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ABSTRACT

The present thesis focused on the development and the role of task motivation and task
values at different phases of students' school career, i.e., from kindergarten to the
transition to secondary education. This thesis had three aims: first, to examine the
developmental dynamics between task motivation, academic performance and self-
concept of ability in mathematics and reading in a longitudinal study lasting from
Grade 1 to Grade 7 of comprehensive school. The second aim was to examine the
developmental dynamics between math- and literacy-related task motivation and
arithmetical and literacy performance before the formal school career has started, that
is, in kindergarten. In addition, developmental change in math- and literacy-related
task motivation during the kindergarten year was examined. The third aim was to
investigate what kinds of patterns of task-values adolescents show at the end of the last
grade of comprehensive school and whether these patterns predict their educational
and occupational expectations and school track. Three different datasets were used.
The first data set reported here is part of the Jyväskylä Entrance into Primary School
study. For this thesis 216 students at baseline were followed from the first to seventh
grade of comprehensive school. The second dataset reported here is part of The First
Steps pilot study, where 139 children were examined twice during their kindergarten
year. The third dataset is part of the FinEdu study. For this thesis 614 students were
examined twice during their final term of comprehensive school and for the third time
1 year after the first measurement. The results of the thesis suggest that math-related
task motivation predicts subsequent math performance particularly in kindergarten,
and that task values play a role in adolescents' occupational aspirations and
educational expectations during the transition from comprehensive school to
secondary education. By contrast, during the comprehensive school years it seems to
be academic performance that contributes to later task motivation rather than vice
versa. The results for reading-related task motivation differed from the results
concerning math-related task motivation, suggesting that some essential differences
exist in the role of task motivation in different school subjects.

Keywords: task motivation, academic achievement, self-concept of ability, reading,
mathematics, educational expectation, occupational aspiration, kindergarten,
comprehensive school

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CONTENTS

1 INTRODUCTION

During the past three decades growing interest has been shown in motivation in educational settings. During this time motivation research has moved far away from the stimuli and reinforcement contingencies that were considered to be the most important factors in motivated behavior during the 1940s and 1950s (e.g. Skinner, 1953). Instead, research has concentrated on the active role of a learner and his or her cognitions and emotions in academic contexts.

Previous studies and theories have conceptualized motivation in educational settings in many different ways. There are theories that have approached motivation from the attribution point of view (Weiner, 1985, 1986), deployed a self-efficacy approach (Bandura, 1986), or concentrated on achievement strategies (Norem & Cantor, 1986; Nurmi, 1993), motivational orientations (Lehtinen, Vauras, Salonen, Olkinuora & Kinnunen, 1995; Lepola, Salonen, & Vauras, 2000), goals (Ames & Archer, 1988; Pintrich, 2000) or values (Eccles et al., 1983).

Although there is substantial diversity in motivational theories and constructs, they also share many ideas and results. Altogether, the different theories suggest, and many empirical studies have shown, that motivated students are interested in different academic activities, feel self-efficacious, invest effort in order to succeed, are persistent even when facing difficulties, and use adaptive strategies to learn (Murphy & Alexander, 2000; Zimmerman, 2000).

One widely used framework in this research field is the interest students show in different school subjects (e.g. Deci & Ryan 1985; Eccles et al., 1983; Ryan & Deci, 2000). In the present study we use the term task-motivation to describe this interest in academic subjects. Although many studies have been carried out on the development and role of this kind of task- or subject-specific motivation in educational settings, these studies have several limitations. First, most of the previous studies have been either cross-sectional or lasted only a relatively short period of time (for exceptions, see Fredricks & Eccles, 2002; Gottfried, Fleming, & Gottfried, 2001; Jacobs, Lanza, Osgood, Eccles, & Wigfield, 2002), and thus longitudinal studies over several school years are needed. Second, the vast majority of previous studies have concentrated on students in their middle school years or adolescents facing educational transitions. There-

fore, the development and the role of task-specific motivation among the youngest students, i.e. children who are in kindergarten or at the very first grades of comprehensive school, have been under-explored (for exceptions, see Aunola, Leskinen, & Nurmi, 2006; Gottfried, 1990; Nurmi & Aunola, 2005; Wigfield et al., 1997). Third, only a few studies have used person-oriented methods to examine task-specific motivation (Nurmi & Aunola, 2005).

Therefore, the aim of this thesis was three-fold: first, to examine the cross-lagged associations between academic performance, self-concept of ability, and task motivation in reading and mathematics from the first to seventh grade of comprehensive school. Second, the aim was to examine developmental change in task motivation in math and literacy and the cross-lagged associations between task motivation and academic performance among kindergarten students. Third, the aim of this thesis was to examine, from the person-oriented point of view, the role that task values play in the choice of adolescents' school track after comprehensive school, as well as their educational expectations and occupational aspirations.

1.1 Task motivation

During the last few decades many researchers have emphasized the important role that motivation plays in students' learning and academic performance (see e.g. Wigfield, Eccles, Schiefele, Roeser, & Davis-Kean, 2006). One widely used framework in the conceptualization of motivation in the school context is how interested students are in various school subjects and academic topics. Task motivation is a concept that refers to this kind of interest and liking that students show toward different academic activities (Aunola et al., 2006; Nurmi & Aunola, 2005). This concept closely resembles other concepts, such as interest (Schiefele, 1996), intrinsic motivation (Deci & Ryan, 1985; Deci, Vallerand, Pelletier, & Ryan, 1991; Gottfried, 1985, 1990; Harter, 1981) and task value (Eccles et al., 1983), which have variously been used to refer to students' academic interests.

1.1.1 Task value, intrinsic motivation and interest

Eccles and her colleagues (1983; Wigfield & Eccles, 1992, 2000) have engaged in extensive theoretical and empirical research on defining the different ways in which individuals can value activities such as school work. In their expectancy-value theory Eccles and her colleagues (Eccles et al., 1983; Wigfield & Eccles, 1992, 2000) defined task values in terms of how a certain task meets different needs of individuals. According to this theory, task values are cognitive-motivational constructs that predict academic behavior in many ways. The value aspect of academic motivation includes three components: attainment value (the importance of doing well in terms of self-schema, "It's important for me to succeed in this task"), utility value (the instrumentality of a goal for reaching other goals, "This topic is useful for me in my future education"), and intrinsic

or interest value (the enjoyment one gets from an activity, "I'm interested in this task"). In addition, there is also fourth dimension of the value aspect, cost. Cost is conceptualized in terms of all the negative consequences that engaging in a particular task might have (e.g. emotional costs, such as anxiety, or the amount of effort needed to succeed in a task).

Eccles et al. have developed their expectancy-value theory on the basis of other theories that share the idea of the importance of values, such as Atkinson's (1964) and Battle's (1966) work on achievement values, research on intrinsic and extrinsic motivation (Deci & Ryan, 1985), and on Rokeach's (1973) views about more general values.

Closely similar concepts are intrinsic motivation and interest, which refer to the inherent enjoyment of participating in certain task. When individuals are intrinsically motivated, they engage in activities for their own sake and out of interest in that particular activity, not because of its consequences. There are several theories focusing on these concepts (see e.g. Deci & Ryan, 1985; Harter, 1981; Hidi, 1990; Schiefele, 1991, 1996).

One theory, which includes the concept intrinsic motivation is the Self-determination theory (SDT) developed by Deci and Ryan (1985; Ryan & Deci, 2000). This theory focuses on human motivation and personality by highlighting the importance of humans' evolved inner resources for personality development and behavioral self-regulation (Ryan, Kuhl, & Deci, 1997). One of the main aims of the SDT has been to provide a more differentiated approach to motivation by asking what kind of motivation is being exhibited at any given time. By considering what moves a person to act, the SDT has identified several types of motivation, each of which has different consequences for learning and performance. The Self-determination theory makes a distinction between two main types of motivation, that is, intrinsic and extrinsic motivation. According to Deci and Ryan (1985), intrinsic motivation refers to doing an activity for its own sake, enjoyment, interest, and the inherent satisfaction of the activity itself. Extrinsic motivation, in contrast, reflects an activity or behavior undertaken for some instrumental value or external reason (Ryan & Deci, 2000).

Interest is one of the central features of intrinsic motivation: people will be intrinsically motivated only for activities that hold some kind of intrinsic interest or value for them (Deci & Ryan, 1985; Ryan & Deci, 2000; Schiefele, 1991). Theories that focus on interest as a key concept (e.g. Hidi & Baird, 1988;) define interest as a motivational variable that refers to the psychological state of engaging with situations or tasks (Hidi & Renninger, 2006). These theories make a distinction between individual and situational interest (see e.g. Hidi, 1990; Krapp, 2002; Krapp, Hidi, & Renninger, 1992; Schiefele, 2009). The concept of situational interest has its origins in the characteristics of a certain task or topic and so refers to the focused attention and the affective reaction that is triggered at a particular moment and that may not last over time (Hidi, 1990; Hidi & Baird, 1986). Individual interest, in turn, can be seen as a relatively stable predisposition to reengage in particular situations and topics. It also can refer to the immediate psychological state when this predisposition has been activated

(Krapp & Fink, 1992). Both individual and situational interest have been found to have an effect on cognitive functioning and learning (Hidi, 1990). The results of these studies have shown that situational interest influences cognitive performance, such as reading comprehension (Hidi, 1990; Hidi & Baird, 1988). Individual interest, in turn, has been found to have a positive impact on levels of learning (Renninger, Ewen, & Lasher, 2002), for example.

Besides concepts that refer to liking or enjoying a specific task, two other sets of concepts have also been used in motivation research. The first of these has focused on the kinds of schemata individuals have constructed in earlier learning situations, and how these are reflected in their achievement-related expectancies (Eccles, 1983; Wigfield & Eccles, 2000), mastery beliefs (Diener & Dweck, 1978), and goal orientations (Dweck & Leggett, 1988; Pintrich, 2000). Most studies have focused on this aspect of learning motivation (Brophy, 1999). Students who expect success and believe in their abilities to do well in different domains are challenge-seeking and persistent even in the face of obstacles, and tend to perform well in different learning situations (Dweck & Leggett, 1988; Murphy & Alexander, 2000; Zimmerman, 2000). Low ability beliefs, perceived task difficulty, and expectations of failure, in turn, have been associated with more negative motivational and performance outcomes. Another set of concepts refers to the kinds of cognitive and behavioral tools individuals construct to deal with learning tasks. These tools have been described by various concepts, such as task-focused and task-avoidant achievement strategies (e.g., self-handicapping and learned helplessness) (Diener & Dweck, 1978; Jones & Berglas, 1978; Onatsu-Arvilommi & Nurmi, 2000), motivational orientations (Lehtinen et al., 1995; Lepola et al., 2000) and coping (Aspinwall & Taylor, 1992). In general, these concepts see learning motivation as consisting of three consecutive stages (Onatsu-Arvilommi & Nurmi, 2000; Wigfield & Eccles, 2000). Beliefs and expectancies about what will happen provide a basis for an individual's motivation which is then reflected in the amount of effort and the kinds of strategies he or she deploys in a particular learning task.

In this thesis the term task motivation is used to refer to students' interest in and enjoyment of a certain school subject, i.e., mathematics, literacy etc. It includes both younger students' motivation and older students' task values. Although task motivation, particularly among younger students can be seen as intrinsic motivation as well, the theory of task values, proposed by Eccles et al. (1983), offers a broader perspective on the different ways in which students can value different academic activities than do the theories of interest and intrinsic motivation, even though among younger students the different dimensions of task values (i.e. interest value, attainment value and utility value) are not distinguishable (Eccles, Wigfield, Harold, & Blumenfield, 1993). Therefore, the task motivation and task value concepts examined in the present thesis are based on the theory of Eccles et al.

1.1.2   The development of task motivation

Previous research has shown that task motivation undergoes important changes during childhood and adolescence. The development of task motivation starts already at the very beginning of the school career, and thus both mean level changes (Gottfried et al, 2001; Jacobs et al., 2002; Wigfield et al., 1997) and the emergence of individual differences (Eccles et al., 1993; Nurmi & Aunola, 2005; Wigfield et al., 1997) can be seen in task motivation already during the first school years.

Overall, previous research has shown that students value academic tasks less as they get older. For example, students' task value and motivation in reading and mathematics are relatively high at the beginning of school career, but decline during the elementary school years (Gottfried et al., 2001; Jacobs et al., 2002; Wigfield et al., 1997). However, differences in these mean level changes have been observed in different school subjects. For example, Wigfield et al. (1997) found that students' interests decrease only towards reading, not towards math during the elementary school years. However, in a study examining students from the 5th to 12th grade carried out by Eccles et al. (1983), the results showed that task motivation for math decreased with age, while students' valuing of English increased with age.

The results concerning individual differences in task motivation, in turn, have shown that task motivation begins to get differentiated across the various school subjects relatively early on in the school career (Eccles et al., 1993; Nurmi & Aunola, 2005; Wigfield et al., 1997). Such inter-individual differences in motivation also become increasingly stable during the first school years (Aunola et al., 2006; Gottfried et al., 2001). Nurmi and Aunola (2005), for example, found that in the beginning of primary school students formed four different groups in relation to task motivation: those who were high in school motivation, those who were low in reading motivation, those who were low in math motivation and those who were high in math motivation. The results showed further, that membership in a particular group was relatively stable across the first two school years.

Previous research has also shown some gender differences in task motivation. In general, girls have been found to value languages more than boys, while boys value mathematics and sciences more than girls (Eccles, Barber, & Jozefowicz, 1998; Eccles, O'Neill, & Wigfield, 2005).

1.2   Task motivation and academic performance

Many researchers have suggested that task motivation contributes to learning and achievement. It has been emphasized that interest in a particular task supports cognitive engagement with learning and that motivated students put more effort into school tasks in order to succeed and show higher levels of per-

sistence even when faced with difficulties, which in turn is manifested in as better performance (Murphy & Alexander, 2000; Zimmerman, 2000).

However, students' motivation plays a role not only in overall academic achievement but also in the development of more specific skills, such as reading (Baker & Wigfield, 1999) and mathematics (Gottfried, 1990). Both reading and mathematics are basic academic skills that students are expected to acquire in the early school years. These skills are especially important since they form the basis for later academic achievement. Clear differences have been found between Finnish children in the pre-skills of reading and math (Aunola et al., 2006; Lerkkanen, Rasku-Puttonen, Aunola, & Nurmi, 2004). In addition, the development of reading skill is a different process than the development of mathematical skills.

Performance in mathematics involves many components, such as number knowledge, memory for arithmetical operations, conceptual understanding, reasoning, and procedural knowledge (Christou & Papageorgiou, 2007; Dowker, 1998; Rittle-Johnson & Siegler, 1998). Learning mathematical skills progresses in a hierarchical manner: learning basic skills is a necessary foundation for mastering more complex skills and procedures (Entwisle & Alexander, 1990). Mathematical performance has also been found to develop in a cumulative way, with substantial inter-individual stability and increasing individual variation over the early school years in these skills (Aunola, Leskinen, Lerkkanen, & Nurmi, 2004).

The *simple view of reading* (Gough & Tunmer, 1986; Tunmer & Hoover, 1992), in turn, defines reading ability as a function of decoding and comprehension skills, but in the early phases of learning to read, reading accuracy (decoding) and reading comprehension are difficult to separate. After children become more fluent readers, reading comprehension emerges more clearly as a closely related but separate skill from basic word reading skill (e.g., Catts, Hogan, & Fey, 2003; Nation, 2005; Storch & Whitehurst, 2002). It has been that, although reading skills also show stability, like math skills, in both English and Finnish languages individual differences in basic reading skills decrease during the first school years (Parrila, Aunola, Leskinen, Nurmi, & Kirby, 2005).

A large body of research has investigated the role of task motivation in the development of academic skills. Previous research has shown, for example, that motivation in reading is related to good reading performance and that it predicts subsequent teacher-rated reading performance and improvement in reading skills among first graders as well as among older elementary school students (e.g., Ecalle, Magnan, & Gibert, 2006; Gottfried, 1990; Wigfield, 1997). Motivation has also been reported to contribute to reading activity, and to the amount and breadth of reading among 4th-, 5th- and 6th-graders (Baker & Wigfield, 1999; Wigfield & Guthrie, 1997) which, in turn, is likely to promote students' reading performance (Anderson, Wilson, & Fielding, 1984; Cipielewski & Stanovich, 1992). Similarly, motivation has been found to play an important role in the development of arithmetic skills (Gottfried, 1990). For example, students' task motivation in mathematics and high motivation towards math predict

good performance in mathematics later on during the first school years (Aunola et al., 2006; Gottfried, Fleming, & Gottfried, 1994). It has been suggested that because mathematics is often perceived to be more difficult and to demand more effort than many other school subjects (Eccles, Adler, & Meece, 1984; Grouws & Lembke, 1996; Stodolsky, Salk, & Glaessner, 1991), it necessitates a strong degree of intrinsic motivation (Gottfried, 1990).

However, there are good reasons to assume that previous academic achievement may also contribute to task motivation. For example, Eccles et al.'s model (1983) suggests that academic experiences and related feedback provide the basis for students' later task values: students who are performing well in a certain subject receive more positive feedback on their performance, which then leads to higher interest and enjoyment of the subject. Other studies have examined the role of learning outcomes as the antecedents of the development of task motivation. For example, Gottfried (1990) found that primary school students' good performance in mathematics predicted their subsequent task motivation in math, while a similar result was also found concerning reading. In addition, there are also results that have suggested the existence of reciprocal relationships between motivation and skill development (Aunola et al., 2006).

Overall, the results on the causal relationships between task motivation and academic performance have been somewhat contradictory. Some studies have found that task motivation predicts subsequent academic performance (Gottfried et al., 1994), whereas others have shown that it is rather previous achievement that predicts motivation (Deci et al., 1991; Gottfried, 1990; Köller, Baumert, & Schnabel, 2001). Other studies have found that the relationships between motivation and skill development are, in fact, reciprocal (Aunola et al., 2006).

However, examination of the cross-lagged relations between task motivation and academic performance over several years has been neglected. The present thesis purposes to broaden the earlier research by studying these relationships over seven years of comprehensive school (Study 1). In addition, no previous studies have been conducted among children who have not yet started their formal education. One aim of this thesis, therefore, was to examine these relationships also among kindergarten students (Study 2).

1.3 Task motivation and self-concept of ability

In addition to task motivation, students' beliefs about their abilities and competencies, as well as their expectations for success have been suggested to be an important factor behind achievement-related behaviours (Eccles et al., 1983). It has been suggested that how people behave can often be better predicted by the beliefs they hold about their skills and capabilities than by their actual capabilities (Schunk & Pajares, 2005).

A large amount of research has been carried out on self beliefs and expectations. However, students' perceptions of their own competence have been

conceptualized in many ways. Some researchers have made a distinction between self-concept of ability and more general self-esteem by emphasizing the evaluative nature of self-esteem in contrast to the more descriptive nature of self-concept (Shavelson, Hubner, & Stanton, 1976). Harter (1983), in turn, defines self-perceptions of competence as students' self-evaluative judgements about their ability to accomplish certain tasks. In addition, Dermitzaki and Efklides (2000) emphasize different aspects of these judgements: according to them self-concept of ability includes both cognitive and affective, but also functional aspects. The expectancy-value model of Eccles and colleagues (Eccles et al., 1983; Wigfield & Eccles, 1992, 2000) contains two theoretically distinct but empirically not separate concepts, that is, expectancies and ability beliefs, both of which refer to students' beliefs about their competence to perform in given and impending tasks. It has also been suggested that self-concept is a hierarchical construct: general self-perceptions can be divided into more discrete self-perceptions, such as academic and social, emotional or physical, for example (Schunk & Pajares, 2005; Shavelson et al., 1976). On the basis of those, academic self perceptions can further be divided into subject-specific or even narrower task-specific self-concepts of abilities (Marsh & Shavelson, 1985; see also Schunk & Pajares, 2005).

Although a large number of different expectancy and competence constructs have been defined, the different theories seem to share the same basic idea about the role of these beliefs and expectancies in educational settings: students who believe they are able and that they can and will do well are much more likely to be motivated than students who don't believe in their abilities and expect to fail in a certain task (Bandura, 1997; Eccles et al., 1998, Pintrich & Schunk, 2002). In fact, many studies have examined the associations between task motivation and self-concept of ability and have found that task motivation and self-concept of ability are positively correlated (Deci & Ryan, 1985; Eccles & Wigfield, 1995; Gottfried, 1990; Harter; 1981), and that this positive association strengthens with age (Fredricks & Eccles, 2002; Jacobs et al., 2002; Wigfield et al., 1997). However, the results of the few existing longitudinal studies have been somewhat contradictory. First, it has been found that decreases in competence beliefs account for a decline in task values from Grade 1 to Grade 12 (Jacobs et al., 2002). Second, evidence for the reciprocity of the relations between math-related task motivation and self-concept of ability has been found among 7th graders (Marsh, Trautwein, Lüdtke, Köller, & Baumert, 2005). However, in several studies hardly observable or no relationships at all across time have been found between task motivation and self-concept of ability (Skaalvik & Valas, 1999; Spinath & Spinath, 2005; Spinath and Steinmayr, 2008). Consequently, the association between task motivation and self concept is far from clear.

In the present thesis (Study 1) the cross-lagged associations between math- and reading-related task motivation and related self-concept of ability were examined among comprehensive school students. The students were followed from Grade 1 to Grade 7. In addition, the role of self-concept of ability as a mediator between academic performance and task motivation was examined.

1.4 Task motivation and educational outcomes during the later school years

Many previous studies have examined how task-values relate to academic decision making. The results have shown that task-values are strongly associated with both students' intentions and actual choices of academic activities, especially during the later school years (Eccles et al., 1983; Eccles et al., 2005; Meece, Wigfield, & Eccles, 1990; Wigfield & Eccles, 2000). Students' task values are also likely to predict their future educational decisions (Eccles et al., 1983; Eccles, 2005). It has been shown, for example, that task-values predict course plans and actual course enrollment decisions as well as more extended educational plans (Eccles et al., 1998; Wigfield & Eccles, 2000). For instance, Eccles, Vida, and Barber (2004) found that having high academic task-values were strong predictors of students' plans to go to college. Subjective task-values have also been shown to be related to individual differences in occupational aspirations and career choices (Eccles, 1994, 2005; Eccles et al., 1998). Eccles et al. (1998), for example, found that girls who value subjects like math are likely to aspire to science and math careers, whereas girls who value people/society-oriented tasks are likely to aspire careers focusing on human services and health.

The majority of the previous studies on task-values, however, have deployed a variable-oriented approach and focused on examining the associations between certain task-motivation variables and some other variables. However, in recent years, an increasing number of researchers have emphasized the importance of studying individuals from a person-oriented or "holistic" approach (Bergman, Magnusson, & El Khouri, 2003). The key assumption behind this approach is that individuals should be conceptualized as a whole, that is, in terms of a unique constellation of various characteristics rather than their relative position in a distribution of certain individual variables. This person-oriented approach provides a complementary view to the variable-oriented framework, because it provides the option of studying individuals by identifying "naturally occurring" groups of individuals according to the patterns they show with respect to certain individual characteristics (e.g., task-value with respect to different school subjects) and examining the proportion of the sample that shows a particular pattern (Bergman et al., 2003). Only one previous study on task motivation has deployed this pattern-oriented approach (Nurmi & Aunola, 2005), and that study was done among young students starting their school career. No previous studies examining older students' task motivation have deployed a pattern-oriented approach.

In the present thesis, this kind of pattern-oriented approach outlined above was deployed in order to investigate what kinds of patterns of task-values concerning different school subjects adolescents show before the transition to secondary education (Study 3).

1.5   The Finnish school system

Finnish children start their education at kindergarten during the year of their sixth birthday. Kindergartens can be arranged either in schools or in day care centres. One year later, at age 7, they move to compulsory comprehensive school where they continue for the next 9 years. Comprehensive school divides into a lower level (grades 1-6) and an upper level (grades 7-9). Up to age 16, all Finnish adolescents have a similar basic education. After comprehensive school 55% of all adolescents enter senior secondary schools and 37% vocational schools, 2% stay on for a voluntary tenth grade, and 6% exit formal education (*School Statistics*, Central Statistical Office of Finland, 2003). High academic achievement in the ninth grade is required for admission to senior secondary school. Senior secondary school usually leads to either university or polytechnic education, whereas vocational schools lead to either entrance into working life or polytechnic education. Finnish girls graduate from senior secondary schools and enter universities more often than boys (*Education in Finland*, 1999; Nevala, 2000). Education in Finland is state-provided and tuition is free.

1.6   Aims of the empirical studies

The aim of this dissertation was to examine the role and development of task motivation and task values among students at different phases of their school career.

Study I examined developmental dynamics, that is, the cross-lagged associations, between task motivation, academic performance and self-concept of ability in mathematics and reading in a longitudinal study lasting from Grade 1 to Grade 7 of comprehensive school.

Study II examined developmental dynamics, that is, the cross-lagged associations between math- and literacy-related task motivation and arithmetical and literacy performance before the formal school career has yet started, that is, in kindergarten. In addition, developmental change in math- and literacy-related task motivation during the kindergarten year was examined.

Finally, Study III investigated what kinds of patterns of task-values adolescents show at the end of the last grade of comprehensive school. In addition, the study examined whether these patterns predict their educational and occupational expectations and post-comprehensive school track.

2   OVERVIEW OF THE ORIGINAL STUDIES

2.1   Method

The studies reported here are parts of the Jyväskylä Entrance into Primary School (JEPS) study (Nurmi & Aunola, 1999-2009), The First Steps Pilot study (Poikkeus & Lerkkanen, 2005), and The FinEdu study (Salmela-Aro, Niemivirta, & Nurmi, 2003). All these studies are longitudinal studies with the aim of examining students' academic motivation. In these studies the participants were Finnish students at different phases of their school career.

Next, each dataset and the measures used are briefly described. More detailed information including information on the reliability and validity of the scales are presented in the original articles.

2.1.1   Jyväskylä Entrance into Primary School study

Study 1 of the present thesis is part of the Jyväskylä Entrance into Primary School study (Nurmi & Aunola, 1999-2009). The original sample of the JEPS study consisted of all the children (N = 207: 111 boys, 96 girls; 5-6 years old at the baseline (in the beginning of kindergarten) of the study) from two medium-size districts in Central Finland who were born in 1993.

In Study 1 of the present thesis four measurement points were used: Grades 1, 2, 4 and 7 of comprehensive school. The sample size changed at each measurement point, either because the students participating in the study relocated, refused to continue participation in the study or did not participate in a specific measurement, or new students entered the examined classrooms. The sample size in Grade 1 was 216 (104 girls, 112 boys; 7-8 years old), in Grade 2 it was 224 (8-9 years old), in Grade 4, 228 (10-11 years old), and in Grade 7, 231 (13-14 years old).

At all the measurement points, the students were interviewed (Grades 1, 2 and 4) or asked to fill in a questionnaire (Grade 7) on their task motivation and self-concept of abilities in the spring term of the school year. Students' academic

performance was assessed by questionnaires filled in by the students' teachers in Grades 1, 2 and 4. In Grade 7, students' academic performance was measured by self-report of grades.

Information about students' task motivation in Grades 1, 2 and 4 was gathered by using the Task Value Scale for Children (TVS-C; Nurmi & Aunola, 1999; Nurmi & Aunola, 2005; originally Eccles et al., 1983). The scale consisted of 3 items measuring students' task motivation in reading tasks and 3 corresponding items in mathematical tasks. In Grade 7 task motivation was assessed with a questionnaire consisting of 2 items measuring reading-related task motivation and 2 items measuring math-related task motivation (Eccles et al., 1983).

Students' self-concept of ability in mathematics and reading was assessed in Grades 1, 2 and 4 by using the Self-Concept of Ability Scale (Nicholls, 1978; see also Aunola, Leskinen, Onatsu-Arvilommi, & Nurmi, 2002; Nurmi & Aunola, 2005). In the Grades 1 and 2 students were asked about their self-concept of ability in reading by one question and self-concept of ability concerning math by two questions. In Grade 4 self-concept of ability in both reading and math was assessed by one question. In Grade 7 students filled in a questionnaire consisting of 3 items concerning reading-related self-concept of ability and 3 items concerning math-related self-concept of ability.

Students' academic performance was assessed in Grades 1, 2 and 4 by asking the students' teachers to evaluate the students' level of performance in mathematics and reading. In Grade 7 students were asked to report their grades from the preceding term (i.e. from the preceding autumn) in mathematics and Finnish language.

2.1.2 The First Steps Pilot study

Study 2 of the present thesis is part of The First Steps Pilot study (Poikkeus & Lerkkanen, 2005). A total of 139 children (73 girls, 66 boys) aged 5-6 years (M = 76 months) from 13 kindergartens in one small semi-rural commune in Central Finland participated in the study. Six kindergartens were situated in day-care centres and seven in primary schools.

The children were examined twice, in the beginning of their kindergarten year (October) and in the end of their kindergarten year (April). At both time points, the children were tested on their academic performance (i.e., literacy and arithmetic performance), and interviewed on their task motivation.

Children's task motivation was assessed by using the Task Value Scale for Children (TVSC; Nurmi & Aunola, 1999; see also Aunola et al., 2006; Nurmi & Aunola, 2005). The scale consisted of 3 items measuring children's task motivation in mathematics and 3 corresponding items in literacy. Children's arithmetic performance, in turn, was assessed by 8 visual addition tasks from the BANUCA test battery (Räsänen, 2005). Finally, children's literacy performance was assessed by using two subtests, that is, a letter knowledge test including 29 items from the ARMI test material (Lerkkanen, Poikkeus, & Ketonen, 2006) at both measurement points and a phoneme identification test including 10 items from the ARMI test material (Lerkkanen et al., 2006) at the first measurement

point, and the Initial Phoneme Naming test (10 items) from the Diagnostic Tests 1 (Poskiparta, Niemi, & Lepola, 1994) at the second measurement point.

2.1.3   FinEdu study

In Study 3 data from the FinEdu study (Salmela-Aro, Niemivirta, & Nurmi, 2003-) were analyzed. At the beginning of the original study the participants were ninth-graders facing the transition to post-comprehensive schooling in one medium-sized town in central Finland (median age = 15, theoretical N = 773).

In Study 3 of the present thesis 614 (295 girls, 319 boys) students were examined twice during their final term of comprehensive school at the beginning and at the end of the spring term. The third measurement took place 1 year after the first measurement, in early spring of the first year of secondary education. The sample size at the second measurement was 513, and at the third measurement 544.

At the first measurement point the adolescents were group-administered a questionnaire on their task values, academic achievement, and fathers' SES. Participants' task values (Eccles et al., 1983) were assessed by asking their task values in five different school subjects (i.e. Finnish language, foreign languages, mathematics and science, social sciences, and practical and art subjects) with three items on each subject. Academic achievement was measured by asking the participants to report their GPA from the preceding spring term. Parental SES was assessed by asking adolescents to state their father's occupations; these were, then, recoded to form a ordinal scale.

At the second measurement point, the participants were group-administered questions concerning their educational expectations and occupational aspirations. Educational expectations were examined by asking the participants to state the highest level of education they expected to attain. Occupational aspirations were assessed by asking the adolescents to state their favorite future occupation, if they had one.

At the third measurement point, the participants were asked about their school track. They filled in a questionnaire asking what type of secondary education they were engaged in.

The methods of the three studies are summarized in Table 1.

TABLE 1   Overview of the studies

Study	Data, measurement points	Variables	Statistical methods
Study 1 The developmental dynamics between task motivation, self-concept of ability, and academic performance	JEPS • Grade 1 (N = 216) • Grade 2 (N = 224) • Grade 4 (N = 228) • Grade 7 (N = 231)	Task motivation mathematics Task motivation reading Self-concept of ability mathematics Self-concept of ability reading Teacher-rated performance mathematics Teacher-rated performance reading	Structural equation modeling
Study 2 Cross-lagged relations between task motivation and performance in arithmetic and literacy in kindergarten	The First Steps Study Pilot • Beginning of kindergarten (N = 139) • End of kindergarten • (N = 139)	Task motivation mathematics Task motivation literacy Arithmetic performance Literacy performance	Path modeling Latent change modeling
Study 3 The role of task-values in adolescents' educational tracks: A person-oriented approach	FinEdu • Grade 9, beginning of the spring term (N = 614) • Grade 9, end of spring term (N = 513) • One year after the first measurement (N = 544)	Task value mathematics and science Task value Finnish Task value foreign languages Task value social sciences Task value practical and art subjects Educational expectations Occupational aspirations School track Academic achievement Father's SES	Cluster analysis Cross-tabulation ANCOVA Multinominal regression analysis

2.2 Study 1: The developmental dynamics between task motiva-tion, self-concept of ability, and academic performance

The study investigated the cross-lagged relationships between students' task motivation, self-concept of ability, and teacher-evaluated performance in mathematics and reading from Grade 1 to Grade 7 of comprehensive school. Three research questions were set 1) Does students' teacher-rated academic performance in mathematics and reading predict their self-concept of ability and task motivation, and does the self-concept of ability mediate the impact of academic performance on motivation? 2) Does students' self-concept of ability predict their subsequent academic performance? 3) Does students' task motivation predict their subsequent academic performance?

The results of the SEM -modeling showed, first, that both reading and math teacher-evaluated academic performance predicted students' subsequent self-concept of ability. In the case of mathematics, the better math performance was at each measurement point, the more positive was self-concept of ability at the next measurement point. In the case of reading the same was true from Grade 1 to Grade 2. Some evidence was also found that teacher-evaluated academic performance predicts subsequent task motivation: math performance in Grade 2 predicted task motivation in Grade 4 and reading performance in Grade 2 predicted task motivation in Grade 7: the better the student's performance evaluated by teacher, the higher was his / her task motivation later on. In addition, the results showed that self-concept of ability mediated the impact of academic performance on task motivation in two cases: in the case of mathematics from academic performance at Grade 2 to task motivation at Grade 7 via self-concept of ability at Grade 4, and in the case of reading from academic performance at Grade 1 to task motivation at Grade 4 via self-concept of ability at Grade 2.

Second, the results showed no evidence for the assumption that self-concept of ability would predict subsequent academic performance evaluated by teacher.

Third, no evidence was found for the assumption that task motivation would predict subsequent teacher-evaluated academic performance in either math or reading.

Overall, the results of the study suggest that during comprehensive school it is, in particular, teacher's evaluation of students' academic performance in mathematics and reading that contributes to their later ability beliefs, and through these, also to their task motivation rather than vice versa.

2.3 Study 2: Cross-lagged relations between task motivation and performance in arithmetic and literacy in kindergarten

This study investigated, first, the cross-lagged relationships between task motivation in mathematics and literacy, and performance in these two areas and, second, the changes and the associations between these changes in math-related and literacy-related task motivation among children in kindergarten. A total of 139 children aged 5 to 6 years were examined twice during their kindergarten year. The cross-lagged relationships were analysed by using path modelling and the changes and the associations between these changes were analysed by using multivariate latent change modelling.

The results showed, first, that in the case of mathematics, children's task motivation and performance showed a cross-lagged relationship: the higher the math-related task motivation children reported in the beginning of the kindergarten year the higher the level of their arithmetic performance at the end of the same year. Moreover, the higher the level of children's arithmetic performance, the more the interest in mathematics the children reported later on. However, in the case of literacy, task motivation and performance did not show a similar pattern of relations.

The results showed further that children's math-related task motivation during the kindergarten year was not stable in terms of individual differences whereas literacy-related task motivation showed some stability, although the stability was relatively low. On the mean level, however, literacy-related task motivation showed some increase whereas math-related task motivation did not. In addition, the results showed that math-related and literacy-related task motivation were highly related: the higher the children's math-related task motivation was, the higher was their literacy-related task motivation. Furthermore, the greater the increase in the children's math-related task motivation during the kindergarten year, the greater also was the increase in their literacy-related task motivation.

Overall, the results of the study showed that already during the kindergarten year math-related task motivation and arithmetic performance showed cross-lagged relations indicating that the basis for cumulative patterns of skill development and task motivation may start to develop before the start of formal instruction.

2.4 Study 3: The role of task-values in adolescents' educational tracks: A person-oriented approach

The study examined what kinds of patterns of task-values adolescents show, and whether these patterns predict their educational and occupational expecta-

tions and school track after controlling for gender, grade point average (GPA), and parental SES.

Six hundred and fourteen adolescents were examined twice before their transition to secondary education and once thereafter. Clustering-by-cases analysis was used in analyzing the data, and six different groups were identified: (1) those who placed a high value on all school subjects (''Multi-motivated''), (2) those who did not value any of the subjects (''Low-motivated''), (3) those who valued Finnish and social sciences (''Social sciences and mother-tongue-motivated''), (4) those who especially valued practical and art subjects but also foreign languages (''Practical skills and language-motivated''), (5) those who valued only practical and art subjects (''Practical skills-motivated''), and (6) those who especially valued mathematics and science (''Math and science-motivated'').

The results showed further that the patterns of task-values also predicted adolescents' occupational aspirations: The adolescents in the ''Multi-motivated'', the ''Math and science-motivated'' and the ''Social sciences and mother-tongue-motivated'' groups had higher occupational aspirations than those who valued practical skills only or who placed a low value on all the school subjects.

Next, the results showed that the patterns of task values also predicted adolescents' educational expectations: girls who were motivated toward all the measured school subjects and girls in the ''Math and science-motivated'' group had higher educational expectations than either those who did not value any of these subjects and or those in the ''Social sciences and mother tongue-motivated'' group. However, task-value grouping did not predict boys' educational expectations.

Finally, the results showed that the patterns of adolescents' task values also predicted their subsequent school track. The adolescents in the ''Low-motivated'' the ''Practical skills and language-motivated'' and the ''Practical skills-motivated'' groups aimed typically at a vocational track, whereas adolescents in the ''Multi-motivated'' and the ''Math and science-motivated'' groups aimed typically at an academic track. However, after controlling for GPA, the patterns of task values no longer predicted subsequent school track.

3   GENERAL DISCUSSION

This thesis focused on the development of task motivation and task values at different phases of students' school career, and the kinds of consequences it has for educational outcomes. The antecedents and consequences of task motivation were investigated by examining the cross-lagged associations, first, between task motivation, teacher-rated academic performance and self-concept of ability among comprehensive school students, and, second, between task motivation and performance before formal education in kindergarten. Also developmental changes in task motivation in reading and mathematics during the kindergarten year were investigated. In addition, the patterns of task values and the role of task values as a predictor of school track and educational and occupational aspirations were examined.

The results of the thesis suggest that the role of math-related task motivation is particularly important in the very beginning of the school career, that is, in kindergarten, and that task values play a role in the transition from comprehensive school to secondary education. By contrast, during the comprehensive school years it seems to be academic performance that contributes to later task motivation rather than vice versa. The results for reading-related task motivation were somewhat different than the results for math-related task motivation suggesting that there are some essential differences in the role played by task motivation in different school subjects.

3.1   Antecedents of task motivation

One aim of the present thesis was to investigate the possible antecedents of task motivation during the comprehensive school years, on the one hand, and before formal school career has started, that is, during kindergarten year, on the other hand. The results suggest that students' academic performance measured either by skill tests (Study 2) or by teacher-evaluation (Study 1) as well as students' own concepts of their abilities (Study 1) predict later task motivation.

3.1.1 Academic performance

The results of the present thesis suggest that students' academic performance plays an important role as a predictor of their later task motivation. First, the results (Study 1) showed that during comprehensive school students' teacher-rated academic performance predicted their later task motivation both in mathematics and in reading: the better the student's performance in mathematics in Grade 2 the higher was his / her math-related task motivation in Grade 4, and the higher was the student's reading performance in Grade 2 the higher also was his / her task motivation in Grade 7. Second, the results (Study 2) expand previous findings on the antecedents of task motivation by showing that the level of children's academic performance in mathematics, but not in reading, predicts their later task motivation even before they have started their formal school career.

The finding that when students' level of performance in certain subject, especially in mathematics, is higher, they report more liking for this subject is in accordance with the findings of many other studies carried out among students at different phases of their school career (Aunola et al., 2006; Deci et al., 1991; Gottfried, 1990). There are at least three possible explanations for these findings. First, it might be that when students have a high level of skills in a certain school subject, that particular subject is considered to be easy, and therefore it is also easy to like this subject. This might especially be true of younger students, who may not yet be cognitively able to discern in greater detail their reasons for liking different things. It is also possible that positive feedback after a good performance leads to increase in their liking for a subject (Deci et al., 1991). Yet another explanation might be that when students' skill level is high enough in relation to the demands of a particular subject, they are more likely to have experiences of success than failure, which might then lead to greater enjoyment in doing tasks in this subject. Repeated experience of failure, in turn, may incline students to withdraw from these negative situations. It is possible that students then try to compensate for their lower levels of performance in certain subjects by showing less task motivation towards those subjects and by becoming more motivated towards some other subject in which they think they have higher skills (Nurmi & Aunola, 2005). In future, this possibility should be studied in more detail.

A possible explanation for the result that it is specifically in mathematics that level of performance predicts later task motivation is that learning mathematics progresses so that more complex mathematical skills are always based on previously learned skills and procedures (Entwisle & Alexander, 1990). This means that not only do skills in mathematics develop cumulatively but experiences of success or failure are also cumulative in nature: students who learn the basic skills well have better basis for learning more complex skills, whereas students who have difficulties in acquiring the basic skills will also have those same difficulties later on. It is possible that it is already at the very beginning of the school career that positive experiences of mathematics begin to accumulate

for some students while negative experiences accumulate for others, and this may play a big role in the development of students' liking for mathematical tasks and mathematics as a school subject. Therefore, the very first school years may be critical in the initiation, development and sustaining of interest in mathematical tasks.

In contrast, there are at least two possible explanations for the result suggesting that, in case of reading, academic performance plays only small role as an antecedent of task motivation. First, the nature of the Finnish language makes it relatively easy for children to learn to read, and the large majority of them achieve an accurate and fluent word reading skill before the end of the first school year (Aunola, Nurmi, Niemi, Lerkkanen, & Rasku-Puttonen, 2002; Seymour, Aro, & Erskine, 2003). Thus, also those students who start school with a lower level of skills have experiences of success during the first school year. It may be that it is statistically difficult to find predictive associations between performance and task motivation in reading, since the level of task motivation is already relatively high during the first school years, and the majority of children achieve relatively good reading skills during a relatively short period of time. Another explanation could be that only some components of more advanced performance, such as text comprehension skills or reading fluency, might predict task motivation, and these skills were not investigated in the present thesis.

Overall, the results suggesting that the role of academic performance in predicting task motivation differs between mathematics and reading confirms the earlier suggestions that task motivation should be studied subject-specifically (e.g., Wigfield & Eccles, 1992; Wigfield, Eccles, Mac Iver, Reuman, & Midgley, 1991). These results are also in line with those of another Finnish study (Nurmi & Aunola, 2005) showing that task motivation and performance are related in mathematics, but not in reading. In addition, the present results add in an important way to the earlier research, which mostly has studied students during their middle school years, by showing that the level of academic performance, especially in mathematics, predicts task motivation already during the very first school years, even before formal education has started.

3.1.2 Self-concept of ability

The present thesis also examined the role of students' self-concept of ability in the development of task motivation both in reading and in mathematics (Study 1). Some evidence was found for a mediator effect of self-concept of ability: self-concept of ability mediated the impact of teacher-rated academic performance on task motivation. In reading this effect was found from performance at Grade 1 via self-concept of ability at Grade 2 to task motivation at Grade 4, whereas in mathematics the same was true from performance at Grade 2 via self-concept of ability at Grade 4 to task motivation at Grade 7. These results may be due to the fact that during the comprehensive school years students receive a growing amount of feedback on their performance and skill development. As students get older they become better able to integrate this feedback with the beliefs that

they have about their skills, strengths and weaknesses (Wigfield & Eccles, 2000; Stipek & Mac Iver, 1989). These beliefs can further affect students' liking of certain tasks and subjects. It can be assumed that it is easier to enjoy and like a task when you know that you are able to manage that task.

One reason for the result that in reading the effect from academic performance to task motivation via self-concept of ability is evident earlier (from Grade 1 to Grade 7 via Grade 4) than it is in mathematics (from Grade 2 to Grade 7 Grade via Grade 4) may again be due to the nature of the Finnish language. Because the majority of students learn to read accurately and fluently before the end of the first school year, experiences of success and failure and feedback on those experiences during the first year may provide an important basis for children's subsequent self-concept of ability. In mathematics, in turn, new skills based on earlier ones are progressively learned. Consequently, the role of performance in related self-concept becomes evident only later on when the basics of mathematics have already been learned. Moreover, in Finland learning to read can be seen as the most important goal during the first grade. Thus, it is possible that students receive more feedback and information about the level of their skills in reading than in other subjects. The result that, in the case of mathematics, performance predicted subsequent self-concept also later on may reflect the fact that mathematics becomes a more central goal during the next grades as reading skill has already been acquired.

These results are in accordance with the theory proposed by Eccles and her colleagues which suggests that earlier academic experiences and related feedback provide the basis for the development of students' self-concept of ability which further influences their subjective task values (Eccles et al., 1983, Eccles et al., 1998). It has also been shown empirically that self-concept of ability and task motivation are positively associated (Deci & Ryan, 1985; Eccles & Wigfield, 1995; Gottfried, 1990; Harter; 1981), and that this association strengthens with age (Fredricks & Eccles, 2002; Jacobs et al., 2002; Wigfield et al., 1997). However, no former studies have examined this mediator effect by applying both sophisticated statistical methods, such as structural equation modeling, and a longitudinal setting of several years duration. Therefore, the present results add importantly to the earlier literature by showing that this mediator effect can be found empirically in a longitudinal study running over several years.

In addition to mediator effects, the results showed that in reading self-concept of ability in Grade 4 predicted task motivation in Grade 7. Again, this result is in accordance with those of earlier studies suggesting that students who feel that they are competent in a certain subject have higher interest in and derive greater enjoyment from tasks related to this subject (Deci et al., 1991; Eccles et al., 1983; Eccles et al., 1998).

3.2 Task motivation and task values as a predictor of academic outcomes

One major aim of the present thesis was to investigate the role of task motivation as a predictor of different academic outcomes, that is, academic performance during kindergarten and comprehensive school, and school track, educational expectations and occupational aspirations when students are facing the transition to secondary education. The results of this thesis suggest, in general, that the role of task motivation may be different at different phases of the school career.

3.2.1 In the beginning of school career

The results of the present thesis showed that at the very beginning of the school career students' task motivation plays a role as a predictor of academic performance. In Study 2, children's higher math-related task motivation in the beginning of kindergarten year predicted their better arithmetical performance at the end of the kindergarten year. It may be that when a child who has not yet started his / her formal school career enjoys playing with numbers and likes counting-related tasks, this leads to informal practice of basic mathematical skills, which is then manifested in better arithmetical performance. Another explanation is that children who like mathematics-related tasks consciously practise those tasks more, because although there are no strict demands for skill development during the kindergarten year, the children are offered mathematical materials and they also are encouraged to do tasks related to mathematics, such as writing numbers and practising the understanding of different amounts.

In fact, the results of the present thesis suggest that task motivation and performance in mathematics may develop cumulatively from the beginning of school career, since arithmetical performance in the beginning of the kindergarten year also predicted higher task motivation at the end of that year. Therefore, it could be that students who like mathematics develop better mathematical skills than students who do not have a high task motivation towards math, and this further leads to higher task motivation. This result is in accordance with other Finnish results suggesting that math-related task motivation and performance form a cumulative cycle during the transition to primary school (Aunola et al., 2006). The result of the thesis adds to this earlier finding in an important way by suggesting that such a cumulative development starts even before formal education starts.

In the present thesis task motivation, however, was found to predict later performance only in mathematics, not in reading. This result is not consistent with some earlier studies showing that reading is related to good reading performance (e.g., Wigfield, 1997), and that it predicts subsequent teacher-rated reading performance (Gottfried, 1990) and improvement in reading skills (Ecalle et al., 2006). However, this result is similar to another Finnish result

showing no association between reading-related task motivation and reading performance (Nurmi & Aunola, 2005). There are at least four possible explanations for this result. First, it may be that since there are specific features of the Finnish language that make it easy to learn to read, task motivation starts to play a role only during the later school years when more advanced reading skills (e.g. text comprehension) are taught. Second, it might be that task motivation has an effect on other components of basic literacy skills than phonological awareness and letter knowledge, which were used in this thesis to measure literacy skills. For example, at this stage when not all children can yet decode and read fluently, higher task motivation might lead to more intensive practice of reading skills, which is then reflected in better reading fluency or accuracy, for example. Third possible explanation for this result is that task motivation may play a different role among children whose skills are very good or very poor compared to those whose skills are close to the average level of literacy performance. In future this possibility should be studied in larger samples by dividing students into smaller groups according to their performance level and by examining the relations between task motivation and performance within and between those groups. Finally, it is possible that more than two measurement points during the kindergarten year would have been needed to capture the important phases of learning to read, which, as already stated, is a relatively rapid process in the Finnish language.

3.2.2 During comprehensive school

In the present thesis no evidence was found for the assumption that task motivation would predict later academic performance during the comprehensive school years (Study 1). This result is in accordance with the cross-lagged study by Marsh et al. (2005), in which interest did not predict later achievement if self-concept of ability was included in the analyses. However, this result differs from the results of some other previous studies suggesting that high task motivation predicts better skill development and academic performance (Aunola et al., 2006; Gottfried, 1990; Köller et al., 2001; Nurmi & Aunola, 2005). There are several possible explanations for this result. First, the measurement points were separated by relatively long intervals. It is possible that in order to capture the developmental dynamics between task motivation and academic performance, the measurements should have been conducted at shorter intervals. This has usually been the case in previous studies. Second, in the present thesis academic performance in comprehensive school was measured by using teachers' evaluation of students' performance, not actual skill measures. Although teachers' evaluations have been shown to correlate highly with students' actual performance (Hecht & Greenfield, 2002), it is possible that other factors also affect teachers' evaluations of students' skills. Therefore, it is possible that teachers' evaluations do not purely measure students' performance. Third, it is possible, as suggested by Köller et al. (2001) and Wigfield and Eccles (1992, 2000), that the role of interests and task motivation may become more important in the later school years, when students have to make active decisions concerning the

future course of their education. Fourth, it is possible that during comprehensive school years some other motivational factors, such as achievement strategies, have a bigger impact on performance (Aunola, Nurmi et al., 2002; Aunola, Nurmi, Niemi, Lerkkanen, & Rasku-Puttonen, 2003; Onatsu-Arvilommi, Nurmi, & Aunola, 2002; Manolitsis, Georgiou, Stephenson, & Parrila, 2009) than subject-specific task-motivation, since they are more general motivational tendencies in nature than are liking or enjoyment. Finally, it is possible that the associations between task motivation and performance are not linear in nature. Therefore, it is possible that these associations could be found by deploying a person-oriented approach instead of variable-oriented approach.

3.2.3   During the transition to secondary education

In the present thesis, a person-oriented approach was applied to examine the relations between task values towards different school subjects at the end of comprehensive school (Study 3). Six different groups were identified on the basis of students' valuing of different subjects, that is, math and sciences, Finnish language, practical and art subjects, social sciences, and foreign languages. One group valued all the school subjects highly whereas another group gave a low value rating to each school subject. The third group placed a high value on, in particular, Finnish language and social sciences, and the fourth group valued, in particular, practical and art subjects, but also foreign languages. The fifth group also valued practical and art subjects, but placed very low value on the other subjects. Finally, in the sixth group, the adolescents valued mathematics and science and foreign languages.

The results of the present thesis initially showed that the patterns of the adolescents' task values predicted their subsequent school track. Adolescents belonging to the group that did not value any of the measured subjects and those in the two groups that valued practical and art subjects were over-represented among the students aiming at a vocational track. By contrast, the students who valued all the measured subjects, along with those who valued math and sciences, were over-represented among those who aimed at an academic track. These results would indicate that adolescents who place overall high values on different school subjects or value such academic subjects as math and science end up continuing their studies on an academic track, which usually leads to studies in universities or polytechnics. In turn, adolescents who are more oriented towards practical skills than towards academic skills, and those who do not value any school subject, are more likely to end up on a vocational track where the focus is on more practical studies and subjects.

However, after controlling for GPA, the patterns of task-values no longer predicted subsequent school track. It seems that although the task-value groups differed in their educational track, this was due to differences in their academic achievement. There are two possible reasons for this result. First, it may be that differences in school achievement in the earlier school years lead pupils to value different school subjects, which then contributes to their planning of their future educational trajectories. This is in line with the results of earlier studies,

suggesting that adolescents attach more value to subjects they think they are good at (Eccles et al., 1983; Eccles & Wigfield, 1995; Jacobs et al. 2002). Another possible reason for this result is that in Finland the selection of students into different schools in secondary education is mainly influenced by adolescents' academic achievement during comprehensive school.

The results of the present thesis showed further that, among adolescents, task-values contribute to their occupational aspirations (Study 3). The group that valued all the measured school subjects, the group that valued mathematics and sciences, and the group that valued social sciences and Finnish language had higher occupational aspirations than the adolescents in the groups that valued practical skills only or none of the measured subjects. These results suggest, unsurprisingly, that high motivation in academic subjects leads adolescents to seek occupations where their academic skills can be exploited. Furthermore, it can be assumed that students who do not value these subjects or value only practical and arts subjects aim at occupations where more practical skills are needed. It is also possible that when a student does not value any school subject, he or she aims at an occupation where no special skills or extra education are needed. These are usually blue-collar occupations. The present results are in accordance with some earlier studies showing that the valuing of certain tasks predicts occupational aspirations (Eccles et al., 1998). However, they add to the earlier literature in an important way by showing that it is the pattern of students' task values, rather than the valuing of one specific subject, that predict later occupational aspirations.

The results of the thesis showed also some evidence for the role of task values as a predictor of later educational expectations among girls. Girls who were motivated towards all the measured school subjects or towards mathematics and science had higher educational expectations than those who did not value any of these subjects or who belonged to the group that valued Finnish language and social sciences. One possible explanation for these results is that girls who value many subjects are in general more willing to study more, and therefore have higher educational expectations than students valuing fewer subjects. Another explanation is that in Finland careers where academic subjects, especially mathematics and science play an important role usually require higher education. It may be that girls who value a wide range of subjects or especially mathematics and science are well aware of the demands of the careers where these subjects play an important role and, therefore, place a high value on these subjects already at the end of comprehensive school. Yet another possibility is that girls who value their mother tongue or social sciences aim to study more practical and interpersonal subjects, which often can be studied at a lower level than university. These results are, overall, in accordance with some earlier studies suggesting that the subjects valued by girls also indicate girls' career aspirations (Eccles et al., 1998).

The results of the present study did not, however, support task-value group as a predictor of boys' educational expectations. One possible explanation for this result is that boys base their educational plans on other criteria than

task values, such as modeling themselves on or taking advices from important adults or future salary possibilities, for example. It is also possible that at the end of comprehensive school boys have not yet started planning their future education in detail. This result raises the question of whether task motivation and task values play a role as a predictor of academic outcomes at different times for boys compared to girls.

3.3   Development of task motivation

3.3.1   Development as interpersonal stability

The results of the present thesis suggest that during the kindergarten year (Study 2) children's math-related task motivation is not stable in terms of individual differences, but that stability in this domain increases during the later school years (Study 1). However, the stability of task motivation does not develop in a similar way in the case of reading: literacy-related task motivation showed some, although relatively low, stability during the kindergarten year (Study 2). The stability in reading-related task motivation increased during the first years of comprehensive school, but appeared to be statistically non-significant between Grades 4 and 7 (Study 1). Overall, these results are in accordance with the earlier literature suggesting that task motivation is not yet stable in the beginning of the school career, but that the stability increases during the first school years (Gottfried, 1990; Gottfried et al., 2001; Wigfield et al., 1997). These results may be due to the growing amount of systematic feedback on performance in different subjects (see, e.g., Stipek & Mac Iver, 1989). It may be that this feedback is then interpreted, and one's abilities, possibilities to succeed, and the work needed for good performance are evaluated, which then can lead to either liking or disliking certain academic subjects. However, the result showing that reading-related task motivation was not stable from Grade 4 to Grade 7 suggests that the nature of reading as a school subject changes during these years, and thus affects task motivation.

There are several possible explanations for the somewhat different results on the development of math-related task motivation and literacy- or reading-related task motivation. First, it may be that reading-related (Study 1) and literacy-related (Study 2) task motivation becomes stable, at least at some level, earlier than math-related task motivation, because learning to read is often considered to be the primary target of the beginning of the school career. Children may be more encouraged to play with letters and also to practice reading, which, therefore, may lead to more systematic feedback on performance in literacy- and reading-related tasks than in math-related tasks. This may then affect task motivation. It is also possible that the nature of reading and the Finnish language as a school subject leads to somewhat lower stabilities in reading-related task motivation compared to math-related task motivation. During the very first years teaching concentrates on the development of decoding skills,

and only after that moves on to the development of fluent reading skill and reading accuracy, which then is followed by more advanced skills, such as text comprehension and grammar. Since all these components of reading as a school subject can be considered very different from each other and not hierarchical skills in the same way as in mathematics, it may be that the different contents of this school subject lead to a continuous re-evaluation of liking or enjoying this subject. It may also be that task motivation should be measured separately for these different sub-areas of reading as a school subject in order to reveal its true stability.

3.3.2   Development as mean level change

The findings of the present thesis showed also that during the kindergarten year changes take place in the mean level of task motivation: the mean level of literacy-related task motivation increased (Study 2). It is possible that because learning to read is often considered to be the primary target of the beginning of the school career, children may be more clearly encouraged to play with letters and also to practise reading. This may then affect to task motivation in a positive way. However, the results for math-related task motivation were different: there was no statistically significant mean level change in task motivation to math (Study 2). One explanation for this difference between the results concerning literacy and mathematics could be that less emphasis is placed on learning mathematics in kindergarten. It is possible that children are more actively encouraged to do reading-related tasks and play letter-related games, and, therefore, a bigger opportunity is given for an increase of literacy-related motivation.

In addition, when examining the associations between the literacy-related and math-related task motivations the results showed (Study 2) that both were highly related during the kindergarten year: the higher math-related task motivation was, the higher also was literacy-related task motivation. The results showed, further, that the development of these task motivations was related: the greater increase in math-related task motivation during kindergarten year, the greater also the increase in literacy-related task motivation. This result suggests that at the beginning of school children's academic motivation is in the nature of a more general interest in school overall, and not subject-specific (Harter, 1983; Jacobs et al., 2002). Similar results have been found earlier when deploying a person-oriented approach (Nurmi & Aunola, 2005). There are several possible explanations for these results. It may be that children who are just starting their school career are excited about all the new experiences that they face in educational settings in general. This is then seen as higher task motivation towards both reading and mathematics. It is also possible that before formal education starts, children are not yet able to distinguish well between different academic topics, and, therefore, report high task motivation towards both math and reading. Another explanation may be that younger students need a bigger amount of systematic instructions for tasks related to different subjects and continuous feedback on their performance in those tasks over a longer period of time before they can develop a deeper understanding of the different

nature of different academic subjects and the different demands and skills that are needed in different subjects.

3.3.3 Patterns of task values at the end of comprehensive school

In the present thesis, a person-oriented approach was used in order to examine the relations between task values towards different school subjects at the end of comprehensive school (Study 3). The results yielded that six different groups identified on the basis of students' valuing of different subjects. These results are in accordance with earlier studies suggesting that during the later school years task values are clearly distinguished from each other (Eccles et al., 1993; Wigfield et al., 1997). The results of the present thesis add to the earlier literature by suggesting that there are many kinds of possible constellations of task values that students may report. The present results give a somewhat different view of adolescents' task-values compared to many earlier variable-oriented studies where task-values have been found to become more negative as the school years proceed (Jacobs et al., 2002; Wigfield et al. 1997; Wigfield & Eccles, 2002). It is possible that the decline in the mean levels of different task-values across age found in previous studies is due to adolescents beginning to value one or a few subjects which at the mean level appears as a decrease in overall task-values.

Overall, these results add in an important way to the earlier research by suggesting that in addition to studying task motivation and task values towards different subjects one by one from the variable-oriented point of view, a more holistic perspective is valuable for understanding how students value different subjects in relation to each other. The key assumption behind this person-oriented approach is that individuals should be conceptualized as a whole, that is, in terms of a unique constellation of various characteristics rather than their relative position in a distribution of certain individual variables. This person-oriented approach provides a complementary view to the variable-oriented framework, as it provides the option of studying individuals by identifying "naturally occurring" groups of individuals according to the patterns they show with respect to certain individual characteristics (e.g., task-value with respect to different school subjects) and examining the proportion of the sample that shows a particular pattern (Bergman et al., 2003).

3.4 Gender differences

The results of the present thesis also showed some gender differences in children's task-motivation. In kindergarten (Study 2), the results showed that girls had higher literacy-related task motivation than boys, whereas in mathematics-related task motivation no gender differences were found. These results are in accordance with many earlier studies reporting similar kinds of gender differences at different phases of the school career (Eccles et al., 1993; Jacobs et al.,

2002; Wigfield et al., 1997). It may be that girls show higher task motivation toward literacy because girls may be more encouraged than boys to play with letters before they start their school career (Tracey & Young, 2002). It is also possible that contents of many literacy materials, such as poems, stories and books targeted at children who are in the beginning of their school career, are more interesting to girls than boys, which may be one reason for this gender difference.

The results of the present thesis showed also some gender differences in the task value grouping conducted among students who were facing the transition to secondary school (Study 3). Girls were overrepresented in the group that placed high value on all the measured school subjects and in the group that ascribed a high value to practical and art subjects as well as foreign languages. Boys, in contrast, were overrepresented in the group that placed a low value on all the measured subjects, in the group that valued mathematics and science, and in the group that valued only practical and art skills and clearly devalued all the other subjects. There are many possible explanations for these results. First, the results concerning the groups that valued either all or none of the measured subjects may be due to the fact that girls typically perform better at school overall (Dwyer & Johnson, 1997; Pomerantz, Altermatt, & Saxon, 2002). Second, one possible reason for the result showing that boys were overrepresented in the group that valued mathematics and science is that even today stereotypical thoughts continue to exist about special areas for boys and girls, respectively, in school and also during later working life. In addition, earlier research has shown that boys have higher beliefs about their competencies in math- and science-related topics (Eccles et al., 1993; Marsh, Craven, & Debus, 1991), which may further have an effect on their valuing of these subjects (Eccles et al., 1983). Finally, it may be that boys were over-represented in the group which valued practical skills but clearly devalued all the other, more academic subjects because in this thesis practical skills included sports and handicraft. The over-representation of girls in the group that ascribed a high value to practical subjects as well as foreign languages may be explained in line with the findings from many other studies showing that girls tend to place a higher value than boys on languages (Eccles et al., 1998). Overall, the results of Study 3 are similar to those of Eccles et al. (1998) and Eccles et al. (2005).

4   PRACTICAL IMPLICATIONS

The results of the present thesis have also some practical implications. For teachers and other practitioners, the results highlight the importance of focusing on motivational factors in addition to skill development. There are at least two reasons for this. First, task motivation and task values seem to play a role, particularly during the transition to preschool and to secondary education. The results suggest that the level of task motivation during the very first year of the school career, that is, the kindergarten year, forms an important basis for skill development in mathematics. Since in mathematics skill development has been found to progress in a cumulative manner (Aunola et al., 2004) and task motivation to show substantial inter-individual stability over the early school years, it would be important to better understand the role of task motivation in math and promote children's interest in this subject even before entry into formal education. It would be especially important, already during the kindergarten year, to identify children who do not see math as very interesting and try to find ways to promote their task motivation. The results also suggest that during the later school years, that is, during the transition from comprehensive school to secondary education, task-values concerning various school subjects have important consequences for later educational aspirations and plans. This means that such interests, in addition to students' abilities and strengths, should be taken seriously in any discussions with students concerning their educational wishes and plans. It is also possible that adolescents are not fully aware of the role that their interests and values play in their decision making. Therefore, these values should be actively brought up to discussion. It is also important, if we want to help adolescents to find suitable career options, to offer accurate information about what educational programs and occupations really are and what subject areas are emphasized in them. In addition, educational choices are often made between two or more positive options or between options that have both positive and negative components (Eccles, 2005). Therefore support from teachers and other important adults in the decision making process may be essentially important.

Second, the results showing that academic performance evaluated by teacher predicted students' later task motivation suggest that teachers may play a role as a promoter of students' task motivation. Teachers' evaluation of students' level of performance and their related feedback can affect students' own understanding of their skills, which, in turn, forms an important basis for their task motivation. It is, therefore, important to be aware that teachers' evaluations, judgements and attitudes concerning students and their performance are transferred to students in many ways that are not necessarily conscious, and that these evaluations may have an important effect on students' later interest and values concerning different subjects. Therefore, it would be important for teachers to find ways to provide each student with realistic and well-grounded, yet positive feedback.

5   LIMITATIONS

The findings of the present thesis are subject to several limitations. First, task motivation, although a widely used framework in motivation research, is only one way to conceptualize motivation in the school context. There are many other ways to conceptualize and examine academic motivation and motivated behavior in educational settings, such as achievement strategies (Norem & Cantor, 1986; Nurmi, 1993), motivational orientations (Lehtinen et al., 1995; Lepola et al., 2000) and goals (Ames & Archer, 1988; Pintrich, 2000). It is possible that the role of motivation may turn out to be different when other conceptualizations are used.

Second, the concept of task motivation is a relatively narrow way to conceptualize motivation and the measures of task motivation consist of only few items. Therefore, it is possible that there are some sources of biases that may affect to the answers that especially younger students give, such as social desirability. With broader measures it would be more difficult for participants to control for the way they give answers.

Third, the measures of task motivation varied at different phases of the school career which raises the question whether different measures really are comparable. However, in the present thesis students were examined from their very first school years to the transition to secondary education. During these years many developmental processes are taking place, such as maturation, and therefore it is not possible to use the same measures for children who are 6 year-olds and teenagers aged 16.

Fourth, in Studies 1 and 2 only the interest part of task value from the model by Eccles et al. was used. In Study 3 all three different dimensions were used but the scale consisted of only one item for each dimension and factor analysis showed that they had to be summed to create a single indicator of task value. Therefore, it was not possible to examine the possible different roles that the different dimensions of task value may play in educational settings. It is possible that the results might have been different if different dimensions had been examined, since Eccles (2005), as well as Deci & Ryan (1985), have suggested that the relative importance of different aspects of a task for behavioral

choices may vary across developmental time, and, therefore the different dimensions of task values may play a different role at different times. It possible, for example, that the perceived utility of a certain school subject plays a bigger role as a predictor of academic achievement during the later elementary school years than interest in that subject.

Fifth, some of the constructs used in the present thesis were measured by only one or two items. In the case of these constructs, it is difficult to evaluate the reliability of the items composing them. However, in Study 1, where structural equation modelling was used, an effort was made to evaluate the reliability of these items by the means of SEM models. In Study 2 where path modelling was used, it was not possible to take measurement errors into account.

Sixth, the reliabilities of some of the task motivation (Study 2) and self-concept of ability (Study 1) variables were relatively low.

Seventh, classroom effects were not controlled for, for example by using multilevel models, in Studies 1 and 3 because of the small number of participating classrooms.

Finally, most of the measures of the present thesis were based on self-report measures. However, self-reports are not always the most valid and reliable method of data collection (Shaffer, 2002). Although it can be assumed that subjective experience is particularly important in the case of constructs like task motivation and self-concept of ability, it is possible that there are many sources of biases in self-reports, especially among young students who have just started their school career. For example, it is possible that children try to answer in a positive way in order to please the interviewer. There may also be gender differences in the ways of answering questionnaires. In addition, self-reports may not be the optimal method of measuring academic achievement.

6 FUTURE DIRECTIONS

The findings of the present dissertation also open up some new avenues for future research.

First, despite the research on the antecedents of task motivation that has been carried out (e.g. Aunola et al., 2006; Marsh et al., 2005; Deci et al., 1991; Gottfried, 1990), the origins of individual differences in interest and task motivation are still not well known. It has been suggested (Eccles, 2005) that the enjoyment of particular activities and topics are linked to certain core aspects of the self, such as temperament and motivational orientations, for example, as well as negative or positive emotional experiences associated with learning. Since the results of the present thesis showed that both inter- and individual differences in task motivation exist already at the very beginning of the school career, the origins of these differences should be examined at that point in children's life. What role do temperament and other more stable traits play in the development of children's task motivation? What are the roles of parents, of the attitudes they communicate to their children, or of activities parents and children participate in together?

Second, the results of the present study provide answers to the question of the role of task motivation in relation to academic performance on the mean level. However, less is known about whether this role is different among students with different levels of skills, needs, and classroom environments. For example, does task motivation play the same role for students who are overall performing well and who have trust in their abilities, and for students who have difficulties in learning and whose competence beliefs are low? Is more motivation needed in big classrooms than in smaller ones in order to achieve good learning outcomes? What is the role of task motivation among students in need of special education compared to students in normal education? There is an evident need for deeper understanding of the role and meaning of task motivation for different kinds of groups. Therefore, in future research it would be important to examine possible moderator variables which impact on the associations between motivation and academic skills, that is, whether the dynamics

between motivation and academic skill development are different among children with different individual characteristics.

Third, since the importance of studying individuals from a person-oriented or "holistic" approach (Bergman et al., 2003) has been emphasized during recent years, more person-oriented research on task motivation among students at different ages should be carried out in future.

Fourth, most motivational theories, although there are plenty of them, fail to give integrated information about the motivational factors behind students' behaviour in educational settings. In future more serious attempts should be made to examine the associations between different, relatively disconnected, theories and concepts. In expectancy-value theory of Eccles et al. (1983) many different concepts have been integrated. However, more holistic empirical research is needed in order to expand our knowledge of how different motivational factors function together.

Fifth, in the present thesis students' academic performance was measured both by tests (Study 2) and teachers' evaluations (Study 1). This raises the question of the role that teachers' judgements and evaluations of students' performance play in classroom environments. Therefore, more studies focusing on the role of teachers, including both test performance and teachers' evaluations of performance, should be carried out in future.

Finally, since the development of new skills and motivation can be assumed to happen relatively quickly, especially during the first school years, this development should be studied during shorter time periods. Therefore, to capture the process of learning and motivation, more intensive studies are needed, possibly even using day-to-day diary data.

7   CONCLUSION

The present thesis focused on the development and role of task motivation and task values at different phases of students' school career. The results showed, first, that during the comprehensive school years it seems to be academic performance in mathematics and reading that contributes to later math- and reading-related task motivation rather than vice versa. Some evidence was also found for the mediator effect of self-concept of ability.

Second, the results showed that the role of math-related task motivation is particularly important at the very beginning of children's school career, that is, in kindergarten. During the kindergarten year math-related task motivation and arithmetic performance showed recursive cross-lagged associations so that the higher children's task motivation was in the beginning of kindergarten year, the higher their performance was at the end of that year and vice versa.

Third, the results suggest that the pattern of task values plays a role in the transition from comprehensive school to secondary education. The task value groupings predicted students' later occupational aspirations and educational expectations.

Finally, the results on reading-related task motivation were somewhat different from the results on math-related task motivation, suggesting that the role of task motivation differs between different school subjects.

TIIVISTELMÄ

Tämän väitöskirjatutkimuksen tavoitteena oli tutkia oppiainekohtaisen koulumotivaation kehitystä ja roolia koulutaipaleen eri vaiheissa. Väitöskirjalla oli kolme tavoitetta. Ensimmäinen tavoite oli tutkia oppiainekohtaisen motivaation, oppijaminäkuvan sekä koulutaitojen välistä kehitysdynamiikkaa matematiikassa ja lukemisessa peruskoulun ensimmäiseltä luokalta seitsemännelle luokalle. Toisena tavoitteena oli tarkastella oppiainekohtaisen motivaation ja taitojen välistä kehitysdynamiikkaa matematiikassa ja lukemisessa jo ennen formaalin koulunkäynnin aloitusta, eli esiopetusvuonna. Lisäksi tutkittiin matematiikkaan ja lukemiseen liittyvän oppiainekohtaisen motivaation kehityksellistä muutosta esiopetusvuoden aikana. Väitöskirjatutkimuksen kolmas tavoite oli tutkia henkilökeskeisestä lähestymistavasta käsin sitä, millaisia ryhmiä peruskouluaan päättävät nuoret muodostavat oppiainekohtaisen motivaationsa perusteella sekä sitä, ennustaako ryhmiin kuuluminen nuorten koulusiirtymää peruskoulusta toisen asteen koulutukseen sekä myöhempiä suunnitelmia koulutuksen ja ammatin suhteen.

Väitöskirjassa käytettiin kolmea eri tutkimusaineistoa. Ensimmäinen tutkimusaineisto oli osa Koulutaitojen ja motivaation kehitys –tutkimusta (Jyväskylä Entrance into Primary School). Tässä aineistossa (N = 216) peruskoulun oppilaita seurattiin ensimmäiseltä seitsemännelle luokalle haastatteluita ja kyselytutkimuslomakkeita käyttäen. Myös oppilaiden opettajat osallistuivat tutkimukseen kyselylomakkeita täyttäen. Toinen tutkimusaineisto oli peräisin Alkuportaat –tutkimuksen pilottiaineistosta (N = 139), jossa esikoululaisia tutkittiin kahdesti esiopetusvuoden aikana haastatteluin ja taitotestein. Kolmas osatutkimus (N = 614) oli osa FinEdu-tutkimusta, jossa peruskouluaan päättäviä yhdeksäsluokkalaisia tutkittiin kyselylomakkeiden avulla kahdesti yhdeksännen luokan kevätlukukauden aikana sekä yhden kerran vuoden kuluttua ensimmäisestä mittauksesta.

Tulosten perusteella voidaan todeta, että oppiainekohtaisella motivaatiolla näyttäisi olevan suurin rooli aivan koulutaipaleen alussa esiopetusvuoden aikana sekä toisen asteen koulusiirtymän aikana. Tulokset osoittivat, että esiopetusvuoden aikana matematiikkaan liittyvä oppiainekohtainen motivaatio oli vastavuoroisessa yhteydessä matematiikkaan liittyviin taitoihin. Siirryttäessä peruskoulusta toisen asteen koulutukseen oppiainekohtainen motivaatio ennusti nuorten koulutussuunnitelmia sekä ammattitoiveita. Sen sijaan peruskoulun aikana näyttäisi siltä, että oppilaan taitotaso ennustaa myöhempää oppiainekohtaista motivaatiota, mutta motivaatio ei ennusta myöhempää taitotasoa.

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