*R: So you would not prefer some more sense of independence?*

*G4: No, I think not. I am feeling fine as it is this year.*

B4 and G4 reported that they actively sought their parents' advising and help in mathematics, whereas they mentioned that their parents' advising and help in seventh grade was at the same level as in sixth grade.

*B4: I am always asking for help from my parents when I need it. And they always help me. It is very important to them because they consider mathematics as one of the most important subjects in school.*

*R: Last year? They advised and helped you the same way?*

*B4: Always. They are always there for me.*

*G4: My parents are helping me and advising me to try hard in mathematics. They did that last year and this year and I think they always will. They want me to try hard in mathematics.*

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The two students experienced a decline in peer help in seventh grade than in sixth grade but they reported that this decline was not a result of not asking for their peer help but rather because they did not have time anymore to seek help from their peers.

> *B4: We do not work with friends as much as in sixth grade anymore. I am not asking for my friends to help me so much this year and they are not asking help from me. It is not because I do not want to ask for help. It is because we do not get together often and when we do we do not want to talk about school and mathematics.*
>
> *G4: I am not asking for help from my friends this year. Sometimes but not often we might talk on the phone about a difficult exercise. But rarely. Last year we were doing it more often. We had a lot of free time that is why.*

*Students' Perceptions of how their Motivation can be Enhanced*

B4 and G4 admitted personally having difficulties in mathematics right after the transition to secondary school. They both expressed these concerns in terms of the self and their response to the new situations such as understanding what the new teachers expected with regard to work and behavior or understanding the new material taught. The two students appeared to be prepared to try to work things out.

> *B4: The transition was really difficult because many things changed. At first I did not know what the mathematics teachers expected from me. I did not know how I was supposed to work in mathematics. So at first I tried really hard. To understand my teacher and her expectations. Now I know. Every thing is ok now.*
>
> *G4: I faced many difficulties. The period after the transition it was really stressful. I had difficulty in the new material we did in mathematics and I did not know how I was supposed to study at home.*
>
> *R: How did you solve that problem?*
>
> *G4: Well I studied hard. I tried really hard to understand everything in order not to have misconceptions.*

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The two students knew that their motivation in mathematics did not change dramatically after the transition to secondary school. They believed that students' motivation in mathematics can be enhanced by focusing primarily on themselves.

> *B4: I will always study mathematics for the same reasons. I will always try hard and study a lot. I think that is up to me to keep my interest in mathematics at the same level throughout school.*
>
> *G4: I am interested in mathematics because I want to master all the new material we are doing. I am always willing to try hard in order to learn new things and be a good student.*

B4 and G4 mentioned that working with friends would encourage them to concentrate and work harder and therefore could enhance their motivation in mathematics.

> *B4: I believe that I could be more interested in mathematics if I had the chance to work with my friends a lot. By working together I think that I would be more concentrated and try harder.*
>
> *G4: I think that if I had the chance to work with other students I would be more engaged in mathematics. I love team work. We learn better when we are working in groups. So I think that I would try harder.*

## Summary

In this chapter the results of the study were presented in four parts. In the first part the analyses regarding the validation of the proposed motivational, classroom culture and social background models were presented. In the second part the change in motivation, in classroom culture and in social background across the transition from primary to secondary school was illustrated, whereas in the third part the analyses addressing the change in the actual and the preferred classroom environment across the transition to secondary school were shown. Lastly, in the fourth part the qualitative analyses for individual students were presented based on students' responses to the semi-structured interviews.

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The results of the study indicated that all the proposed models fit the data well. Therefore, students' motivation in mathematics can be studied as a multidimensional construct including cognitive, social and affective dimensions, whereas the classroom culture across transitions can be studied as a two dimensional construct involving cognitive and social dimensions. Students' social background across transitions can be studied as a three dimensional construct including peer and parent help and parent advising.

Furthermore, the results of the study highlight the negative shifts in students' motivation in mathematics, in their perceptions of the classroom culture and of their social background across the transition to secondary school. Students' mastery and social goal orientations decelerate, whereas their performance orientations accelerate after the transition to secondary school. Their self-efficacy perceptions decelerate right after the transition and accelerate through seventh grade.

The differences in students' perceptions of the change in classroom culture across the secondary school transition were highlighted by the results of the study. Students in primary school perceived their classroom goal structure to be more mastery-focused, whereas middle school students perceived that their classroom goal structure stresses performance goals more and mastery goals less. Furthermore, students in elementary school perceived that in their classrooms during mathematics the teacher is more friendly and encourages more cooperation than students in middle school. Furthermore, differences in peer and parent help were observed across the transition, with students' perceptions decelerating after entering secondary school.

Despite these general trends, the latent class analyses provided evidence that students are changing differently in relation to each other and that different groups of students respond to the transition to secondary school in different ways. Students viewed the change in the classroom culture and in their social background in different ways and these differences reflected the different direction of change in their motivation in mathematics across the transition to secondary school. More specifically, students experiencing the biggest increase in the classroom performance goal structure also experienced the biggest increase in their performance-approach goal orientation, whereas students experiencing the biggest increase in classroom performance-avoid goal structure also experienced the biggest increase in their performance-avoid goal and the biggest decrease in their mastery goal. The students



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who perceived the biggest decrease in the social aspects of the classroom environment also perceived the biggest decrease in their social goal orientation and self-efficacy. Furthermore, few students perceived an increase in the classroom mastery goal structure across the transition. These students also perceived an increase in their mastery and social goal orientations and self-efficacy. Finally, the students who reported decrease in their parent and peer help across the transition also reported decreases in their mastery and social goal orientations and in self-efficacy and increases in performance orientations, whereas the few students who perceived an increase in parent and peer help reported increase in mastery and social orientations and in self-efficacy.

The analyses indicated that there was a mismatch between the actual and the preferred classroom environment across the transition to secondary school, with students reporting that they preferred more opportunities for participation and interaction with the teacher than they perceived they actually had. As far as investigation is concerned, pre-transition students' needs were being met, whereas for differentiation the actual classroom environment appeared to be higher than the preferred in primary school and in the last two trimesters in secondary school. For independence the actual classroom environment appeared to be lower than the preferred in primary school and in the first trimester in secondary school.

The investigation of the change in students' perceptions of the actual classroom environment indicated that students' perceptions regarding personalization and investigation decelerated across the transition, whereas their perceptions of independence accelerated. Students' differentiation perceptions decelerated right after the transition and accelerated through seventh grade. The examination of the change in students' preferred classroom environment revealed that students' personalization and independence perceptions accelerated right after the transition and decelerated during seventh grade. For differentiation, the opposite trend occurred with students' perceptions decelerating right after the transition and accelerating through seventh grade. Examining the change in the fit scores, the results indicated that students' fit scores regarding personalization and investigation decelerated across the transition. On the contrary, the change of the fit score for independence and differentiation indicated decelerated growth across the transition and accelerated growth through seventh grade.

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The exploration of the contexts of change of individual students indicated that the individual students interrelated in different ways with their contexts and the interrelationships assumed different importance for them in their motivational change. The students with predominant performance-approach orientation focused more on their status among classmates, whereas students with predominant performance-avoid orientation and the lowest social orientation were less reflective about themselves and appeared to be extremely critical of the classroom environment in secondary school. On the contrary, students with predominant mastery orientation focused more in their own role on motivation, on their response to the new setting and on their efforts to improve in mathematics.

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# CHAPTER V

# DISCUSSION

## Introduction

This research examines motivational change across transitions focusing primarily on the transition from primary to secondary school as the context for examining change in students' motivation in mathematics. The design of this study differs from other longitudinal studies addressing the issue of motivational change across transitions in three aspects. Firstly, a multifaceted conceptualization of motivation including cognitive, social and affective dimensions is adopted. This conceptualization appears to be valid since the results of the study indicate that the proposed motivational model fits the data well across all the waves of measurement. The inclusion of a range of motivational constructs in this research study provides a broader view of motivational change than previous research. Second, motivational change is situated in specific classroom and social contexts. That is motivational change is examined in relation to the changes in students' perceptions of their classroom culture in mathematics and of the changes in their social backgrounds. Hart and Allexsaht-Snider (1996) proposed that the consideration of the broader sociocultural context is important in examining motivation in mathematics learning for all students. Lastly, the fit of the perceived as actual and the preferred classroom environment across the transition to secondary school is examined in order to identify whether some types of changes in the educational environments are perceived by students to be inappropriate across the transition to secondary school.

In this chapter the results of the study are discussed focusing on the nature of motivational change and how it is related to classroom and social background contexts. This chapter proceeds with the educational issues and implications arising from the results of the study and concludes with the limitations of this longitudinal research and the recommendations for future research in the area of motivational change across transitions.

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This study provided the first multifaceted model for examining motivation across the transition from primary to secondary school. Although other studies examined motivational change across this transition (e. g., MacCallum, 1997; Urdan & Midgley, 2003), they have not addressed the range of motives included in this study. The validity of the motivational model proposed is demonstrated across the transition, indicating that the cognitive, social and affective dimensions represent three distinct aspects of students' motivation in mathematics with each dimension having a differential prediction on the overall motivational construct.

The results confirm the conclusions of previous studies about the decline in students' motivation in mathematics during the transition from primary to secondary school (Anderman & Midgley, 1997; Schneider et al., 2008). By being the first such major transition, the transition to secondary school is experienced more abruptly and disruptively by students (Barber & Olsen, 2004). However, many of the above studies indicate that the decline in motivation is fairly short lived; students' motivation recovers after a period in secondary school, without returning to the high levels apparent at the end of primary school. On the contrary, the motivational declines obtained herein are long-term, that is the deterioration of motivation in mathematics that begins right after the transition to secondary school continues until the end of seventh grade. Despite the fact that motivational constructs appear to stabilize soon after the beginning of the new school year in secondary school, they continue to decline during seventh grade. This finding highlights the necessity to study the changes within the first year in the new school environment and not just right after the transition from primary to secondary school. Fredricks and Eccles (2002) suggest that these declines observed across the transition to secondary school are part of a downward trend in motivation of young adolescents across their development. This is an alarming suggestion because of the current need throughout the world to create math competence (Gottfried et al., 2007).

More specifically, the study indicates that the transition to secondary school is characterized by a deterioration of motivation that continues until the end of seventh grade, with an accelerated rate of decline in mastery and an accelerated rate of incline for performance-approach goal orientation in mathematics. This finding is very unsettling because researchers indicate that when mastery-focused, students try harder, persist longer, take on more challenging work, are more creative and tend to use deep-processing



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strategies. When performance-focused students invest the minimum effort required, take on easy tasks and tend to use surface-level strategies (Midgley et al., 1995).

The stabilization of mastery and performance-approach orientations during seventh grade indicated in this study can be explained by the "honeymoon period" effect (Kirkpatric, 2004). The honeymoon period is situated after the transition to a new school setting and during this period the adjustment to the new school environment comes to the forefront over academic and motivational issues. Students are focusing on adjusting to the new school setting and are not primarily concerned with their motivation in mathematics. As time progresses and students adapt to the new classroom environment the "honeymoon is over". Motivational and academic issues prevail and students report an accelerated decline of mastery goals and an accelerated incline in performance goals by the end of seventh grade.

The study also indicates the accelerated decline in students' social goal orientation across the transition to secondary school. Students' endorsement of social goals declines sharply after the transition and remains stable across seventh grade. This decline occurs because the transition disrupts young adolescents' social networks at a time when social activities are becoming increasingly important (Anderman & Anderman, 1999), without any indications that these networks are re-establishing over the course of the first school year in secondary school.

Examining more closely the affective dimension of motivation, that is self-efficacy, it is interesting to note that students' perceptions change across the transition and within the first year in secondary school. More specifically, the results indicate that students' self-efficacy perceptions decline sharply right after the transition to secondary school. This decline observed in self-efficacy can be explained by two factors. The first suggests that the decline probably reflects young adolescents' reactions to their new school setting (Wigfield et al., 1991). By being the oldest students in elementary school they are likely to have more status. Not surprisingly then their self-efficacy is quite high by the end of sixth grade. In seventh grade students are the youngest children in their school, without knowing their school routines. This unfamiliarity with the new school environment can explain the drop in their self-efficacy in mathematics right after the transition to secondary school. Secondly, the decline in self-efficacy across the transition reflects natural developmental changes (Fredricks & Eccles, 2002). Younger children tend to have overly optimistic perceptions of their competence in mathematics and tend to use less comparative standards to judge their abilities, relying more on wishful thinking (Ruble, 1983). As children grow



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older they are more likely to engage in social comparison, which may result in a more critical evaluation of their abilities. The decline in self-esteem across the transition to secondary school may also reflect increases in the competitiveness of the school and the change in evaluation techniques as children progress through transitions (Fredricks & Eccles, 2002). Most elementary school teachers use criterion-mastery grading, whereas middle school teachers use more normative or social comparative grading that tends to give children information about their abilities relative to other students (Eccles et al., 1993b).

The drop in self-efficacy across the transition to secondary school in this study seems to be fairly short-lived, since students' perceptions show an accelerated rate of incline during seventh grade. Students' perceptions of their self-efficacy in mathematics somehow recover after the first trimester in secondary school. This finding can be explained if we take into consideration the fact that the transition disrupts adolescents self-perceptions at a time when self-focus is becoming increasingly important. As the students adjust over the course of the school year their perceptions appear to rise. When students become familiar with the norms of the new classroom environment their self-efficacy is re-evaluated and almost reaches the high levels apparent at the end of primary school.

The analyses of this study also provide indications about the differences in motivational change in mathematics across the transition to a new school context and the transition within the same school context. The declines observed in motivational dimensions across the transition to secondary school are not seen in the same school transitions. Observing the CE and CS students' mean ratings, there are indications that students' motivation remains stable across the transitions from one grade level to the next within the same school. Furthermore, there are indications that primary school students' mean ratings regarding mastery and social orientations and self-efficacy are higher than secondary school students' mean ratings. On the contrary secondary school students' mean ratings regarding performance-approach and performance-avoid orientations are higher than primary school students' mean ratings. Secondary school students appear to be more performance-oriented than primary school students. In secondary school evaluation becomes more frequent and formal; the children receive reports for the first time when they move to secondary schools and those grades may be based more on ability and less on effort than was the case in elementary school. On the contrary, primary school students appear more mastery and socially-oriented in terms of expressing a willingness to help other students in their math work.

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Lastly, this study indicates that students' motivation in mathematics across the transition from primary to secondary school is correlated with students' perceptions of the classroom culture in mathematics and their social backgrounds. This finding, supports the developing trend in motivation research that stresses the need to consider the sociocultural dimensions of motivation and to situate studies of student motivation in particular classroom, school and social contexts (Hart & Allexsaht-Snider, 1996). The high correlation coefficients between motivation and classroom culture and between motivation and students' social backgrounds found in the study, indicate that students' perceptions of their classroom culture in mathematics and of their social backgrounds have a direct effect and are strong predictors of their motivation in mathematics across the transition to secondary school. Students' perceptions of the change in classroom culture and in their social backgrounds and the effect on motivational change are discussed in the next sections of this chapter.

## Change in Classroom Culture across Transitions and the Effects on Students' Motivation in Mathematics

This study documented the decreased quality of the classroom environment across the transition to secondary school that other researchers suggested (e.g., Ferguson & Fraser, 1998; Rice, 1997; Urdan & Midgley, 2003). More specifically, the study indicates the dramatic shift in classroom environment after the transition to the new school with students reporting an accelerated rate of incline for performance goal structures and competition among students and an accelerated rate of decline in mastery goal structure, teacher friendliness and cooperation. This finding can be interpreted by considering the organizational structure of secondary schools. Secondary schools are typically larger, less personal and more formal than elementary schools (Midgley et al., 1995). The shift to secondary school involves an increase in practices such as whole class organization and public evaluation of the correctness of work encouraging social comparison (Anderman & Anderman, 1999).

Specifically for teacher friendliness, primary school students perceive their mathematics teacher as more friendly, caring and helpful. In this study the deceleration of students' perceptions regarding their teacher's friendliness is not observed only across the



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transition but during seventh grade as well since students' perceptions decelerate by the end of the first year in middle school. This deceleration across the transition can be explained by the fact that secondary school teachers, as subject matter specialists, instruct many more children than do elementary school teachers in self-contained classrooms. Thus they are less likely to come to know their students well and to develop a strong relationship with them (Wigfield et al., 1991). The deceleration in teacher friendliness by the end of seventh grade can be attributed to the fact that as the school year progresses and reaches the end, secondary school teachers might feel an intense pressure about the untaught material in mathematics and thus focus on instruction than on developing relationships with their students.

Despite those general trends, this study provides evidence to support the view that students are changing differently in relation to each other and that different groups of students respond to the transition to secondary school in different ways. The majority of the students experience a negative change in the cognitive or in the social dimensions of the classroom culture. But, there are a few students who perceive a positive change in the classroom culture such as an increase in the mastery goal structure and in cooperation. Latent class analysis indicates that the changes students' perceived in the classroom culture reflected the changes in their motivation in mathematics across the transition. More specifically, the results of the study reveal that students who report a decline in their classroom social environment across the transition to secondary school also report a decline in the social aspects of their motivation and in their self-efficacy in mathematics. On the contrary, for the students who report an increase in the social environment of their classrooms after the transition, the general negative pattern of change in motivation is not evident.

Similarly, the students who report a decline in the mastery goal structure of their classroom and in incline in the performance-approach goal structure also report a decline in their mastery orientation and an incline in their performance-approach orientation after the transition. Urdan and Midgley (2003) report the same results in their study, although they are not focusing on the distinction between the approach and avoidance aspects of performance goals. In this study, the results indicate that the students who perceive an increase in their classroom's performance-avoid goal structure experience the most negative pattern of change in their motivation in mathematics: the biggest decrease in mastery goal orientation and self-efficacy and the biggest increase in the performance-avoid orientation in mathematics. This finding suggests that whereas students' perceptions



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of an increase in the classroom performance-approach goal structure has motivational costs, the disadvantages associated with the perception of an increase in the performance-avoid goal structure are even worse, since students endorse the most maladaptive forms of motivation.

Furthermore, these results suggest that whereas a perceived increase in classroom social dimensions or in the classroom mastery goal structure has advantages, the disadvantages associated with a perceived decrease in the classroom social environment and in mastery goal structure are even stronger. Perhaps social and goal structure messages in the classroom are more evident to students when they are first removed than when they are perceived to be added. In other words, students may not notice the presence of social dimensions or of a mastery goal structure in the classroom as much as they notice their absence. This may be particularly true when students move from what has been described as the more nurturing and mastery-oriented elementary school environment to the more impersonal and performance-oriented middle school classroom environment (Anderman & Anderman, 1999).

Lastly, comparing students' perceptions of classroom culture change across the transitions within the same school with students' perceptions across the transition from primary to secondary school, there are indications that the changes observed in the classroom culture across the transition to secondary school are not evident in the same school transitions. Observing CE and CS students' mean ratings there are indications that students' classroom culture perceptions remain stable across the transitions from one grade level to the next within the same school. Furthermore, primary school students' mean ratings regarding mastery goal structure, teacher friendliness and cooperation are higher than secondary school students' mean ratings. On the contrary secondary school students' mean ratings regarding performance-approach and performance-avoid goal structure and competition are higher than primary school students' mean ratings.

## Change in Students' Social Background across Transitions and the Effects on Students' Motivation in Mathematics

The developmental stage from primary to secondary school is unique it its multitude of concurrent changes that exist across various contexts (Gutman & Eccles, 2007). In the



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previous section of this chapter the changes in the classroom culture were discussed. In this part the changes in students' perceptions of their parent and peer help and parent support are analyzed. Parents and peers are considered to be important correlates of change during this period of transition (Gutman & Eccles, 2007, Schneider et al., 2008) and researchers have recognized that family and peer relationships provide an increasingly important context for social learning and a source of support across the course of development (Wargo-Aikins et al., 2005).

This study indicates that the disruption in social relationships across the transition to secondary school appears to extent beyond the classroom environment. Students' perceptions of their parent and peer help show an accelerated rate of decline right after the transition and by the end of seventh grade. This finding indicates that students lack the support structures either by their parents or by their friends across the transition to secondary school a finding that is in alignment with previous studies (Gutman & Eccles; Rice, 1997; Schneider et al., 2008; Wargo-Aikins et al., 2005).

The period surrounding the transition from primary to secondary school appears to be a stressful time-point for students' motivation in mathematics and students' social background contexts contribute to making it so. The findings of this study indicate that support structures from others like parents or peers are predictive of the changes in students' motivation after the school transition. More specifically, the few students from more supportive home environments and who have friends who can help them cope with transition-related problems, tend to experience the transition positively reporting increases in mastery and social goal orientations and in self-efficacy in mathematics. On the contrary, the majority of the students' who experience declines in the support structures from parent and peers, tend to experience the transition negatively reporting increases in maladaptive forms of motivation such as performance-avoid orientation and decreases in adaptive forms of motivation such as mastery and social orientations and self-efficacy.

Another important finding of the study is that students' perceptions of their parent advising regarding mathematics remains the same prior and after the transition. This finding is pretty logical taking into consideration the fact that in Cyprus language and mathematics are considered as the most important subjects in the school curriculum. Therefore, parents at all grade levels advise and continue to advise their children to study and put effort in mathematics as one of the most important subjects. What appears to change, however, across the transition to secondary school, is not parent advising but parent help as discussed earlier. Parents in response to their children's development and



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growth may push their children to become more independent and autonomous regarding their school responsibilities in mathematics and therefore limit the amount of help offered to their children, while sustain their roles as advisors.

Finally, comparing students' perceptions of their social background change across the transitions within the same school and across the transition from primary to secondary school, there are indications that the changes observed in social background across the transition to secondary school are evident in the secondary school transition. Observing CS students' mean ratings there are indications that students' perceptions of parent and peer help decline across the transition from 7$^{th}$ to 8$^{th}$ grade. On the contrary, students' experiencing the transition within primary school report that the amount of their parent help across the transition remains stable, whereas the amount of their peer help increases. Furthermore, primary school students' mean ratings regarding all the aspects of their social background are higher than secondary school students' mean ratings.

## Change of the Fit between the Actual and the Preferred Classroom Environment in Mathematics across the Transition to Secondary School

The analysis of the data for students experiencing the transition from primary to secondary school indicates that there is a mismatch between the actual and the preferred classroom environment across the transition. At both the pre and the post-transition level students' preferences are out–of-synch with their environment regarding personalization. Especially after the transition to secondary school, students report that they would like considerably more opportunities for participation and interaction with the teacher than they perceive they actually have. For independence, post-transition students' needs are being met. This finding can be attributed to the fact that after students get acquainted with the new school environment in secondary school they also realize that they are more autonomous in terms of sitting arrangements than they were in primary school.

A different pattern of findings is observed for the dimensions of investigation and differentiation. For the former, pre-transition students' needs are being met, while post-transition students would expect more opportunities for mathematical investigations. This finding can be attributed to the fact that elementary school classrooms as compared to secondary school classrooms are characterised by a greater emphasis on student



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involvement and investigation in learning mathematics as the present study indicates. The findings about differentiation indicate that the perceived as actual classroom environment is significantly higher than the preferred environment in primary school and after a trimester in secondary school the students prefer less differentiation than they perceive they actually have. If we consider that differentiation in both contexts has to do with selective treatment of students, based on ability and therefore with difficulties in mathematics and social discrimination, then it seems logical that students do not want the teacher to offer different teaching materials or aids to students with special abilities in mathematics. The match between the actual and the preferred differentiation environment right after the transition to secondary school can be attributed to the fact that the first trimester is considered a setting in period with secondary school teachers actively seeking information about the ability of their students in order to identify the students with difficulties in mathematics.

The results of the study contribute to our understanding of the fit between the perceived as actual and the preferred classroom environment in mathematics during the transition to middle school. It is remarkable that the mismatch between students' perceived as actual and preferred personalization and investigation classroom environment has the most negative value immediately after the transition to middle school. Given the differences in the classroom culture between elementary and secondary schools reported in the present and other studies (e.g., Urdan & Midgley, 2003) it is not surprising that elementary school students perceive that in their mathematics classroom the teacher is friendly, caring and helpful and that he/she encourages investigation and participation more than the teachers in middle schools.

Furthermore, the mismatch between students' actual and preferred independence environment had the most negative value right after the transition but during seventh grade an accelerated rate of incline is evident with the fit reaching the most positive value. Despite the fact that students report the need to be more independent in secondary school and that secondary school provides them that opportunity, the amount of autonomy granted to them is much more than the students need. This finding can be attributed to the fact that although adolescents' desire more autonomous relationships and push for more decision-making power with their teachers, they often require the decisions to be made by adults such as their teachers at the same time (Gutman & Eccles, 2007).

Lastly, the mismatch between students' actual and preferred differentiation environment had the most negative value right after the transition but during seventh grade



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an accelerated rate of incline is evident with the fit reaching the most positive value, with students reporting a preference for less differentiation than they actually receive. As discussed earlier, differentiation has to do with selective treatment of students, based on ability and difficulties in mathematics and therefore can be perceived as a form of social discrimination. Studies indicated that across the transition to secondary school students become more concerned about their status among classmates (Roeser et al., 1996) and therefore differentiation as an instructional practice in secondary school can be seen as an obstacle in students' efforts to gain social status among their classmates.

As suggested by person-environment fit theory (Eccles et al., 1993a; 1993b) exposure to such changes in classroom environment leads to a particularly poor person-environment fit, which could account for some of the declines in motivation seen at this developmental period. Therefore, the environmental changes often associated with the transition to middle school seem especially harmful in that they emphasize lower level cognitive strategies at a time when the ability to use higher level strategies such as investigation is increasing; they emphasize pathetic learning at a time of heightened need for participation and involvement in learning; and they disrupt social networks with the teacher at a time when adolescents are especially concerned with close adult relationships (Eccles & Midgley, 1989).

## Motivational and Classroom Culture Change across the Transition to Secondary School for Individual Students

The exploration of the contexts of change of individual students through interviews in this study brings a detailed picture of individual motivational change. Previous motivation research has largely neglected this issue and has not attempted to reconcile individual change with change of the group as a whole. The individual students focus on different aspects of the classroom context related to the concerns they bring to the situation (McCallum, 2004). Thus, students interrelate in different ways with their contexts and the interrelationships assume different importance for them in their motivational change.

The main aim of the semi-structured interviews is to examine in some depth the contexts of motivational change of eight students with different patterns of change in their motivational goal orientations. The examination is conducted through students'



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descriptions of their motivational change stories, of their perceptions of the differences between primary and secondary school, of the change in the amount of parent and peer help and support and of their views of how their motivation could be enhanced after the transition to secondary school.

The analyses of the interviews reveal that students' responses are in line to their goal orientations, that is in ways that would be expected from their goal orientation emphases, without any differences according to gender. For students like B2 and G2 the intense concern about not appearing dump is predominant, whereas for students like B3 and G3 a tension to avoid social relationships is developed. B4 and G4 depict the mastery-oriented strategic learners, whereas B1 and G1 appear to be the performance-oriented confident achievers.

All the students appear to be aware of the changes in their motivation across the transition from primary to secondary school, although some of them are unwilling to express them. Students with a high mastery orientation are the only ones who admit facing difficulties across the transition, expressing these concerns in terms of the self and their response to the new situation. On the contrary, students with a high performance-approach orientation are not ready to admit facing difficulties in order to protect their social status among their classmates, whereas students with a high performance-avoid orientation admit facing difficulties across the transition but express an intense concern about keeping them for themselves. Students' responses indicate that the students expressing a predominant performance orientation are more ego-centered and focus more on their status among classmates than the students with a high mastery orientation. Previous studies (e.g. MacCallum, 2004) yielded the same results. The students who endorse ego goals actively make comparisons of the work and grades between themselves and their classmates and express a relief when they perform better than other students or when other students perform worse than them. On the contrary, the students who espouse mastery goals tend to focus on themselves and try to find strategies to work things out such as trying harder and seeking help from others (peers, teacher or parents).

Many researchers document the view that students with different motivational goal orientations focus their attention on specific dimensions of their school and classroom environments (e.g., MacCallum, 1997; Urdan & Midgley, 2003). Therefore they are likely to experience the environments differentially. The findings of the individual interviews suggest that the students' experiences of the transition to secondary school differ in discernible ways.

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As far as the differences between primary and secondary school are concerned, there are common perceptions among the students with similar and different goal orientation patterns. All the students perceive their secondary classroom's goal structure as more performance-oriented, the classroom environment as more competitive, the teacher as less friendly and supportive and the gap between the perceived as actual and the preferred classroom environment as growing bigger. Although the students mention the same differences between primary and secondary school, they are not seeing them in the same light, that is, the students with different goal orientations focus on different aspects of the transition. More specifically, students with a high performance orientation tend to be extremely critical of the classroom environment in mathematics and highlight the negative aspects of the transition. On the contrary, students with a high mastery orientation describe the differences between the two school contexts in more positive terms and are less critical of them. Furthermore, all the students and not only the students with a lower social orientation across the transition, focus on issues concerning the differences in relationships and interactions with the teacher and classmates. This latter finding indicates that students' social perceptions are an integral aspect of their motivation in mathematics as well as the cognitive and the affective dimensions. The study of Anderman & Anderman (1999) highlighted the importance of attending to the social aspects of students' transition experiences in order to gain a fuller understanding of young adolescents' motivation in school settings. Specifically, they indicated that students' social perceptions make significant, unique contributions to their achievement goal orientations.

The students mention a number of differences that covered both the social and academic aspects of the relationships between students and teachers and express these concerns in both positive and negative terms. The students with a more prominent mastery orientation are less critical of the teacher, focus more on the teacher's knowledge and skills and highlight the positive aspects of interactions, whereas students with a prominent performance orientation tend to be more critical of the student-teacher interaction and are concerned with liking the teacher or the teacher liking them.

All the students have definite ideas about how their classroom needs to be like in order their motivation in mathematics could be enhanced. Their perceptions of the ideal environment differ from each other according to their predominant goal orientation. The students expressing a predominant performance orientation after the transition are less reflective about themselves and their role in their own motivation and seem to think others had the major role. More specifically, the students with a predominant performance-

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approach orientation want the classroom organized in ways that enable them to have status or to impress particular people, whereas the students expressing a predominant performance-avoid orientation after the transition focus on what the teacher could do for them and they want their teachers to motivate them in order to respond. On the contrary, the students expressing a predominant mastery orientation focus both on themselves and on the classroom environment-in terms of working and interacting with peers-as a means of enhancing their motivation in mathematics.

It is interesting to note that the students with a more dominant mastery orientation tend to be more reflective about themselves and focus more on the importance of their own role in motivation and learning as they perceive motivation as principally dependent on themselves, whereas the more performance-oriented students focus less on their own role in motivation. In the literature, mastery orientations are put forward as the most adaptive form of motivation that could lead to a better quality of learning (MacCallum, 2004). In the present study, these students appeared to have learned how to make the most of any environment and appeared to have a better fit in the secondary school environment than the students with other predominant orientations.

Studies have suggested that although a performance-approach orientation is sometimes associated with maladaptive patterns of learning it may also be associated with some positive outcomes especially when a mastery orientation is also high (Midgley, Kaplan & Middleton, 2001; Pintrich, 2000). In contrast, a performance-avoid orientation is associated with maladaptive outcomes with no evidence of positive effects. This study provides evidence supporting the above statements since it shows that the performance-approach orientation is adaptive for certain students when a mastery orientation is also espoused. The students with predominant mastery orientation also endorse performance-approach orientation and appear to enjoy the status of high achievers but are prepared to do what is expected of high achieving students such as trying hard. The results of the study also indicate the maladaptive nature of the outcomes associated with the performance-avoid orientation. Specifically, the students with a high performance-avoid orientation show a significant psychological distress-that was not gender exclusive-that leads to less enjoyment of mathematics and a tension of not seeking help from others (peers, parents and teachers) in order not to look incompetent. The study of Ryan, Pintrich and Midgley (2001) indicates that the avoidance motivation plays a central role in the avoidance of help seeking, whereas the study of Covington and Müeller (2001), in which the two types of

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performance orientations were studied separately, indicated that the true enemy of intrinsic engagement is the pursuit of avoidance goals driven by fear of failure.

## Educational Implications

Concern over education for young adolescents has increased in recent years, as evidenced by burgeoning research literatures investigating the transition from primary to secondary school across the world. The results of this study indicate that the primary to secondary school transition is a major cause of disruption in students' motivation in mathematics.

This study also highlights the effects of the changes in classroom culture and in the amount of social support provided by family and peers on the changes in students' motivation in mathematics, indicating that across the transition to secondary school there are inappropriate and unwished changes in the classroom environment and in social relations and support that lead to deterioration of motivation in mathematics over time. Therefore, the critical question remains: "What can be done to make transitions easier so fewer students are lost as a result of them?"

It is now relatively commonplace for primary teachers and students in Cyprus to visit the secondary school students will attend next year for a day prior to the move. There can be little doubt that such an activity helps to reduce levels of anxiety considerably. However, this initiative, welcome though it may be, has very little impact on the curriculum, on teaching and on the amount of social support provided to students by their family and friends (Galton et al., 2000).

The two school settings, that is the primary and secondary schools should build constructive liaisons focusing on encouraging and facilitating communication, planning and joint work among teachers from different school levels through meetings, visits, exchanges and by establishing norms of collaboration and collegiality. Galton et al. (2000) suggested that the collaboration among teachers in different school levels can be achieved by the development of what are now called "bridging units" (Galton et al., 2000). These are joint curriculum mini-projects (usually subject specific) between the teachers in the feeder and transfer schools that pupils begin during the last few weeks of the summer term and then carry over during the first few weeks in the new school after the summer vacation.



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Furthermore, there is a strong need for parent involvement. Parents involved in the transition process tend to remain involved in their children's schooling (McIver, 1990) and are able to motivate their children to do the same (Perkins & Gelfer, 1995). Furthermore, parent involvement in the transition process improves communication with teachers and enables teachers and parents to work together to prevent problems from occurring or to intervene quickly when problems arise.

In order to facilitate transitions there is a need for comprehensive efforts. Anderson and his colleagues (Anderson et al., 2000) argued that school, or better school districts, must create transition programs. Transition programs are plans that are predicated on the basis of meeting the needs of students in order to provide a smooth transition to the new school setting. Such programs target students' adjustment in the new school setting through focusing on the negative impacts of the transition and trying to prevent them (Tonkin & Watt, 2003). In this way, students adjust to the school in targeted areas as quickly and smoothly as possible. Schumacher (1998) argued that students making the transition into secondary school need to receive assistance prior to, during and after the move so that their social, psychological and academic well-being are not compromised.

Based on the fact that up to now in Cyprus there is not any formal transition program helping students cope with the difficulties of the transition to secondary school and of transitions in general, a series of recommendations can be offered according to the available research on the area. Anderson et al. (2000) suggested that in order to facilitate the process of transitions, a transition program should operate within a conceptual framework that contains three major components: transitional success or failure, preparedness and support.

Firstly, a transition program should assess transitional success or failure. In doing so four indicators can be applied referring to: (a) student grades, either low grades or declining grades; (b) the appropriateness of students' post-transitional classroom behaviour; (c) students' post-transitional relationships with peers; and (d) students' academic orientations in post-transition classroom. These indicators can be used in order to place each student into one of the three categories: successful, moderately successful or unsuccessful. Secondly, the assessment of students' preparedness level should be examined. This examination can be made on the basis of students' (a) academic preparedness, that is whether the students possess the knowledge and skills they need to succeed at the next level; (b) independence and industriousness, that is whether students are able to work by themselves and stay focused without direct teacher intervention or

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supervision; (c) conformity to adult standards, that is whether students conform to adult standards of behaviour; and (d) coping mechanisms, that is whether students can deal with problems and difficulties they are likely to encounter upon the transition to the next school level. Lastly, support from others (parents, siblings, peers, teachers, counsellors) should be considered. Kurita and Janzen (1996) have identified four types of support: informational, tangible, emotional and social.

According to Anderson et al. (2000), there are two important aspects of the above framework. Firstly, support is inversely related to the extent of student preparedness, that is the less prepared the student the greater the support he/she needs and vice versa. Furthermore, the type of support needed by various students depends on the deficiencies of their preparation. Students with academic deficiencies would need tangible support that is academic services provided to them prior and immediately after the transition such as tutors or after school homework assistance. Students who either are unable to conform to adult standards or who lack coping mechanisms would need informational, emotional and social support such as counselling or help from peers. Secondly, the greater the discontinuity between the two school contexts the greater the need for students to have support and guidance in order to progress successfully through the transition. Once again, the type of support to be provided should be in alignment with the type of discontinuity.

For a transition program to be successful, it needs comprehensive efforts that are carefully planned, multi-faceted and long term. Perkins and Gelfer (1995) discuss five essential components of a systemic transition model: (i) developing a planning team (including administrators, teachers, students and parents); (ii) generating goals that focus on factors that clearly relate to facilitating successful transitions and identifying problems (such as helping students learn new school rules and routines, adjust to many teachers and learn to work independently); (iii) developing a written transition plan that lays out the steps to be followed in achieving the goals; (iv) acquiring the support and commitment of teachers and all those involved in the transition process; and (v) evaluating the transition process in order to improve its effectiveness.

## Limitations of the Study

The implications and interpretations of the results from this study are tempered by a number of factors. A first issue concerns the generalizability of the findings. The study was



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based on data from two secondary schools in urban and suburban areas and the five primary schools feeding those secondary schools. Although the schools were not selected randomly, are considered as typical of most urban and suburban schools in Cyprus. Therefore representativeness of the sample of students can be argued and the major findings of the study are assumed to be generalizable to other similar groups of students experiencing the transition from primary to secondary school. It is important however to have in mind that the school, classroom and individual contexts of students play an important role in motivation and motivational change. Thus, generalizability of the specific findings of the research beyond the particular groups of students should be conducted with care.

Another issue regarding the generalisability of the findings is the number of the participating students in CE and CS. The number of students in these two cohorts that were taken for comparison purposes was small. Therefore generalisability of the results for the above two groups of students can be argued. Furthermore, since the students in the three cohorts participating in this study are not the same (the same students were not followed across the three stages of the transitions studied in this research) the comparisons across cohorts must be conducted with care.

This study is also limited by the sole reliance in youth-reported data. Although adolescents may be the best reporters of their motivation and of the classroom environment measured in this study, it would strengthen the validity of the findings to have multiple subjective assessments (either from teachers or parents) and objective assessments of the classroom environment (classroom observations).

Lastly, another limitation of the present study is that adolescents' actual achievement was not controlled for and this is a factor likely to contribute to explaining developmental trajectories through secondary school.

## Recommendations for Future Research

The particular set of ways in examining motivational change explored in this study (that is the questionnaire and the interviews) are unique, but they are not exhaustive. There are other ways that change could be examined (such as observations of classrooms in both school contexts) and additional motivation and school culture variables that could be



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included in the analyses. Furthermore, the use of teacher measures such as questionnaires completed by teachers and interviews with them would provide additional information regarding the differences between primary and secondary school. Teachers' perceptions along with students' perceptions across transitions would help unravel the issues associated with motivational change.

Social support dimensions in this study were examined only from the perspectives of the students themselves, not their parents or friends who may have understood these relationships quite differently. Future research should include the measurement of social support as it is perceived by those providing the support as well as those who receive it.

Longitudinal studies should also examine the effect of transitions on students' motivation not only across the transition from primary to secondary school but across the within the same school transitions as well. If we are concerned about helping young people sustain through primary and secondary schooling, an enthusiasm for learning, confidence in themselves as learners and a sense of achievement and purpose, then it follows that it is important to look beyond just transfer (the move from one school to another) to the routine breaks in learning that occur as students move from one year to another. Researchers need to follow children over an extended period of time not just across the transition to middle school. In this way the degree to which youth advance or decline in their functioning at other transition points such as the multiple grade transitions they experience that do not involve moving to a new school can be examined.

Furthermore, replication of the study at other Cypriot sites not only in mathematics but in various other subject domains is needed in order to confirm the generalizability of the current results even within that country. Replication of the study in different academically-oriented secondary school systems like those in East Asia would expand and clarify the findings.

Studies should try to identify the characteristics of adolescents who are likely to have the greatest difficulties adjusting to secondary school. These adolescents might have behavioral, academic or social problems in elementary school. If these problems are not addressed before the adolescents leave elementary school, their adjustment to secondary school may be poor.

In this study students in the individual interviews were characterized as holding few particular patterns of orientations such as high performance-approach orientation or performance-avoid orientation only, high mastery and performance-approach orientations and high mastery and social orientations. Patterns other than those might be evident such



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as high performance–approach and performance–avoid orientations, suggesting that future research in the area should examine different clusters of students' orientations as the few broad categories may mask a number of the subtle differences that are important in the motivation of particular students.

Lastly, an important aspect in motivational change research is the evaluation of transition programs. Studies should examine the implementation and the effect of transition programs on students' motivation in mathematics and in other subject areas.

## Summary

In conclusion, this study documented the negative shifts in students' motivation in mathematics across the transition from primary to secondary school. Students after the transition to secondary school become more performance-oriented and less mastery and socially-oriented, whereas their self-efficacy in mathematics declines. This deterioration in motivation is long term, since students motivation in this study is not appearing to recover after an initial period of adjustment in secondary school.

In addition, the study highlights the fact that primary and secondary schools are very different organizations with respect to instructional practices, goal emphases and social relations as suggested by other researchers (e.g. Rice 1997; Urdan & Midgley, 2003). Students in primary school perceive their classroom goal structure to be more mastery-focused and less performance-focused and their mathematics teachers as more friendly, caring and helpful and encouraging more cooperation, investigation and participation than in secondary school. Students' relationships with parents and peers undergo a stressful period across the transition to secondary school as well. Students report decreases in their parent and peer help and support across the transition to secondary school.

Furthermore, this study highlights the necessity to situate studies regarding motivational change across transitions in specific classroom and broader social contexts, by indicating that the changes in students' perceptions of their classroom culture and of their social backgrounds contribute to making the transition to secondary school a stressful period in students' lives and are significant predictors of the change in their motivation in mathematics. More specifically, this study demonstrates that the discontinuities in



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classroom and social contexts are sources of problems for students' motivation in mathematics as they pass through the transition from primary to secondary school. Students who experience a decline in their teacher, peer and parent help and view their classroom as more performance-oriented and less mastery oriented show the most negative changes in their motivation in mathematics as well. On the contrary, students who experience the transition positively and report an increase in their teacher, peer and parent help and in the mastery orientation of their classroom also report an increase in the most adaptive patterns of their motivation (mastery and social orientations and self-efficacy).

Finally, another alarming finding of the study is that the majority of the students experience a negative shift in their perceptions of their classroom culture and social background across the transition to secondary school. This indicates that the majority of the students in Cyprus view the transition to secondary school as a negative event in their lives that leads to deterioration of their motivation in mathematics. According to the latent class analyses conducted in the study, only 3-4% of the students perceive the transition as contributing to positive changes in their classroom culture and in their social backgrounds and subsequently in their motivation in mathematics. This finding suggests the need for closer collaboration between the two authorities of Primary and Secondary Education in Cyprus and the need for the development of a comprehensive transition program through the cooperation of policy makers, counselors, psychologists, teachers and parents.

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# APPENDIX A

## Ερωτηματολόγιο μαθητή

### Η ΕΞΕΛΙΞΗ ΤΩΝ ΚΙΝΗΤΡΩΝ ΠΡΟΣ ΤΑ ΜΑΘΗΜΑΤΙΚΑ ΚΑΤΑ ΤΗ ΜΕΤΑΒΑΣΗ ΑΠΟ ΤΟ ΔΗΜΟΤΙΚΟ ΣΤΟ ΓΥΜΝΑΣΙΟ

1. **Ονοματεπώνυμο: .....**

2. **Φύλο**

   ***Βάλε σε κύκλο το 1 ή το 2***

   | | |
   |---|---|
   | Αγόρι | 1 |
   | Κορίτσι | 2 |

3. **Τάξη**

   ***Βάλε σε κύκλο το 1, το 2, το 3 ή το 4***

   | | |
   |---|---|
   | Ε' Δημοτικού | 1 |
   | Στ' Δημοτικού | 2 |
   | Α' Γυμνασίου | 3 |
   | Β' Γυμνασίου | 4 |

4. **Τμήμα (π.χ. Α'2**): .....

5. **Γυμνάσιο στο οποίο φοιτώ**: .....

6. **Δημοτικό από το οποίο αποφοίτησα**: .....

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**ΜΕΡΟΣ Α**

**Διάβασε προσεκτικά τις πιο κάτω δηλώσεις και βάλε σε κύκλο τον αριθμό που αποδίδει καλύτερα την πραγματικότητα όπως την καταλαβαίνεις εσύ.**

**1 = Διαφωνώ απόλυτα, 2 = Διαφωνώ, 3 = Ούτε διαφωνώ, ούτε συμφωνώ,**

**4 = Συμφωνώ, 5= Συμφωνώ απόλυτα**

| | | | | | | |
|---|---|---|---|---|---|---|
| 1. | Στις εργασίες μου στα μαθηματικά με βοηθά η μητέρα μου. | 1 | 2 | 3 | 4 | 5 |
| 2. | Στις εργασίες μου στα μαθηματικά με βοηθά ο πατέρας μου. | 1 | 2 | 3 | 4 | 5 |
| 3. | Η βοήθεια της μητέρας μου στα μαθηματικά είναι σημαντική για μένα. | 1 | 2 | 3 | 4 | 5 |
| 4. | Η βοήθεια του πατέρα μου στα μαθηματικά είναι σημαντική για μένα. | 1 | 2 | 3 | 4 | 5 |
| 5. | Ο πατέρας μου με συμβουλεύει να εργάζομαι σκληρά στα μαθηματικά. | 1 | 2 | 3 | 4 | 5 |
| 6. | Η μητέρα μου με συμβουλεύει να εργάζομαι σκληρά στα μαθηματικά. | 1 | 2 | 3 | 4 | 5 |
| 7. | Μερικοί από τους φίλους μου με βοηθούν στις εργασίες μου στα μαθηματικά. | 1 | 2 | 3 | 4 | 5 |
| 8. | Είναι σημαντικό για μένα να έχω τη βοήθεια των φίλων μου στα μαθηματικά. | 1 | 2 | 3 | 4 | 5 |
| 9. | Οι φίλοι μου με βοηθούν να εργάζομαι σκληρά στα μαθηματικά. | 1 | 2 | 3 | 4 | 5 |
| 10. | Όταν δουλεύω μαζί με τους φίλους μου στα μαθηματικά γίνομαι καλύτερος/η. | 1 | 2 | 3 | 4 | 5 |

Chryso Chr Athanasiou

**ΜΕΡΟΣ Β**

**Διάβασε προσεκτικά τις πιο κάτω δηλώσεις και βάλε σε κύκλο τον αριθμό που αποδίδει καλύτερα την πραγματικότητα όπως την καταλαβαίνεις εσύ.**

**1 = Διαφωνώ απόλυτα, 2 = Διαφωνώ, 3 = Ούτε διαφωνώ, ούτε συμφωνώ,**
**4 = Συμφωνώ, 5= Συμφωνώ απόλυτα**

| | | | | | | |
|---|---|---|---|---|---|---|
| 1. | Στην τάξη μας, θεωρείται σημαντικό να προσπαθείς πολύ στα μαθηματικά. | 1 | 2 | 3 | 4 | 5 |
| 2. | Στην τάξη μας, το πιο σημαντικό πράγμα είναι να παίρνεις καλούς βαθμούς στα μαθηματικά. | 1 | 2 | 3 | 4 | 5 |
| 3. | Στην τάξη μας, θεωρείται σημαντικό να δείχνεις στους άλλους ότι δεν είσαι άσχετος/η στα μαθηματικά. | 1 | 2 | 3 | 4 | 5 |
| 4. | Στην τάξη μας, θεωρείται σημαντικό να γίνεσαι συνεχώς καλύτερος/καλύτερη στα μαθηματικά. | 1 | 2 | 3 | 4 | 5 |
| 5. | Στην τάξη μας, θεωρείται σημαντικό να βρίσκεις τις σωστές απαντήσεις στις ασκήσεις των μαθηματικών. | 1 | 2 | 3 | 4 | 5 |
| 6. | Στην τάξη μας, θεωρείται σημαντικό να μην κάνεις λάθη στα μαθηματικά μπροστά στους άλλους. | 1 | 2 | 3 | 4 | 5 |
| 7. | Στην τάξη μας, το πιο σημαντικό πράγμα είναι να καταλαβαίνεις πραγματικά τα μαθηματικά. | 1 | 2 | 3 | 4 | 5 |
| 8. | Στην τάξη μας, θεωρείται σημαντικό να παίρνεις ψηλούς βαθμούς στα διαγωνίσματα των μαθηματικών. | 1 | 2 | 3 | 4 | 5 |
| 9. | Στην τάξη μας, θεωρείται σημαντικό να μην τα πηγαίνεις χειρότερα από τους άλλους μαθητές στα μαθηματικά. | 1 | 2 | 3 | 4 | 5 |
| 10. | Στην τάξη μας, θεωρείται σημαντικό να καταλαβαίνεις τα μαθηματικά και όχι να τα μαθαίνεις απ' έξω. | 1 | 2 | 3 | 4 | 5 |
| 11. | Στην τάξη μας, θεωρείται σημαντικό να μην δείχνεις ότι δεν καταλαβαίνεις τα μαθηματικά. | 1 | 2 | 3 | 4 | 5 |
| 12. | Στην τάξη μας, θεωρείται σημαντικό να μαθαίνεις νέα πράγματα στα μαθηματικά. | 1 | 2 | 3 | 4 | 5 |
| 13. | Στην τάξη μας, δεν πειράζει να κάνεις λάθη στα μαθηματικά φτάνει να μαθαίνεις από αυτά. | 1 | 2 | 3 | 4 | 5 |

Christos Chr. Athanasiou

| | | | | | | |
|---|---|---|---|---|---|---|
| 14. | Στην τάξη μας, θεωρείται σημαντικό να μην φαίνεσαι άσχετος/η στα μαθηματικά. | 1 | 2 | 3 | 4 | 5 |
| 15. | Κατά τη διδασκαλία των μαθηματικών στην τάξη μας, ο δάσκαλος συζητά με κάθε μαθητή σχετικά με τα μαθηματικά. | 1 | 2 | 3 | 4 | 5 |
| 16. | Κατά τη διδασκαλία των μαθηματικών στην τάξη μας, ο δάσκαλος αποφασίζει που θα καθίσουν οι μαθητές. | 1 | 2 | 3 | 4 | 5 |
| 17. | Στην τάξη μας, οι μαθητές βρίσκουν τις απαντήσεις στις ασκήσεις στα μαθηματικά από τα βιβλία τους παρά κάνοντας διερευνήσεις (ανακαλύψεις). | 1 | 2 | 3 | 4 | 5 |
| 18. | Κατά τη διδασκαλία των μαθηματικών στην τάξη μας, κάποιοι μαθητές κάνουν διαφορετικές ασκήσεις από τους άλλους μαθητές. | 1 | 2 | 3 | 4 | 5 |
| 19. | Κατά τη διδασκαλία των μαθηματικών στην τάξη μας, ο δάσκαλος ενδιαφέρεται για κάθε μαθητή. | 1 | 2 | 3 | 4 | 5 |
| 20. | Στην τάξη μας, οι μαθητές επιλέγουν με ποιο συμμαθητή τους θα συνεργαστούν στα μαθηματικά. | 1 | 2 | 3 | 4 | 5 |
| 21. | Κατά τη διδασκαλία των μαθηματικών στην τάξη μας, όλοι οι μαθητές κάνουν τις ίδιες ασκήσεις την ίδια χρονική στιγμή. | 1 | 2 | 3 | 4 | 5 |
| 22. | Στην τάξη μας, ο δάσκαλος των μαθηματικών δεν είναι καθόλου φιλικός με τους μαθητές. | 1 | 2 | 3 | 4 | 5 |
| 23. | Κατά τη διδασκαλία των μαθηματικών στην τάξη μας, ο δάσκαλος λέει στους μαθητές πώς να συμπεριφέρονται. | 1 | 2 | 3 | 4 | 5 |
| 24. | Στην τάξη μας, οι μαθητές κάνουν διερευνήσεις (ανακαλύψεις) στα μαθηματικά για να απαντήσουν προβλήματα των συμμαθητών τους. | 1 | 2 | 3 | 4 | 5 |
| 25. | Κατά τη διδασκαλία των μαθηματικών στην τάξη μας, κάποιοι μαθητές χρησιμοποιούν διαφορετικά βιβλία και υλικά από άλλους (π.χ. κύβους, υπολογιστικές…). | 1 | 2 | 3 | 4 | 5 |
| 26. | Στην τάξη μας, οι μαθητές εξηγούν το νόημα σχημάτων και γραφικών παραστάσεων στα μαθηματικά. | 1 | 2 | 3 | 4 | 5 |

Chryso Chri. Athanasiou

## ΜΕΡΟΣ Γ

**Διάβασε προσεκτικά τις πιο κάτω δηλώσεις και βάλε σε κύκλο τον αριθμό που αποδίδει καλύτερα την πραγματικότητα όπως την καταλαβαίνεις εσύ.**

**1 = Διαφωνώ απόλυτα, 2 = Διαφωνώ, 3 = Ούτε διαφωνώ, ούτε συμφωνώ,**
**4 = Συμφωνώ, 5= Συμφωνώ απόλυτα**

| | | | | | | |
|---|---|---|---|---|---|---|
| 1. | Είμαι σίγουρος/η ότι μπορώ να μάθω όλα τα νέα πράγματα που θα κάνουμε στα μαθηματικά. | 1 | 2 | 3 | 4 | 5 |
| 2. | Αν έχω χρόνο, θα καταφέρω να εργαστώ πολύ καλά στα μαθηματικά. | 1 | 2 | 3 | 4 | 5 |
| 3. | Μπορώ να λύσω ακόμα και τις πιο δύσκολες ασκήσεις στα μαθηματικά αρκεί να μην εγκαταλείψω την προσπάθεια. | 1 | 2 | 3 | 4 | 5 |
| 4. | Είμαι σίγουρος/η ότι μπορώ να ανακαλύπτω τον τρόπο να λύνω και τις πιο δύσκολες ασκήσεις στα μαθηματικά. | 1 | 2 | 3 | 4 | 5 |
| 5. | Όταν προσπαθήσω, μπορώ να λύσω ακόμα και τις πιο δύσκολες ασκήσεις στα μαθηματικά. | 1 | 2 | 3 | 4 | 5 |
| 6. | Ακόμα και αν τα μαθηματικά είναι δύσκολα, μπορώ να τα καταλάβω. | 1 | 2 | 3 | 4 | 5 |

## ΜΕΡΟΣ Δ

**Διάβασε προσεκτικά τις πιο κάτω δηλώσεις και βάλε σε κύκλο τον αριθμό που αποδίδει καλύτερα την πραγματικότητα όπως την καταλαβαίνεις εσύ.**

**1 = Διαφωνώ απόλυτα, 2 = Διαφωνώ, 3 = Ούτε διαφωνώ, ούτε συμφωνώ,**
**4 = Συμφωνώ, 5= Συμφωνώ απόλυτα**

| | | | | | | |
|---|---|---|---|---|---|---|
| 1. | Όταν βελτιώνομαι στα μαθηματικά, καταλαβαίνω καλύτερα το λόγο γιατί πρέπει να ασχολούμαι με αυτά. | 1 | 2 | 3 | 4 | 5 |
| 2. | Θα μου άρεσε να ήμουν ο μόνος/μόνη που βρίσκει τις απαντήσεις στις ερωτήσεις του δασκάλου στα μαθηματικά. | 1 | 2 | 3 | 4 | 5 |
| 3. | Είναι σημαντικό για μένα να μη φαίνομαι άσχετος/η στα μαθηματικά στην τάξη μου. | 1 | 2 | 3 | 4 | 5 |



Chryso Chr. Athanasiou

| | | | | | | |
|---|---|---|---|---|---|---|
| 4. | Όταν συνεργάζομαι με τους συμμαθητές μου, καταλαβαίνω καλύτερα το λόγο γιατί πρέπει να ασχολούμαι με τα μαθηματικά. | 1 | 2 | 3 | 4 | 5 |
| 5. | Όταν είμαι καλός/η στα μαθηματικά, καταλαβαίνω καλύτερα το λόγο γιατί πρέπει να ασχολούμαι με αυτά. | 1 | 2 | 3 | 4 | 5 |
| 6. | Είναι σημαντικό για μένα να πιστεύουν οι συμμαθητές μου ότι είμαι καλός/η στα μαθηματικά. | 1 | 2 | 3 | 4 | 5 |
| 7. | Ένας σημαντικός λόγος που κάνω τις εργασίες μου στα μαθηματικά είναι για να μην ντροπιάσω τον εαυτό μου. | 1 | 2 | 3 | 4 | 5 |
| 8. | Όταν συνεργάζομαι με τους φίλους μου, ξέρω καλύτερα το λόγο γιατί πρέπει να ασχολούμαι με τα μαθηματικά. | 1 | 2 | 3 | 4 | 5 |
| 9. | Ξέρω καλύτερα το λόγο γιατί πρέπει να ασχολούμαι με τα μαθηματικά όταν νιώθω ότι μπορώ να κάνω τις εργασίες μου. | 1 | 2 | 3 | 4 | 5 |
| 10. | Ο λόγος που συμπληρώνω τις εργασίες μου στα μαθηματικά είναι για να μην νομίσει ο δάσκαλός μου ότι ξέρω λιγότερα από τους άλλους συμμαθητές μου. | 1 | 2 | 3 | 4 | 5 |
| 11. | Όταν βοηθώ τους συμμαθητές μου στις εργασίες τους στα μαθηματικά, ξέρω καλύτερα το λόγο γιατί πρέπει να ασχολούμαι με τα μαθηματικά. | 1 | 2 | 3 | 4 | 5 |
| 12. | Νιώθω ότι πετυχαίνω στα μαθηματικά όταν τα πηγαίνω καλύτερα από τους περισσότερους συμμαθητές μου. | 1 | 2 | 3 | 4 | 5 |
| 13. | Ο λόγος που κάνω τις εργασίες μου στα μαθηματικά είναι για να μην νομίσουν οι άλλοι ότι δεν είμαι έξυπνος/έξυπνη στα μαθηματικά. | 1 | 2 | 3 | 4 | 5 |
| 14. | Όταν δείχνω ενδιαφέρον για τους άλλους στα μαθηματικά, ξέρω καλύτερα το λόγο γιατί πρέπει να ασχολούμαι με αυτά. | 1 | 2 | 3 | 4 | 5 |
| 15. | Θέλω να δείχνω στους δασκάλους μου ότι είμαι καλύτερος/η από τους συμμαθητές μου στα μαθηματικά. | 1 | 2 | 3 | 4 | 5 |
| 16. | Ένας λόγος που αποφεύγω να συμμετέχω στο μάθημα των μαθηματικών στην τάξη μου είναι για να μην φαίνομαι άσχετος/άσχετη με τα μαθηματικά. | 1 | 2 | 3 | 4 | 5 |

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## ΜΕΡΟΣ Ε

**Διάβασε προσεκτικά τις πιο κάτω δηλώσεις και βάλε σε κύκλο τον αριθμό που αποδίδει καλύτερα την πραγματικότητα όπως την καταλαβαίνεις εσύ.**

**1 = Διαφωνώ απόλυτα, 2 = Διαφωνώ, 3 = Ούτε διαφωνώ, ούτε συμφωνώ,**

**4 = Συμφωνώ, 5= Συμφωνώ απόλυτα**

| | | | | | | |
|---|---|---|---|---|---|---|
| 1. | Ο δάσκαλος των μαθηματικών μας ενθαρρύνει να προσπαθούμε να λύνουμε τις ασκήσεις μας μόνοι μας πριν να ζητήσουμε τη βοήθειά του. | 1 | 2 | 3 | 4 | 5 |
| 2. | Στην τάξη μας, μερικοί μαθητές προσπαθούν να είναι οι πρώτοι που θα απαντήσουν στις ερωτήσεις του δασκάλου στα μαθηματικά. | 1 | 2 | 3 | 4 | 5 |
| 3. | Κατά τη διδασκαλία των μαθηματικών στην τάξη μας, εργαζόμαστε σε μικρές ομάδες. | 1 | 2 | 3 | 4 | 5 |
| 4. | Μερικοί συμμαθητές μου προσπαθούν να είναι οι πρώτοι που θα τελειώσουν τις ασκήσεις τους στα μαθηματικά. | 1 | 2 | 3 | 4 | 5 |
| 5. | Όταν έχουμε μαθηματικά, ο δάσκαλος μας ενθαρρύνει να εκφράζουμε τα συναισθήματά μας σχετικά με τα μαθηματικά. | 1 | 2 | 3 | 4 | 5 |
| 6. | Όταν ο δάσκαλος μας επιστρέφει τα διαγωνίσματά μας στα μαθηματικά δείχνουμε στους συμμαθητές μας τους βαθμούς μας. | 1 | 2 | 3 | 4 | 5 |
| 7. | Κατά τη διδασκαλία των μαθηματικών στην τάξη μας μπορούμε να συζητούμε με τους συμμαθητές μας σχετικά με τα μαθηματικά. | 1 | 2 | 3 | 4 | 5 |
| 8. | Ο δάσκαλος των μαθηματικών ενδιαφέρεται να ξέρει τι θα θέλαμε να μάθουμε στα μαθηματικά. | 1 | 2 | 3 | 4 | 5 |
| 9. | Στην τάξη μου, όλοι ξέρουν ποιος είναι καλός στα μαθηματικά και ποιος δεν είναι καλός. | 1 | 2 | 3 | 4 | 5 |
| 10. | Στην τάξη μας, βοηθούμε ο ένας τον άλλο στα μαθηματικά. | 1 | 2 | 3 | 4 | 5 |
| 11. | Στην τάξη μας, μερικοί συμμαθητές μου κοροϊδεύουν τα παιδιά που απαντούν λανθασμένα στις ερωτήσεις του δασκάλου στα μαθηματικά. | 1 | 2 | 3 | 4 | 5 |
| 12. | Ο δάσκαλος των μαθηματικών είναι δίκαιος στους βαθμούς που μας βάζει. | 1 | 2 | 3 | 4 | 5 |

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|---|---|---|---|---|---|---|
| 13. | Στην τάξη μας, μπορούμε να εργαζόμαστε σε ασκήσεις που εμείς σκεφτόμαστε στα μαθηματικά. | 1 | 2 | 3 | 4 | 5 |
| 14. | Ο δάσκαλος των μαθηματικών είναι φιλικός μαζί μας. | 1 | 2 | 3 | 4 | 5 |
| 15. | Ο δάσκαλος των μαθηματικών ενδιαφέρεται για τα συναισθήματά μας σχετικά με τα μαθηματικά. | 1 | 2 | 3 | 4 | 5 |
| 16. | Στην τάξη μας, διαλέγουμε από μόνοι μας με ποιους συμμαθητές μας θα συνεργαστούμε στις ομαδικές εργασίες των μαθηματικών. | 1 | 2 | 3 | 4 | 5 |

**ΜΕΡΟΣ ΣΤ**

**Διάβασε προσεκτικά τις πιο κάτω δηλώσεις και βάλε σε κύκλο τον αριθμό που αποδίδει καλύτερα <u>την προτίμησή σου για το περιβάλλον της τάξης σου στα μαθηματικά.</u>**

**1 = Διαφωνώ απόλυτα, 2 = Διαφωνώ, 3 = Ούτε διαφωνώ, ούτε συμφωνώ,**

**4 = Συμφωνώ, 5= Συμφωνώ απόλυτα**

| | | | | | | |
|---|---|---|---|---|---|---|
| 1. | Κατά τη διδασκαλία των μαθηματικών στην τάξη μας, θα προτιμούσα ο δάσκαλος να συζητά με κάθε μαθητή σχετικά με τα μαθηματικά. | 1 | 2 | 3 | 4 | 5 |
| 2. | Κατά τη διδασκαλία των μαθηματικών στην τάξη μας, θα προτιμούσα ο δάσκαλος να αποφασίζει που θα καθίσουν οι μαθητές. | 1 | 2 | 3 | 4 | 5 |
| 3. | Στην τάξη μας, θα προτιμούσα οι μαθητές να βρίσκουν τις απαντήσεις στις ασκήσεις στα μαθηματικά από τα βιβλία τους παρά κάνοντας διερευνήσεις (ανακαλύψεις). | 1 | 2 | 3 | 4 | 5 |
| 4. | Κατά τη διδασκαλία των μαθηματικών στην τάξη μας, θα προτιμούσα κάποιοι μαθητές να κάνουν διαφορετικές ασκήσεις από τους άλλους μαθητές. | 1 | 2 | 3 | 4 | 5 |
| 5. | Κατά τη διδασκαλία των μαθηματικών στην τάξη μας, θα προτιμούσα ο δάσκαλος να ενδιαφέρεται για κάθε μαθητή. | 1 | 2 | 3 | 4 | 5 |
| 6. | Στην τάξη μας, θα προτιμούσα οι μαθητές να επιλέγουν με ποιο συμμαθητή τους θα συνεργαστούν στα μαθηματικά. | 1 | 2 | 3 | 4 | 5 |
| 7. | Κατά τη διδασκαλία των μαθηματικών στην τάξη μας, θα προτιμούσα όλοι οι μαθητές να κάνουν τις ίδιες ασκήσεις την ίδια χρονική στιγμή. | 1 | 2 | 3 | 4 | 5 |

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|---|---|---|---|---|---|---|
| 8. | Στην τάξη μας, θα προτιμούσα ο δάσκαλος των μαθηματικών να μην είναι καθόλου φιλικός με τους μαθητές. | 1 | 2 | 3 | 4 | 5 |
| 9. | Κατά τη διδασκαλία των μαθηματικών στην τάξη μας, θα προτιμούσα ο δάσκαλος να λέει στους μαθητές πώς να συμπεριφέρονται. | 1 | 2 | 3 | 4 | 5 |
| 10. | Στην τάξη μας, θα προτιμούσα οι μαθητές να κάνουν διερευνήσεις (ανακαλύψεις) στα μαθηματικά για να απαντήσουν προβλήματα των συμμαθητών τους. | 1 | 2 | 3 | 4 | 5 |
| 11. | Κατά τη διδασκαλία των μαθηματικών στην τάξη μας, θα προτιμούσα κάποιοι μαθητές να χρησιμοποιούν διαφορετικά βιβλία και υλικά από άλλους (π.χ. κύβους, υπολογιστικές…). | 1 | 2 | 3 | 4 | 5 |
| 12. | Στην τάξη μας, θα προτιμούσα οι μαθητές να εξηγούν το νόημα σχημάτων και γραφικών παραστάσεων στα μαθηματικά. | 1 | 2 | 3 | 4 | 5 |

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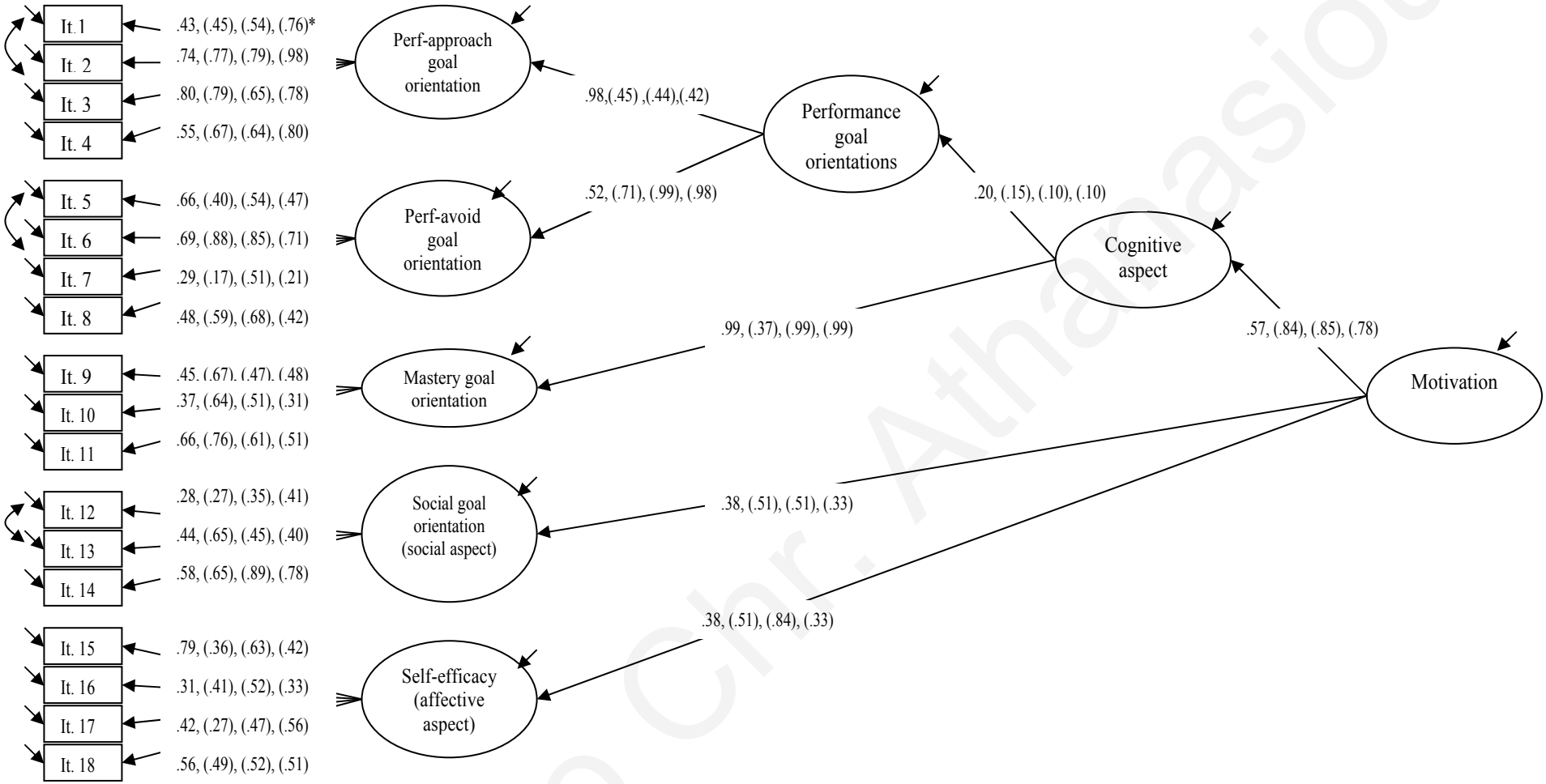


* The first number indicates the $r^2$ for Wave 1 and the numbers in the parentheses the $r^2$ for Waves 2, 3 and 4 respectively.

*Figure B.1*. Motivational model for students in CT



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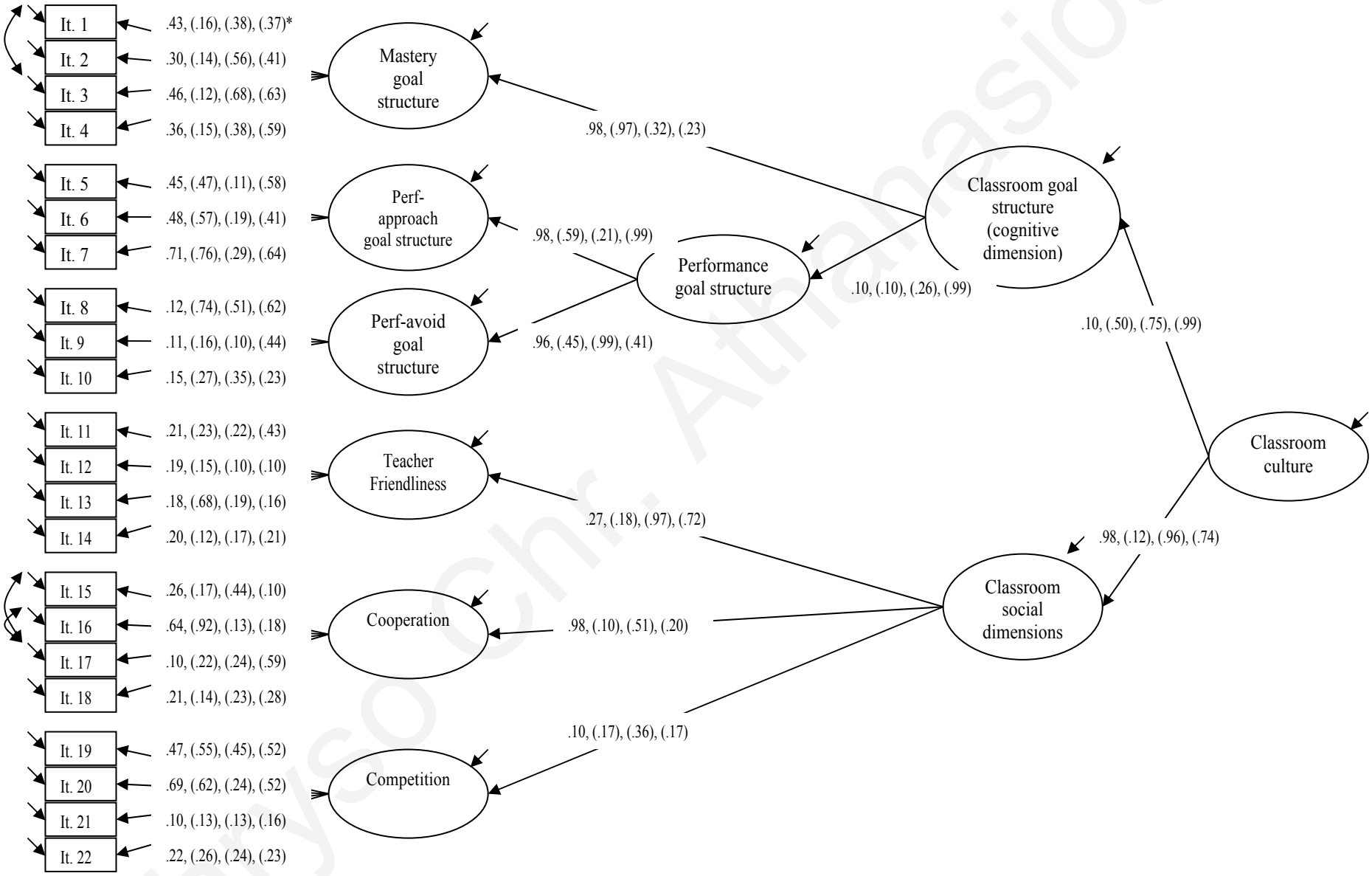


* The first number indicates the r² for Wave 1 and the numbers in the parentheses the r² for Waves 2, 3 and 4 respectively.

*Figure B.2*. Classroom Culture Model for Students in CT



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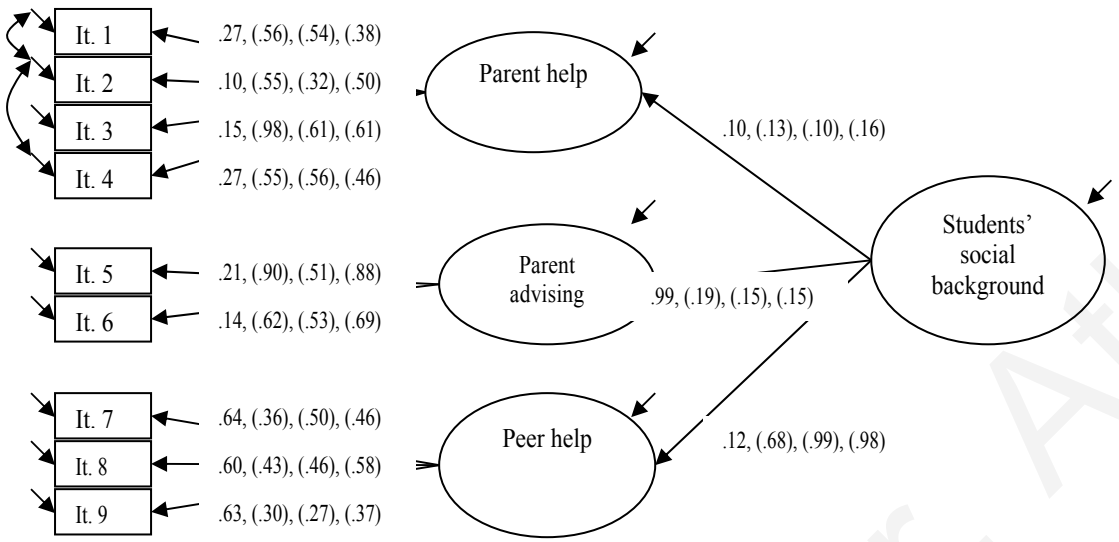


* The first number indicates the $r^2$ for Wave 1 and the numbers in the parentheses the $r^2$ for Waves 2, 3 and 4 respectively.

*Figure B.3*. Social background model for students in CT.

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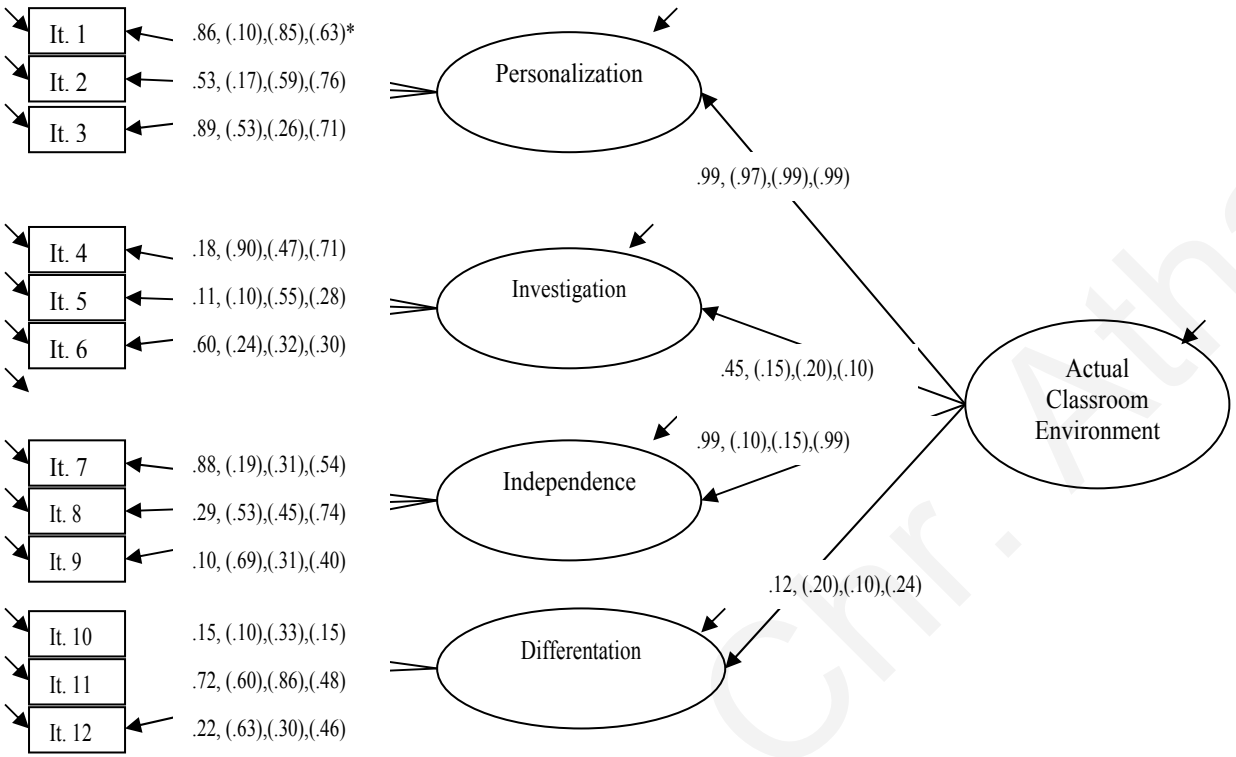


* The first number indicates the $r^2$ for Wave 1 and the numbers in the parentheses the $r^2$ for Waves 2, 3 and 4 respectively.

*Figure B.4*. Actual Classroom Environment Model.

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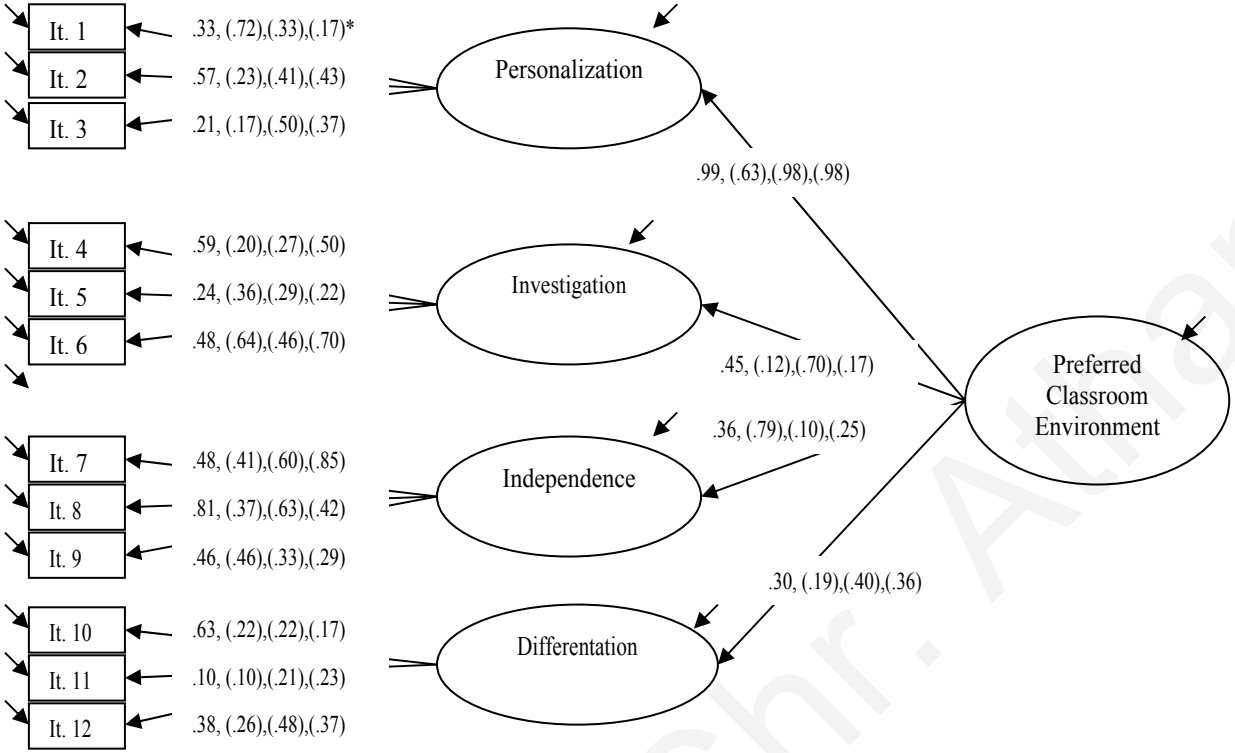


**The first number indicates the r² for Wave 1 and the numbers in the parentheses the r² for Waves 2, 3 and 4 respectively.*

*Figure B.5*. Preferred Classroom Environment Model.

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