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Exploring perspectives for improving students' motivation in pre-vocational secondary education

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in pre-vocational secondary education**

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Exploring perspectives for improving students' motivation in pre-vocational secondary education

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Content

Chapter 1	General introduction	7
Chapter 2	Student-centred and teacher-centred learning environment in pre-vocational secondary education: Psychological needs and motivational engagement	25
Chapter 3	Multiple content goals in the classroom: A validation of the Goal Identification and Facilitation Inventory (GIFI)	51
Chapter 4	Goal salience in the classroom	78
Chapter 5	The self-regulation of motivation: Motivational strategies as mediators between motivational beliefs and engagement for learning	104
Chapter 6	Summary and general discussion	131
	References	162
	Summary in Dutch	185
	Dankwoord	192
	Curriculum vitae	193

Speak to me and don't speak softly,

Talk to me and let me know,

Grab hold of my shoulder and tell me,

Grab hold and do not let go,

Grab hold and do not let go.

From 'These Stones will shout' by The Raconteurs

Chapter 1

General Introduction

1.1 Introduction

It is well known that motivation plays an essential role in learning. Previous studies show that motivation involves the pleasure students experience when learning, the effort they put into learning, the commitment and persistence they show, the choices they make, and the levels of learning and results they achieve (Boekaerts & Corno, 2005; Deci & Ryan, 2000; Ryan & Deci, 2000a, 2000b; Sheldon, Ryan, Deci, & Kasser, 2004; Steinmayr & Spinath, 2009; Vansteenkiste et al., 2004; Wigfield & Cambria, 2010). Furthermore, the lack of motivation is an important predictor of dropping out of school (De Witte & Rogge, 2012). It is therefore worrying that students are not always motivated as a matter of course and that their motivation decreases during adolescence (Gottfried, Fleming, & Gottfried, 2001; Stroet, 2014; Van der Veen & Peetsma, 2009). These worries are shared by the Dutch Inspectorate of Education (2015), who recently expressed concerns about students' motivation in secondary education, and not for the first time. The necessity to motivate students is probably felt most strongly in pre-vocational secondary education and senior secondary vocational education and training. Here students' motivation is lower, and, although drop-out rates have decreased substantially over the past ten years, they are consistently higher in pre-vocational secondary education than in other forms of secondary education (Central Bureau Statistics, 2015; De Looze et al., 2014; OECD, 2011; Oostdam, Peetsma, Derriks, & Van Gelderen, 2006; Van der Veen & Peetsma, 2009). Students' motivation is therefore a recurring topic in the discourse on education (Commissie Dijsselbloem, 2008; OECD, 2013), in school policy, in the teachers' lounge, and, last but not least, in research.

There are several explanations for the lower level of motivation in pre-vocational secondary education. First, the reform of the Dutch educational system in 1998 entailed substantial changes to vocational education. The number of theoretical subjects increased, whilst the number of hours spent on practical learning decreased. This may disadvantage

students who are cognitively less talented, students who have less patience and poor concentration, or students who mainly want to learn and practice vocational skills. Second, the Ministry of Education determined that education in general should be more inclusive. Consequently, students with special needs, learning problems, or behavioural problems, who were previously referred to special education, are now mostly sent to pre-vocational secondary education. Lastly, or perhaps as a result, pre-vocational secondary education has been labelled the drain of the Dutch educational system (Keulen, 2005). It is important to note, especially with this label in mind that 1) pre-vocational secondary education is attended by approximately 60% of the Dutch school-going population; 2) the students in question, aged from 12 to 16 years old, attend pre-vocational secondary education for four years, and this is mandatory; 3) it is the gateway to further vocational education and the educational basis for a large part of our workforce. On a more personal level, these students include friends of my children, and children of friends of mine. Despite all the knowledge we have collected about motivation, we are still struggling with the question of how to motivate students for learning. The aim of this dissertation is to study how the motivation of students in pre-vocational secondary education can be enhanced. We focus on two feasible intervention points, namely 1) students' perception and appraisal of the quality of the learning environment, and 2) students' self-regulation of motivation. We embedded our studies in two theoretical frameworks: Self Determination Theory and the theory on Self-Regulated Learning.

Our focus on the learning environment as motivator is inspired by the reality of educational practice: The urge to increase students' motivation for learning has, especially in pre-vocational secondary education, led to learning environments being redesigned according to social constructivist principles, e.g., problem-based learning, new learning, transformational teaching, or student-centred learning environments (Boekaerts, De Koning,

& Vedder, 2006; Savery & Duffy, 2001; Simons, Van der Linden & Duffy, 2000; Slavich & Zimbardo, 2012). The actual contribution of these learning environments to students' motivation has been hotly debated in the Netherlands, both in the media and among researchers. The discussion was fueled by the sometimes fanatical attitude with which social constructivism was both embraced (see Commissie Dijsselbloem, 2008) *and* contested (Beter Onderwijs Nederland, 2006). Already in 1996, Cunningham and Duffy stated that the idea that students should construct their own knowledge "is being reverentially chanted throughout the halls of many a school/college/department of education these days" (p. 1), and according to Martens (2004), confidence in the so-called new learning even took on the characteristics of a religion. Indeed, empirical evidence for the effect of learning environments, traditional or new, on students' motivation is scarce (Gullikers, Bastiaens, & Martens, 2005; Martens, Bastiaens, & Kirschner, 2007), and the evidence we have is not always clear-cut (e.g. Stroet, Opdenakker, & Minnaert, 2016). We suspect that the complexity of learning environments and the many aspects that come into play are to blame for this lack of evidence and clarity. In search of a theory to explain differences between learning environments when it comes to their effect on motivation, we expect that the Basic Needs Theory, a sub theory of Self Determination Theory, may offer a suitable framework. According to the Basic Needs Theory, students' motivation can be enhanced and increased through the fulfilment of three basic psychological needs – the need for a feeling of autonomy, the need to feel competent, and the need to feel related to significant others (Deci & Ryan, 1985, 2000; Ryan & Deci, 2000a, 2000b). Considering the characteristics of traditional learning environments on the one hand, and learning environments based on social constructivist principles on the other, we expect that the latter are better suited to satisfy these three basic psychological needs. We will elaborate on the Basic Needs Theory and on the characteristics of the learning environments further on in this chapter.

However motivating the learning environment may be, the responsibility for students' motivation mainly lies with the school and the teacher. Therefore we also focus on students' ability to self-regulate their motivation, inspired by the wish to make students agents in their own learning process, enabling them to deal with all aspects that hinder learning or distract from learning themselves. Learning environments, for example, are not always of high quality and the relation with teachers is not always satisfactory. Furthermore, even if all conditions are optimal, not all courses and subjects align with students' personal interests, and distractions are numerous. Moreover, students bring to the classroom their own goals and beliefs, which may compete with learning goals and thus hamper the learning process (Boekaerts & Corno, 2005; Boekaerts & Niemivirta, 2000; Eccles & Wigfield, 2002; Fries, Schmid, Dietz, & Hofer, 2005; Hofer, Schmid, Fries, Zivkovic, Dietz, 2009; Lemos & Gonçalves, 2004). Indeed, the Education Council (2013) considers the lack of self-regulation one of the underlying reasons for students to drop out of school. The assumption is that regulation of one's motivation will help students to stand up to goals that compete with learning goals and overcome distractions; it enables students to focus on mastery goals, increase their effort and persistence, and experience more pleasure in schoolwork (Boekaerts, 1999a; Boekaerts, 2006b; Boekaerts & Corno, 2005; Boekaerts & Niemivirta, 2000; Wolters, 1998 1999; Zimmerman, 2000b). Although learning environments based on social constructivist principles are associated with self-regulated learning, students do not always report more self-regulation in these learning environments (Schuitema, Peetsma, & Van der Veen, 2012). We assume that the regulation of motivation often still lies with the teacher. Autonomy granted by teachers, for example, referred to as "students' perceived freedom of action" (De Brabander & Martens, 2014, p. 37), does increase students' motivation (Deci & Ryan, 1985; Stroet, 2014; Vedder-Weiss & Fortus, 2011), but does not guarantee that students will actively and purposefully control and self-regulate their motivation. Our

conclusion is that the regulation of motivation does not happen as a matter of course. Therefore, the question is: how can we stimulate students to “[...] self-regulate school activities and, without external pressure, to carry them out on their own?” (Ryan & Deci, 2000a, p. 60). We will elaborate on Self-Regulated Learning, more specifically the self-regulation of motivation, further on in this chapter.

The aim of this dissertation is to study the underlying premises of two feasible intervention points that help to enhance and increase the motivation of students in pre-vocational secondary education. In brief, the question is whether educators can motivate students by means of the learning environment, and whether students can regulate their own motivation for learning. In the remainder of this chapter we discuss the Basic Need Theory and how individuals’ basic psychological needs, as formulated in this theory, are related to the characteristics of learning environments. Next, we discuss self-regulation of motivation. Finally, we give an overview of the chapters of this dissertation.

1.2 Basic Needs Theory in relation to need fulfilment in the learning environment

Self Determination Theory states that human beings are inquisitive and curious by nature and can perform activities out of pure interest and pleasure, without the need for external consequences such as rewards, grades, or avoiding punishment. However, activities for school are rarely performed purely out of curiosity, or for the pleasure of it. Where children exhibit a broad interest and curiosity for everything and anything, during adolescence humans develop more specific interests, and what is offered at school does not automatically correspond with these interests. According to the Basic Needs Theory the satisfaction of basic psychological needs – the need for autonomy, competence, and relatedness – can motivate students to execute tasks that are not inherently motivating. The need for autonomy, first, refers to the need for self-determination, to have control, to be able to make choices, and to

be heard; students want to be agents in their own learning process. If controlled by rewards, grades, and deadlines, for example, they will display less motivation. The need for a sense of competence, second, concerns the idea that one can perform one's schoolwork successfully. It also addresses the need to be challenged; both schoolwork that is too easy and schoolwork that is too difficult frustrates the satisfaction of this need. Relatedness, finally, regards the need for connectedness with significant others, such as teachers. The fulfilment of these three basic psychological needs leads to increased motivation – visible in effort and persistence, pleasure in learning, and better achievements –, whereas the frustration of these needs leads to a decrease in motivation (Deci & Ryan, 1985, 2000; Ryan & Deci, 2000a, 2000b; Ryan & Patrick, 2001). From a perspective of the Basic Needs Theory, the characteristics of new learning environments seem to align more closely with the fulfilment of these three needs than do the characteristics of more traditional learning environments. We will describe the main characteristics of these two types of learning environments.

There is no single, comprehensive definition, but traditional forms of learning are described as knowledge-transmission models, in which knowledge is seen as objective, (Nie & Lau, 2010; Stroet, 2014); teachers transfer knowledge to students (Boekaerts, De Koning, & Vedder, 2006; De Corte, 2003), and students are expected to reproduce this knowledge in standard tests. Consequently, tasks are theoretical and decontextualized, without links to real-life situations. Students have a passive role, mainly listening to the teacher and subsequently practicing exercises, mostly individually. Teachers control the learning process, since they decide what is learned, in what way, and when. The teacher and the educational method, often a textbook, are the main sources of information (De Corte, 2003). In social constructivist views of learning, on the other hand, knowledge is seen as subjective, since it depends on the context and on the individual. The acquisition of knowledge is an active, constructive process: Students interpret new information and link it to prior knowledge

(Brown & Palinscar, 1989; Savery & Duffy, 2001). To facilitate this process, knowledge is presented in the form of problems and tasks, embedded in rich, authentic contexts (Oostdam, Peetsma, Derriks, & Van Gelderen, 2006). Learning is also a social process, as knowledge is co-constructed and distributed among learners through dialogues with the teacher, with parents and peers, and with oneself (Greeno, Collins & Resnick, 1996; Nie & Lau, 2010; Vygotsky, 1978). The teacher takes the role of coach, expert, and model. He or she facilitates and guides the learning process, provides help and cues where necessary, and withdraws from the learning process where possible (Vygotsky, 1978). Information is derived from a variety of sources besides the teacher and book, e.g., from peers, the library, ICT, and often the real world outside school (Oostdam, Peetsma, Derriks, & Van Gelderen, 2006). From the perspective of the Basic Needs Theory, the characteristics of new learning environments seem to align more closely with the fulfilment of the three basic psychological needs than do the characteristics of a more traditional learning environment. First, the need for autonomy is met by tasks that are problem-based, embedded in a realistic context, have no straight forward solutions, and require a certain amount of autonomy to execute and solve. Furthermore, students are provided with choices with regard to topics and working methods (Simons, Van der Linden, & Duffy, 2000). This gives them a chance to pursue their own goals and to choose tasks according to what they deem valuable and important (Boekaerts, De Koning & Vedder, 2006). Moreover, students are asked to plan their learning activities and act accordingly. Second, the need to feel competent is met by choice in subject and working methods, enabling students to choose according to their capabilities and interests. Furthermore, as knowledge is embedded in a realistic context, it becomes both comprehensible and challenging (Dochy, Segers, Van den Bossche, & Gijbels, 2003; Urdan & Turner, 2005). Third, the need for relatedness is satisfied by the cooperative forms of learning that are used in new learning environments. Also, the teacher, apart from being an

expert and a provider of feedback, has an important role as coach and guide (Savery & Duffy, 2001). We expect that if the learning environment facilitates the satisfaction of the three basic psychological needs, this will have a positive effect on students' motivation. In this thesis we compared need satisfaction in a student-centred learning environment designed according to social constructivist principles and in a more traditional, teacher-centred learning environment.

1.3 Self-Regulated Learning: the self-regulation of motivation

Self-Regulated Learning is defined as the activation and sustenance of motivation, cognition, behaviours, and affect, in order to attain one's goals (Zimmerman, 1986). It applies to various aspects of learning. Boekaerts (1999b) categorized these aspects in a three-layered model of self-regulation. The inner and middle layer concern the regulation of cognitive aspects of learning – that is, the learning content and the learning process – and involve the use of cognitive and meta-cognitive strategies respectively. The outer layer represents the regulation of the self, allowing researchers “to relate learning and achievement directly to the self, that is, to a person's goal structure, motivation, volition, and emotion” (Boekaerts, 1999b, p. 447). In this dissertation we study aspects of the outer layer, the regulation of the self, and more specifically, students' regulation of their motivation. We focus on the why of behaviour – that is, the goals students deem important and the motivational beliefs they hold, and the how of behaviour – that is, the motivational regulation strategies they use. The questions we aim to answer are: What are the goals students bring into the classroom and what goals are important to them? What motivational regulation strategies do students use when dealing with competing goals and distractions? And what is the role of motivational beliefs in the use of motivational regulation strategies? (Boekaerts, 1999b; Eccles & Wigfield, 2002; Pintrich, 1999; Schunk & Zimmerman, 2012; Zimmerman, 2000a).

The first aspect of self-regulation that we address in this dissertation are the goals students pursue. Goals are assigned an important role in motivation and in the self-regulation of motivation. The word ‘motive’ is synonymous with end, aim, purpose, or goal, which are thought to direct, energize, and regulate behaviour (Austin & Vancouver, 1996; Emmons, 1989; Ford & Ford, 1987; Klinger & Cox, 2004; Little, 1999). According to Ryan and Deci (2000a) “someone who is energized or activated toward an end is considered motivated.” (p. 54); goals give meaning to one’s life and actions. Therefore it is important to know what goals students pursue, and whether these goals are consistent with the goals educators consider important. In educational settings, the goals that have been studied are mainly learning goals and social goals. That in itself is not surprising, since education is about learning and normally takes place in a social context. Moreover, we know from research on Achievement Goal Theory and social goals that the pursuit of specific goals is positively related to important outcome variables (Dowson & McInerney, 2003, 2004; Hulleman, Schragar, Bodmann, & Harackiewicz, 2010; King, McInerney, & Watkins, 2010; Wentzel, 1994, 2000). However important as these lines of research are, it is assumed that students, like all humans, pursue a wide variety of personally significant goals (Emmons, 2003; Ford, 1992; Ford & Nichols, 1987; Kasser & Ryan, 2001; Little & Chambers, 2004); that these goals are taken into the classroom (e.g. Boekaerts, 2002a, 2009; Mansfield, 2012; Shah & Kruglanski, 2003; Volet & Mansfield, 2006); and that they can have an effect on learning, positive and negative. For example, drawing on the work of Husman and Lens (1999) on Future Time Perspective, Peetsma and colleagues found that striving for future goals that value school and career is positively related with students’ investment in learning (Peetsma & Van der Veen, 2011; Schuitema, Peetsma, & Van der Veen, 2014). Yet another line of research shows that students’ multiple goals are linked to the quality and effectiveness of cooperative learning (Hijzen, Boekaerts, & Vedder, 2006, 2007). Considering detrimental

effects of multiple content goals, with the Dual Processing Model Boekaerts and colleagues hypothesize that students balance between growth and mastery goals on the one hand and goals focused on well-being on the other hand. This influences how students spend their resources: a focus on well-being goals may come at the expense of the energy invested in learning goals. (Boekaerts, 2007; Boekaerts & Cascallar, 2006; Boekaerts & Corno, 2005; Boekaerts & Niemivirta, 2000). This is confirmed in a study by Serra de Lemos and Gonçalves (2004) in which students report that their goals can simply coexist or support each other, but can also compete. Following that line of research, Fries et al. (2005) show that most students have to cope with leisure goals that threaten their learning goals. As Boekaerts states: knowledge of students' multiple content goals "provides an indication of why students are prepared to do what they do and why they are or are not inclined to do what is expected of them" (Boekaerts, 1999b, p. 451). Apart from the results of a small number of studies, our knowledge of multiple content goals in educational settings is still limited.

The second aspect of the self-regulation of motivation that we focus on in this dissertation is the use of motivational regulation strategies. To act and to persevere students need executive motivation (Kuhl & Kraska, 1989), also called volitional control (Boekaerts, 1995). This concerns the actual action that is taken, and includes the use of motivational regulation strategies. These strategies facilitate students in realizing their intention to learn and protecting their learning goals. Using the strategies help students to start working on schoolwork and to persist in the event of distractions and other threats, thus increasing their motivation for learning (Boekaerts, 2006b; Boekaerts & Cascallar, 2006; Boekaerts & Corno, 2005; Corno, 1986, 1989; Pintrich, 2000b; Wolters, 1998, 1999, 2003; Zimmerman & Martinez-Pons, 1990). In order to study these strategies, Wolters (1998) made an inventory of the strategies that college students reported using. In a follow-up study, an exploratory factor analysis resulted in five theoretically meaningful strategies (Wolters, 1999). First, Interest

Enhancement (IE) concerns making a task more interesting and enjoyable by turning it into a game, or by making schoolwork valuable by relating it to daily life. Second, Environmental Control (EC) concerns changing or using aspects of the environment to make it easier to complete a task, or to avoid interruptions whilst working, e.g., keeping a tidy desk, or working at a productive time of the day. Third, motivation can be regulated by linking consequences to the effort that is put into learning: Self Consequating (SC). It includes self-reward and self-punishment. The fourth and fifth strategy concern Self-Talk: telling oneself to start working and persist in order to get good grades, or to outperform others (Performance Self-Talk, PST), and telling oneself to start working in order to get a grasp of the material (Mastery Self-Talk, MST). Previous studies show that these strategies affect students' motivational engagement (e.g. Schwinger, Steinmayr, & Spinath, 2009; Wolters, 1999), but it is assumed that the effect varies according to the nature of the strategy. Based on Organismic Integration Theory, a sub-theory within Self Determination Theory (Deci & Ryan, 2000; Ryan & Connell, 1989; Ryan & Deci, 2000a) Wolters (1998) and Reeve (2012) distinguish between strategies that represent a controlling form of motivation regulation, and strategies that represent an autonomous form of motivation regulation. Behaviour is regulated in a *controlling* way when the strategies are not inherently related to schoolwork and have a controlling nature; i.e. when students work to avoid punishment or receive rewards. Wolters (1998) categorized PST and SC as controlling strategies. Behaviour is regulated *autonomously* when the strategies involve the actual schoolwork and the self; i.e. when students seek to identify with the values and the goals of a learning activity (Deci & Ryan, 2000; Reeve, 2012; Ryan & Connell, 1989; Ryan & Deci, 2000a). IE and MST are categorized as autonomous regulation of motivation. This distinction is important as more controlled regulated behaviour is related to less interest and less willingness to invest effort, compared to more autonomously regulated behaviour, which leads to more effort and

pleasure (Ryan & Connell, 1989), better achievements (Miserandino, 1996), and greater well-being (Ryan, Kuhl, & Deci, 1997; Sheldon & Kasser, 1995).

The third aspect on the self-regulation of motivation we include are students' motivational beliefs. Beliefs are defined as perceptions that students have about themselves and about the task and are influenced by, among other things, students' characteristics and former experiences (Eccles & Wigfield, 2002). These beliefs partly determine students' choice to actually engage in learning and use motivational regulation strategies in order to protect learning intentions. This has been termed 'choice motivation' or 'motivation control' (Boekaerts, 1995; Kuhl, 1984) and precedes the actual execution of the task. In this dissertation we studied students' competence beliefs and value beliefs: 'Am I sufficiently competent to perform this task successfully?', and 'Why should I execute this task, what's in it for me?'. Students' beliefs on value and competence, and the relation with outcome measures such as effort, persistence, pleasure, and performance, are modelled in several theories on motivation, including the Expectancy*Value Model of Achievement Motivation (Eccles & Wigfield, 2002; Wigfield & Eccles, 2000), the Theory of Planned Behaviour (Ajzen, 1991), the Unified Model of Task-specific Motivation (UMTM) (De Brabander & Martens (2014)), and the cyclical phases of Self-regulation (Zimmerman, 2000a). Moreover, the contribution of motivational beliefs to learning outcomes is well documented empirically (Boekaerts, 1999b; Bong, 2004; Burić & Sorić, 2012; Chouinard, Karsenti, & Roy, 2007; De Brabander & Glastra, 2014; Eccles & Wigfield, 2002; Gollwitzer, 2012; Pintrich & De Groot, 1990; Van der Veen & Peetsma, 2009; Wolters & Rosenthal, 2000; Zimmerman & Schunk, 2008). Summarizing, if students believe the task has value for them and they feel up to the task, it is more likely they will decide to act, and will protect their intentions. Therefore we assume that the use of motivational regulation strategies is a function of the beliefs students

have. In this research we studied the relation between students' motivational beliefs and motivational outcomes, mediated by motivational regulation strategies.

1.4 Validation of questionnaires

Working with validated instruments is an important condition for conducting research.

Therefore, first, in order to study multiple content goals, we need an instrument that is suitable to measure these goals in pre-vocational secondary education. For this purpose, we validated the Goal Identification and Facilitation Inventory (GIFI), a goal questionnaire developed by Boekaerts and colleagues, based on Ford and Nichols' goal taxonomy (1987).

Second, in order to study students' use of motivational strategies in pre-vocational secondary education, we validated a questionnaire on motivational strategies developed by Wolters (1998,1999).

1.5 Motivational engagement

We linked need fulfilment, goals, strategies and beliefs to various motivational outcome measures. In referring to the motivational outcome measures effort, pleasure/interest, persistence, and absenteeism, we will use the term motivational engagement, defined by Reeve (2009) as "the extent of a student's active involvement in a learning activity" (p. 150).

Also, achievement was used as a further outcome measure.

1.6 Present dissertation

The aim of this dissertation is to explore opportunities to increase the motivation for learning of students in pre-vocational secondary education. For an overview of the Dutch educational system and the position of pre-vocational secondary education, see Figure 1.

We focus on 1) students' perception and appraisal of the quality of the learning environment and 2) students' self-regulation of motivation. We use two main theoretical frameworks: Self Determination Theory and the Theory of Self-Regulated Learning.

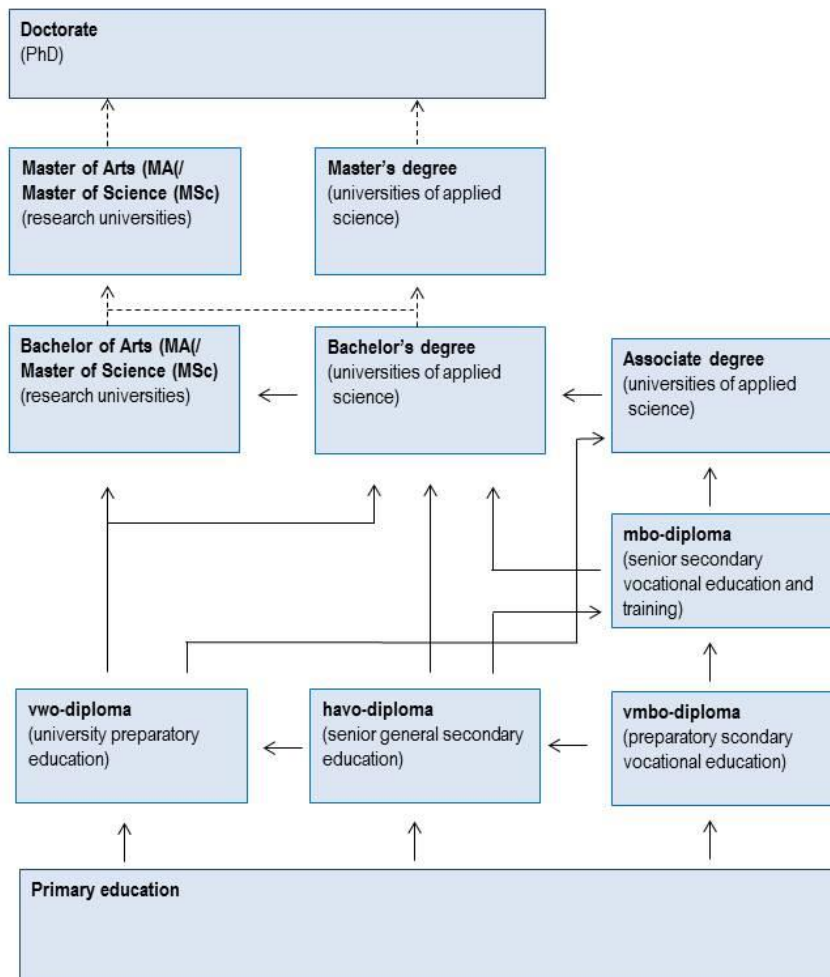


Figure 1: The Dutch educational system

The current dissertation addresses the following general research question (see also Figure 2 for an overview): *Is students' motivational engagement for learning in pre-vocational education related to the quality of the learning environment and to students' self-regulation of motivation?* In seeking to answer this question we formulated the following sub-questions:

1. What is the relation between the learning environment, students' need fulfillment, their motivational engagement (perceived effort, pleasure/interest, persistence, absenteeism), and achievement?
2. What is the relation between students' multiple content goals, and what are their goal preferences?
3. What is the relation between motivational regulation strategies and motivational engagement and achievement, and is the relation between motivational beliefs and motivational engagement and achievement mediated by the use of motivational regulation strategies?

To enable the study of multiple content goals and motivational strategies in this particular population, we validated two questionnaires, aiming to answer the following questions:

4. Is the Goal Identification and Facilitation Inventory a valid instrument to measure students' multiple content goals in pre-vocational education?
5. Is Wolters' questionnaire on motivational regulation strategies a valid instrument to measure how students in pre-vocational education regulate their behaviour?

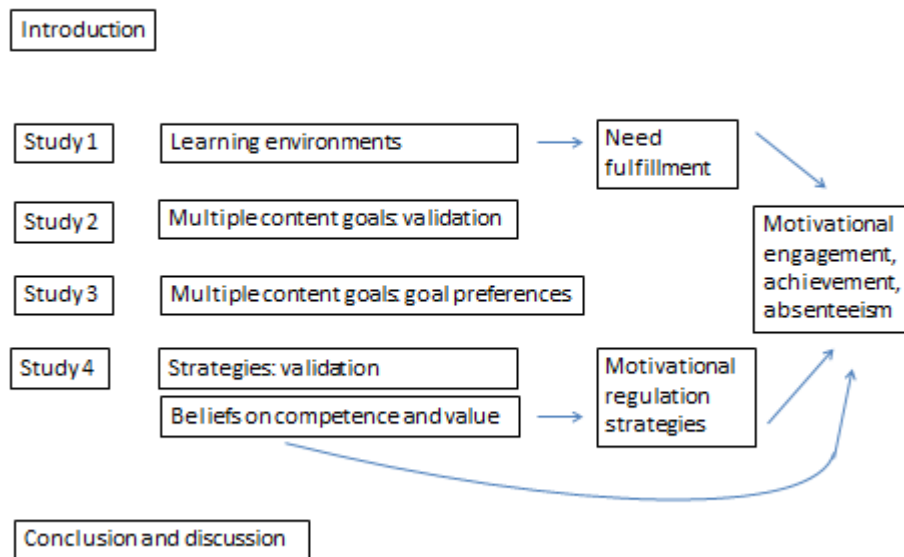


Figure 2 Overview of the studies in this dissertation

The following chapters set out to answer these questions. We first provide a brief overview of the studies in this dissertation, including information on the samples and the analysis techniques.

In Chapter 2 we discuss students' need fulfillment, motivational engagement, and achievement in relation to a traditional learning environment and a learning environment based on social constructivist principles. The data set consisted of 230 students (mean age 16.1 years) in the third and fourth year of pre-vocational secondary education, from one school. Grades and data about absenteeism were provided by the school. Since we were dealing with nested data of students in classes, multilevel analyses were conducted, enabling us to distinguish differences that can be ascribed to students, classes and the learning environments.

In Chapter 3, we discuss the validation of the Goal Identification and Facilitation Inventory (GIFI) for students in pre-vocational secondary education. The GIFI is an instrument that aims to measure students' multiple content goals. We used structural equation

modelling and tested invariance at class and gender level. The data set consisted of 511 students (mean age 16.1 years), drawn from three schools in an urban area in the Netherlands. We randomly divided the data set into two sets, which enabled us to cross-validate the questionnaire (Byrne, 2013). Furthermore, we studied the relation between goals and motivational outcomes, using a path model.

Chapter 4 reports on an exploratory study. Using the GIFI it visualizes the 16 multiple-content goals students bring to the classroom, their goal preferences, and how goals relate to each other and to individual students. A cluster analysis was used to study the importance students attach to the various goals. The multidimensional unfolding technique, a rather new technique in the field of educational research, was used to visualize goal salience, showing the preference scores of each individual for each goal. We also studied differences between boys and girls. The data set consisted of 1733 students from 11 schools (mean age 18.1 years) for secondary vocational education.

In Chapter 5, we examine motivational regulation strategies and their relation to students' motivational beliefs and motivational outcomes. We first validated Wolters' questionnaire on strategies for students in pre-vocational secondary education. Second, we studied the mediational role of motivational regulation strategies between motivational beliefs, and motivational engagement and achievement, using Structural Equation Modeling. The dataset consisted of 3602 students (mean age 14 years) in 49 schools for pre-vocational secondary education, mainly from the urban region in the west of the Netherlands.

Chapter 6 summarises and discusses the four empirical studies, the theoretical and practical implications, and the limitations of the current research project. It also describes directions for future research.

Chapter 2

Student-centred and teacher-centred learning environment in pre-vocational secondary education: Psychological needs and motivational engagement

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Abstract

In this study the perception of psychological need fulfilment and motivational engagement in a student-centred and a teacher-centred learning environment are compared, using Self Determination Theory as a framework. The self-report Intrinsic Motivation Inventory was completed by 230 students (mean age 16.1 years) in pre-vocational secondary education. School records on absenteeism and achievement were also analyzed. As predicted, multi-level analyses showed that students in the student-centred learning environment reported higher levels of perceived autonomy, competence, relatedness, and motivational engagement, measured by pleasure and effort. Furthermore, boys were less absent. No differences were found for achievement. These results suggest that a student-centred form of learning can be more beneficial for students' motivational engagement if granted autonomy is embedded in a supportive environment.

Key words

Motivational engagement; Learning environment; Psychological needs.

2.1 Introduction

Motivation directs, energizes, and regulates behaviour (Ford, 1992), but many students seem to lack motivation for learning at school (Martens, De Brabander, Rozendaal, Boekaerts, & van der Leeden, 2010) or their motivation decreases during adolescence (Eccles, 2004; Peetsma, Hascher, van der Veen, & Roede, 2005). This displays itself in less pleasure, effort and interest, and can lead to absenteeism and dropout (Peetsma & Van der Veen, 2008), especially in vocational education. This tendency can be seen all over Europe (OECD, 2011), including the Nordic countries (Markussen, Frøseth, & Sandberg, 2011; Statistics Norway, 2012; Statistics Sweden, 2008).

Motivation for learning is a process that partly takes place within the person and partly arises from the interaction between the individual and the environment (Bandura, 1986; Ryan & Deci, 2000a). Accordingly, schools shift from teacher-centred learning environments (TLEs) to student-centred learning environments (SLEs) (Cannon & Newble, 2000; Savery & Duffy, 2001), assuming this will affect students' motivation positively.

Underpinnings of the effect of new learning concepts on motivation, however, are scarce. In this study the Basic Needs Theory, a theory within Self Determination Theory, is used to explain the relation between different learning environments and motivation. The Basic Needs Theory states that the fulfilment of three basic psychological needs, the need for autonomy, competence and relatedness, supports and enhances students' intrinsic and autonomously regulated motivation, leading to more pleasure and effort in relation to schoolwork (Deci & Ryan, 1985; Ryan & Deci, 2000a, 2000b). The characteristics of SLEs correspond with the core of the Basic Needs Theory, as will be illustrated in this article. It is therefore assumed that SLEs will fulfil students' needs, and consequently enhance students' motivational engagement. However, there are doubts about the mechanism of need fulfilment in the actual practice of the classroom, especially where it concerns the need for autonomy

and competence (Assor, Kaplan, & Roth, 2002; Kirschner, Sweller, & Clark, 2006). In addition, little research has been done in more complex real-life situations (Lowyck, Elen, & Lehtinen, 2004).

This study aims to explore differences in students' motivation between a student-centred learning and a teacher-centred learning environment in practice, using Basic Need Theory as a framework. First, we describe the theoretical foundations of new forms of learning and the characteristics of both learning environments. Next, the three needs and their effect on motivational engagement will be discussed and, finally, learning environments will be related to need fulfilment and motivational engagement.

2.2 Student-centred and teacher-centred learning environments

New forms of learning are based on psychological and educational theories, stating that learning is a constructivist, situated, and social activity (De Kock, Slegers, & Voeten, 2004). According to these theories knowledge is situated in real life contexts and students construct their personal representations of knowledge, and link new information to prior knowledge and the context (Brown, Collins, & Duguid, 1989). Furthermore, learning takes place through a dialogue with teachers, peers, and one self, through e.g., the articulation of problems and the encounter of different solutions (Simons, Van der Linden, & Duffy, 2000; Vygotsky, 1978). For a more extended overview of new forms of learning and instruction we refer to Slavich and Zimbardo (2012).

Student-centred learning is based on these learning theories that consider learning as a constructivist, situated, and social activity. It is defined by Cannon and Newble (2000) as “ways of thinking about teaching and learning that emphasize student responsibility and activity in learning rather than content or what the teachers are doing” (p.16). We describe the TLEs and SLEs with five tangible characteristics as that are formulated by Savery and

Duffy (2001): tasks, student activities, teacher activities, sources of information, and assessment.

First, tasks in SLEs are problem based and situated in a rich, authentic context. This provides students with a clear purpose and different perspectives to approach the learning material. It also enables attachment of new information to familiar situations (Brown et al., 1989; Simons et al., 2000). Furthermore, tasks are presented like a “smörgåsbord” (Arnqvist, 2010, p. 54) from which students can make their choice. Second, students’ role in SLEs is an active one; they perform real life activities and are challenged to be mentally active through problem based tasks. Learning is also meant to be self-regulated: students are stimulated to set goals and take responsibility for the learning process (Van Hout-Wolters, Simons, & Volet, 2000). Furthermore, students learn cooperatively to enable negotiation and social construction of knowledge (Simons et al., 2000; Vygotsky, 1978). Third, teachers take the role of coach, expert, model, and facilitator of the learning process. In dialogue with the student, learning goals are set, and the learning process is monitored and evaluated as teachers gradually hand over responsibilities for the learning process (Boekaerts, 2002a). Fourth, sources of information in the SLEs are extended from teachers and text books to e.g., the Internet. Teachers also provide scaffolds to help students obtain knowledge and skills that are almost within their reach (Vygotsky, 1978). Finally, learning is assessed through reflection on both the product and the process of learning with a focus on improvement of tasks to come (Black & William, 2009).

In traditional learning environments, like TLEs, tasks are mainly theoretical (De Corte, 2003). Knowledge in these tasks is de-contextualised. The focus of learning is on content, not on the learning process. Second, students’ role is mainly passive; knowledge is transferred from teachers to students, whereupon students practice the assigned exercises individually. The learning activities are identical for all students and performed

simultaneously. Third, teachers mainly provide whole class instruction and control the learning process. Fourth, teachers and text books are the main sources of information and, finally, assessment concerns the content only, tested with traditional tests that wind up a learning period. We described the learning environments according to the theory and as two extremes on a continuum (O'Neill & McMahon, 2005). However, in practice, learning environments hardly ever are fully teacher-centred or student-centred, but take on hybrid forms (De Kock et al., 2004; Stroet, 2014) .

2.3 The need for autonomy, relatedness, and competence in relation to motivational engagement

School activities are rarely performed solely for pleasure or out of curiosity. An important question raised by Ryan and Deci (2000a) is “how to motivate students to value and self-regulate these activities and, without external pressure, to carry them out on their own?” (p. 60). The Basic Needs Theory identifies the need for autonomy, competence, and relatedness, as “innate psychological needs essential for on-going psychological growth, integrity and well-being” (Ryan & Deci, 2000a, p. 227). Need fulfilment or the thwarting of need fulfilment supports or disturbs innate intrinsic motivation. Moreover, if an activity is not inherently motivating, need fulfilment establishes autonomously regulated motivation, relocating motives for learning and the regulation of learning from external motives to the individual. The extent to which external motives are being internalized, determines the quality of motivation, and affects school engagement, effort, pleasure, persistence and achievement (Deci & Ryan, 1985; Ryan & Deci, 2000a; 2000b).

The need for autonomy, first, refers to the need for self-determination (Deci & Ryan, 1985); students need to feel they can contribute to their learning process, and have a choice in subjects and learning activities. Several studies show that teachers, who support autonomy,

enhance motivation, curiosity, and engagement (Assor, Kaplan, Kanat-Maymon, & Roth, 2005; Backman et al., 2011; Levesque, Zuehlke, Stanek, & Ryan, 2004), whereas teachers who display controlling behaviour have a negative effect on motivational engagement (Assor et al., 2005; Stornes, Bru, & Idsoe, 2008). Moreover, autonomy-supportive contexts are of vital importance for students to appreciate intrinsic goal setting (Vansteenkiste, Simons, Lens, Sheldon, & Deci, 2004), and offer opportunities in the classroom for students to pursue multiple goals, acquiring a high level of student involvement (Hijzen, Boekaerts, & Vedder, 2006).

Second, the need for competence refers to the need to feel able to perform a task successfully (Backman et al., 2011; Deci & Ryan, 1985). Students who feel competent show more persistence when meeting obstacles on their learning path (Bandura, 1994). It enhances their motivational engagement and increases the use of deep level learning strategies (Levesque et al., 2004) such as asking critical questions and thinking up concrete examples (Segers, Martens, & Van den Bossche, 2008). In our study a distinction is made between perceived personal competence and perceived organisational competence. The basic assumption is that students can feel competent on their own account and on account of empowering facilities from the organisation (De Brabander, Rozendaal, & Martens, 2009). Since criticism about new learning environments especially concerns too much autonomy and the lack of support and structure provided by teachers, we operationalized perceived organisational competence as perceived support from the teacher.

Finally, the need for relatedness refers to the need for attachment and secure relations to important others. We studied the relatedness to teachers, which implies trust, reliability, and feeling at ease with teachers. Relatedness improves students' well being. Also, students who trust their teachers are inclined to value their teachers' opinion (Ryan & Deci, 2000a; 2000b), and students who perceive their teacher as indifferent are less motivated, even when

tasks are reported as interesting (Ryan & Grolnick, 1986). Relatedness, therefore, is a predictor of motivation for learning (Backman et al., 2011; Furrer & Skinner, 2003).

2.4 The learning environment in relation to fulfilment of psychological needs

‘New’ learning concepts, like student-centred learning, have emerged assuming this will lead to more active engagement (Simons et al., 2000) and increase students’ motivation.

However, many assumptions remain implicit (Martens, Bastiaens, & Kirschner, 2007). In this study we used the Basic Need Theory as a framework, arguing that SLEs fulfil the three basic psychological needs more extensively than TLEs and therefore are more motivating for students. We will illustrate this in the next paragraphs.

First, Urdan and Turner (2005) studied the effect of learning environments on students’ perceived personal competence. They report that tasks embedded in a realistic context are comprehensible for students and therefore increase their feeling of competence. This is confirmed by Dochy, Segers, Van den Bossche, and Gijbels (2003). Furthermore, choice in subject and working methods enables students to choose tasks within reach of their capability. Also, feedback, assessment, and teacher support, provided at individual level, support students’ sense of competence (Urdan & Turner, 2005). These features correspond with the characteristics of SLEs, as described earlier in this article. Second, autonomy is automatically embedded in SLEs; students are expected and stimulated to self-regulate their learning and to choose subjects and working methods. Moreover, realistic tasks in authentic contexts often have no clear cut solutions and require autonomy to solve the problems that these tasks evoke (Simons et al., 2000). The perception of relatedness, finally, is fed by cooperative learning and by the interaction with teachers in the roles of coach, guide, expert and provider of feedback (Savery & Duffy, 2001).

It is assumed that the fulfilment of these three needs will have a positive effect on students' motivational engagement. However, the positive effect of SLEs on perceived need fulfilment is not self-evident. Educational researchers heavily debated the balance between granted autonomy and lack of structure in new forms of learning. They expressed concerns about the minimisation of guidance, leaving students with a decreased feeling of competence (Assor et al., 2002). Kirschner et al. (2006) even named an article "Why minimal guidance during instruction does not work: An analysis of the failure of constructivist, discovery, problem-based, experiential, and inquiry based teaching." (p.75). Indeed, students who experienced new forms of learning, reported difficulties in finding an appropriate way of tackling real life, and therefore ill-defined tasks (Mayer, 2004) and showed higher achievements when tasks are well-defined (Lodewyk, Winne, & Jamieson-Noel, 2009). The cognitive challenge of SLEs can even be detrimental to motivational engagement (Lehtinen, Vauras, Salonen, Olkinuora, & Kinnunen, 1995).

In conclusion, although experimental research proved that perceived fulfilment of the three psychological needs affects motivational engagement positively, there are doubts about this mechanism in the actual practice. This study aims to examine need fulfilment and motivational engagement in a more complex, real-life situation.

In addition achievement and absenteeism are taken into account. The effect of motivation on achievement is not straightforward. Ahmed, Minnaert, Van der Werf, and Kuyper (2010) found a positive relation between motivation and grades, whereas Sanchez, Colón, and Esparza (2005) state that grades are poor predictors. However, as grades are one of the main aspects students are judged on in practice, grades are taken into account. Absenteeism is a significant predictor for dropout (Hammond, Linton, Smink, & Drew, 2007). However, little research has been done on this aspect. Sánchez, et al., (2005) show that learning environments, especially the lack of relatedness with teachers, predict absenteeism.

This is confirmed by Baker, Sigmon, and Nugent (2001), who mention relatedness as one of many predictors. Teasly (2004) adds a feeling of incompetence as a predictor of absenteeism; students avoid feeling incompetent by not attending. A feeling of incompetence often becomes more visible in secondary education

Finally, gender differences are studied. Boys show more drop-out from school than girls (Central Bureau for Statistics, 2011; Statistics Norway, 2012). Research also reports gender differences in motivation (Martin, 2003; Sánchez, et al., 2005); boys pointed out that e.g., a feeling of relatedness and autonomy at school is important to them (Martin, 2003), but differences are small (Martin, 2004).

2.5 Aim – hypotheses

The aim of this study was to compare a student-centred learning environment with a teacher-centred learning environment to answer the main research-question “Is the learning environment related to students’ need fulfilment and motivational engagement?”.

In this study it is hypothesized that students in the SLE will perceive more autonomy (Simons et al., 2000) (Hypothesis 1a); more relatedness with teachers (Simons et al., 2000) (Hypothesis 1b); more personal and organisational competence (Urdan & Turner, 2005) (Hypothesis 1c & 1d) than students in the TLE. Furthermore, we assume, based on the Basic Need Theory, that the perception of autonomy, competence, and relatedness will lead to motivational engagement, indicated by more pleasure and effort (Deci & Ryan, 1985; Ryan & Deci, 2000a; 2000b) (Hypothesis 2). Also, we expect that boys will be more motivated in the SLE than boys in the TLE (Martin, 2003) (Hypothesis 3). Finally, as relatedness and perceived competence are related to absenteeism (Baker et al., 2001; Sánchez et al., 2005; Teasly, 2004), we assume that students in the SLE are less absent (Hypothesis 4). Findings

in previous studies on achievement in relation to motivation are not decisive and therefore no hypothesis is formulated.

2.6 Method

2.6.1 Participants

For this study, 17 classes in third and fourth years of pre-vocational secondary education filled in a one-time self-report questionnaire at the end of the school year. This was done during school time in the classroom, in 25 to 40 minutes, supervised by the researcher and the teacher. One class filled in the questionnaire after school time in less than ten minutes and therefore probably inattentively; the class was kept out of the analyses.

Pre-vocational secondary education prepares students in four years for vocational training. Assignment to type of secondary education is mainly based on an entrance test in the final year of primary education; those with the lower test results, about 60% of the pupils, are referred to pre-vocational secondary education. The first two years the curriculum consists of general subjects and at the end of the second year students choose a vocational discipline. In the third and fourth years, general subjects cover approximately two third of the school time, and the vocational subject covers one third of the school time.

The analyses included 123 students in 7 classes (boys 61%) in the teacher-centred learning environment with a class size ranging from 9 to 21 students with a mean age of 16 ($SD = 1.16$), and 107 students in 9 classes (boys 58%) in the student-centred learning environment, with a class size ranging from 7 to 22 students ($M = 13.7$, $SD = 1.45$). Students' age ranged from 15 to 18 years ($M = 16.1$; $SD = 0.70$).

2.6.2.Design

This study was carried out in one school, gradually changing from teacher-centred to student-centred learning, discipline per discipline, over several years. The aim of the school was to involve students in the learning process, and to increase their motivation. School management decided when a discipline was to switch from TLE to SLE. At the time the study was executed the SLE had been in practise for four years in the vocational discipline ICT, for three years in Sport, Services & Security and for one year in Care & Well Being. The vocational disciplines with a TLE were Commerce, Graphics & Media, Administration, and Mechanics.

Obviously, we could not assign students to a vocational discipline randomly. That choice was made by the students. However, as preferences for a particular learning environment or discipline could bias the findings a question was added to the questionnaire about students' choice (e.g., the way that is being taught in this discipline, appealed to me; I like this discipline; I like the teachers in this discipline). The questions could be answered with yes or no. A chi square test to determine the distribution of reasons over the TLE and SLE, showed no specific preferences for disciplines related to a specific learning environment.

2.6.4 A description of the learning environments in practice

We verified if the learning environments indicated by the school as SLE and TLE, actually met the characteristics as described in theory. For both learning environments, we compared curricula, interviewed team managers and observed a lesson in each discipline. Also, documents on school policy were consulted. We used the five characteristics formulated earlier in this article to describe both learning environments in practice: tasks, role of the student, role of the teacher, sources of information, and assessment. We start with the learning environment indicated by the school as SLE.

Tasks

Tasks for the vocational subjects are either real assignments (from e.g., businesses, the city council and non-profit organisations), or simulations. The subject Dutch language is almost fully integrated in the vocational subjects; letters of application, tenders, reports and presentation skills are linked to the assignments. Students choose the task they want to execute in consultation with the teacher or tasks are assigned by the teacher according to students' level and interest. Tasks also comprehend the learning and application of meta-cognitive skills; planning, monitoring and evaluating the work is essential in the learning process.

Teacher activities

For the vocational subject and Dutch language every lesson starts and ends plenary, discussing the progress of the tasks. Subsequently, students work independently, individually or in groups. Teachers lecture the whole class, a group or an individual student, depending on what students ask and need to execute the task. Otherwise, teachers are available for questions, actively monitor students' progress and provide scaffolds where necessary.

Student activities

Students are actively involved in the lessons, choosing tasks and activities. They work individually or in groups. The exact problem, and the skills and knowledge necessary to execute these tasks, are determined by the students in dialogue with customers, teachers, and peers. Students use their prior knowledge and figure out what aspects of the assignment are unknown to them and whether they require help. Students also keep account of their development of competences and meta-cognitive skills in a workbook.

Assessment

Every six weeks the teacher discusses the learning process with each student individually to determine which progress is made and what aspects need further improvement. This is recorded in the workbook and will be used for next assignments.

Furthermore, the utility and quality of the results related to the real life setting, is assessed. For example, a welding is tested to determine whether it holds heavy objects in collisions. Also, students keep account of their work in a digital portfolio. Finally, the product is assessed by the teacher with grades, based on the requirements from the government.

Sources of information

Every classroom in the school has two computers, except for the discipline ICT, which has a computer available for every student. Students are allowed to use the computers when necessary. Furthermore, the teacher provides information.

The TLE in this study is almost identical to the description earlier in this article, based on De Corte (2003), except for the discipline Graphs & Media that has been working with real life tasks for several years. Also, most subjects in the TLE work occasionally with projects that grant certain autonomy and are executed in groups.

In conclusion, the SLE is carried out quite thorough, but only within the limited area of the Vocational subject and Dutch language, covering approximately one third of the time at school. The other subjects in the SLE and all subjects in the TLE are taught in a teacher-centred manner. Graph & Media forms an exception because it shows some SLE characteristics.

2.6.5 Instruments

Students' motivational engagement and their perception of psychological needs were measured with the Intrinsic Motivation Inventory (IMI). The items inquired about schoolwork in general. The validity of the IMI was tested by McAuley, Duncan, and Tammen (1989). For this study, scales were added to measure perceived organisational competence. The questionnaire was thoroughly inspected by a group of experts and tested by 20 students. One item was deleted because of a poor language fit. The analyses were performed with 230 students. All answers were scored on a five-point Likert scale from 1 (*I don't agree at all*) to 5 (*I fully agree*).

Pleasure/interest, effort, perceived autonomy, and relatedness

Pleasure and interest were measured with one scale, in line with the IMI, with six items (e.g., 'I think schoolwork is fun'). Five items measured effort (e.g., 'I put a lot of effort into schoolwork'). Cronbach's α was .85 for both scales. Five items measured perceived autonomy (e.g., 'I feel I can determine what I do at school'). Two negatively formulated items were recoded, but not reliable; after deletion perceived autonomy showed a Cronbach's α of .71. Perceived relatedness was measured by six items (e.g., 'Teachers make me feel at ease', Cronbach's $\alpha = .90$).

Perceived personal and organisational competence

Four different aspects of competence were measured. Perceived personal competence consisted of five items (e.g., 'I think I am good at doing schoolwork most of the time'). Three aspects of perceived organisational competence were measured; five items on usefulness of help (e.g., 'Teachers make sure I understand what I have to do'), five items on accessibility of help (e.g., 'Teacher are present when I need help), and six items on help with looking up

information (e.g., ‘Teachers help me find my way on Internet’). The competence scales differed from the original IMI, therefore the data were analyzed using confirmatory factor analysis with a maximum likelihood method (for the results see Table 1). After two recoded items were removed, the four hypothesized factors fitted the data satisfactory (model 1). However, the factor on usefulness of help and the factor on accessibility of help were highly correlated ($r = .83$). In model 2 we joined them in one factor ‘quality of teacher help’. Within this factor, some items showed a common denominator, for instance where help finding information in the computer was mentioned explicitly. The items clearly belonged to this specific factor, but caused variance, visible in the covariance of error terms. Allowing the covariance of some of the error terms to be estimated (model 3) improved the fit significantly. A multilevel analysis, taking class level into account completed the analysis with very satisfactory fit values (model 4).

Table 1. Fit values of four models from confirmatory factor analyses on aspects of competence (N = 230).

Model	Chi 2 (df), p	CFI	NNFI	RMSEA
1	276.58 (163), < 0.0001	0.95	0.94	0.056
2	378.07 (166), < 0.0001	0.91	0.90	0.075
3	207.94 (157), < 0.004	0.98	0.97	0.038
4	293.62 (325), < 0.894	1.000	1.036	0.000

This resulted in a total of three scales of perceived competence; perceived personal competence, measured with five items (Cronbach’s $\alpha = .81$), perceived organizational competence ‘quality of teacher help’, measured with ten items (Cronbach’s $\alpha = .94$) and perceived organizational competence ‘help with information’ consisting of six items (Cronbach’s $\alpha = .86$).

Grades and absenteeism

The mean grade over one year for the Vocational subject, and the subjects Dutch, provided by the school, were also taken into account. The tests that underlie these grades are identical for both learning environments. Grades can take the value of 1 (*poor*), to 10 (*excellent*), with a value of 5.5 and above as a passing grade. Absenteeism involved counts of hours absent during the school year, recorded by the school in the same way for both learning environments. A distinction was made between non-permitted absenteeism (NA) and permitted absenteeism (PA). Three NA values and one PA value were identified as outliers and excluded from the analyses.

2.7 Statistical analyses

The main purpose of this article is to attribute differences in need fulfilment and motivational engagement to different learning environments. However, the data are nested, therefore outcome variance maybe determined by class membership. Accordingly, multi-level analyses were performed (Hox, 2002). The number of 16 classes is small, but sufficient (Snijders & Boskers, 2011) and we used the restricted function (RML) of MlWin 2.0, suitable for a small number of classes (Rasbach, Steele, Browne, & Prosser, 2003).

We deal with two levels and in case of a multivariate response (e.g., different aspects of competence), a third level is added that represents variance resulting from differences between variables. Categorical variables were represented by dummy variables (SLE = 1, TLE = 0; boys = 1, girls = 0). To assure comparability between different variables, their scores were standardised. As a first step the unconditional model is estimated. Explanatory terms are added stepwise, and the final model includes only significant main effects and interaction effects. Interpretation of the results is based on explained variance and differences between models that were tested.

2.8 Results

2.8.1 Descriptive analyses

Means, standard deviations, and correlations for the variables on motivational engagement and perceived needs are presented in Table 2. The descriptive statistics for grades and absenteeism are presented in Table 3.

Table 2. Means (M), standard deviation (SD), and intercorrelation coefficients for motivational engagement and perceived needs in the student-centred learning environment (SLE) and the teacher-centred learning environment (TLE)

		SLE	TLE						
Variable		M (SD)	M (SD)	1	2	3	4	5	6
1.	Pleasure/interest	3.19 (0.87)	2.78 (0.87)						
2.	Effort	3.95 (0.82)	3.66 (0.93)	.59**					
3.	Autonomy	3.51 (0.81)	3.26 (0.74)	.42**	.36**				
4.	Relatedness	3.34 (0.99)	2.65 (0.89)	.47**	.35**	.37**			
5.	Personal competence	3.71 (0.73)	3.46 (0.76)	.53**	.55**	.49**	.37**		
6.	Organisational competence quality	3.54 (0.89)	3.07 (0.86)	.42**	.35**	.32**	.81**	.38**	
7.	Organisational competence information	3.27 (0.93)	2.80 (0.99)	.44**	.28**	.36**	.55**	.33**	.60**

Effort and pleasure are moderately to highly correlated, also with perceived needs, and especially with perceived personal competence. Furthermore, results show a strong relation between perceived relatedness and perceived organisational competence ‘quality of teacher help’. A multicollinearity check showed variance inflation factors with permissible values, ranging from 1.4 to 1.9 (Kutner, Nachtsheim, & Neter, 2004).

Table 3. Means (M) and standard deviations (SD) for grades and absenteeism in the student-centred learning environment (SLE) and the teacher-centred learning environment (TLE)

Variable	SLE	TLE
	M (SD)	M (SD)
Grade Dutch	6.67 (0.93)	6.67 (0.87)
Grade Vocational practice	6.23 (0.87)	6.63 (0.81)
Permitted absenteeism	41.95 (33.27)	54.73 (45.47)
Non-permitted absenteeism	4.47 (6.00)	6.38 (7.89)

2.8.2 Multi-level analyses

Motivational engagement: effort and pleasure

Effort and pleasure are both indicators of motivational engagement and therefore analysed together. To distinguish between the effort and pleasure score, a dummy variable was used (effort = 1, pleasure = 0). A three-level analysis was carried out, with the variables at the first level, the respondents on the second level and the classes on the third level.

Table 4. Multi-level analysis of motivation (effort and pleasure)

	Model	
	Unconditional	Final
<i>Coefficients</i>		
Intercept	0.000 (0.103)	0.086 (0.118)
Learning environment		0.367 (0.141), $p = 0.018$
Gender		-0.439 (0.122), $p < 0.001$
<i>Variance components</i>		
Class	0.119	0.028
Respondent	0.471	0.472
Response	0.407	0.407
N responses	460	460
Deviance	1186.556	1172.786
Δ		13.77, $df=2$, $p=0.001$

The unconditional model (Table 4) showed that part of the variance in motivational engagement can be explained at class level with an intra-class correlation (ICC) of .119, and a larger part of the variance can be attributed at the respondent level (ICC = .471). In the final model the predicting variables learning environment and gender explained part of the variance at class level (ICC = .028). The log-likelihood-ratio test shows that the final model is significantly better than the unconditional model ($\chi^2(3) = 28.46$, $p < .001$), with a significantly higher level of motivational engagement on the whole in the SLE (t -ratio = 2.60, $p = .018$). Also, there is a significant but negative relation between gender and motivational engagement (t -ratio = - 3.59, $p < .001$); boys are less motivated than girls.

Personal and organisational competence

Perceived personal competence and the two forms of organisational competence were distinguished with two dummy variables ('personal competence' = 1 respectively 0, 'quality of teacher help' = 0 respectively 1, 'help with information' = 0 respectively 0).

Table 5. Multi-level analysis of perceived personal and organisational competence

	Model	
	Unconditional	Final
<i>Coefficients</i>		
Intercept	-0.010 (0.090)	-0.013 (0.097)
Learning environment		0.431 (0.110), $p < .001$
Gender		-0.322 (0.104), $p = .018$
<i>Variance components</i>		
Class	0.089	0.009
Respondent	0.353	0.357
Response	0.561	0.561
<i>N</i> responses	686	686
Deviance	1810.501	1795.012
Δ	0.561	15.489, $df = 2$, $p < 0.001$

The unconditional model shows (Table 5) that a small part of the variance can be explained at class level (ICC = .089) and a substantial part of the variance can be attributed to the respondent (ICC = .353). The results show that the learning environment is a very significant predictor of perceived competence on the whole (t -ratio = 3.92, $p < .001$). Also, there is a significant but negative relation between gender and perceived competence on the whole; boys have significantly lower perceptions of competence than girls (t -ratio = - 3.10, $p = .002$).

Autonomy

Autonomy is a single variable and therefore we performed a two-level analysis. The unconditional model shows (Table 6) that a very small part of the variance can be explained at class level (ICC = .017). Adding learning environment as a predicting variable, there is a significantly higher level of autonomy in the SLE (t -ratio = 2.46, $p = .014$). There is no effect for gender.

Table 6. Multi-level analysis of perceived autonomy

	Model	
	Unconditional	Final
<i>Coefficients</i>		
Intercept	0.000 (0.074)	-0.150 (0.090)
Learning environment		0.322 (0.131), $p = 0.014$
<i>Variance components</i>		
Class	0.017	0.000
Respondent	0.984	0.978
<i>N</i> responses	228	228
Deviance	645.764	640.067
Δ		5.697, $df = 1$, $p = 0.017$

Relatedness to teachers

Relatedness is measured as a single variable, therefore we used a two-level analysis. The unconditional model shows (Table 7) that a fair amount of the variance ($ICC = .119$) can be attributed to class level. Still, there is a significant effect of the learning environment on relatedness ($t\text{-ratio} = 3.41$, $p < .001$), implying relatedness to teachers is much stronger in the SLE. Gender had no significant effect.

Table 7. Multi-level analysis of perceived relatedness with teachers

	Model	
	Unconditional	Final
<i>Coefficients</i>		
Intercept	-0.043 (0.128)	-0.328 (0.130)
Learning environment		0.661 (0.194), $p < 0.001$
<i>Variance components</i>		
Class	0.199	0.087
Respondent	0.814	0.816
<i>N</i> responses	227	227
Deviance	619.627	610.377
Δ		9.25, $df = 1$, $p = 0.002$

Practise-based outcomes: absenteeism and achievement

Absenteeism is measured by the number of hours absent during the school year. PA covers permitted absence, NA covers non-permitted absence. Both variables were analysed with generalized linear mixed modelling using the log link function for the Poisson distribution.

We performed these analyses with the lmer function of the lme4 R package. The models were fit by the Laplace approximation. With respect to PA, none of the predictors contributed significantly. In the final model for NA, however, gender ($z = 2.59$, $p = .0097$) and the interaction between gender and the learning environment ($z = -2.66$, $p = .0078$) were significant; boys are less absent in the new learning environment (Table 8). Grades, finally, showed no differences between the SLE and the TLE.

Table 8. Multi-level analysis of non-permitted absenteeism

	Model	
	Unconditional	Final
<i>Coefficients</i>		
Intercept	1.7017 (0.1164)	0.086 (0.118)
Gender		0.367 (0.141), $p = 0.018$
Gender*learning environment		-0.439 (0.122), $p < 0.001$
<i>Variance components</i>		
Class	0.2011	0.3024
Gender		0.2855
N responses	218	218
Deviance	1460.186	1398.169
Δ		62.017, $df=4$, $p < 0.0001$

2.9 Discussion

Currently, student-centred learning environments (SLEs) are designed to enhance and increase students' motivation, especially in vocational education. According to Self-Determination Theory the fulfilment of the need for autonomy, competence and relatedness, is essential for motivation; SLEs seem to meet the fulfilment of these needs. However, SLEs can also be quite demanding, granting students too much autonomy and, consequently, have a less positive or even detrimental effect on motivation. Our goal was to examine to what extent students' motivational engagement and perceived need fulfilment differ in a SLE and TLE.

The results of this study are in favour of the SLE. First, students in the SLE, compared with the students in the TLE, perceive more autonomy (Hypothesis 1a), more relatedness

with teachers (Hypothesis 1b), more personal competence (Hypothesis 1c) and more organisational competence (Hypothesis 1d). Furthermore, students report more pleasure and effort (Hypothesis 2). Gender differences were seen for non-permitted absenteeism; boys were less non-permitted absent in the SLE compared to boys in the TLE (Hypothesis 3 & 4). Achievement, finally, showed no significant differences between learning environments.

Returning to the discussion about autonomy and lack of structure, the results of this study justifies placing question marks with the article by Kirschner et al. (2006) that automatically relate new forms of learning to minimal guidance. First, the present study shows that students in the SLE, based on constructivist learning theories, perceive more autonomy, and simultaneously more organisational competence. This is consistent with new forms of learning described by Simons et al. (2000); the guiding role of the teacher and the organisational support from the learning environment are essential aspects of SLEs. Hmelo-Silver, Duncan, and Chinn (2007), too, state that “both problem based learning and inquiry learning employ scaffolding extensively” (p.99).

Second, students in the SLE perceive more relatedness with teachers. Several studies emphasise the importance of relatedness in relation to autonomy; making autonomous behaviour possible has an emphatic, supportive character (e.g., Assor et al., 2002). Finally, according to this study students can perceive more autonomy and simultaneously feel more competent. To put it more clearly, increased perceived autonomy goes hand in hand with perceived relatedness and perceived competence very well.

We do not deny that new forms of learning can and do coincide with students being left to their own devices. We do argue, however, against the statement that new forms of learning are equal to leaving students to their own devices. What are the underlying reasons for the negative statements about SLEs? The implementation of SLEs is essential in order to establish the intended learning effects, but often is poor (Boekaerts, 2002a). Mayer (2004)

speaks of “a naïve interpretation of constructivism” (p.18) and the underestimation of the complexity of learning concepts based on constructivist principles.

One could also argue that the concept of autonomy is interpreted too naïve and too straight forward. We support research that takes more complex relations into account, reporting that fulfilling students’ need for autonomy also involves teachers taking students seriously (Assor et al., 2002) and providing rationales for learning (Jang, Reeve, & Deci, 2010). Hansson (2010) and Slavich and Zimbardo (2012) translated social constructivism to the instructional practice of the classroom, including both active involvement of students and development of their responsibility for learning, as well as teachers’ responsibility to provide content and support. It goes without saying that, although it sounds paradoxical, SLEs put great demands on teachers. This has to be taken into account when implementing such an environment.

In this research we also studied absenteeism, achievement and gender. Grades do not differ in the learning environments. This means that the SLE does not necessarily have detrimental effects on motivational engagement, as suggested by Lehtinen et al. (1995), but clearly, it did not boost students’ achievement either. Hebb’s principle of optimal arousal could explain this result; people thrive on challenges as long as it is not too difficult (Hebb, 1955). The motivational challenges of the SLE might have a positive effect on students’ motivational engagement and simultaneously have no effect on achievement; it may be motivating, but too difficult to obtain high grades. Finally, results show that the difference for non-permitted absenteeism is more explicit for boys. This is an important finding: boys generally are less motivated than girls (Martin, 2004) and show higher dropout rates (Central Bureau for Statistics, 2011). The SLE seems to be more inviting for boys to attend the lessons.

The results of this exploratory study are interesting, but some limitations have to be taken into account. First, this research has been executed in one school; therefore results can not be generalized to other schools. Second, the research design shows some weaknesses. We compared the students in two learning environments with a one-time measurement, which makes determination of causal relations difficult. Also, students were not randomly assigned to the learning environments. Comprehensive changes in real-life educational settings make random assignment to conditions almost impossible. We recommend that schools regularly monitor their students to enable the evaluation of educational innovations with longitudinal research. The third limitation concerns the threat of external validity (Kazdin, 1999). The novelty of the SLEs might influence the enthusiasm of those involved. However, one could also argue that enthusiasm is part of the SLE, as can be inferred from its description. Nonetheless, longitudinal research is necessary to test the stability of the results reported in this study. Furthermore, we question the use of grades as outcome measure; previous research showed mixed results. Moreover, the tests underlying the grades stem from TLEs and mainly require rote learning, which does not give credit to the knowledge and skills students learn in SLEs. We recommend the development of tests that measure knowledge and skills, both on the level of rote learning and deep level learning, but that also test whether learning environments differ in how students are prepared for professional practice. Finally, the SLE in this study focused mainly on the role of the learning environment in students' motivation. To shift students' motives for learning from external sources to the individual even more, SLEs should also focus on motivational processes within the person (Slavich & Zimbardo, 2012), e.g., students' goals (Ford, 1992), and motivational strategies (Boekaerts & Corno, 2005; Wolters, 2004) thereby opening up students' full potential to become active, self-regulated learners (Bandura, 1986, 1994).

In conclusion, although we do not want to trivialize the findings on achievement, being present at school and perceiving school as pleasurable has proved to be important. A more appealing learning environment that supports need fulfilment is highly desirable. This study shows that an SLE can be such an appealing learning environment.

Chapter 3

Multiple content goals in the classroom: A validation of the Goal Identification and Facilitation Inventory (GIFI)

This chapter is resubmitted for publication as: Smit, K., Boekaerts, M., De Brabander, C. J., & Pat-El, R., (Under Review). Multiple content goals in the classroom: A validation of the Goal Identification and Facilitation Inventory (GIFI).

Abstract

In this study the validity and reliability of the Goal Identification and Facilitation Inventory (GIFI), a self-report questionnaire on goals for educational purposes, was tested. The GIFI, based on the goal taxonomy by Ford and Nichols (1987), aims to measure the salience of students' multiple content goals in the classroom. Students from pre-vocational secondary education (N = 511, mean age = 16.12, 56% boys) completed the GIFI. Two models were tested. After some adjustments, SEM analyses with EQS 6.2, showed a reasonable fit for the 16 factor model. The model was confirmed by a cross validation and proved to be gender invariant. A multilevel analysis revealed that class membership slightly influenced students' striving for the goals Tranquility, Superiority, Self-determination, and Resource Provision. Implications of these results will be discussed. Some goals proved to have some predictive validity for the basic motivational outcomes effort and pleasure.

Keywords: multiple goals, goal salience, measurement instrument, cross validation.

3.1 Introduction

Goals are defined as consciously articulated, personally meaningful objectives that individuals pursue in their daily lives (Sheldon & Elliot, 1998), or, as Wentzel (1999) puts it more prosaically “a cognitive representation of what it is an individual is trying to achieve in a given situation” (p. 77). Goals influence motivation; they direct, energize, and regulate behaviour (Austin & Vancouver, 1996; Emmons, 1989; Ford & Ford, 1987; Little, 1999; Klinger & Cox, 2004). In educational settings, goal research mainly focuses on learning goals and social goals, studying the why of goals. However, it has long been theorized that human behaviour is determined by a wider range of goals a person sets and pursues, also referred to as personal content goals (Ford & Nichols, 1987), higher order goals (Carver & Scheier, 2000), ‘be goals’ (Pintrich, 2000a), life goals (Deci & Vansteenkiste, 2004), personal projects (Little, Salmela-Aro, & Phillips, 2007), or multiple content goals (Boekaerts, 1999a; 2009). We assume that more knowledge of what it is a student wants to achieve, and the importance attributed to multiple content goals that are pursued in the classroom, provides us with a better fit between goal theories and students’ reality. Consequently, we expect to accomplish a more thorough understanding of their motivation for learning. Furthermore, knowledge of students’ goals enables us to identify goals that compete or support each other. This is important in the light of studies on the training of motivational self-regulatory skills, e.g. to coordinate the pursuit of multiple content goals (Boekaerts & Corno, 2005; Boekaerts & Niemivirta, 2000; Wentzel, 1999).

Researchers from the Psychology Department at the Leiden University developed a questionnaire, based on Ford and Nichols’ goal taxonomy (1987), to study multiple content goals in relation to health (Maes, Sweeney, & Gebhardt, 1998). This questionnaire was further developed by De Koning, Boekaerts en Zeijl (2001) for research on e.g. goal preferences in relation to school identification (De Koning & Boekaerts, 2005), and

cooperative learning (Hijzen, Boekaerts, & Vedder, 2006). This resulted in the Goal Identification and Facilitation Inventory (GIFI). This study aims to validate the GIFI.

First, we briefly discuss some established theories on learning goal orientations, social goals, and social goal orientation. Second, in line with developmental psychology, we argue that students pursue a wider range of goals that influences their motivation for learning. Third, we describe the validation of the GIFI.

Learning goal orientations

In the field of educational psychology, Achievement Goal Theory is the leading framework in research on goals (e.g., Ames, 1992; Dweck & Leggett, 1988; Elliot & Harackiewicz, 1996; Harackiewicz, Barron, Pintrich, Elliot, & Thrash, 2002a). This theory focuses on various learning goal orientations. Mastery orientated students wish to gain competence (mastery approach orientation), or avoid doing less well than before (mastery avoidance orientation). Students with a performance orientation, on the other hand, wish to show their competence and outperform peers (performance approach orientation), or avoid looking incompetent (performance avoidance orientation). For reviews we refer to Hulleman, Schrager, Bodmann, and Harackiewicz (2010), Linnenbrink (2005), and Maehr and Zusho (2009).

Ample evidence proves that a mastery approach orientation has positive effects on e.g. the use of effective strategies, a feeling of competence, interest, well-being, and pleasure. It does, however, not affect exam scores or grade point average (e.g. Bereby-Meyer, Moran, & Unger-Aviram, 2004; Harackiewicz, Barron, Tauer, & Elliot, 2002b). A mastery avoidance orientation undermines affect and interest, related to schoolwork (Cury, Elliot, Da Fonseca & Moller, 2006). A performance approach orientation is positively related to persistence, affect, and performance (Harackiewicz at al., 2002a; Harackiewicz at al., 2002b; Linnenbrink,

2005), but can also cause fear of failure and resistance against cooperative learning (Midgley, Kaplan, & Middleton, 2001). A performance avoidance orientation, on the other hand, is maladaptive for students' motivation, and has negative effects on e.g., their feeling of competence, engagement, and achievement (Ames & Archer, 1988; Elliot & Church, 1997; Urdan, Ryan, Anderman, & Gheen, 2002).

Elliot, Murayama, and Pekrun (2011) extended the model. They state that the mastery goal orientation can be task-based, directed at the demands of the task, or self-based, dealing with intrapersonal growth. The competence goal is other-based, directed towards comparison with others and interpersonal growth. The model showed a good fit. Other researchers, however, raised questions on the performance approach orientation: in their studies students state they want to perform, but not outperform others (Brophy, 2005; Mansfield, 2010).

Social goals and social goal orientations

Wentzel acknowledged that the classroom is not a mere context for learning, but also an environment with powerful social interactions. Studies with Asian students (mean age 13.45) showed that social goals explain a unique part of the variance when controlling for mastery and performance goals (King, McInerney & Watkins, 2010; King & Watkins, 2012; Mansfield, 2010). Moreover, the social goals students pursue, partly explain their academic performance. For example, the striving to behave in a pro-social way, be compliant and cooperative, is positively correlated with academic performance (Wentzel 1991, 1994, 1996a, 2000). Likewise, Mansfield and Wosnitza (2010) found a positive relation between mastery goals, and relationship and responsibility goals for students aged 12 to 13. On the other hand, high scores on entertainment goals, and resistance against social acceptable behaviour and classroom standards, co-occurred with the lowest achieving students. These goals have detrimental consequences for learning and achievement (Ryan, 2001; Wentzel, 1993).

Several researchers (Horst, Finney, & Barron, 2007; McInerney, Hinkley, Dowson & Van Etten, 1998; Urdan & Maehr, 1995; Wentzel & Wigfield, 1998) advocated further research on the relation between social goals and learning goals, that is, social goal orientations. Studies by e.g. Dowson & McInerney (2003, 2004) confirm that students combine these goals, illustrated by statements like “I want to get good marks so that I can become popular and not have to be at the bottom of my class”.

Multiple content goals

However, there is no reason to assume that students confine themselves to academic and social goals in the classroom, leaving other goals in their locker until the school bell marks the end of the school day. The role of multiple content goals has become even more explicit with the change from traditional to new forms of learning. These forms grant students more autonomy and often include collaborative learning, thereby providing more opportunity to pursue learning and non-learning goals in tandem, within educational settings (Boekaerts, 2003; Boekaerts, De Koning, & Vedder, 2006; Hijzen, Boekaerts, & Vedder, 2006).

Findings on the effect of striving for multiple content goals are diverse. According to Ford (1992) behaviour steered by several goals simultaneously, generates strong motivation and increases the chance to achieve the desired consequences. Kiviniemi, Snyder and Omoto (2002), however, stated that behaviour instigated by several goals, can also lead to less favorable consequences, such as stress, and decreased well-being. Indeed, well-being goals can compete with mastery goals, drawing attention and energy from learning goals (Boekaerts & Corno, 2005; Boekaerts & Niemivirta, 2000). On a more concrete level, Fries, Schmid, Diets, and Hofer (2005) showed that a striking almost 90% of the students (mean age 13.8) reported conflicts between school goals and leisure goals. Lemos and Gonçalves (2004) found proof for both effects: students reported that goals can both support each,

compete, or simply coexist. We can conclude that goals do not, as a matter of fact, stand on their own. To enhance our understanding of motivation in the classroom, we should study a wider range of goals ‘en groupe’.

Ford and Nichols’ goal taxonomy covers 24 multiple content goals (see table 1). It describes ‘the basic content of the purposes, desires, and concerns that motivate human behaviour’(Ford & Nichols, 1987, p. 85). These higher order goals or the ‘I want to be goals’ (Ford, 1992), represent the characteristics or the state of being a person desires, in order to establish the ideal self (Carver & Scheier, 2000) or possible self (Peetsma & Van der Veen, 2011). In a qualitative study, for example, the higher order goals mastery and performance serve the interest of e.g. ‘an enjoyable and successful career’ (Mansfield, 2010; p.48). Ford maintained that each of the higher order goals consists of a set of cognitions that steers the selection of more specific task related sub goals, also referred to as action programs, or ‘do goals’; they direct striving to reach the higher order goal.

Within the taxonomy of higher order goals, Ford and Nichols do not deem some goals more important than others, they do not position goals opposites ends of a continuum as Schwarz and Bardi (2001) suggest, nor are they formulated as a means to reach other goals as is the case in e.g. social goal orientations (Dowson & McInerney, 2003, 2004). The goals a person pursues and the importance that is attached to these goals, is determined idiosyncratically, characteristic for the individual (Ford, 1992, Ford & Nichols, 1987; Sheldon & Elliot, 1999).

Table 1 *Ford and Nichols goal taxonomy*

<i>Goal</i>	<i>Description</i>
Goals referring to the relation between person and environment	
Integrative social relationship goals	
Belongingness	Building or maintaining attachments, friendships, intimacy, or a sense of community and social identity. Avoiding feelings of social isolation or separateness.
Social responsibility	Fulfilling social roles, effort in keeping interpersonal commitments, conforming to social moral–cultural rules, often independent of close relationships. Avoiding social transgressions and unethical or illegal conduct.

Equity	Promoting fairness, justice, and reciprocity. Avoiding unfair or unjust actions.
Resource provision	Providing support, assistance, advice, and validation for others. Avoiding selfish or uncaring behaviour.
Self-assertive social relationship goals	
Individuality	Feeling unique, special, or different. Avoiding similarity or conformity with others.
Self-determination	Experiencing a sense of freedom to act or make choices. Personal control, freedom, autonomy. Avoiding the feeling of being pressured, constrained, or coerced.
Superiority	Comparing favourably to others in terms of winning, status, or success. Social status or importance, dominance, and winning. Avoiding unfavourable comparisons with others.
Resource acquisition	Obtaining approval, support, assistance, or advice from others. Avoiding social disapproval or rejection.
Task goals	
Mastery	Improving one's performance or meeting a standard of achievement. Avoiding incompetence and decrements in performance.
Management	Maintaining order, organization, or productivity in daily life tasks; handling routine tasks, organizing people or things, or being productive. Avoiding inefficiency, sloppiness, or disorganization.
Material gain	Obtaining or accumulating money or tangible goods. Avoiding the loss of money or material possessions.
Safety	Being unharmed, physically secure, and free from risk. Avoiding threatening or depriving circumstance.
Task creativity	Inventing new processes or products. Avoiding tasks that do not provide opportunities for creative action.
Goals referring to the person	
Affective goals	
Entertainment	Having fun, seeking heightened arousal, or avoiding boredom.
Tranquillity	Experiencing peace of mind, serenity, and avoiding stress.
Happiness	Experiencing feelings of joy, satisfaction, or well-being.
Bodily sensations	Experiencing particular bodily sensations or experiencing physical movement. Highs a person wishes to experience or unpleasant sensations a person would like to avoid. Short-term consequences.
Physiological well-being	Experiencing desired physiological states or feeling healthy. Long-term consequences.
Cognitive goals	
Positive or confirmatory self-evaluations	Experiencing self-efficacy, self-esteem, self-acceptance, or self-worth.
Understanding	Ordering, categorizing, explaining, or making sense.
Exploration	Experiencing curiosity, intellectual stimulation, or learning.
Intellectual creativity	Inventing new ideas or expanding one's limits.
Subjective organization goals	
Unity	Seeking coherence, harmony, or oneness.
Transcendence	Rising above ordinary experience, pursuing an idealized state, or spirituality.

Note. This table is adapted by De Koning, Boekaerts and Zeijl (2001).

3.2 Development of the GIFI

De Koning, Boekaerts en Zeijl (2001) operationalized Ford and Nichols' goals for educational purposes, using several action programs per goal. For each of the 89 items the

questionnaire asked how important the specific goal is at this moment in students' life (salience identification) and to what extent students consider it possible to attain that goal in the present school context (goal facilitation).

The questionnaire was adapted (Boekaerts, 2009); some goals formulated by Ford and Nichols were either too abstract or outside vocational students' everyday school world. For example, students reported that the goals Unity and Transcendence were not part of their reality and would not be taken seriously by their peers. This also applied to the goals Bodily Sensations and Physiological Well-being. Bodily sensations might be a sensitive subject for young adolescents and they may be too young to appreciate the importance of physiological wellbeing. These goals were omitted from the GIFI. Hence, the first version of the GIFI measured 20 goals, and was administered to students in secondary vocational education. In first testing of the questionnaire, another four goals did not emerge as separate goals; Items for the goals Understanding and Exploration seem to be taken in by the goal Mastery, and the goals Intellectual Creativity and Task Creativity did not seem to be meaningfully rooted in the reality of vocational students. The goal Happiness seemed to be taken in by the goals Entertainment and Tranquility. By contrast, Equity items split up into the goals Equity Parents and General Equity, reflecting the importance of parents in these students' everyday life. These adaptations resulted in 16 goals (see Boekaerts, 2009). The aim of the present study is to validate the current version of the GIFI for students in pre-vocational secondary education.

3.2 The Present Study

We tested two models. First, we hypothesized a first order factor model of 16 goals measured with 59 items with all factors correlated (De Koning, Boekaerts & Zeijl, 2001). Furthermore, we hypothesized that the 59 items will show the highest loadings on their corresponding 16

latent factors (model A). Second, some studies showed that the goals Individuality, Superiority, and Material gain take a different position from the other goals (Boekaerts, 2009; Smit, Boekaerts, & Busing, 2010). We hypothesized that these goals are perceived as a group, which we labelled as ego goals following Boekaerts (2009), alongside non-ego goals. Consequently, we tested a model (Model B) with a second order factor for ego goals. Bear in mind that we used the term ego goals differently than intended by Kaplan and Maher (1999) who used the expression ego goals as a synonym for performance goals in achievement goal theory. Finally, the best fitting model was cross validated and tested on gender and class invariance.

Gender invariance. Although the results are inconclusive, several studies indicate differences in goal appreciation between males and females. Female students showed more preferences for mastery goals (Harackiewicz, Barron, Carter, Lehto, & Elliot, 1997; Hijzen, Boekaerts & Vedder, 2006), whereas male students attached more importance to Relatedness, Autonomy (Martin, 2003; 2004), and Superiority (Hijzen, et al, 2006). Furthermore, girls scored higher on prosocial behaviour (Wentzel, Battle, Russell & Looney, 2010), whereas boys reported higher on social status goals (Andermann & Andermann, 1999). Sound interpretations of gender differences in goal appreciation require similar interpretation of the questionnaire by males and females. Therefore, we tested the invariance of the GIFI across gender.

Class effect. Data from individual respondents are often nested in larger structures. In educational settings data of students are nested in, for example, classes and schools. The assumption is this may influence the scores of individual students. According to the social-cognitive perspective, the goals students pursue, are not determined fully idiosyncratic, but partly by social and contextual factors (Bandura, 1986). Teacher behaviour and classroom climate influence students' goal orientation (Ames, 1992; Hijzen, Boekaerts, & Vedder,

2006; Meece, Anderman, & Anderman, 2006; Wentzel, Baker, & Russell, 2012). Also, the goals that significant others pursue can influence one's engagement (Edwards, 2006); classmates who are resistant to school norms, for example, can affect their peers motivation for learning negatively (Nelson & DeBacker, 2008). Furthermore, Hijzen, et al (2006) showed differences in goal preferences between the various program types; the program ICT/engineering, for example, scored higher on the Superiority goals and lower on the Mastery and Social Support goal, compared to other programs. To distinguish effects, e.g. mean differences, that can be attributed to the individual and to class membership, multilevel analyse are used more and more often. However, valid interpretations of class differences in goal appreciation require invariance across classes, indicating that different classes interpret the questionnaire similarly. Therefore we tested whether the questionnaire is invariant between classes, testing the goal structure with a multilevel analysis (Byrne, 2006; Hox, 2002).

3.3 Method

3.3.1 Participants

Data were gathered in three schools for pre-vocational secondary education in an urban area in the Netherlands. Pre-vocational secondary education prepares students in four years for vocational training. Assignment to this type of secondary education is mainly based on an entrance test in the final year of primary education. In the Netherlands, about 60 % of the students are referred to pre-vocational secondary education; these are the children with the lower test results

The questionnaire was completed by 511 students (mean age = 16.12, SD = .82, 46% boys) in 32 classes and 9 departments: ICT, Sport, Services & Security, Health & Wellbeing, Retail & Administration, Graphics & Media, Mechanics, Beauty Care, Construction, and

Electrical Engineering. One student refused to participate and six cases with predominantly missing values were deleted, resulting in a total sample of 504 respondents in the analyses.

Procedure

Students participated with informed consent from their parents. The researcher introduced the research to the students and administered a paper and pencil version of the GIFI. Anonymity was guaranteed. The questionnaire was completed during school time in, on average, 30 minutes, in the presence of a teacher and the researcher.

3.3.2 Instruments

The GIFI consists of 59 items representing 16 content goals, and aims to measure individual preferences and perceived facilitation. In this study, we focused on goal preferences. Students were asked how important each goal was to them, measured on a five point Likert scale (from 1 = not important at all to 5 = very important). The questionnaire was pre-tested; 100 students were interviewed in groups of five about word comprehension and relevance. We first asked about their most important goal in school. 99 of the 100 students replied 'getting my diploma', often followed by 'having fun at school, otherwise it is difficult to get your diploma'. Students reported that all goals they considered relevant were included in the GIFI, except possibly the goal 'having a good relationship with family' next to 'having a good relationship with parents'. Furthermore, the goals measured by the GIFI made sense to most students, although they did not consider the ego goals to be very important. When asked which goals were not applicable to them, they almost unanimously referred to 'superiority'. To check the social desirability of this response, the researcher then asked whether they thought this goal was important for any of their peers. That was confirmed, but it concerned one specific person only. Questions about word comprehension resulted in changing one word into a word with an unambiguous meaning.

Pleasure and interest were measured with one scale, in line with the IMI, with six items (e.g., 'I think schoolwork is fun). Also derived from the IMI, effort was measured with 5 items (e.g., 'I put a lot of effort into schoolwork').

3.3.3 Data analyses

The data were analyzed by means of structural equation modelling, using EQS 6.1 (Bentler, 2005). Maximum likelihood estimation was used to estimate the parameters. Given that we treated the data at a quasi-interval measurement level, we used covariance analyses. Structural equation modelling compares the covariance matrices of the hypothesized model with the covariance matrices of the actual data, examining relationships between observed and latent variables to determine whether the hypothesized model is consistent with the response (Byrne, 2006). The validation was executed in five steps. First, we tested the factor structure of the hypothesized models on a randomly selected half of the data set, the training set. Second, we performed post-hoc modifications, provided they were theoretically sound, in order to improve the model. Third, the modified model was tested on the other half of the dataset, the test set. Fourth, we performed a cross validation, and gender and class invariance were tested. Finally, the predictive validity of the goals for motivational engagement, i.e. pleasure/interest and effort was tested.

Fit indices

To assess the fit of the models, we used the fit measures formulated by Byrne (2006). A non-significant chi square indicates a good fit, but, as chi square is sensitive to sample size, chi square divided by the degrees of freedom is also used; values below 3, preferably below 2, indicate a good fit. CFI scores above .90 are acceptable, whereas scores of .95 and more

indicate an excellent fit. The RMSEA value should be as small as possible ($< .08$, preferably $< .05$) within a small confidence interval (CI) and interval values close to 0.

Differences between the hypothesized factor structure and post-hoc modified models are assessed with a chi square test; a non-significant test implies that the modified model does not differ from the hypothesized model, hence the more restricted model has to be preferred. Invariance was tested by inspecting the difference between the CFI values; a difference of < 0.01 between the more constraint model and the baseline model (configural model) indicates that addition of constraints did not result in a solution worse than the baseline model; hence, the model is invariant (Byrne, 2006). Finally, the AIC is used to compare non-nested models; the smaller AIC value indicates a better fit. As the data are partly skewed, we will use the robust method and robust fit measures that are provided by the EQS program and have been corrected for non-normality.

3.4 Results

3.4.1 Data inspection

Analyses showed that the data are skewed; students rate most goals as quite important (table 3), which concerns especially Equity Parents (EQP), but also Self Determination (SDT), Belongingness (BEL), Entertainment (ENT), General Equity (GEQ) and Positive Self Evaluation (POS). Individuality (IND) and Superiority (SUP) are considered least important, but the standard deviation is quite high, indicating there are students who deem IND and SUP quite important. Correlations and VIF values indicated no multicollinearity. Missing values do not exceed 2 %, but they are, according to Little's MCAR test, not missing completely at random. Especially items on the safety goal have relatively many missing values; questions about the use of alcohol, drugs, and avoiding trouble, obviously are sensitive to non-response, although anonymity is guaranteed. According to Scheffer (2002), even when data are not

missing completely at random, the mean and standard deviation from imputed data hardly differ from non-imputed data, as long as the missing values do not exceed the five percent. We used maximum likelihood estimation to deal with missing values.

3.4.2 Testing the fit

Testing Model A

To test the fit of the hypothesized first order model, 16 factors with all factors correlated (A1), we performed the analysis on a random half of the dataset (training set, N = 248, 48 % boys). It showed a weak fit ($\chi^2/df = 1.5$, CFI = .885, RMSEA = .045). Some post-hoc modifications were made, provided they were theoretically sound. First, the factor loadings were inspected to determine whether the items attributed sufficiently to the solution. Two items with high standardized residuals and small factor coefficients ($<.40$) were removed from the model. Second, based on the Lagrange Multiplier Test, two parameters were added. An item on the management goal also explained variance for the mastery goal, and vice versa. However, after adding these two parameters, both items appeared to have higher factor loadings on the factor other than hypothesized; obviously, the items did not discriminate sufficiently and were removed. Furthermore, for the item 'it is important to me to keep the feelings of classmates into account' (general equity goal), a parameter is added for the resources provision goal; students perceived equity also as providing help. Further modifications, suggested by the program, did not make sense, and therefore, were not executed. After these post-hoc changes, the model (A2) showed a reasonable and significant better fit; $\chi^2/df = 1.40$, CFI = .911, RMSEA = .042; $\Delta \chi^2 (df)$, $p < .001$.

Testing Model B

To test the fit of the hypothesized alternative second order model, we performed a CFA on the training set, containing 13 first order factors for the non-ego goals and a second order factor for the ego goals individuality, superiority, and material gain. The fit for this model was not satisfactory (B1; $\chi^2/df = 1.51$, CFI = .88, RMSEA = .046). The post hoc modifications did improve the fit significantly (B2; $\chi^2/df = 1.43$, CFI = .90, RMSEA = .043; $\Delta \chi^2 (df)$, $p < .001$), but did not exceed the fit of model A2. Therefore model A2 is preferred and, consequently, all further analyses are based on model A2. For an overview of the fit measures, see table 2.

Cross validation and invariance (A3, A4, A5)

Modification of models can lead to capitalization on chance, resulting in a model that “is only fitted to some peculiarities of the given sample” (Schermelleh-Engel, Moosbrugger, & Muller, 2003, p. 62). Therefore, we cross validated model A2 on the second random half of the dataset, (test set, $N = 258$, 43 % boys). This showed a reasonable fit (A3; $\chi^2/df = 1.30$, CFI = .931, RMSEA = .035); the adjusted model is quite stable across both sets.

Furthermore, we tested invariance across the data sets. In the configural model the parameters that initially were estimated for each dataset separately are estimated simultaneously in a multi group analysis without constraints, testing the similarity of the numbers of factors and the patterns of parameters across both datasets. The fit of the configural model was reasonable (A4, $\chi^2/df = 1.34$, CFI = .921, RMSEA = .038); the factor structure is fairly invariant.

To ensure that an instrument is equivalent across samples, the metric invariance was tested (measurement model); the factor loadings and factor correlations were constrained to be equal across groups. The fit measures were reasonable (A5, $\chi^2/df = 1.35$, CFI = .920,

RMSEA = .038). Furthermore, when comparing the fit of the measurement model with the fit of the configural model, the difference in CFI value is minimal (< 0.01); the relationships between constructs are invariant across both sets.

The reliability of the scales is good to high, except for the goal Resources Acquisition (see table 3). Available identical or comparable scales used in other studies (De Koning & Boekaerts, 2005; Hijzen, Boekaerts, & Vedder, 2006; Vedder, Kouwenhoven, & Burke, 2009) showed similar or slightly higher reliabilities.

Table 2 Models and fit measures (N training set = 248, N est set = 256)

	Description	dataset	χ^2	df	χ^2/df	AIC	CFI	RMSEA	90% CI	$\Delta \chi^2$ (df)	p < .001	Δ CFI
A1	16 first order factors, all r	training	2299.33	1532	1.50	-764.671	0.885	0.045	0.041, 0.049	A1 vs A2	p < .001	
A2	model A1Modified	training	1872.18	1309	1.43	-745.820	0.911	0.042	0.037, 0.046			
B2	second order factor modified	training	1961.77	1354	1.45	-746.230	0.903	0.043	0.038, 0.047			
A3	model A2 cross validated	test	1701.94	1309	1.29	-916.057	0.931	0.035	0.030, 0.039			
A4	model A2 configural	training/test	3575.26	2618	1.37	-1660.737	0.921	0.038	0.035, 0.041			A5 vs A4 < .01
A5	model A2 measurement	training/test	3611.92	2658	1.36	-1704.09	0.920	0.038	0.035, 0.041			
A6	model A2 female	female	1856.85	1309	1.42	-761.15	0.919	0.039	0.035, 0.043			
A7	model A2 male	male	1768.46	1309	1.35	-849.53	0.915	0.039	0.034, 0.044			
A8	model A2 gender configural	female/male	3624.40	2618	1.38	-1611.60	0.917	0.039	0.036, 0.042			A9 vs A8 < .01
A9	model A2 gender measurement	female/male	3677.07	2658	1.38	-11638.93	0.916	0.039	0.036, 0.042			
A10	model A2 multilevel	total	2781.31	2510	1.11	-2238.688	0.980	0.021	0.015, 0.025			

Table 3 Goal, number of items, mean, standard deviation and Cronbach's alpha for the 16 scales (N = 504)

Goal	items	M	SD	α	α^*	α^{**}	α^{***}
Belongingness (BEL)	2	4.24	0.72	.71	.89	.86	
Tranquility (TRN)	3	4.09	0.85	.79			
Social Responsibility (SOC)	4	3.88	0.78	.74			.84
Safety (SAF)	3	3.72	1.05	.82	.88		
Individuality (IND)	3	2.52	1.16	.86			
Self Determination (SDT)	4	4.34	0.68	.87	.93		
General Equity (GEQ)	5	4.16	0.66	.77			.74
Superiority (SUP)	4	2.32	1.06	.91			
Resource Provision (RPR)	4	3.99	0.84	.87		.91	
Resource Acquisition (RAQ)	3	4.00	0.75	.66			
Entertainment (ENT)	3	4.22	0.75	.72			
Mastery (MAS)	3	4.18	0.72	.73	.93	.92	.77
Positive Self Evaluation (POS)	4	4.15	0.80	.86			
Equity Parents (EQP)	3	4.52	0.79	.93			
Management (MAN)	3	4.01	0.83	.84			
Material Gain (MG)	4	3.48	1.01	.84	.79		
Pleasure/Interest (PLS)	4	2.75	1.02	.91			
Effort (EFF)	4	3.61	0.77	.70			

*comparable scales Vedder, Kouwenhoven & Burke, 2009

**comparable scales Hijzen, Boekaerts & Vedder, 2006

***comparable scales Wentzel (1993)

Table 4 *Goal, and Pearson correlation for the 16 scales (N = 504)*

Goal	BEL	TRN	SOC	SAF	IND	SDT	GEQ	SUP	RPR	RAQ	ENT	MAS	POS	EQP	MAN
Belongingness (BEL)	-														
Tranquility (TRN)	.37**	-													
Social responsibility (SOC)	.46**	.45**	-												
Safety (SAF)	.32**	.41**	.53**	-											
Individuality (IND)	.03	.08	.13**	.02	-										
Self Determination (SDT)	.21**	.39**	.24**	.20**	.10*	-									
General Equity (GEQ)	.39**	.44**	.58**	.43**	.06	.37**	-								
Superiority (SUP)	-.02	.05	-.00	-.00	.43**	.06	-.06	-							
Resource Provision (RPR)	.42**	.44**	.50**	.35**	.10*	.29**	.55**	-.06	-						
Resource Acquisition (RAQ)	.34**	.38**	.40**	.32**	.07	.33**	.46**	.01	.45**	-					
Entertainment (ENT)	.26**	.42**	.29**	.24**	.08	.47**	.37**	.00	.34**	.38**	-				
Mastery (MAS)	.29**	.44**	.42**	.37**	.07	.44**	.43**	.06	.36**	.39**	.55**	-			
Positive Self Evaluation (POS)	.32**	.53**	.34**	.32**	.08	.48**	.39**	.03	.37**	.38**	.49**	.50**	-		
Equity Parents (EQP)	.35**	.35**	.35**	.40**	-.03	.22**	.34**	-.14**	.29**	.34**	.31**	.39**	.37**	-	
Management (MAN)	.31**	.48**	.45**	.48**	.01	.32**	.54**	-.01	.44**	.38**	.35**	.55**	.49**	.46**	-
Material Gain (MG)	.07	.16**	-.03	.01	.29**	.16**	.06	.33**	.02	.08	.16**	.16**	.16**	.01	.11**

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed)

Table 4 *Items, goals, standardized solution, error, and R Squared.*

	BEL	TRN	SOC	SAF	IND	SDT	GEQ	SUP	RPR	RAQ	ENT	MAS	POS	EQP	MAN	MG	E	R ²
Belongingness (BEL)																		
get along with my classmates.	.973																.231	.947
be liked by my classmates.	.519																.855	.270
Tranquility (TRN)																		
feel calm		.905															.426	.819
feel secure when I give my opinion on something		.870															.492	.757
not feel irritated by classmates.		.661															.750	.437
Social responsibility (SOC)																		
show respect for classmates.			.684														.730	.468
not fight/quarrel with classmates			.615														.789	.378
get along with teachers.			.638														.770	.406
understand what teachers want			.645														.764	.416
Safety (SAF)																		
not take big risks (e.g. not drink too much or use drugs)				.714													.700	.510
avoid dangerous/risky situations				.874													.487	.763
stay out of troubles				.765													.644	.586
Individuality (IND)																		
be different from others					.902												.431	.814
be unique, special					.916												.402	.839
be able to do unusual things					.669												.743	.448
Self Determination (SDT)																		
be able to decide things myself						.708											.706	.502
be able to choose how I do my schoolwork						.949											.316	.900
be able to execute my own ideas						.598											.801	.358
be able to choose tasks and subjects for schoolwork						.883											.469	.780
General Equity (GEQ)																		
meet my appointments, do what I promised							.623										.782	.389
treat my classmates fair							.681										.733	.463
remember important things							.671										.741	.451
be able to cooperate with my classmates. .							.732										.681	.536
keep the feelings of classmates into account							.420		.385								.691	.522
Superiority (SUP)																		
know more than my classmates								.870									.493	.757
be more competent than classmates								.894									.447	.800
be more attractive than my classmates								.835									.551	.697

impress my classmates	.749	.663	.560
Resource Provisions (RPR)			
help classmates when they are not able to do a task	.741	.671	.550
help classmates when they have personal problems	.828	.560	.686
take into account if classmates need help	.807	.590	.651
cheers classmates up, when they are in trouble	.733	.681	.537
Resource Acquisition (RAQ)			
get help when I can't get done what is needed	.719	.695	.517
get help when I am having personal problems	.605	.796	.367
classmates to keep in mind what my abilities and limitations are	.546	.838	.298
Entertainment (ENT)			
be in a department that is interesting	.664	.747	.442
have variation in the lessons	.730	.684	.532
school to be pleasurable	.741	.672	.549
Mastery (MAS)			
keep on learning new things	.774	.634	.599
become a good craftsman/professional	.576	.818	.332
really understand the learning material	.803	.595	.645
Positive self-evaluation (POS)			
be satisfied with who I am.	.770	.638	.592
not to doubt myself	.811	.585	.657
know I will be good at my profession	.777	.630	.603
have the idea I am competent and capable	.760	.650	.578
Equity parents (EQP)			
not quarrel with my parents.	.910	.414	.829
get along with my parents.	.910	.416	.827
not get into trouble with my parents.	.896	.444	.802
Management (MAN)			
be tidy, orderly	.727	.686	.529
finish my work in time	.818	.576	.668
plan my work properly.	.836	.549	.698
Material gain (MG)			
have many clothes		.612	.791 .375
make a lot of money		.773	.634 .598
be able to buy what I want		.848	.530 .719
have the newest things		.701	.713 .491

3.4.3 Testing invariance

Gender invariance (A6, A7, A8, A9)

Furthermore, we tested invariance across gender. First, the best fitting model (A2) was tested on the female (A6) and male sample (A7) separately. Model A2 proved to be a reasonable model for girls (A6, $\chi^2/df= 1.41$, CFI = .919, RMSEA = .039), and boys (A7, $\chi^2/df= 1.34$, CFI = .915, RMSEA = .039). Second, we tested invariance for gender with multi-group analyses performing two increasingly stringent steps: the configural model and the measurement model. Both the configural model (A8; $\chi^2/df= 1.38$, CFI = .917, RMSEA = .039) and the measurement model showed an adequate fit (Model A9; $\chi^2/df= 1.37$, CFI = .916, RMSEA = .039, $\Delta CFI < .01$). We can conclude that the factor structure and the scores on items are fairly similar across gender.

Class invariance (A10)

Finally, we tested whether the questionnaire is invariant between classes, with a multilevel analysis, comparing model A2 across classes, allowing variance between classes. This analysis explained a small, but significant part of the variance (A10, $\chi^2/df= 1.11$, CFI = .980, RMSEA = .021), indicating that, indeed, there is some variance at class level in addition to individual variation. Inspecting the intra class correlations, providing information about the correlations within the clusters of classes, we found small but significant differences between classes for the goals Tranquility, Self Determination, General Equity, Superiority, and Resource Provision. Please not that these difference do not concern mean differences; it indicates that at class level the observed model differs from the hypothesized model, for the goals mentioned: classes tend to interpret the structure of the GIFI differently for these goals. Therefore, mean differences between classes that are found using the GIFI need to be interpreted with caution.

3.4.4 Concurrent validity

Finally, we tested whether the goals in the GIFI are related to motivational outcome measures: the effort students report they put into schoolwork and the pleasure/interest they perceive in doing schoolwork, which are, according to the Self Determination Theory basic motivational outcome measures. We performed a path analysis in EQS 6.2. A path analysis is a multivariate technique that enables us to specify relationships between exogenous variables, in this case students' multiple goals, and endogenous or dependent variables, in this case motivational engagement in the form of effort and pleasure/interest. Results show that the 16 goals explain 21% of the variance in effort, and 34% of the variance in pleasure/interest. Figure 1 and 2 show the significant relations.

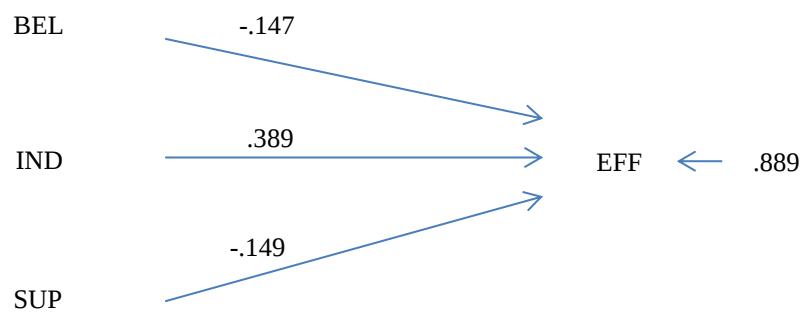


Figure 1 Path Analyses goals and effort, standardized solution, error, all factors correlated.

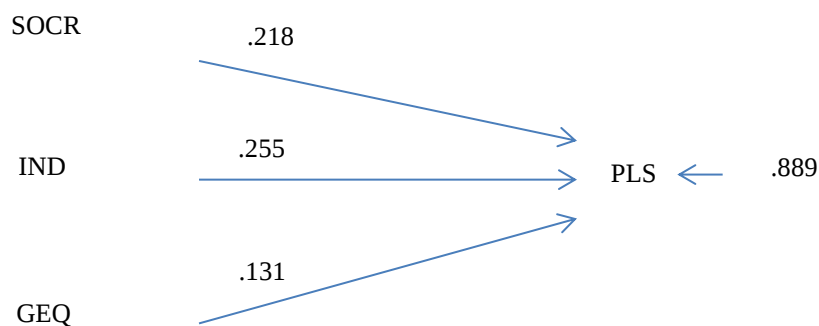


Figure 2 Path Analyses goals and pleasure/interest, standardized solution, error, all factors correlated.

3.5 Conclusion and discussion

Research to unravel what provides students with energy and direction in the classroom, has mainly focused on learning goals and – to a lesser extent – on social goals. Yet, a handful of educational and developmental psychologists have repeatedly pointed out that our thoughts, feelings and actions are influenced by multiple content goals. The aim of the present study was to validate the Goal Identification and Facilitation Inventory (GIFI), a goal questionnaire that enables researchers to study students' multiple content goals in the classroom.

We tested two models. The hypothesis, based on De Koning, Boekaerts en Zeijl, (2001), that 16 correlated factors describe the goal structure, can be accepted, albeit with some modifications. The modified model was confirmed with a cross validation. The alternative hypothesis, based on a study by Boekaerts (2009) and Smit, Boekaerts and Busing (2010), that students in vocational secondary education perceive the goals Superiority, Individuality, and Material Gain as a subgroup representing ego goals, is rejected. Although these three goals are inter-correlated and hardly correlated with the other goals, they do not share a common denominator. This strengthens the conclusion that students distinguish between 16 separate content goals.

Reported differences between boys and girls in preference e.g. for Mastery, Social Relatedness, and Autonomy goals (Anderman & Anderman, 1999; Harackiewicz, et al, 1997; Martin, 2003, 2004), urged us to test gender invariance. Analyses indicated that the 16 factor model was gender invariant; the GIFI is interpreted similarly by boys and girls. This means that differences in scores between boys and girls measured with the GIFI, can actually be ascribed to different goal preferences and not to perceiving the items of the questionnaire differently.

Furthermore, we tested whether the GIFI is invariant across classes. Multilevel analyses indicated that eleven of the 16 goals were invariant across classes and that five goals were perceived differently in various classes; Tranquility, Self Determination, General Equity, Superiority, and Resource provision. Please note that invariance indicates that classes differ in how they perceive the items; it is not the difference in the importance they attach to the goals. Differences could be explained by differences between departments. It goes without saying that student populations in the departments of Health & Welfare and Beauty Care are different from the populations in the departments Mechanics and Construction. Also, the goal structure of the classrooms, the teaching methods and grading practices used, may be at variance. We could explain how this may influence mean differences in the importance students attach to goals. It is, however, difficult to explain how different departments could lead to different perceptions or meanings of the goals. Further research is needed to determine the exact nature of the variance between classes. For now, differences between classes concerning the five goals mentioned, should be interpreted cautiously.

Finally, we tested the concurrent validity of the 16 goals for basic measurements of motivation. We conclude that, although goals explain a moderate part of the variance, only a limited number of goals are significantly related to effort and pleasure/interest. This is in contrast previous studies that showed that social goals are related to effort and academic achievement (Wentzel, 1989, 1991, 1996, 2000), peer acceptance (Wentzel, 1994) and the quality of collaborative learning (Hijzen, Boekaerts & Vedder, 2006).

Limitations

The validation shows that the GIFI is a useful research instrument to measure multiple goals. However, several limitations and considerations have to be taken into account. First, the generalizability of the study is limited, as it was executed in a specific group of students.

This study suggests that the GIFI is suitable for students in pre-vocational secondary education. Cross validation with different student populations should inform us whether the GIFI can be deployed for other student populations. Second, the less concrete goals like Unity, Transcendence, and Creativity were left out of the GIFI in a previous study; according to the students in that particular study, these goals either did not make sense or did not relate to their own reality. Still, even though Ford and Nichols (1987) acknowledged that the higher order goals “are difficult to define in precise terms” (p. 299), future research could reformulate the contested goals in wordings and style that might address adolescents in different types of school, to enable us to study the taxonomy as a whole. Another consideration concerns the type of questions that need to be asked to grasp the different aspects of goals. The GIFI asks about goal importance (Identification) and whether the context facilitates the pursuit of the goals (Facilitation). However, these are only two ways of studying students’ goals of which we only studied goal importance. According to Wentzel (1999), a person might deem many outcomes important, but not act accordingly. Her way of asking is ‘how often do you try to reach this goal’. The Achievement Goal Theory questionnaire (Elliot & Murayama, 2008) and the social goal orientations questionnaire (Dowson & McInerney, 2003;2004) ask about goal content, followed by the why of a goal; the goal to please ones parents, for example, can underlie the mastery goal. Mansfield (2009) studied the same relation, but, instead of formulating two goals in one item, she first asks about goal content, followed by the ‘why’ of that specific goal. Wentzel and Wigfield (1998) and Little, Salmela-Aro, and Phillips (2007) used yet another approach in their Personal Project Analysis. They take into account various perspectives on goals, e.g. the support from the environment, influence from peers, costs and benefits, thus gathering rich information about a person’s goals. However, this brings about other obstacles, for example, the amount of questions a respondent can digest, and the instruments researchers can use; paper and

pencil questionnaires are known to be difficult for obtaining answers to all the questions (e.g. Bowing, 2005). Another consideration concerns the overlap of various existing goal questionnaires. A quick, comparative glance at the GIFI, and e.g. the goal questionnaire developed by Wentzel (1993), the GOAL-S (McInerney & Dowson, 2004), the coding system for the Motivation Induction method (Nuttin, 1985), the Achievement Goal Theory questionnaire, the Importance of Goals Scale (Carroll, Durkin, Hattie & Houghton, 1997) and the IMI, used for research based on the Self Determination Theory, reveals overlap as well as unique contributions. Cross validating the different questionnaires could sort out the overlap, providing a more comprehensive instrument for future research.

In conclusion, the GIFI is a valid and stable instrument, allowing us to study goal salience. However, given the complexity of measuring goals, further study is necessary to get a firm grip on multiple content goals in relation to other aspects of motivation and self-regulation.

Chapter 4

Goal salience in the classroom

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Abstract

In this exploratory study, cluster analyses and multidimensional unfolding technique were used to visualize goal salience. A total of 1,733 students from secondary vocational educations reported on the importance of 16 goals, using the GIFI, which is based on the 24 goal taxonomy proposed by Ford and Nichols (1991). Results show that students make a clear distinction between ego and non-ego goals and that non-ego goals are reported as most important by most students. Also, differences within the group of boys and the group of girls, and differences between boys and girls are shown. The results and possibilities of multidimensional unfolding for future research on goals are discussed.

4.1 Introduction

The aim for our empirical work on goals is to document that students bring multiple content goals into the classroom, to visualize goal salience, and to study how different goals interact. Boekaerts and colleagues have argued that individuals pursue multiple goals that energise and direct their behaviour. Salient goals give meaning to people's life and achieving or not achieving these goals is relevant to their personal and social well-being. Educational psychologists have routinely focused on achievement goals and social goals that students pursue in the classroom, but education researchers have not really studied students' multiple content goals or goals as a system. Boekaerts and colleagues conducted several studies with adolescents, using the Goals Identification and Facilitation Inventory (GIFI), which is based on the 24 goal taxonomy proposed by Ford and Nichols (1991).

Our focus on the multiple content goals that students bring into the classroom reflects the appeal that researchers in main stream psychology (e.g., Carver & Scheier, 2000; Ford & Smith, 2007) and educational psychology (Boekaerts, De Koning, & Vedder, 2006; Dowson & McInerney, 2003; Lemos & Gonçalves, 2004) made for studying the individual's goals as a system.

For our studies on multiple goals, we chose vocational schools. There are several reasons for studying the motivation of students in secondary vocational education. First, these students show low motivations for academic subjects and have high dropout rates, already visible in pre-vocational secondary education (Central Bureau for Statistics, 2015). Second, a decrease in motivation becomes visible simultaneously with students' psychological development in adolescence (Eccles, 2004). Especially from the age of 16 years, goals other than learning goals might gain relevance, influencing students' motivation for school.

We find it important that gender differences are taken into account when students' goals are studied. Several researchers assumed that there are gender differences in motivation

and goals salience (e.g. Martin, 2003, 2004). However, Dowson, McNerney, and Nelson (2006) stated that there is little empirical evidence. Their own study showed a gender effect only on social concern goals: for boys social concern goals were less important than for girls. In a study by Hijzen, Boekaerts, and Vedder (2006) girls reported higher preferences for social support goals and also for mastery goals, whereas boys valued superiority goals higher. We are convinced that the multidimensional unfolding technique (Busing, 2010) will enable us to gain more insight into the goals students pursue and will reveal gender differences in goal salience. Before we discuss this technique, we will briefly discuss current thinking about the pursuit of multiple goals.

4.2 Conceptualization of Multiple Goal Pursuit

Performance vs. mastery orientation

An important line of research that investigates students' goal pursuit is achievement goal theory. Achievement goal theorists (e.g. Linnenbrink-Garcia, Tyson & Patall, 2008; Pintrich, 2000; Urdan, 2004) have focused on a single type of goal, namely achievement goals. Goal theorists want to understand *why* students set themselves particular goals rather than *what* type of goals they want to pursue. Urdan and Maehr (1995) described two main reasons for goal pursuit in the classroom, namely wanting to learn and understand the material (mastery goal) and wanting to demonstrate to others that one has the ability to get good grades and to outperform others (performance goal). Reviewing the extant literature, Urdan (2004) stated that mastery goals are associated with positive outcomes whereas the results for performance goals have been less consistent. The work of Harackiewicz and colleagues sheds some light on these findings (e.g., Harackiewicz, Barron, Pintrich, Elliot, & Trash, 2002).

Harackiewicz elaborated the distinction between mastery and performance goals by crossing these goals with approach and avoidance goals. In general, the literature on mastery-

approach and performance-avoidance goals has been consistent. For example, Linnenbrink-Garcia et al. (2008) reported benefits from pursuing mastery-approach goals (e.g. enhanced interest, deep-level processing, and the use of meta-cognitive strategies). Performance-avoidance goals seem to be detrimental for learning, mainly because the students' focus is on avoiding to look incompetent relative to peers. This creates anxiety and lower levels of interest, and in turn, lower achievement. Results on the effect of performance-approach goals have been less consistent, especially in conglomeration with mastery goals. Goals theorists discuss the effect of the pursuit of a single goal (a mastery approach goal or a performance approach goal) or the pursuit of both goals simultaneously. Barron and Harackiewicz (2001) defined four different effects from the pursuit of both mastery approach and performance approach goals. First, when each goal is independently beneficial for a single outcome, it is defined as an additive effect. Second, an interactive effect is established when the pursuit of both goals is more adaptive than the pursuit of one of the goals alone. Third, goals can have unique effects on multiple outcomes, labelled as specials effects. Finally, a selective effect emerges when the effect of personal goals depends on the match with the goal context.

According to adherents of the mastery goals perspective, mastery goals are beneficial in all situations. These researchers assert that performance-approach goals can, under certain conditions, be beneficial for learning. Harackiewicz et al. (2002) reported positive associations between a range of indices of performance and achievement and the pursuit of performance-approach goals (see also Linnenbrink-Garcia et al., 2008). However, performance-approach goals may also trigger negative emotions, such as performance anxiety (Middleton & Midgley, 1997), even in combination with mastery goals, suggesting that there is no interactive effect. Yet, researchers who support the multiple goal perspective suggest that there is an interactive effect and that the pursuit of both mastery goals and performance approach goals in concert is more beneficial for various aspects of learning than

the pursuit of mastery goals only. For an interesting overview on different findings on both perspectives, see Linnenbrink (2005).

Social goals interact with mastery and performance goals

The four different effects of goals pursuit can be extended to the research on non-learning goals. Recall that most goal theorists have defined classrooms as achievement contexts and defended the view that learning and achievement goals are the most prominent goals that students pursue in that context. A number of researchers have also studied the social goals that students pursue in the classroom (e.g. Hijzen et al., 2006; McInerney, 2004; Lemos & Gonçalves, 2004; Wentzel, 1996, 2000) and their interaction with mastery goals. For example, Wentzel (1996) stated that students who value both mastery and social responsibility goals are willing to invest more effort in academic work than students who attach less importance to these goals. She also found that entertainment goals and belongingness with peers goals impede rather than support learning. The former goals, mastery and social responsibility, are more salient in high achievers and the latter goals, entertainment and belongingness, in low achievers. Boekaerts and Hijzen (2007) confirmed these results in a vocational school context. They also showed that students who value belongingness with peers have a lower perception of the quality of collaborative work in the classroom than students who do not value these goals.

Although researchers have accrued some information about the interaction of achievement and social achievement goals (social responsibility, social status, social approval, and social affiliation goals) in a school context (e.g. Dowson & McInerney, 2003), we still know very little about the conflicts that may arise when students pursue non-learning goals simultaneously with learning goals. Ford (1992) and Ford and Smith (2007) argued that we need to develop a comprehensive model of students' goal endorsement and study

students' goals *as a system*, displaying the superordinate and subordinate relations among the goals. The taxonomy of goals that Ford and Nichols (1991) constructed is based on a system perspective that is grounded in developmental theory. Ford (1992) explained that 24 different content goals provide information on the consequences that these goals represent for different people. He argued that having knowledge about the *content* of a person's salient goals tells us something about the way that this person assigns meaning to his or her life in that particular period of life. Ford also maintained that goals can have an interactive effect. He clarified that people's behaviour is often guided by multiple content goals simultaneously and that the most motivating activities and experiences are those that involve the simultaneous pursuit and attainment of many different kinds of goals.

Nine core goals provide information on adolescents' goal-directed behaviour

Boekaerts and colleagues (e.g. Boekaerts, 2009; Hijzen et al., 2006) developed the Goal Identification and Facilitation Inventory (GIFI) to measure adolescents' goal salience. The aim of these studies was to find out which of the 24 taxonomy goals (Ford & Nichols, 1991) are meaningfully rooted in adolescents' everyday reality. Boekaerts (2009) found that 16 of the 24 goals identified in the taxonomy were endorsed by vocational students. Hierarchical cluster analysis revealed that these students clearly differentiated between non-ego goals and a cluster of three ego goals (i.e. Superiority, Individuality, and Material Gain). The non-ego goals further differentiated into a task-related goal cluster and a social goal cluster.

Recently, Smit, Boekaerts, and Pat-El (in preparation) re-analyzed the data set. Using exploratory and confirmatory factor analysis on a split half of the subjects, they extracted nine core goals. Interestingly, the goals Mastery and Management were combined into one goal cluster (e.g. I want to learn new things; I want to complete my work in time). The goals Support Provision and Support Acquisition combined into *social support goals* (e.g. I want to

support others; I want others to help me when I have difficulties). The goals Self Determination, Equity Parents and General Equity were also joined together into *self-determination and equity goals* (I want to be treated fairly; I want to have decision latitude). The goals Positive Self-evaluation, Tranquility and Entertainment were integrated into *feel-good goals* (e.g. I want to feel confident; I want to feel happy; I want to enjoy my studies). The goals Belongingness and Social Responsibility were also interrelated into a *Belongingness and social responsibility goals* (e.g. I want to be liked; I want to feel welcome in the group, I want to respect others). The goal Safety (e.g. I want to stay out of trouble; I want to avoid risks) remained a separate goal and so did the three ego-goals: Superiority (e.g. I want to be better than others, I want to impress others), Individuality (e.g. I want to have special things, I want to be unique), and Material Gain (e.g. I want to earn a lot of money; I want to have many clothes).

Please note that some of the 16 content goals that Boekaerts (2009) reported are now interlinked with other goals, suggesting that adolescents mentally represent these goals in a similar way. For example, they do not seem to separate the goals Mastery and Management implying that wanting to learn new things and managing one's resources to acquire new knowledge and skills are perceived by the students as the same goal. Similarly, the goals General Equity, Equity Parents and Self-determination are intertwined, suggesting that in the students' theory of mind wanting to be treated fairly in class and having room to make one's own decisions are two sides of the same coin. This also applies for the goals Belongingness and Social Responsibility. They seem to communicate that they want to feel welcome in the peer group (i.e. be respected for who they are) and that they will –in turn- respect others.

In the present study we explored the interaction of these nine core goals. We used cluster analysis and multidimensional unfolding to visualize the patterning of the nine core goals for both boys and girls.

4.3 Method

Subjects

The present study is part of a larger project on vocational students' goals and motivation. Participants were Dutch first-year students attending secondary vocational education. A subsample of 1,713 students (55.9% girls) from nine different secondary vocational schools, spread evenly across the Netherlands, was used. Students' age ranged from 15 to 55 years with an average of 18 years and 1 month ($SD= 3.56$ years). Most students were enrolled in health and welfare programs (54.2%), a part of the students were enrolled in retail and administration (21.5%), and relatively few students were enrolled in engineering and ICT (15.9%).

Instruments

Students' goal salience was measured with the Goal Identification and Facilitation Inventory (GIFI) which is based on the 24 goals of Ford and Nichols (1991). Data collection took place in the second semester of the students' first year in the classroom. Students were asked how important each goal was, using a five point Likert scale ranging from 'very unimportant (1)' to 'very important (5). Smit et al. (in preparation) used an exploratory and a confirmatory factor analysis and extracted nine scales. Table 1 presents the nine goals, sample items, and the reliability for each goal.

Table 1. *Goals, sample items, number of items and Cronbach's alpha coefficients*

Goal	Item sample	Items	Alpha
Mastery & Management (MM)	I want to learn new things;	16	.96
	I want to complete my work on time		
Social Support (SO)	I want to support others;	8	.92
	I want to be supported		
Self Determination and Equity (SE)	I want to be treated fairly;	14	.95
	I want to have decision latitude		
Feel Good (FG)	I want to feel confident;	10	.94
	I want to enjoy my classes		
Belongingness and Social responsibility (BS)	I want to feel welcome;	10	.90
	I want to respect others		
Safety (SF)	I want to stay out of trouble	4	.83
Superiority (SU)	I want to be better than others	9	.94
Individuality (IN)	I want to be unique	4	.87
Material Gain (MG)	I want to have a lot of clothes	4	.85

Analyses techniques

We began the analyses with Ward's hierarchical cluster analysis. This technique is used to explore and classify data sets in groups of objects that resemble each other and differ from other objects in the data set (Everitt, Landau, & Leese, 2001). It is an exploratory tool designed to reveal natural groupings or clusters. Hierarchical clustering provides detailed information by showing the different levels to which objects and clusters of objects belong, visualized in a dendrogram. Ward's hierarchical clustering method is based on variance, clustering objects with small variance within each cluster and large variance between the clusters (Gordon, 1999). Other clustering techniques offer possibilities to cluster objects or respondents. As we wanted to study goals as a system, we chose to cluster the goals. Since we expected gender differences in goal salience, we applied the clustering techniques separately for boys and girls.

We continued our analyses with the multidimensional unfolding technique, which is a special case of multidimensional scaling (MDS). The multidimensional unfolding technique is an exploratory technique intended to study preference scores, which can be seen as proximities between the elements of two sets (individuals and objects). It leads to a configuration that is based on the preference scores of each individual for each object, translates into distances (Busing, 2010). We used the mean score for each goal for each respondent to determine preferences. Individuals are placed at the ideal spot in the multidimensional space, so that the graph reflects each individual's preference scores to the various objects. In other words, respondents are located closest to their most preferred objects and furthest from their least preferred object, implying that high preferences correspond with small distances and vice versa. The advantage of this technique is that it transforms the relations between each respondent and the set of objects into comprehensible graphic output.

An excellent and detailed overview of multidimensional unfolding can be found in Busing (2010) and Borg and Groenen (1997).

4.4 Results

We wanted to know the importance that students attach to ego and non-ego goals, how these goals are related, and whether the pattern of relations between the nine goals is different for boys and girls. Two techniques were used to explore the data sets, namely the hierarchical cluster analysis technique and the multidimensional unfolding technique. The nine goals that were described above will be represented in the respective figures by short labels, namely BS for the goals Belongingness and Social Responsibility, SF for the goal Safety, FG for Feel Good goals, SE for the goals Self Determination and Equity, SO for the Social Support goals, MM for the goals Mastery and Management, IN for individuality, MG for the goal Material Gain, and SU for the goal Superiority.

We performed two separate cluster analyses, both describing the relations between the nine goals, but for girls and boys separately. We wanted to identify a discrete number of goal clusters. Visual inspection of the dendrograms of boys and girls reveals how the nine goals are clustered. Comparison of Figure 1a and 1b reveals that the dendrograms are very similar. It is evident that there are four closely inter-related goals in Figure 1a, namely SE, MM, SO, and FG. This suggests that girls in vocational education report as equally salient in their life ‘wanting to be treated fairly and be granted decision latitude’(SE), ‘wanting to master the learning material and manage one’s own activities to reach this goals’ (MM), ‘wanting to help others and be helped by others’ (SO), and ‘wanting to feel confident and enjoying learning’(FG). We would like to refer to this cluster of four core goals with the term ‘learning-related goals’. The goals Belongingness and Social Responsibility are added to this primary cluster at a short distance (at a cut-off point of 2.5 on the ordinate) and the Safety

goal is added a little higher in the dendrogram (at a cut-off point of 3 on the ordinate). The three ego goals, especially Individuality and Superiority, are quite distinct from the non-ego goal cluster.

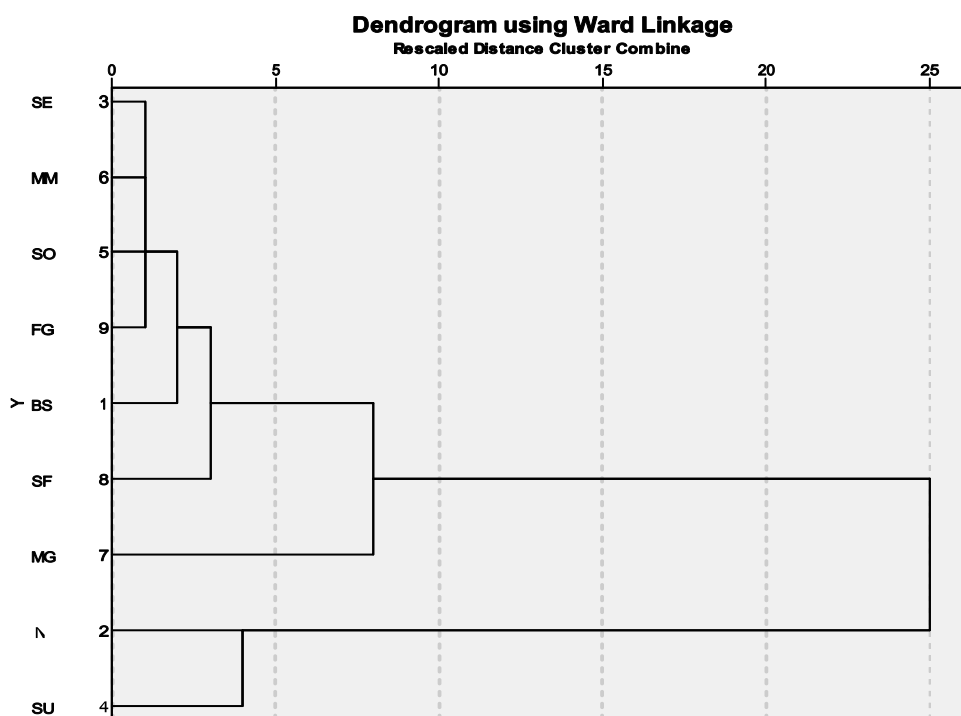


Figure 1a: Cluster with girls' goals

In Figure 1b, we observe that three of the four goals that were clustered in the initial stage of the hierarchical clustering in the dendrogram for girls are also closely related goals for boys, namely the Self Determination & Equity goals, the Mastery & Management goals, and the Feel Good goals. At a short distance in the dendrogram, the goals Social Support, and Belongingness and Social Responsibility were added (respectively, below the cut-off points of 2.5 and 3 on the ordinate). This suggests that the social goals (Social Support and Belongingness and Social Responsibility goals) are closely associated with the learning-related goals, but are also distinct from them.

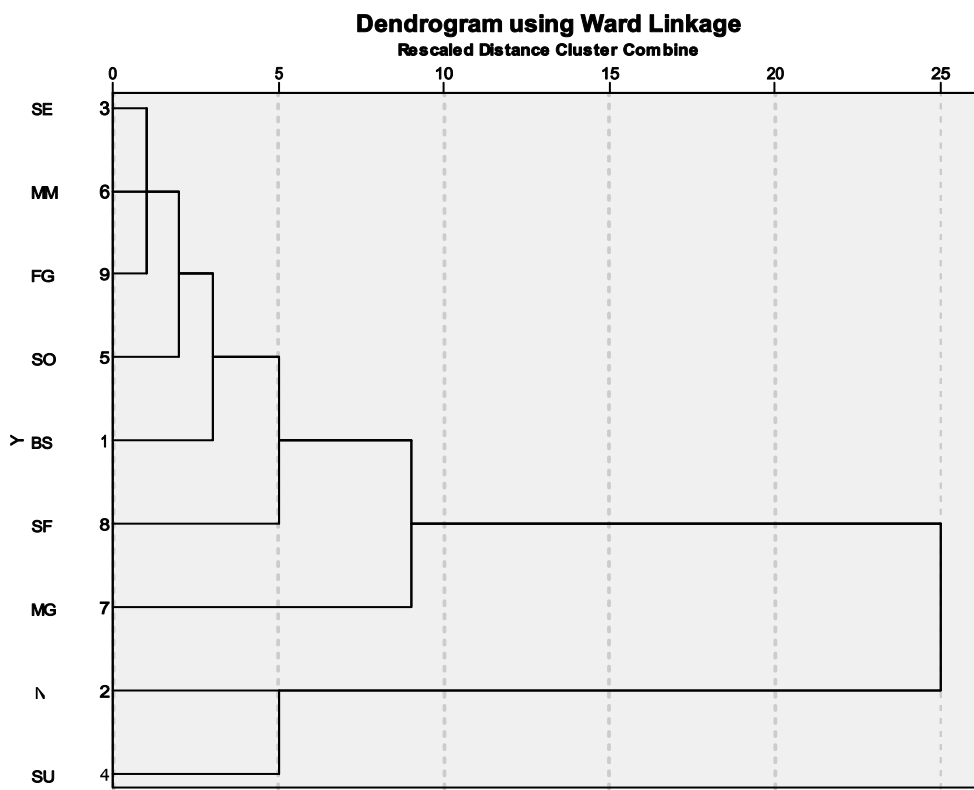


Figure 1b: Cluster with boys' goals

Please note that in both dendrograms the goals Individuality and Superiority are clustered early in the hierarchical classification and do not cluster with any of the non-ego goals. The goal Material Gain has an ambivalent position; it is neither clearly associated with the ego goals nor with the non-ego goals.

A difficulty with using dendrograms to identify clusters is to decide on the distance at which the clusters are to be formed. Myatt and Johnson (2009) argued that once the distance cut-off point is selected, a line may be drawn cutting through the dendrogram at the chosen distance. Generally, choosing a cut-off point high on the ordinate will produce fewer groupings but the diversity within each group will be greater. Cut-off points set at a lower distance on the ordinate result in a greater number of clusters, but more homogeneity within

the groups. We decided to select a cut-off point of 5 on the ordinate and that yields three groupings in both dendrograms. As stated, the dendrograms were almost similar for girls and boys. Boys seem to differentiate slightly more between the goals than girls do.

Whereas cluster analyses provide us with clusters of goals based on common characteristics, the multidimensional unfolding technique enables us to examine within a single configuration the position of the goals in relation to each other and in relation to the importance that each individual respondent assigned to each goal. Again, as we expected differences in gender, we unfolded separately for boys and girls. Unfolding can be done with multiple dimensions, but more than two dimensions are difficult to interpret. Therefore, we chose to perform the unfolding with two dimensions.

To interpret the configuration, any characteristics of the configuration from the multidimensional unfolding process that are unlikely to result from chance can be marked. Dependent on what the configuration shows, this marking may take the shape of dimensions, groups, clusters, regions, and lines, curved or straight (Borg & Groenen, 1997).

Figure 2a and 3a show the results as displayed by the PREFSCAL procedure. Our interpretation of the unfolding results is presented in Figures 2b and 3b. The position of the respondents in Figure 2a tells us that girls who value mastery and management goals, do that in combination with four non-ego goals, namely Self Determination and Equity, Belongingness and Social Responsibility, Social Support, and Feel Good goals (learning-related goals). These non-ego goals are concentrated in the middle of the graph, close to each other, even on top of each other. This indicates that girls value several goals as equally important. The goal Safety (SF) which is conceptually a part of the non-ego goals is clearly separated from the other non-ego goals and the three ego goals, meaning that girls view this goal as distinct from the other non-ego goals.

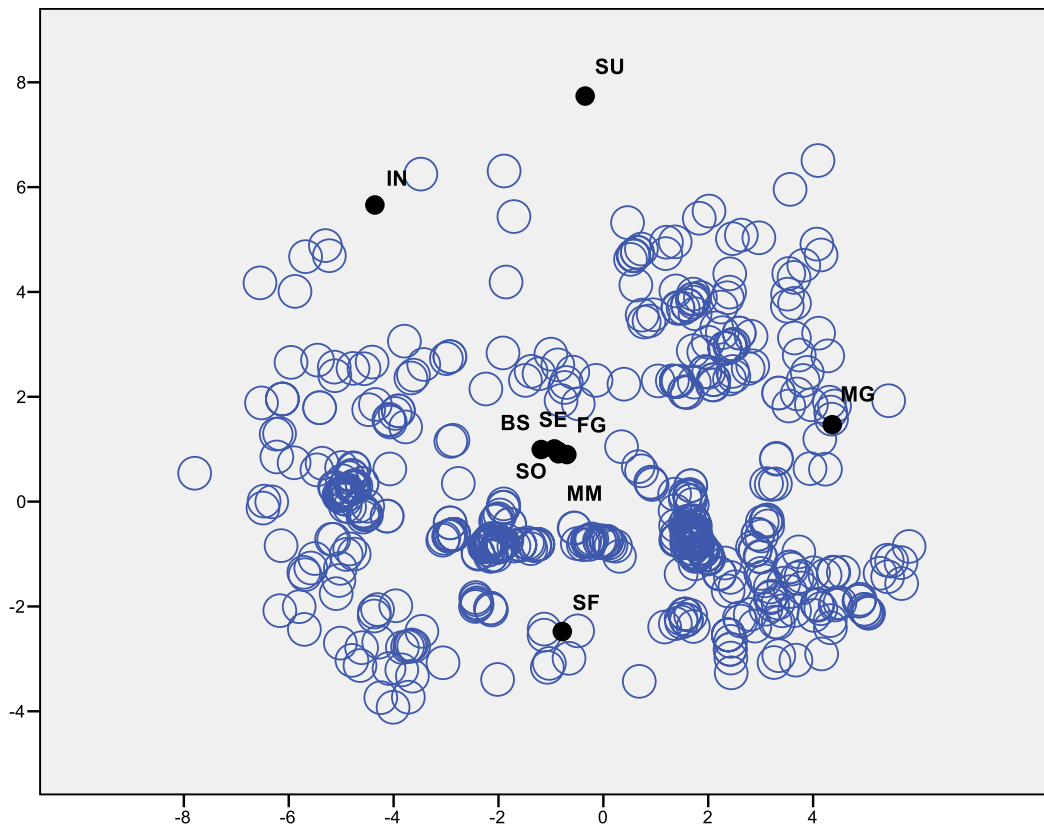


Figure 2a: Representation of unfolding with girls and goals, • = goals, O = respondents, N= 762

The three ego goals, Superiority, Individuality and Material Gain) are also located in the periphery of the graph, clearly distinct from the location of the non-ego goals. Please note that individuality goals (IN) and superiority goals (SU) are valued least by most girls. Within the group of ego goals, material gain (MG) stands out as a salient goal for a large group of girls. To further explore the configuration generated for girls, we circled groups of respondents who are located in the vicinity of the respective goals.

Keep in mind that respondents are located closest to the goals they reported as most important and furthest away from the goals they reported as least important. Groups of respondents can be described in terms of their position relative to the learning-related goals in

the middle of the graph and any of the goals located at the periphery of the graph (i.e. the safety goals and the three ego goals). As can be seen in Figure 2b, there is a heavy preponderance of respondents in specific parts of the graph. Hence, four unique *goals patterns* can be discerned. These are marked by the four circles.

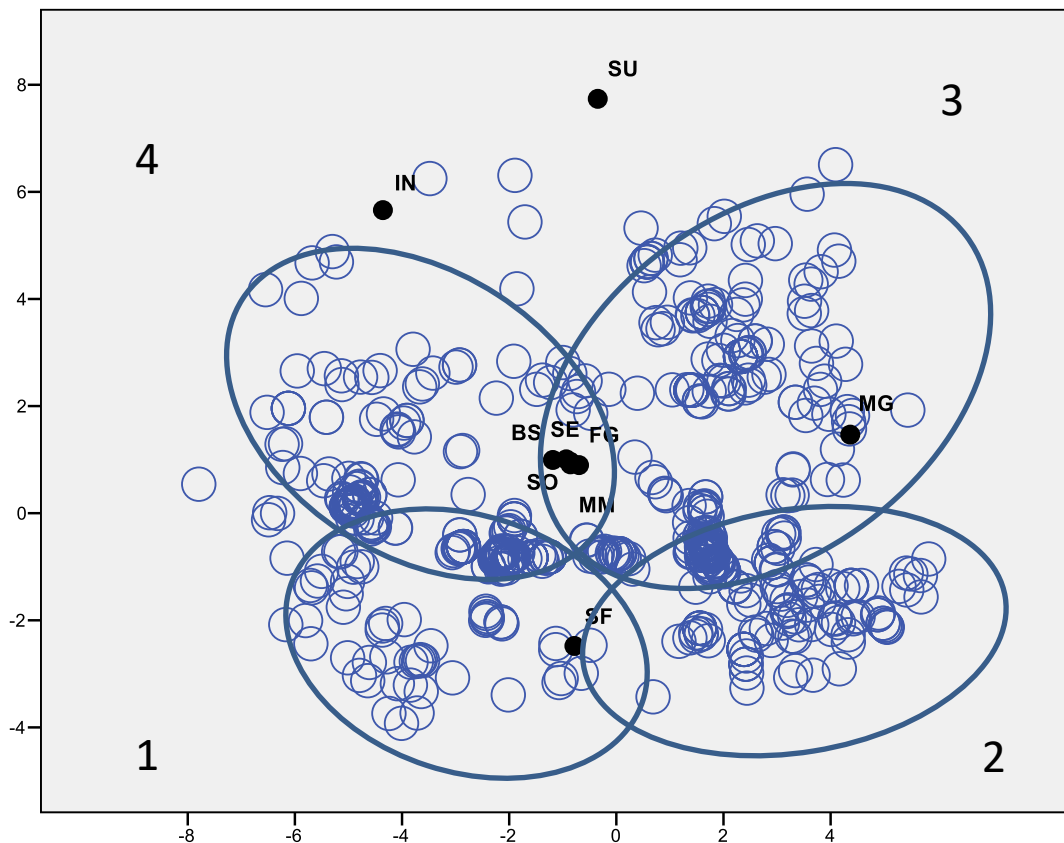


Figure 2b: Interpretation of unfolding with girls and goals. • = goals, O = respondents, N= 762

Girls in circles 1, 2, and 3, and 4 all attach importance to the five non-ego goals located in the center of the graph (MM, BS FG, SE, SO). In addition, girls in circle 1 express a preference for the goal Safety (SF). They do not seem to value the goals Individuality, Superiority, or Material Gain. This suggests that these girls are inclined to adopt learning-related goals but at the same time want to avoid taking risks. By contrast, girls in circle 2

value learning related goals and also attach additional value to the Material Gain goal (MG). This suggests that they are extrinsically motivated. Girls who are located in circle 3 seem to have preferences for Material Gain (MG) and, to a lesser extent, for the Superiority goal (SU). These girls do not attribute much importance to safety goals. This patterning suggests that these girls want to demonstrate their ability and obtain material rewards, but are not concerned about taking risks. Finally, girls in circle 4 value learning-related goals and to a lesser extent have a preference for the Individuality goal (IN). They want to show that they are unique.

It is clear that multidimensional unfolding may shed light on respondents' *goal pattern*. Examining the type of goals that students endorse and the ones that they consider as unimportant in their current life supplies us with information on how their goals work as a system. We will come back this issue later in the discussion.

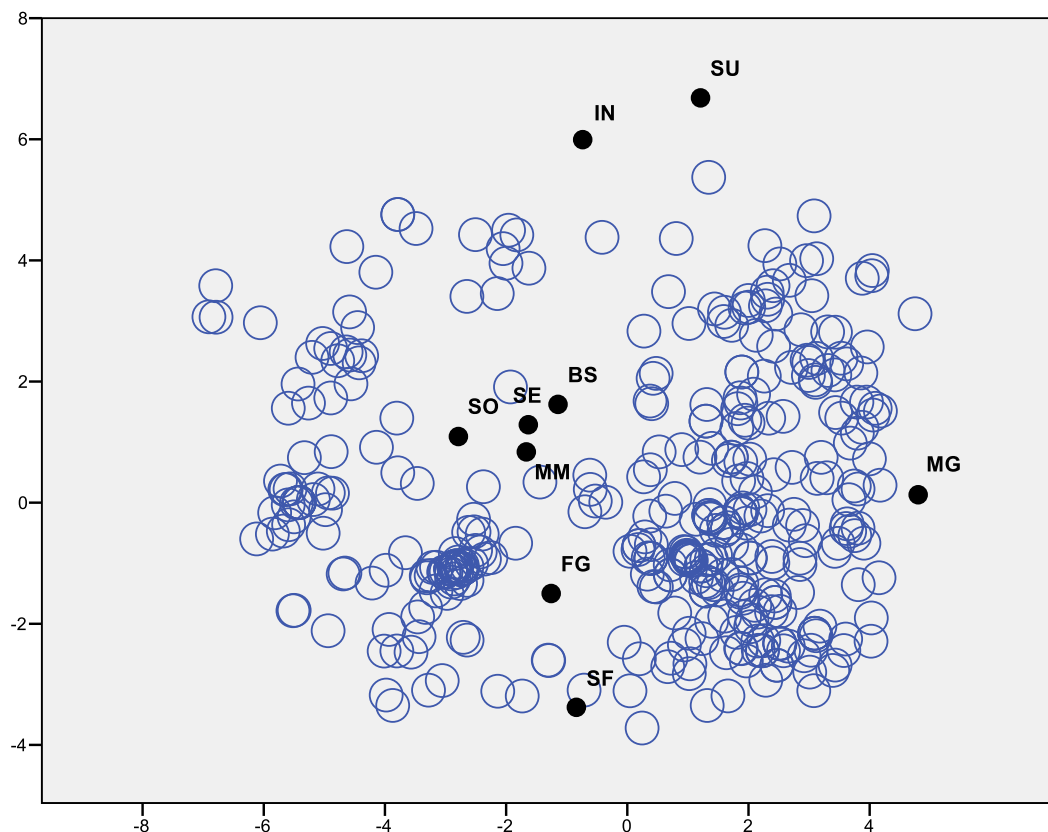


Figure 3a: Representation of unfolding with boys and goals • = goals, O = respondents, N= 403

Figure 3a shows that the nine goals are clearly visible. Unlike the representation found in girls, the non-ego goals are less intertwined. Mastery and Management goals are closely related to the Self Determination and Equity goals and are flanked by Belongingness and Social Responsibility to the right and Social Support goals to the left. Both the Safety goal and the Feel-Good goals are pushed to the periphery, implying that boys conceptualize the latter goals as distinct from the four learning-related goals. Similar to what we noticed in the visual representation of girls, the three ego goals are located at the periphery of the graph, and within the group of ego goals, Material Gain (MG) stands apart from Individuality (IN) and Superiority (SU). Similar to girls, the goal Material Gain (MG) is reported as important by a substantial number of boys. The interpretation of the unfolding results is presented in Figure 3b.

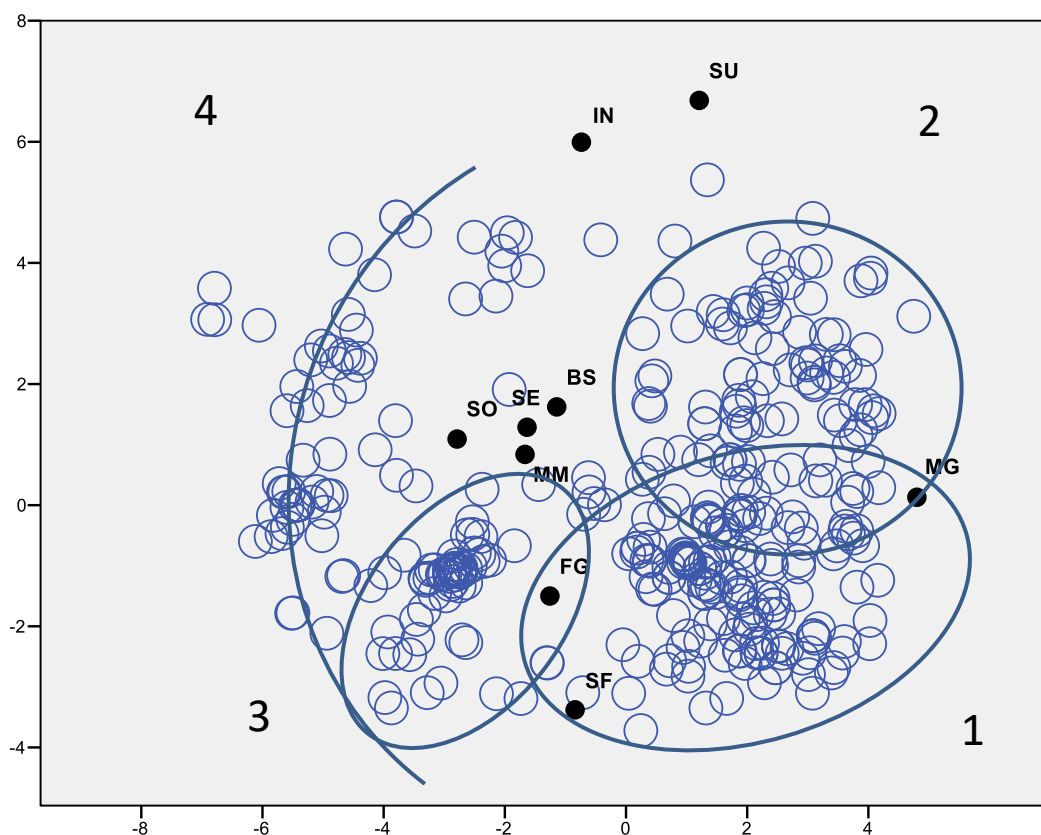


Figure 3b: Interpretation of unfolding with boys and goals. • = goals, O = respondents, N = 403

As can be seen in Figure 3b, there are high concentrations of respondents at the right side of the configuration, located between the learning-related goals on the left and the goal Material Gain (MG) on the right. This suggests that boys located on the right of the graph attach more value to Material Gain (MG) than boys on the left. Within this group, boys located in circle 1 show an additional preference for the goals Safety and the Feel-Good goals, and boys located in circle 2 show supplementary preferences for Superiority and Individuality. Focusing on the left side of the graph, we notice a high density of respondents in circle 3. These boys value learning-related goals, but also attach importance to the Feel-Good goals and, to a lesser extent, to Safety. They do not attach much importance to the three ego goals (Superiority, Individuality, and Material Gain). This patterning suggests that in order to adopt learning-related goals, some male students want to feel good in the learning environment (i.e. they want to feel confident and enjoy their classes).

The curved line (4) shows a group that values learning and learning-related goals, but the importance that is attached to other goals shifts gradually from Feel Good (FG) and Safety goals (SF) to Individuality (IN) and Superiority (SU) goals. Boys located at the top of the curved line express a preference for the Individuality goal. These boys do not attribute much importance to Feel-Good, Safety, and Material Gain goals.

4.5 Conceptual and Methodological Issues

Looking at goal patterns from a goal content and goal purpose perspective

We began this paper by stating that the pursuit of goals in the classroom is rarely done from a content perspective. The predominant approach to the study of student goals is to describe the reason why students engage in achievement related activities. Social–cognitive theory has provided significant insights into the pattern of achievement goals and how students’

perception of the classroom goal structure influences their goal orientation. Yet, achievement goals are not the only goals that students bring into the classroom.

In our goal studies we wanted to know which of the 24 mid-level goals that Ford and Nichols described are conceptually similar and distinct. We reasoned that – given the broad range of social and affective goals that students bring to the classroom in addition to the mastery and performance goals – it is likely that the importance that students attach to the different content goals influences their pursuit of the learning goals.

Cluster analyses revealed that there are four goals that girls in vocational school consider equally important, namely Self Determination and Equity (SE), Mastery and Management (MM), Social Support (SO), and Feel Good (FG), and three goals that male students find equally important, namely Self Determination and Equity (SE), Mastery and Management (MM), and Feel Good (FG). We referred to this cluster of goals with the term ‘learning-related goals’. We also noted that the goals Individuality and Superiority were clustered early in the hierarchical classification but did not cluster with any other goal. Material Gain had an ambivalent position for boys and girls.

Multidimensional unfolding confirmed that there is a small cluster of goals that refers to learning-related goal-directed behaviour. This cluster includes for boys and girls the Mastery and Management goals, the Self Determination and Equity goals, and the Social Support goals. For girls, Belongingness and Social Responsibility goals, and Feel-Good goals are also included in this learning-related cluster. In fact these six goals are intertwined. Interestingly, for both boys and girls, the Safety goal or the tendency to avoid problems and taking risks, are positioned at the periphery of the goal graph. Together with the three ego goals, which are also located in different positions in the periphery of the graph, SF goals help characterize the *unique pattern* of goals that students currently define as salient in their life. What can we say about the patterning of goals in boys and girls?

In girls we found four dominant goal patterns. A large group of girls attaches value to learning-related goals in combination with the Safety goal. This means that these girls want to avoid taking risks in the classroom. This is in accordance with the studies on gender differences that we mentioned earlier in this paper. A second substantial group of girls adopts learning-related goals but also wants to obtain material reward. A third group adopts learning-related goals and wants to demonstrate ability. The smallest group reports being an individual and unique as important, next to learning-related goals.

We found that most boys in secondary vocational education value the goal Material Gain in conjunction with learning-related goals. This suggests that a large majority of boys in secondary vocational education adopt learning-related goals but at the same time want to obtain material reward. This group of boys may be further divided into boys who want to demonstrate their ability and those who primarily want to feel good in class and avoid taking risks. There is also a small group of boys who express salience in learning-related goals in combination with Feel-Good goals; they do not attribute much value to the ego goals (Individuality, Superiority, and Material Gain).

At this point in the discussion, we return to the discussion on the different effects that the pursuit of multiple goals might have. The findings presented in this study allow us to speculate on the unique pattern of goals that students may bring to the classroom. It seems that different groups of students combine distinct goals with learning-related goals. Smit, Boekaerts and Busing (2011) also showed that students bring different salient goals into the classroom and that unique patterns of goals have a different effect on students' motivation. What is the interaction between salient goals? Do they simply coexist, as suggested by Lemos and Gonçalves, and has each goal a unique effect on motivation and achievement or is there an interaction (Barron & Harackiewicz, 2001)? In the case of an interaction, the next question

is whether the interaction is positive or negative. In terms of Lemos and Gonçalves' discussion: do salient goals support each other or compete with each other?

The next step in this line of research will be to identify different groups of students based on the salient goals they pursue. We think that the multidimensional unfolding technique discussed in this paper is a powerful technique to study the distinct effects that different patterns of goals may have on achievement and well-being in the classroom.

Methodological issues associated with the study of multiple goals

Studies of multiple content goals bring with them particular challenges in terms of methodological issues. The different goals that students bring into the classroom are not easy to measure because these goals are intertwined. For example, after doing a course in history, some students may report that they invested effort in the course because they felt that the material discussed in the course was meaningful and they wanted to become more knowledgeable about that period in history (mastery goal). The same students may elaborate that they invested effort because they have enjoyed helping others with the group project and getting support from their peers with their own work (social support goals). Unfortunately the goals that students pursue are hidden from outsiders so it is not possible to ask observers (e.g., parents, teachers, or researchers) to describe students' goals and triangulate the results.

How can we measure goal salience? One may ask students to indicate for each of the 24 goals identified by Ford and Nicholls (1991), or for the reduced list of 9 goals, how (un)important they are to them as a person in this period of their life. This can be done on a 5- or 7-point Likert scale. An alternative is to ask students to rank order a list of goals in terms of their salience. An advantage of the former procedure is that students consider each goal separately and use the same scale to indicate how (un)important they consider that goal.

Smit et al. (2011) asked students to rank order their current goals in terms of their salience. This technique has the advantage that students compare and contrast the various goals and assigning a unique value to each goal. In other words, students are forced to assign a different rank order to each of the goals. This means that, for example with 16 goals, the unfolding is performed with 16 values. By contrast, when the salience of the goals is measured with, for example, a 5-point Likert scale, the unfolding is carried out with five values, implying many tied values. This produces a more problematic data set for multidimensional unfolding, but it is probably a realistic view of students' goal salience. A problem with ranking is that one may force students to make a distinction when none exists. Furthermore, it is difficult for respondents to compare and contrast 16 goals. Smit et al. (2011) designed a two-step procedure to obtain the rank order of the 16 goals proposed by Boekaerts (2009). They asked students, first, to rank order the five most important goals and then the five least important goals. Next they invited them to repeat the procedure with the remaining goals: try to rank order the most important and least important goals within this set of goals. Whatever method is chosen to indicate goal salience, the researcher should be alert to problems like the ones discussed above and interview the students to examine which technique is the better one under the given conditions.

We emphasize that the multidimensional unfolding technique is a useful tool to study the relations between variables that might influence students' tendency to give purpose to tasks and activities in the classroom. The technique provides a visual display of the goals that students find important and less important and graphically displays the relations between the different goals. Separate pictures can be made for groups of students that are expected to differ on goal salience, for example for boys and girls, for students who follow different study programs, and students from different cultures. As such, interesting differences and similarities can be detected by screening these pictures systematically. In our goals studies we

wanted to know which of the 24 goals that Ford and Nichols describe are conceptually similar and distinct.

4.6 Conclusion

The study that we referred to in this paper is but a modest beginning. It was meant as an illustration of how the multi-dimensional unfolding technique can shed light on how students' goal function as a system. The patterning of goals that we found suggests that in both boys and girls in secondary vocational education a cluster of goals is closely associated with Mastery goals and Management goals. On the basis of this patterning we suggest that in vocational students 'wanting to master new learning material' goes hand in hand with 'wanting to be supported and help others', with 'wanting to be treated fairly and have decision latitude', and with 'wanting to belong in the peer group and take social responsibility'.

We were able to demonstrate that four goals are in the periphery of vocational students' goals system, namely the goals Superiority, Individuality, Material Gain, and Safety. These goals stand out against the learning-related goals in the center of the goals system. The position of groups of respondents in the graph relative to these 'marker' goals can inform us which goals are relatively important and unimportant for them as a group.

We hasten to remark that these are only preliminary results and that further research with the GIFI in different subsamples will reveal whether these patterns of goals are replicable in different populations. In the meantime, we conclude that the research community needs to develop powerful new techniques to study the additive and interactive effects between learning-related goals and the other goals that students bring into the classroom. Until recently, MDU provided a configuration only, and no information on significance. Busing is developing new applications for MDU, including the possibility to

add explaining variables and to test the significance of, for example, the predictive value of these variables. In our case, this will enable us to study different groups of students, defined by their position relative to the learning-related goals and the markers goals at the periphery of the graph, and relate them to motivational engagement.

We are convinced that we need to study students' goals *as a system* and develop models that are powerful enough to adopt a content and purpose perspective simultaneously. Only then will we be able to shed light on students' goals-directed behaviour in the classroom.

Chapter 5

The self-regulation of motivation: Motivational strategies as mediators between motivational beliefs and engagement for learning

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Abstract

In this research we studied students' motivational self-regulation as mediator between motivational beliefs and motivational outcomes. Dutch students in pre-vocational secondary education (N=3602, mean age 14) completed a questionnaire on five motivational strategies (Environmental Control, Interest Enhancement, Self Consequating, Performance Self-talk, Mastery Self-talk); motivational beliefs (value attached to schoolwork, competence); and motivational engagement (pleasure, effort, persistence, achievement). A validation of the self-report questionnaire on the five motivational strategies showed a good fit. Structural equation modelling indicated that strategy-use partly mediates the relation between value, and effort and pleasure. Competence showed a weak direct relation with effort and pleasure. No relations were found for achievement. Further implications of these findings for practical use and further research are discussed.

Keywords: validation, motivational strategies, motivational beliefs, structural equation modelling

5.1 Introduction

The aim of this research was to study students' use of motivational strategies in relation to their motivational engagement, that is, effort and persistence, pleasure and interest in learning, and achievements. Being motivated is not self-evident. In the Netherlands, motivation is especially poor in pre-vocational secondary education. This is apparent from high absenteeism and drop-out rates (Central Bureau of Statistics, 2015). Motivation decreases during secondary education (Opdenakker, Maulana, & Den Brok, 2012; Van der Veen & Peetsma, 2009), and, even if students are motivated, they can be distracted from learning (Boekaerts & Niemivirta, 2000; Fries, Schmid, Dietz, & Hofer, 2005; Lemos & Gonçalves, 2004). Researchers, therefore, have been interested in motivational strategies. These strategies help students to get started on schoolwork, to persist in the presence of motivational threats (Boekaerts & Corno, 2005; Kuhl, 1984; Wolters, 1998, 1999, 2003; Wolters & Rosenthal, 2000), or to shift their focus from non-learning to learning goals (Boekaerts & Niemivirta, 2000). Previous studies have shown that the use of these strategies can lead to more effort, and persistence (Bembenutty & Zimmerman, 2003; Boekaerts & Corno, 2005; Dignath & Buttner, 2008; Donker, De Boer, Kostons, Dignath, Van der Werff, 2014; Vermeer, Boekaerts & Seegers, 2001; Wolters, 2003). Results on relations between the use of strategies and achievement are less conclusive, but some studies suggest that the relation is mediated by effort (Schwinger, Steinmayr, & Spinath, 2009; Schwinger & Stiensmeier-Pelster, 2012).

Furthermore, it is theorized that strategies are not used as a matter of fact: students need motivation to get to work. Motivational beliefs are strong determinants in students' choice to engage in learning (Ajzen, 1991; Bandura, 1991; De Brabander & Martens, 2014; Eccles & Wigfield, 2002; Gollwitzer, 2012; Pintrich 1999; Wolters & Benzoni, 2013; Zimmerman & Schunk, 2008). This includes the use of learning strategies and motivational

strategies (Pintrich & DeGroot, 1990; Wolters & Pintrich 1998). If so, this is important information for the design of intervention studies on the use of strategies; students' beliefs should be taken into account. In this study we focus on the beliefs students have about the value of the task, and their competence (Eccles & Wigfield, 2002). The assumption is that students will be more inclined to use motivational strategies to protect their learning intentions against distractions and competing goals when they believe schoolwork is valuable and they can perform schoolwork successfully.

The aim of this research was to study students' use of motivational strategies as a function of their motivational beliefs, in order to increase their motivational engagement and achievement. First, we tested the validity and usability of Wolters's questionnaire on motivational strategies for this population.

5.1.1 Motivational strategies

Students are considered to be agents in their own learning process, able to use self-regulatory strategies purposefully in order to reach their learning goals (Pintrich & De Groot, 1990; Zimmerman, 2000, 2002; Zimmerman & Schunk, 2008). To assess students' motivational self-regulation, Wolters (1998) designed a questionnaire on the basis of an inventory of motivational strategies that college students used. In a follow-up study with ninth- and tenth-grade students, an exploratory factor analysis resulted in five theoretically meaningful strategies (Wolters, 1999). First, Interest Enhancement (IE), also described in by Sansone, Weir, Harpster, and Morgan (1992), concerns making a task more interesting and enjoyable by turning it into a game, or by relating schoolwork to one's daily life. Second, Environmental Control (EC) is defined as 'students' efforts to arrange or control their surroundings or themselves, to make completing a task easier, or more likely to occur without interruption.' (Wolters, 1999, p. 283). Examples include keeping a tidy desk, and working at

a productive time of the day (Zimmerman & Martinez-Pons, 1990). Third, Self Consequating (SC), also studied by Zimmerman and Martinez-Pons (1986), concerns linking consequences to the effort that is put into learning. Examples of SC are promising oneself something good to eat, or denying oneself the pleasure to hang out with friends. The fourth and fifth strategy concern Self-Talk, defined as ‘verbalizations that are addressed to oneself, which can serve both instructional and motivational functions’ (Hardy, Hall, & Hardy, 2005; p. 905). Performance Self-Talk (PST) comprises telling oneself to start working and persist in order to get good grades, or to outperform others. Mastery Self-Talk (MST), finally, concerns telling oneself to start working in order to get a grasp on the learning material.

Based on the self-determination continuum as described by e.g. Deci and Ryan (2000), Wolters distinguishes between extrinsic and intrinsic regulation of motivation (Wolters, 1998). Or, as Reeve (2012) states: “ Students use autonomous guides to action while others rely on controlling and environmental guides.” (pg. 153). This distinction is important as the autonomous forms of regulation are more beneficial for the motivation for learning than the controlling forms of regulation (Deci & Ryan, 1985, 2000; Reeve, 2012; Ryan & Deci, 2000). Controlling forms of motivation regulation steer students’ behaviour in the prospect of results that are separate from schoolwork itself: avoiding punishment, getting rewards, pleasing parents or teachers, outperforming others, or boosting self-esteem. Autonomous forms steer students’ behaviour in the prospect of results that are related to schoolwork itself: understanding the subject matter, recognizing the value of schoolwork, working towards one’s own goals and values. Following Wolters (1998), we consider PST and SC, to be typical controlling forms of motivation regulation, whereas MST and IE can be grouped under autonomous regulation of motivation. Although EC is not related to schoolwork itself, it does not exert any pressure as opposed to SC and PST. Therefore we did not classify EC as a controlling or autonomous regulation of motivation.

5.1.2 Motivational beliefs and the relation with strategies and motivational outcome measures

Motivational strategies are not applied as a matter of course; motivational beliefs partly determine whether students will engage in learning. Before acting, students weigh up and consider whether they believe themselves sufficiently competent (self-efficacious) and whether the task is sufficiently valuable (Eccles & Wigfield, 2002; Gollwitzer, 2012; Heckhausen & Gollwitzer, 1987; Pintrich & De Groot, 1990; Zimmerman & Schunk, 2008). Kuhl refers to this as choice motivation (Kuhl, 1984). This partly determines whether students will protect working at the task against competing goals and distractions. In other words, they will be more inclined to use motivational strategies. The assumption is that the relation between motivational beliefs and motivational outcomes is mediated by the use of strategies.

Some empirical studies have been carried out on the mediation as a whole. Pintrich and DeGroot (1990) showed that strategy-use mediated the relation between both motivational beliefs and performance. In a study by Wolters and Pintrich (1998), the relation between value and performance was fully mediated, whereas the relation between and competence performance was partly mediated by strategy-use. For more findings, we turn to the individual paths of the mediation. Concerning the path between beliefs and strategies, studies by Bong (1999), Boekaerts (2002), Pintrich (1999) and Van der Veen and Peetsma (2009) show a positive relation between the value students ascribe to schoolwork and their intentions to act and self-regulate. More specifically, Wolters and Rosenthal (2000) found positive relations between value and the use of strategies, except for PST; eighth graders who perceived more value in schoolwork were more inclined to use strategies, except for the strategy of urging themselves to get higher grades or to outperform others. In a study with undergraduates by Sansone, Wiebe, and Morgan (1999), value was positively related to IE;

the information that the otherwise boring task was important to the researchers made students invent games in order to persist and get the work done. Pintrich (1999) reported that stronger feelings of competence went hand in hand with more use of motivational strategies. These findings were corroborated by Zimmerman & Martinez-Pons (1990) for fifth-grade, ninth-grade and eleventh-grade students for, among others, EC and SC; by Wolters and Benzion (2013) for college students for all strategies except IE; and by Wolters and Rosenthal (2000), for eight-grade students for all strategies except SC.

A second body of research concerns the path between strategies and motivational outcomes. Sansone, et al. (1992) found a positive relation between IE and effort. According to Wolters (1999), students who made more use of the five strategies reported more effort than students who made less use of strategies, with the strongest relation for MST. These findings are supported by Schwinger, Steinmayr, and Spinath (2009), and Schwinger and Stiensmeier-Pelster (2012), except for the relation between IE and effort, which was weak or non-significant in their studies. However, students' use of IE was related to their interest in schoolwork (Hulleman & Harackiewicz, 2009). Results on the relation between strategies and achievement were inconsistent. Wolters found no relation between strategies and grades in his study in 1998. However, in his study in 1999 the use of PST was positively related to grades. In studies by Hulleman and Harackiewicz (2009), the use of IE was positively related to students' performance; and Nota, Soresi, and Zimmerman (2004) found an effect for SC and grades. According to Schwinger and Steinsmeier-Pelster (2012), and Schwinger, et al. (2009), the use of strategies is related to achievement, but via effort.

5.1.3 Research questions and hypotheses

We aim to answer the following research questions: 'Are the motivational strategies that Wolters describes part of the reality of students in pre-vocational secondary education?' and

‘Do motivational strategies mediate the relation between motivational beliefs – i.e., competence and perceived value – and motivational outcomes – i.e., effort, pleasure, persistence, and achievement?’. The findings described above were consistent for the mediational function of MST and EC between motivational beliefs and effort, and inconsistent for PST, IE and SC. We therefore hypothesize that strategy-use positively mediates the relation between both beliefs, and effort, possibly with the exception of PST, IE and SC (H1). Interestingly, although perceived pleasure and interest in schoolwork is seen as an important part of students’ motivation, only one study was found that related the use of motivational regulation strategies to interest and none of the studies addressed the relation between strategy use and pleasure. Therefore, our hypotheses are based on the theoretical distinction between controlling forms of motivation regulation and more autonomous forms of motivation regulation: We expected MST and IE to have stronger relations with effort, persistence and pleasure, than PST and SC (H2). Results for the use of motivational regulation strategies and performance are inconsistent. Therefore, no hypotheses were formulated for achievement

5.2 Method

Participants

Respondents (N=3602, 11 to 21 years of age, M=14.04, S.D. = 1.27) from 49 schools for pre-vocational secondary education, mainly from the urban region in the west of the Netherlands (62%) filled in the questionnaire. The remaining 38% came from urban and rural areas all over the country.

Instruments

We used Wolters' questionnaire on strategies to measure strategy-use. First, the items were translated from English (see Table 2) to Dutch by the researcher. Final agreement on the translation was settled through discussion between the researcher and a near-native English speaker from the Netherlands. To increase comprehensibility, we added some examples to the items. Retranslation to English resulted in items with comparable meaning.

Scales for competence, value, pleasure/interest, and effort, were derived from the Intrinsic Motivation Inventory, validated by McAuley, Duncan, and Tammen. (1989), and Tsigilis and Theodosiou (2003). Competence assesses students' beliefs about their current ability to perform schoolwork (5 items, e.g. 'I am good at doing schoolwork'). Value measures to what degree students perceive schoolwork as useful, for now or in the future (5 items, e.g. 'I think schoolwork is relevant for my future'). Pleasure/interest, effort and persistence are expressions of motivational engagement (Reeve, 2012) (5 items, e.g. 'I like doing schoolwork'; 5 items, e.g. 'I put much energy into schoolwork'). The pleasure/interest scale was validated for students in pre-vocational secondary education by Van Nuland, Dusseldorp, Martens, and Boekaerts (2010). The motivational outcome persistence from the MSLQ (Pintrich, Smith, Garcia, & McKeachie, 1991) measures students' endurance, even when faced with boring or difficult tasks (5 items, e.g. 'I try to finish schoolwork, even when it is boring'). All scales were measured on a 5-point Likert scale, ranging from "strongly disagree" (1) to "strongly agree" (5); all questions referred to schoolwork in general. Achievement was measured for the subjects Dutch and Mathematics, with a self-report question ('Is your grade at the moment a pass or a fail?').

Before testing the mediation, we performed structure equation modelling on motivational beliefs and motivational outcomes. We removed five items on competence and effort, with loadings $< .40$. These items were formulated with a negation. Obviously, students

did not respond to these items similarly to affirmatively formulated items. Furthermore, due to a strong correlation, we merged effort and persistence, from this point referred to as effort. Cronbach's alphas were satisfactory (.76 to .83). Environmental Control (.62) and competence (.60) showed a weak reliability, but we have to take into account that competence consisted of two items only. For descriptive statistics, see Table 3.

Procedure

Instructed assistant researchers introduced the questionnaire in the classroom. The paper and pencil self-report questionnaire was filled in by the students in approximately 25 minutes, in the presence of the assistant researcher and a teacher.

Analyses

We first examined whether Wolters' questionnaire on motivational strategies was applicable to Dutch students in pre-vocational secondary education. The sample was divided into two random sets: the validation set ($N = 1751$), and the analysis set ($N = 1829$). The validation set was further divided into two random sets for cross validation: the training set ($N = 908$, 47% boys), and the test set ($N = 843$, 48 % boys). The analysis set was used to test the hypotheses about the mediational function of motivational strategies. We validated the questionnaire with structural equation modelling in EQS 6.2 (Bentler, 2005; Byrne, 2006). Maximum likelihood estimation was used to estimate the parameters. We tested the factor structure of the hypothesized models on the training set. The fit of the model is determined by the strength of the model, but is also influenced by weak items, items with a negation and items that have a high covariance, due to similarities other than the characteristics of the scale they belong to. Therefore, based on the observed model, post-hoc modifications were performed in order to improve the hypothesized model, provided the modifications were theoretically sound. To

rule out overfitting and changes made purely based on chance, the best fitting model cross validated on the test set. Increasing levels of equality constraints were applied to assess the invariance of the questionnaires (Byrne, 2006). A critical value of $-0.01 \Delta CFI$ was used to judge invariance (Cheung & Rensvold, 2002). Subsequently, the analysis set ($N = 1829$) was used to test the mediation model with structural equation modelling in EQS 6.2.

Fit indices

The fit indices for both validation and mediation are derived from Byrne (2006). A non-significant chi square indicates a good fit. However, as chi square is sensitive to sample size, it is divided by the degrees of freedom; a value < 3 , preferably < 2 , indicates a good fit. Furthermore, a Comparative Fit Index (CFI) with values between .90 and .95, preferably $> .95$, and the Root Mean Square Error of Approximation (RMSEA), with a value $< .08$, preferably $< .05$, within a small confidence interval (CI) and interval values close to 0, are also indicators of a good fit. A chi square test is used to judge differences between the hypothesized structure and the modified models.

5.3 Results

5.3.1 Data inspection

Missing values, less than 2% for all scales, were missing completely at random. Respondents with mainly missing values ($N = 22$) were removed. In the analyses, we used maximum likelihood estimation for the missing values. Inspection showed sixteen respondents as outliers, but no reason was found to remove these respondents. The data is partly skewed; therefore we will turn to the robust fit measures.

5.3.2 Results validation

The 5-factor model with all factors correlated (A1) showed a good fit. One item on Interest Enhancement with a factor loading $<.40$ was removed from the model. Apparently, ‘making a game out of schoolwork’ did not fit with the other items. Indeed, inspection of the remaining items showed a focus on ‘looking for the value in schoolwork’. Furthermore, high standardized residuals revealed a shared denominator for two items on Self Consequating; in contrast to the other items in the same scale these items both mentioned ‘homework’, and therefore had somewhat more in common with each other than with the rest of the items. This prompted us to correlate the two error terms, and the fit improved significantly (A2). High correlations between the strategies, especially between the two strategies using Self-Talk, urged us to test Self-Talk as one factor (A3), Self-Talk as a second order factor (A4), and all strategies as one (A5). The fit of the three alternative models was less satisfactory. In conclusion, although strategies are related, students distinguished between the five motivational strategies, with high loadings for individual items. To test the stability of the preferred model (A2) and to rule out capitalization of chance due to overfitting, the model was cross validated on the test set (A6, A7, A8, A9). It showed an even better fit, indicating that the model is good, but not completely invariant across samples (see table 1 and table 2). The five-factor model was then used for further analyses.

Table 1:

Goodness-of-fit indices for motivational strategies

Model	Data set	N	AIC	χ^2	df	χ^2/df	CFI	RMSEA	90% CI	Δ
A1 5 factors, all correlated	training	908	237.147	635.147	199	3.19	0.946	0.049	0.045, 0.053	
A2 Minus item IH 2, 2 error terms correlated	training	908	100.521	456.521	178	2.56	0.965	0.042	0.037, 0.046	A1 vs A2 p < .0001
A3 Self Talk as one factor	training	908	105.259	469.295	182	2.58	0.964	0.042	0.037, 0.046	A2 vs A3 p < .05
A4 Self Talk as second order factor	training	908	734.258	1100.258	183	6.01	0.885	0.074	0.070, 0.079	A4 vs A2 p < .0001
A5 All strategies as one factor	training	908	559.565	935.565	188	4.98	0.906	0.066	0.062, 0.070	A5 vs A2 p < .0001
A6 Cross validation (like A2)	test	834	122.849	478.849	178	2.69	0.957	0.045	0.040, 0.050	Δ CFI A6 vs A2 < .01
A7 Configural invariance	training/test	908/834	481.670	1197.670	358	3.35	0.944	0.052	0.049, 0.055	
A8 Measurement invariance	training/test	908/834	481.067	1229.067	374	3.29	0.943	0.051	0.048, 0.054	Δ CFI A8 vs A7 < .01
A9 Factorial invariance	training/test	908/834	469.807	1237.807	384	3.22	0.943	0.051	0.047, 0.054	Δ CFI A9 vs A7 < .01

Table 2

Strategies, items, standardized solution, error, and R Squared, N=834

	EC	SC	IE	PST	MST	E	R2
Environmental Control (EC)							
I try to get rid of any distractions around me.	.629					.777	.396
I change my surroundings so that it is easy to concentrate on schoolwork.	.567					.824	.321
I choose a place where I like to work.	.548					.837	.300
I try to study at a time when I can be more focused.	.466					.885	.217
Self Consequating (SC)							
I promise myself I can do something I want later if I finish the assigned work now.		.789				.614	.623
I tell myself I can do something I like later if right now I do the work I have to get done.		.744				.668	.554
I make a deal with myself that if I get a certain amount of the work done, I can do something fun afterwards.		.695				.719	.483
I promise myself some kind of reward if I get the assignment done.		.579				.815	.336
I reward myself each time I get part of the work done until I'm finished.		.477				.879	.227
Interest Enhancement (IE)							
I think of a way to make the work seem interesting.			.710			.704	.504
I try to find ways that relate the material to my life			.535			.845	.286
I try to make schoolwork more enjoyable by turning it into a game.			.516			.856	.267
Performance Self Talk							
I remind myself how important it is to do well on tests and assignments.				.759		.652	.575
I try to make myself work harder by thinking about getting good grades.				.740		.672	.548
I think about how my grade will be affected if I don't do my schoolwork.				.676		.737	.457
I remind myself about how important it is to get good grades.				.464		.886	.215
Mastery Self Talk							
I tell myself that I should keep working just to learn as much as I can.					.787	.617	.620
I challenge myself to complete the work and learn as much as possible.					.763	.647	.581
I persuade myself to keep at it just to see how much I can learn.					.761	.649	.578
I think about trying to become good at what we are learning or doing.					.733	.680	.537
I persuade myself to work hard just for the sake of learning.					.719	.695	.517

5.3.3 Results mediation

Inspecting the mean scores of strategy use, we conclude that strategies are not used extensively. Mastery Self-talk, Performance Self-talk, Environmental Control and Self-Consequating show an average or just above average use, while Interest Enhancement is hardly used at all. To test the hypotheses on the mediational function of motivational strategies between motivational beliefs and motivational outcomes, we performed structural equation modelling, including beliefs, the five strategies and pleasure and effort as outcome measures. However, the results showed that the regression coefficients were different from the strength and the sign of the correlations, with some coefficients being stronger, and some coefficients being weaker or even negative. These results, together with strong correlations between the scales on motivational strategies, point in the direction of multi-collinearity; there is not sufficient unique variance to predict pleasure and effort for each strategy individually. So although the results of the validation of the questionnaire allowed us to treat the strategies separately, we were forced to analyse strategy use as a unidimensional construct. In line with Schwinger and Steinsmeier-Pelster (2012), who ran into the same statistical problems, we performed structural equation modelling on the overall motivational regulation, and inspected each strategy separately to detect unique patterns. We are aware of the fact that we cannot comment on the significance of the separate strategies. The overall model showed a fairly adequate fit ($\chi^2=3130.674$, $df=729$, $p<.0001$, $\chi^2/df=4.29$, $CFI=.917$, $RMSEA=.042$, $CI=.041,.044$). To test the significance of indirect effects we used the test of joint significance, a straightforward procedure, that, tested in a simulation study by Leth-Steensen & Gallitto (2016), proved to be a good alternative for bootstrapping with regard to power and Type I errors. If the individual paths that together form the mediation are all significant, then the indirect effect can be regarded as significant. The coefficients for the individual paths are all significant, therefore both direct and indirect effects are significant

(Leth-Steensen & Gallitto, 2016). The coefficients show that the direct effects are stronger than the indirect effects.

First, we examined the mediation as a whole. Consistent with our hypothesis (H1), strategy-use partly mediated the relation between value, and effort and pleasure. This means that students who perceived schoolwork as more valuable reported more use of motivational strategies, resulting in more pleasure and effort in schoolwork than students who attached less value to schoolwork (Figure 2). The indirect and direct effect were more or less equally strong. Contrary to our hypothesis (H1), strategy-use did not mediate between competence, and effort and pleasure, except for a weak mediation by IE for pleasure. This means that students who feel competent also reported more pleasure, but not via the use of strategies, except by trying to establish the value of schoolwork.

Table 3:

Descriptive statistics: mean, sd, standardized skewness, Cronbach's alpha, number of items, and correlations. N = 1829. EC=Environmental Control, SC=Self Consequating, IE=Interest Enhancement, PST=Performance Self-Talk, MST=Mastery Self-Talk, VL=Value, CP= Competence, PL=Pleasure, EF=Effort, GD=Grade Dutch, GM=Grade Math

	M	sd	Stand. skew	alpha	N-items	EC	SC	IE	PST	MST	VL	CP	PL	EF
EC	2.68	.87	3.10	.62	4	-								
SC	2.52	1.02	5.25	.82	5	.77**	-							
IE	1.95	.82	15.12	.67	3	.75**	.78**	-						
PST	2.83	.96	1.72	.73	4	.77**	.79**	.75**	-					
MST	3.02	1.04	.32	.87	5	.79**	.77**	.76**	.91**	-				
VL	3.88	.81	-11.11	.76	4	.49**	.47**	.47**	.63**	.68**	-			
CP	3.42	.88	-7.02	.60	2	.34**	.28**	.34**	.39**	.43**	.52**	-		
PL	2.72	.86	1.18	.80	5	.50**	.45**	.50**	.52**	.61**	.67**	.49**	-	
EF	3.63	.79	-7.92	.83	7	.54**	.59**	.41**	.57**	.63**	.66**	.46**	.62**	-
GD						.04	.03	.02	.00	.03	.03	.09	.03	.10
GM						.04	.03	.03	.03	.04	.03	.21**	.07	.11

** Correlation is significant at the 0.01 level (2-tailed).

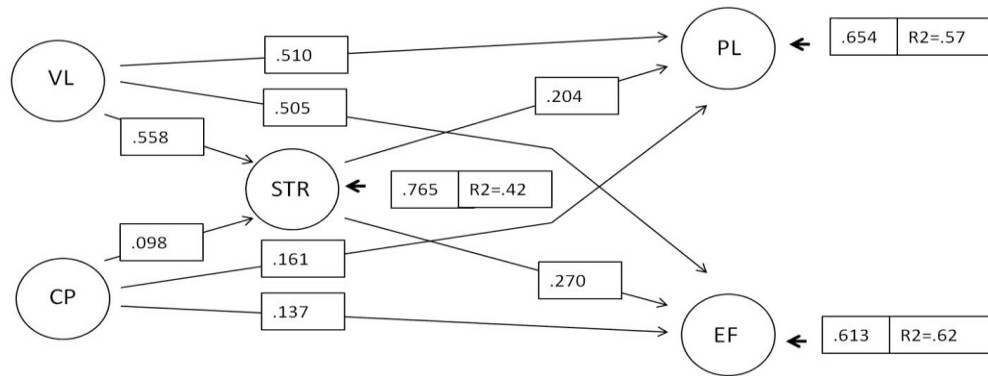


Figure 1: Strategy use (STR) as mediator between Value (VL) and Competence (CP), and Pleasure (PL) and Effort (EF). Standardized values, errors and r-squared. All paths significant at $p < .05$ level.

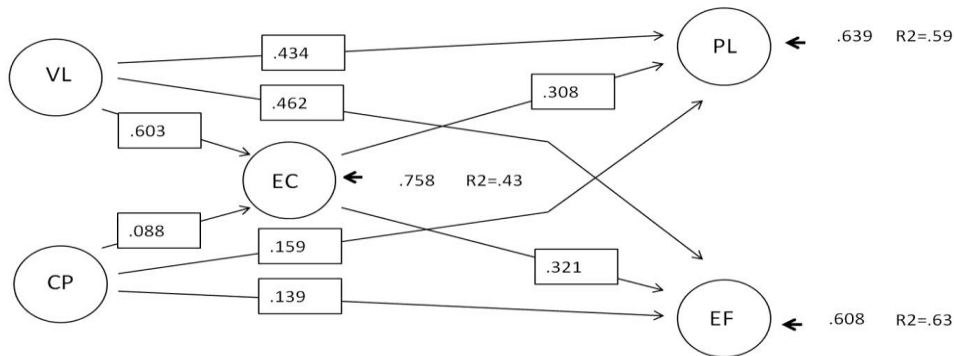


Figure 2: Environmental Control (EC) as mediator between Value (VL) and Competence (CP), and Pleasure (PL) and Effort (EF). Loadings, error and r-squared. All paths significant at $p < .05$ level.

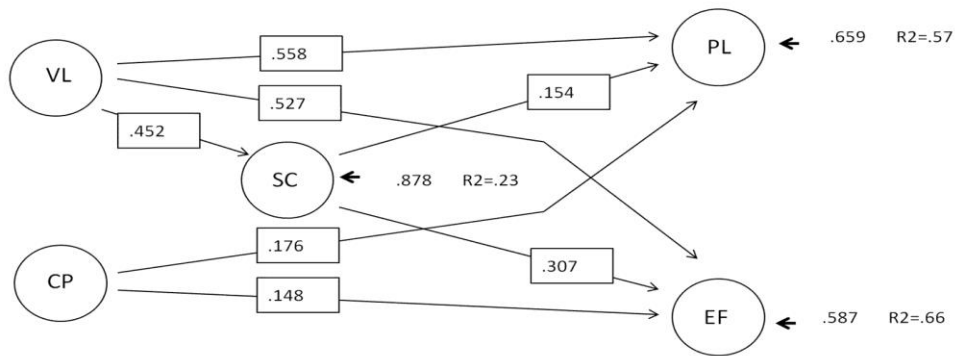


Figure 3: Self Consequating (SC) as mediator between Value (VL) and Competence (CP), and Pleasure (PL) and Effort (EF). Loadings, error and r-squared. All paths significant at $p < .05$ level

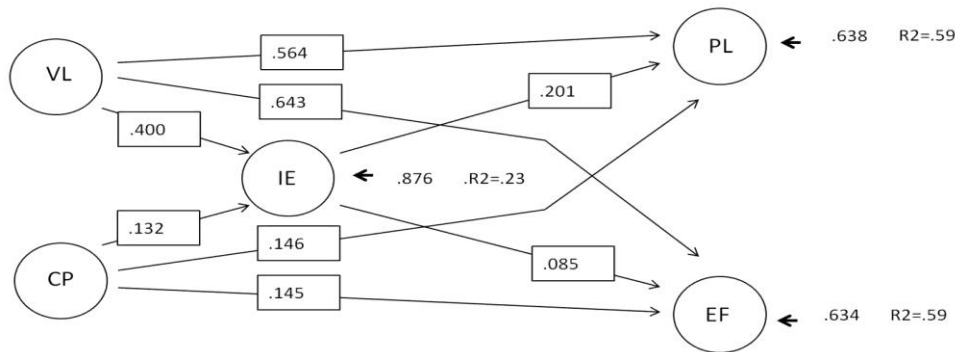


Figure 4: Interest Enhancement (IE) as mediator between Value (VL) and Competence (CP), and Pleasure (PL) and Effort (EF). Loadings, error and r-squared. All paths significant at $p < .05$ level.

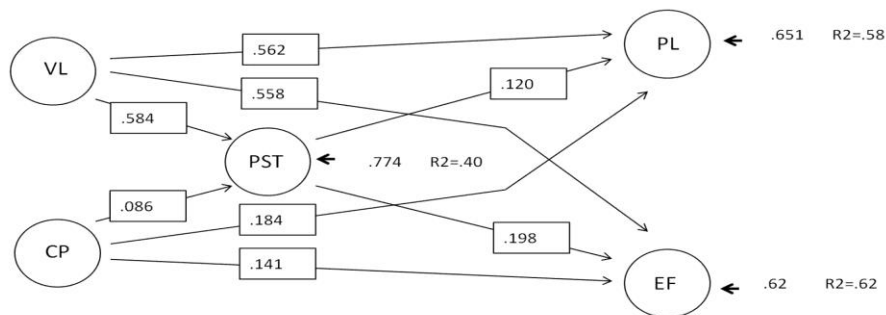


Figure 5: Performance Self talk (PST) as mediator between Value (VL) and Competence (CP), and Pleasure (PL) and Effort (EF). Loadings, error and r-squared. All paths significant at $p < .05$ level.

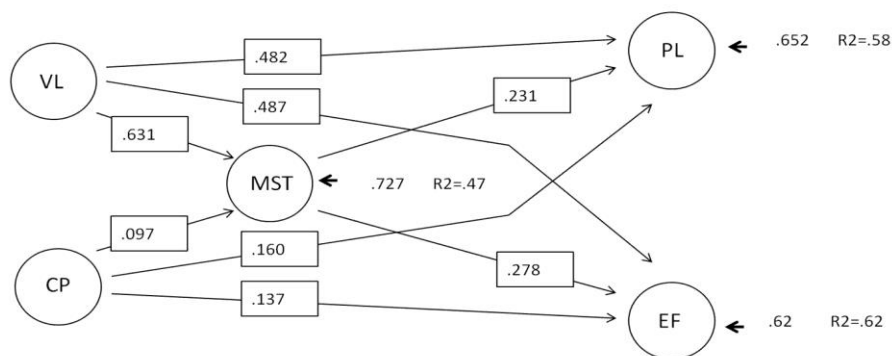


Figure 6: Mastery Self Talk (MST) as mediator between Value (VL) and Competence (CP), and Pleasure (PL) and Effort (EF). Loadings, error and r-squared. All paths significant at $p < .05$ level.

To detect unique contributions, we analysed each strategy separately (Figure 3-7).

The paths that are shown are all significant at $p < .05$ level. Consistent with our hypothesis, all strategies were positively related to effort, except for IE that showed a negligible relation.

EC showed the strongest relation with both effort and pleasure. This means that students who reported to manage their surroundings more frequently in order to start working and persist, also reported putting more effort into schoolwork, and perceive more pleasure. Consistent with our hypothesis, the more autonomous forms of regulation MST and IE showed stronger relations with pleasure than SC and PST, the more controlling forms of motivational regulation. Contrary to our hypothesis, SC showed stronger relations with effort than MST and IE. Finally, no relations were found between the use of motivational strategies and achievement (see figure 1-6)

5.4 Conclusions and discussion

Motivational strategies can help students to get started with schoolwork, to persist in the presence of motivational threats, or to shift their focus from non-learning to learning goals. Previous studies show that the use of these strategies can lead to more effort, persistence and better achievement. It is assumed that students will use strategies more frequently when the task is sufficiently valuable to them, and when they deem themselves sufficiently competent to perform the task successfully. In this research, we studied motivational strategies as mediators between motivational beliefs and motivational outcomes for students in pre-vocational education.

We first validated the questionnaire on motivational strategies. In line with Wolters' (1999) results, the questionnaire proved valid for Dutch students in pre-vocational secondary education; the model with five separate strategies showed the best fit. Concerning the research question on the mediational role of strategies, our results clearly indicate that (a) students in pre-vocational education know and use motivational strategies, albeit not extensively; (b) competence showed only a direct, weak relation with effort and pleasure in doing schoolwork, and a weak relation with only one strategy, i.e. IE; (c) strategy-use partly

mediated the relation between perceived value on the one hand, and effort and pleasure on the other, with moderate direct and indirect relations; (d) individual strategies showed slightly different patterns; and (e) no relations were found for achievement. We will further elaborate on these findings.

In line with our expectations, we found a mediational role of strategy-use between the value students attach to schoolwork and the effort they report (H1). This is in line with the findings by Bong (1999), Wolters and Rosenthal (2000), Sansone, et al. (1999) and Donker et al. (2014). Contrary to our expectations, the mediational role of strategy-use for students who felt competent at schoolwork was negligible (H1), except for IE: There was a weak relation between competence and IE, which in turn was related to pleasure, but not to effort.

Apparently, feeling competent only prompt students to engage in finding the value of schoolwork and none of the other motivational regulation strategies. This finding is in line with the findings reported by Wolters (2003): feeling competent only showed a direct relation with motivational outcomes and not with the use of the motivational regulation strategies.

However, we should bear in mind that competence scale consisted of two items only. This may have affected the results. Wolters (2003) and colleagues (Wolters & Benzoni, 2013; Hulleman & Harackiewicz, 2009) suggest that the relation between a feeling of competence and the use of motivational regulation strategies might be curvilinear. This makes sense: when one feels confident that one can fulfil a task successfully, why use strategies? And, vice versa, when one feels incompetent for schoolwork, this probably will include feelings of incompetence for the use of motivational regulation strategies. However, our data were not curvilinear. Recall that we used self-efficacy in relation to schoolwork, which does not automatically mean students feel competent to use motivational regulation strategies. Bong (1999), Zimmerman, Bandura, and Martinez-Pons (1992), and Zimmerman (2000) differentiate between the competence belief that one can fulfil schoolwork successfully and

self-regulatory efficacy, which is the belief that one is able to self-regulate, that is, ‘to plan and manage specific areas of functioning’ (Zimmerman, 2000, p. 18).

In our study, we did not find any relations with achievement, except for a weak direct relation between competence and the achievement for math. Schwinger et al. (2009) argued that motivational strategies aim to increase students’ motivation and are not directly focused on improvement of students’ grades. In their study the effect of motivational strategies on grades was mediated through the effort student put into schoolwork. We did not find such a mediation.

Next, we turn to the distinction between more autonomous and more controlling motivational regulation strategies. As predicted, MST and IE indeed showed a stronger relation with pleasure/interest, confirming the results of Deci and Ryan (2000, 1985), Ryan and Deci (2000), Wolters (2003) and Reeve (2012); strategies that are connected to the task itself and include more internal, autonomous regulation, are more beneficial for perceiving pleasure in schoolwork than more externally regulating, controlling strategies, such as PST and SC. However, the more controlling strategy SC has a stronger relation with effort than MST, and PST, and EC has the strongest relation both with effort and pleasure/interest. Surprisingly, IE was not related to effort at all. This raises questions for future intervention research. PST is comparable with performance-approach goal orientation, a goal orientation that focuses on getting good grades and outperforming others. It is positively related to persistence, affect, and performance (Harackiewicz et al., 2002a; Harackiewicz et al., 2002b; Linnenbrink, 2005), but it can also cause, for instance, fear of failure and stress (Midgley, Kaplan, & Middleton, 2001). Thus, should we encourage students to use those strategies that prove to have a positive relation with motivational outcomes, irrespective of their controlling or autonomous nature; or should we train students to use strategies that are, according to SDT, more autonomously regulating, and therefore more beneficial? Future studies on

motivational strategies should take into account different outcome measures, such as fear of failure and negative emotions to obtain a broader view of the effect of motivational strategies. Although the findings of this study are promising, some limitations need to be taken into account. First, we chose to use Wolters's questionnaire because it has been validated and is formulated in clear language, suitable for the intended population. However, although the validation shows that students distinguish between the five strategies, high correlations prevented us from testing the mediational effect of each strategy within one analysis. Therefore we miss the unique contribution of each strategy to motivational outcomes, which may be important information for intervention studies. Furthermore, although we concluded that strategy use mediated the relation between beliefs and motivational outcomes significantly, bootstrapping techniques can provide us with interval estimates of the indirect effects, which gives an idea of the strength of the effect. Secondly, using Wolters' questionnaire also meant we ignored strategies that might also be relevant and effective, for instance, 'help-seeking' (Karabenick, 2004; Pintrich, 2000). Furthermore, Schwinger et al. (2007) divided IE into two scales, distinguishing between situational interest, which focuses on making the task more fun, and personal significance, which focuses on personal value and relevance. They also added the setting of proximal goals as a motivational strategy (Schwinger et al., 2009). Future studies can reveal a wider range of motivational strategies that students use and could be beneficial for their motivation for learning. Thirdly, although studies with once-off questionnaires give useful information, on-line measures of self-regulation are necessary. The effect of beliefs and strategies on motivational outcomes, are, as Bandura (1991, p. 269) formulated, 'products of reciprocal causation'. Increased pleasure and effort can, in turn, lead to a higher valuation of schoolwork and better achievements can lead to a stronger sense of competence (Boekaerts & Cascallar, 2006; Zimmerman, 2000; Zimmerman & Schunk, 2008). It should be noted that the conclusions in this study are based

on correlational results, therefore we cannot draw any conclusions about causality. The fourth limitation in this study is that we asked students to report on schoolwork in general. Wolters and Pintrich (1998) showed that the use of regulatory strategies does not differ across domains, but Bong reported that scores on competence are moderately correlated, and scores on value are weakly correlated across domains (Bong, 1999, 2001, 2004). The more generally formulated items in this study could therefore have tempered the results. Furthermore, we used a self-report method to measure achievement. Self-reported grades are less reliable when reported by students from lower educational levels and for students with lower results (Kuncel, Credé, & Thomas, 2005). This study dealt with students from lower educational levels. Also, we measured performance as a dichotomous variable. This could explain the lack of results for achievement in relation to motivational regulation strategies. Finally, we removed some items that were formulated with a negation, because they did not fit in the scales. The aim of these items is to check whether respondents have read the items carefully and answered them according to the instruction. In our opinion, the fact that analyses show that students differentiated between the various scales proves that students filled in the questionnaire conscientiously, and not 'on automatic pilot'. Nevertheless, in future studies we will look more carefully into the differences between positively and negatively formulated items.

Implications for future research

This study shows that students in pre-vocational education know and use motivational strategies. Yet, the mean scores of the strategies in this study show that there is enough room for improvement. Intervention studies are necessary to establish whether creating more awareness of motivational strategies and training students in motivational strategies increases their use of such strategies and subsequently has more impact on their motivational outcomes

(Bembenutty & Zimmerman, 2003; Boekaerts & Corno, 2005; Dignath & Buttner, 2008; Gollwitzer & Sheeran, 2006; Kramarski & Mizrachi, 2006; Kuhl, 2000).

In addition, this study shows that the use of motivational strategies is related to the value students attach to schoolwork. When training these strategies, it might therefore prove beneficial to include the value belief in the training; the more value students attach to schoolwork, the more they use motivational strategies. Therefore, special attention should be paid to the strategy IE that comprises looking for the value of a task in order to start working and keep working at schoolwork. So, IE could be considered as a reminder for those students who already value schoolwork. However, the strategy would be even more beneficial for students who do *not* find schoolwork worthwhile in the phase before the decision to act has been made. In the ideal situation we would like to see a high, but negative correlation: the less value is attached to schoolwork, the higher the use of IE. This would increase the value belief, and, according to our results, the more students value schoolwork, the more they use the motivational strategies. We see here the distinction made between motivational strategies and volitional strategies (Boekaerts & Corno, 2005; Wolters, 2003) Motivational strategies help students in the pre-decisional phase with the choice to actually get started, i.e. IE. Volitional strategies help students in the post-decisional phase, after the choice to get to work is made, to continue working at schoolwork (e.g. Gollwitzer, Heckhausen, & Ratajczak, 1990). The implication is that we should promote using different strategies at different stages in the working process in order to make an intervention on strategy use more effective.

Third, we want to focus on effort. More use of motivational strategies leads to more effort, but not to better achievements. The assumption that if we put effort into our work we will achieve better results is almost hardwired into the way we think about learning. However, our measurement of effort relates to the *amount* of effort exerted, not the *quality* of

that effort; it is not self-evident, after all, that more of the same effort will be effective. Indeed, the effort exerted might not be effective at all; we can imagine students forcing themselves to stay put at their desk, chewing their pen, really making an effort to work, but not actually learning. We could overcome this problem by first training students to use cognitive and meta-cognitive strategies, focusing on how to approach and handle the cognitive side of learning. The extra effort that is triggered by the use of motivational strategies can subsequently be used effectively, namely by applying cognitive and meta-cognitive strategies. However, effort has more drawbacks. Students did not distinguish between effort and persistence. Effort can be seen as the regular energy one puts into schoolwork, whereas persistence includes perseverance in case of distractions and setbacks, which is typically the effect one expects from using strategies. Also, both schoolwork and the use of strategies require effort, but we did not distinguish between the two. This could have contaminated the results of this study. Following Boekaerts (2006) we recommend a more detailed study of the quality of effort students claim to put into schoolwork.

Furthermore, achievement appears to be a difficult outcome measure in relation to motivation (Gagne & St Pere, 2002), irrespective of whether the grade is self-reported or derived from the school administration. However, many studies use achievement as an outcome measure. A clear description of the mechanism that is apparently assumed to be present in the link between motivational beliefs, motivational strategies, motivational outcomes, and achievement could shed some light on the inconclusive findings for achievement.

Finally, competence was not related to the use of motivational strategies. Future studies should take different mind-sets into account (Dweck, 2006). According to Dweck, students with a fixed mind-set have the idea that their (in)competence is innate and unchangeable. In that case, the use of strategies will not seem helpful to them. Students with

a growth mind-set perceive their competence as malleable, which implies that the use of strategies will be seen as helpful, as a means to grow.

In conclusion, this study shows that students use motivational strategies, which leads to more effort put into schoolwork and to more pleasure whilst doing schoolwork. The more value students attach to schoolwork, the more they use motivational strategies. Intervention studies are needed to establish causal relations and to find out whether the training of strategies will strengthen these effects. According to this study, the training of strategies will be more effective if it is accompanied by paying attention to the beliefs about the value that students attach to schoolwork. A training like this could help students to motivate themselves, especially in situations that are not inherently motivating.

Chapter 6

Summary and general discussion

6.1 Introduction

The present dissertation is prompted by a major concern for students in pre-vocational secondary education: the average motivation is lower and drop-out rates are consistently higher compared to students in other forms of secondary education. Yet, pre-vocational secondary education is the gateway to further vocational education and the educational basis for a large part of our workforce. Moreover, approximately 60% of the Dutch school-going population attend pre-vocational secondary education. In other words, it is an important and substantial part of the Dutch educational system. The aim of this dissertation is to obtain more insight into what motivates students in pre-vocational secondary education and how this affects their motivational engagement when working on schoolwork. In the four empirical studies in this thesis we examined two feasible intervention points, namely 1) students' perception and appraisal of the quality of the learning environment and 2) students' self-regulation of motivation. We embedded our studies in two theoretical frameworks: Self Determination Theory and the theory on Self-Regulated Learning.

Our research into the role of the learning environment in relation to motivational engagement is inspired by developments in educational practice. The need to increase students' motivational engagement has long been felt by school leaders and teachers, especially in pre-vocational secondary education. Therefore, learning environments have been redesigned from traditional teacher-centred to student-centred learning environments based on social constructivist principles. Despite the large-scale use of student-centred learning environments in practice, the evidence of their effects on students' motivational engagement is surprisingly scarce. Searching for a theory that would do justice to the different impacts that the two learning environments are assumed to have on students' motivation, we chose the Basic Needs Theory, a theory within Self Determination Theory (SDT) (Deci & Ryan, 2000; Ryan & Deci, 1985, 2000). According to the Basic Needs

Theory, students' motivational engagement will increase if the three basic psychological needs are met: the need for autonomy, competence, and relatedness. Given the characteristics of the two different learning environments, we hypothesized that student-centred learning environments are more suitable for fulfilling students' needs and, consequently enhance students' motivational engagement.

Secondly, we studied students' self-regulation of motivation. Obviously, educators have a responsibility to optimize the learning environment, but it is assumed that students are also agents in their own learning process. Moreover: we want them to be agents in their own learning process. Their ability to self-regulate their motivation for learning should make them less vulnerable to external and internal influences that can be detrimental for their motivation for learning. In addition, self-regulation is seen as one of the essential skills that students need to function properly in an increasingly dynamic society and labor market (Educational Council, 2013). Nevertheless, self-regulation of motivation still takes a back seat, if not in research, then certainly in daily educational practice. What do we actually know about students' motivational self-regulation in the classroom, especially in pre-vocational secondary education? Based on Boekaerts' three-layered model that describes the various aspects of self-regulated learning, we focused on the goals students deem important, the motivational regulation strategies they use, and the motivational beliefs they hold (Boekaerts, 1995, 1999; Wolters, Pintrich, & Karabenick, 2005; Zimmerman, 2008).

As outcome measures in the various studies, we used motivational engagement, i.e. perceived effort, perceived pleasure/interest, and perceived persistence for schoolwork in general. In addition, we expected that higher motivational engagement would be reflected in increased achievement and reduced absenteeism. We aimed to answer the following general research question: *Is students' motivational engagement for learning in pre-vocational education related to the quality of the learning environment and to students' self-regulation*

of motivation? In the remainder of this chapter we present a summary and the results of each separate study, answering the research questions we posed:

1. What is the relation between the learning environment, students' need fulfillment, their motivational engagement (perceived effort, pleasure/interest, persistence, absenteeism), and achievement?
2. What is the relation between students' multiple content goals, and what are their goal preferences?
3. What is the relation between motivational regulation strategies and motivational engagement and achievement, and is the relation between motivational beliefs and motivational engagement and achievement mediated by the use of these strategies?

To enable the study of multiple content goals and motivational strategies in this particular population, we validated two questionnaires, aiming to answer the following questions:

4. Is the Goal Identification and Facilitation Inventory a valid instrument to measure students' multiple content goals in pre-vocational education?
5. Is Wolters' questionnaire on motivational regulation strategies a valid instrument to measure how students in pre-vocational education regulate their behaviour?

Subsequently we discuss the theoretical and practical implications. Finally, limitations of these studies are discussed and recommendations for future research and educational practice are presented.

6.2 Summary of the results of the individual studies

Chapter 2. Learning Environments

In the study described in Chapter 2 we investigated the motivational impact of the learning environment by analyzing its relation to students' need fulfillment, motivational engagement, and achievement. In order to motivate students, schools have designed student-centred

learning environments according to social constructivist principles. In a nutshell: tasks, knowledge and skills are presented in a meaningful, real-life context; students actively construct their knowledge, often in cooperation with others; and teachers, in addition to being experts on the subject, have a supporting, coaching role (Brown et al. 1989; De Kock, 2004; Salvich & Zimbardo, 2012; Savery & Duffy, 2001; Vygotsky, 1978). We hypothesized that students' basic needs (Ryan & Deci, 1985, 2000; Deci & Ryan, 2000), the need for autonomy, competence, and relatedness, are satisfied to a larger extent in a student-centred learning environment than in a traditional teacher-centred learning environment, leading to more motivational engagement. Multi-level analyses were used to distinguish differences between need fulfillment and motivational engagement at the level of individual students, classes, and the two types of learning environment.

The results of this study confirmed our expectations. Students in the student-centred learning environment perceived greater fulfillment of their psychological needs than students in the teacher-centred learning environment. They also reported to put more effort into schoolwork and perceived more pleasure/interest. Furthermore, boys in the student-centred learning environment were absent less often than boys in the teacher-centred learning environment. Apparently the student-centred learning environment is more motivating for all students, and especially for boys. Achievement, measured with standardized tests that were identical for both learning environments, did not differ per learning environment. That in itself is reassuring, given that one of the criticisms of new forms of learning is that they lead to poorer performance (see e.g., Volman, 2006 for comments on new learning). On the other hand, it is disappointing that more effort and pleasure/interest does not automatically lead to higher grades. Similar findings were observed in the study in Chapter 4. We will elaborate on the relation between motivation and achievement in the section on the limitations of our studies and recommendations for future studies.

Chapter 3. Validity of the Goal Identification and Facilitation Inventory

The study in Chapter 3 addressed the first step in our research into students' self-regulation of motivation, namely the multiple-content goals that students in pre-vocational secondary education pursue. In the field of educational research, goals have been studied extensively. A substantial body of studies show that learning goals and social goals are related to motivation for learning. Obviously, teachers want their students to adhere to mastery goals and social goals, but the assumption is that students bring a wider variety of goals into the classroom, some of which are supportive, and others detrimental for the motivation for learning (Boekaerts & Niemivirta, 2000; Mansfield, 2009; Van Veen & Peetsma, 2009; Wosnitza & Volet, 2009). It is assumed that these goals are important determinants for the direction of students' actions, the energy they put into their actions, and the persistence they show. We want to know what students' goal preferences are, and how they are related to motivational engagement.

To facilitate further study on multiple-content goals to ensure that students in pre-vocational secondary education recognize the goals presented in the GIFI, we validated the Goal Identification and Facilitation Inventory (GIFI), a questionnaire developed by Boekaerts and colleagues based on Ford and Nichols' goal taxonomy. In the interviews, firstly, students reported that all goals in the GIFI made sense and that all goals were present. To the open question 'what is most important for you at school', nearly all students answered 'getting my diploma'. For some of the students this was immediately followed by 'having fun at school, otherwise it is difficult to get my diploma'. Hence, they explicitly linked the two goals. Furthermore, students indicated that, in addition to a good relationship with parents, a good relationship with extended family was also important to them. Secondly, results from Structural Equation Modelling showed that students in pre-vocational secondary education indeed distinguished between 16 separate content goals. The reliability of the scales was

moderate to good. Furthermore, the GIFI was interpreted similarly by boys and girls, but showed some variance across classes for the goals Tranquility, Self-Determination, General Equity, Superiority, and Resource Provision, indicating that there is a slight difference in the interpretation of the questionnaire between classes concerning these goals. Thirdly, testing the concurrent validity of the goals for motivational engagement, the goal Individuality, meaning it is important to be unique, was positively and moderately related to both effort, and pleasure/interest. Social Responsibility and General Equity were positively and moderately to weakly related was related to pleasure/ interest in schoolwork. Belongingness and Superiority were negatively and weakly related to effort.

Overall, the findings of this validation do not indicate that these are the only goals that students in pre-vocational secondary education pursue, and that some caution is advised in interpreting differences in goal preferences between classes, for some of the goals, but we can conclude that the Goal Identification and Facilitation Inventory is a valid instrument to measure students' multiple content goals in pre-vocational education. However, more research is needed on what behaviour is actually triggered by one's goals.

Chapter 4. Goal preferences

The study in Chapter 4 addressed the questions of what goals are important to students, what their individual goal preferences are, and how goals are interrelated. The study was performed in vocational secondary education. We first checked whether students in this particular sample also distinguished between the 16 goals as reported in the study in Chapter 3. Preliminary results showed that several goals were grouped together. The goals Resource Acquisition ('I want to be helped by my classmates') and Resource Provision ('I want to help my classmates'), for example, were perceived as one goal. Although there is a clear difference between the two goals, namely receiving help and giving help, apparently students perceived

them as two sides of the one coin of social support. Hence, we worked with 9 goals. In order to study goal importance we used a cluster analysis and Multi-Dimensional Unfolding. The cluster analysis enabled us to classify groups of goals that resemble each other in importance. Multi-Dimensional Unfolding enabled us to visualize the preferences for the 9 goals for each individual respondent within one configuration.

The cluster analysis showed two main clusters. Drawing on the work of Boekaerts (2009), we used the terms ego goals and non-ego goals. The ego goals Superiority, Individuality, and Material Gain formed one cluster, and the remaining non-ego goals, i.e. learning-related goals, social goals, and well-being goals, formed another cluster. Hence, students perceive ego goals and non-ego goals as two distinct groups. The Multi-Dimensional Unfolding showed the same pattern, and clearly showed that most students regarded the three ego goals as least important. These goals contrasted with a large group of goals that most students reported as important; this included the Mastery and Management goals. However, the unfolding technique shows that students simultaneously deemed various goals important. Feel-good goals – e.g., Having Fun, and Belongingness – are also included in this central cluster, for girls more so than for boys. This is consistent with the findings from the interviews: the most important goal for them at school was to obtain their diploma, followed by having fun at school. Furthermore, the central group of goals includes the goals Social Responsibility, Social Support, Self-determination, and Equity. This implies that students considered ‘wanting to master the material’ to be equally important to ‘wanting to be supported and help others’ and ‘wanting to be treated fairly and have decision latitude’; thus students explicitly linked these goals.

In addition to the importance most students attributed to goals related to learning aspects and social aspects, we distinguished four unique goal patterns within this general picture. First, a group of students also expressed a preference for the Safety and Feel Good

goals, and no preference for the goals Individuality, Superiority, or Material Gain. These students adhered to learning-related goals and simultaneously did not like taking risks and simply wanted to feel at ease. A second group clearly expressed a preference for the goals Material Gain and, to a lesser extent, to the goal Superiority. Students in this group showed that, besides the importance they attached to the non-ego goals, they were also driven by more extrinsically motivating incentives. A third group of students showed preferences for the goals Material Gain and Safety. This suggests that these students are motivated by extrinsic incentives, but not in a competitive manner as shown by the second group. The fourth group of students attached value to the goal Individuality, in addition to the learning-related and social goals.

We can conclude that the ego-goals are least important to students; students show a clear preference for the group of non-ego goals. Furthermore, we roughly distinguished four groups of students with their own pattern of goal preferences.

Chapter 5. Motivational regulation strategies and motivational beliefs

The study in Chapter 5 reports research on the use of motivational regulation strategies by students in pre-vocational secondary education, and the mediational role of strategies between motivational beliefs and motivational engagement. The use of motivational regulation strategies is the core aspect of the self-regulation of motivation. According to Boekaerts and Niemivirta (2000), Boekaerts and Corno (2005), and Wolters (1998, 1999, 2003) motivational regulation strategies can help students to enhance their motivational engagement and keep working in the face of competing goals and other distractions. It is also assumed that these strategies are not used as a matter of course; it is influenced by their beliefs about learning (Eccles & Wigfield, 2002; Gollwitzer, 2012; Kuhl, 1984; Zimmerman & Schunk, 2008). Therefore, we studied strategies as a mediator between beliefs and

motivational engagement. We focused on students' beliefs about their competence and their beliefs about the value schoolwork represents for them: if students believe they are sufficiently competent to execute the task successfully and that schoolwork is worthwhile, they will be more willing to actually start putting effort into schoolwork. In addition, based on Self Determination Theory, we expect motivational regulation strategies to differ from each other in the effect they have on motivational engagement; some of the strategies have a more controlling character, regulating motivation with external incentives, e.g. rewards and punishments, whereas other strategies have a more autonomous character, regulating motivation with internal incentives linked to schoolwork and the self: e.g., the perceived value of schoolwork.

To study motivational regulation strategies we used Wolters' questionnaire, consisting of five strategies: Mastery Self-Talk, Performance Self-Talk, Self Consequating, Environmental Control, and Interest Enhancement. We first validated the questionnaire for students in pre-vocational secondary education. The data were analyzed with Structural Equation Modelling. The results of the validation showed that students distinguished between the five different strategies. However, students did not consider increasing their interest in a learning task by making it more fun ('turn learning into a game') and increasing their interest by means of attaching value ('linking schoolwork to benefits in one's daily life and future life') as one and the same strategy. Therefore, we removed the items on 'turning schoolwork into a game'. The strategy Interest Enhancement now concerns only motivating oneself by reminding oneself of the value of schoolwork. The model with five separate strategies showed a good fit, and the scales had a moderate to good reliability. This meant that we could use Wolters' questionnaire for students in pre-vocational secondary education to measure the use of these five strategies.

Average scale scores showed that students did use these strategies, but only to a limited extent. Furthermore, the correlation between most of the strategies was moderate to high: if students reported using one of the strategies, they reported that they used the other strategies as well. This was especially the case for Mastery Self-Talk and Performance Self-Talk.

Subsequently, we used Structural Equation Modelling to test how motivational regulation strategies mediate between students' motivational beliefs and motivational engagement. Our results showed, first, that the students in our study did not distinguish between reported invested effort and reported persistence. Therefore we aggregated effort and persistence and labeled it effort/persistence. As expected, strategy use partly mediated the relation between the value students ascribed to schoolwork and effort/persistence and pleasure, with moderate direct and indirect relations. This signifies that students who believe that schoolwork is valuable showed more motivational engagement, and used motivational regulation strategies to a larger extent than student who did not value schoolwork. This confirmed findings by, e.g., Peetsma and van Veen (2009). Contrary to our expectations, for students who felt competent about schoolwork the mediational role of strategy use was negligible: belief in one's own competence showed only a direct, weak relation with effort/persistence and pleasure in doing schoolwork. This signifies that students who believed themselves competent to execute schoolwork successfully did not automatically use motivational regulation strategies to protect the actual execution of schoolwork against distractions or competing goals. This confirmed the findings by Wolters (2003), who also found a weak direct relation between competence beliefs and motivational engagement, and no mediational role for motivational regulation strategies. It is not consistent, however, with models on motivation, such as Eccles and Wigfield's expectancy*value model.

Finally, although we cannot draw conclusions on significance for the effect of the individual strategies, due to multi-collinearity, we explored differences between the separate strategies in their relation to effort/persistence and pleasure. Following Wolters (1998) and Reeve (2012), based on Self Determination Theory, we hypothesized that the more controlling strategies are less beneficial for students' motivational engagement than strategies that are related to schoolwork and to the self-strategies. Findings show that Mastery Self-Talk and Interest Enhancement have stronger relations with pleasure than do Self Consequating and Performance Self-Talk. For the relation with effort/persistence the results were less consistent: more controlling strategies alternated with more autonomously regulating strategies. This means that the distinction between autonomous and controlling regulation of motivation and their differentiated effect on motivational engagement did not prove fully sustainable. Finally, no relations were found for achievement.

We can conclude that motivational strategies partly mediate the relation between the belief on value of schoolwork and motivational engagement, but more research is necessary on the role of the belief on competence. Furthermore, intervention studies are necessary to get students more acquainted with motivational regulation strategies, and start using them in a larger extent.

6.3 From results to conclusions and implications

6.3.1. Implications for SDT research in relation to the quality of the learning environment.

The first implication addresses SDT as a framework for studying the effect of learning environments in relation to motivation. We stated that there was little evidence for this effect and that we expected that SDT could provide this evidence. Our study shows that SDT is indeed an appropriate framework: the student-centred learning environment and the teacher-centred learning environment showed differences in perceived need fulfillment. The

characteristics of these learning environments can help shed some light on the mechanisms on how to fulfill these needs.

However, revisiting the characteristics of learning environments, we must conclude that SDT does not fully encompass all aspects. An important addition we made is the distinction between a sense of personal competence (I feel competent on my own account), and organizational competence, based on perceived external support (I feel competent due to support from the organization) as formulated by De Brabander and Martens (2014). This enabled us to connect need fulfillment even more to concrete characteristics of the learning environment. Furthermore, we can imagine that the inclusion of meaningful, realistic contexts and assignments in the student-centred learning environment, leads students to attach more value to learning activities. We also showed that students in a student-centred learning environment reported more pleasure and interest, which may be attributed to real-life, meaningful contexts, triggering interest for that moment. We know from Hidi and Renninger (2006) that this situational interest, triggered on the spot, can evolve into individual interest, a form of intrinsic motivation and more beneficial for long-term motivational engagement. Value, interest, and other aspects of motivation can be found in the continuum developed by Deci and Ryan (2000), but the continuum does not show how these variables are actually related. The Unified Model of Task-specific Motivation (UMTM) unifies several motivation theories (De Brabander & Martens, 2014) and relates their elements to one another. Moreover, next to the distinction between a sense of personal competence and organizational competence, as mentioned earlier, it also distinguishes between a sense of personal autonomy and perceived freedom of action: the former is an individual matter, whereas the latter depends on the environment. Finally, the model differentiates between a sense of personal relatedness and the subjective norm, which enables researchers to study motivational engagement as a result from a feeling of relatedness or as a result from peer pressure and

groups norm. The UMTM could prove to be a more comprehensive model for studying learning environments, thereby providing a more refined picture of the effect on student motivation.

The second implication zooms in in the role of relatedness. A much-heard concern from both researchers (e.g., Kirschner, Sweller & Clark, 2006) and educators about social constructivist learning environments, and the autonomy involved is that students cannot handle the freedom that comes with it. In our study a perceived feeling of autonomy went hand in hand with a perceived feeling of competence, pleasure/interest, and effort. Given the concerns expressed this is good news, and could be attributed to organizational competence and a feeling of relatedness, which was also reported in a larger extent in the student centred learning environment. Indeed, studies show that both autonomy and support are necessary for students to thrive (e.g. van Loon, Ros, & Martens, 2012; Reeve et al., 2004; Reeve, 2009; Stroet, Opdenakker & Minnaert, 2013). Findings by Minnaert, Boekaerts, De Brabander, and Opdenakker (2011) on group work with students in vocational education indicated that the fulfilment of the three basic needs is important for students' interest in the project, but at different stages in the process. Perceived relatedness both with the teacher and peers, is the most influencing factor. Perceived autonomy becomes important after the first stage of task orientation. Furthermore, in a study with children (mean age 11.8 years), Opdenakker and Minnaert (2011) also showed that the teacher played an important role in academic engagement, especially when the children perceived their teacher as being helpful and being a good instructor. With our study we added to the huge amount of evidence that the fulfilment of the basic needs is beneficial for students motivational engagement. Future studies could focus on the possible hierarchy in need fulfilment, as it may have important implications for educational practice.

A third implication concerning SDT is the use of indicators of intrinsic motivation. According to Ryan and Deci (2000), besides pleasure and interest free choice is an important indicator of intrinsic motivation: do students voluntarily choose to perform more tasks after the obligatory amount of work is done? In controlled experimental settings this seems an appropriate method, but in the actual practice of the classroom one can wonder if it is not too much to ask from a student, given possible peer pressure and the tight and full schedule of a school day. In our study on learning environments, performed in an ecologically valid setting, we used absenteeism as an outcome measure, and found that boys in the SLE were less frequently absent. In other words, they chose to go to school more often than the boys in the TLE. Therefore, we argue that absenteeism can be considered as a free choice measure, an indication of intrinsic motivation, in a non-experimental setting: will I or will I not go to school? For our study this would indicate that boys were more intrinsically motivated in the SLE, as they chose to be present more often. An alternative explanation is that students feel more related to their teacher and peers in the student-centred learning environment and therefore are more inclined to attend classes. Furthermore, as the student-centred learning environment often involves group work, which creates interdependence, students might feel more responsible. Either way, for research on motivational engagement, but also for studies that use SDT as a framework, absenteeism seems to be an appropriate and objective measure.

6.3.2. Implications for SRL: The validation of the questionnaires on multiple content goals and motivational regulation strategies

In this section we discuss the validation of the questionnaires we used in the studies on self-regulation. With these studies we have created important conditions for further research on the subject of self-regulation for this particular population. First, we discuss the validation of the GIFI on multiple content goals. The study in Chapter 3 shows that students recognize the

16 goals the GIFI aims to measure. Hence, we can answer the research question ‘Is the Goal Identification and Facilitation Inventory a valid instrument to measure students’ multiple content goals in pre-vocational education?’ affirmatively: we can use this questionnaire to study multiple-content goals. However, based on the findings in Chapter 4, we cannot assume that students always distinguish between those 16 goals. A validation of the questionnaire with a sample from vocational secondary education showed that almost all items fitted in the solution, but students scored several goals under one denominator, resulting in 9 goals. The differences we found could be attributed to the different samples we used: the study in Chapter 3 was executed with students from pre-vocational secondary education, whereas the study in Chapter 4 was executed with students who are somewhat older. One would expect that older students are more able to distinguish between the goals, but one could also argue that they are more able to identify the broader outlines of goals, taking together goals that are conceptually related.

However, we cannot simply assume that the goals that the GIFI covers all goals that students consider important. In interviews most students mentioned ‘getting their diploma’ as the most important goal at school, but we do not recognize this as one of the goals as formulated in the GIFI. Is it, for example, students’ translation of the Mastery goal? Is it a higher order goal for these students in this period of their lives? Does it serve the goal ‘Keeping a good relationship with one’s parents’ or the wish to get a proper job and provide for one’s future family? In addition, the relation with motivational engagement shows that only some of the goals are related to motivational engagement. An important question that arises from this is: how can we obtain a better view of students’ goals, in addition to the insights the GIFI provides, and how can we gain more insight into the effect goals have on students’ behaviour? Although the GIFI is based on a taxonomy that was built up over 30 years, rooted in theory, practice, and research, and part of a comprehensive theory on human

motivation, results from our interviews provide another picture of students' goals. According to the review by Massey, Gebhardt, and Garnefski (2008) adolescents' goals differ from the goals that adults deem important. We may not need a completely different goal taxonomy, but we do need to extend our measurements.

The GIFI asks about goal importance and how striving after goals is facilitated, but in studies on goals a variety of questions are used, approaching goals from a different angle. According to Wentzel (1999) a person may deem many goals important, but may not act accordingly. She thus reformulates the question as 'how often do you try to.....', so that participants' answers provide insight into the energy and time spent on a particular goal. The Achievement Goal Theory questionnaire (Elliot & Murayama, 2008), the GOAL-S (Dowson & McInerney, 2003;2004), and Mansfield's work on goals (Mansfield, 2009), for instance, explore the 'why' of a specific goal. This may reveal lower-order goals or action programs that serve a higher-order goal (Boekaerts, De Koning, & Vedder, 2006). Striving after material gain, for example, may represent a wish to be able to earn a basic living wage and 'bring home the bacon', or a desire for nice, material goods here and now. Furthermore, we detect a proximal and distal aspect in the goals 'we want to have fun' and the goal 'getting my diploma'. It is worthwhile to include work about future time perspective, for example by Peetsma and Van Veen (2011), adding the dimension of time to the study of goals: What goals are important here and now, what goals refer to the future, and what is the effect of this differentiation on motivational engagement? The method used by Little, Salmela-Aro, and Phillips (2007) in the Personal Project Analysis seems an appropriate way to dig further into what students pursue, and the meaning and consequences of these goals. The researchers started by asking the respondents to select their most important goals. Through interviews, various aspects of these goals – e.g., the support from one's environment, the influence of peers, the costs and benefits associated with the pursuit of these goals – were subsequently

examined more comprehensively, providing rich information about individual goals. The method used by Little and colleagues is somewhat comparable with the method that is used by Wolters to compose his questionnaire on motivational regulation strategies: he asked students to formulate the strategies they used. Different from the method Little and colleagues used, he subsequently categorized these strategies according to existing theoretical concepts. The advantage of this method is that the operationalization of the strategies is very concrete and close to students' reality and at the same time theoretically strong. There is a risk, however, with both the method used by Little et al. (2007) and Wolters (1998), that some important theoretical concepts will not be included. Also, students might not be aware of the goals they pursue and the strategies they use, but may only recognize them when presented in an instrument. Schwinger, von der Laden, and Spinath (2007) found a good middle ground between these two approaches. In their studies on strategies they used Wolters' existing questionnaire on strategies, added some strategies from other studies and, additionally, invited respondents to list their own strategies. The latter were subsequently categorized according to existing theoretical concepts.

Secondly, we discuss the validation of Wolters' questionnaire. We can answer the research question 'Is Wolters' questionnaire on motivational regulation strategies a valid instrument to measure how students in pre-vocational education regulate their behaviour?' positively. At the same time we need to raise a similar question as we did for the results of the GIFI: does Wolters' questionnaire include all strategies that students in pre-vocational secondary education use? We again refer to how Schwinger et al. (2007) proceeded to get a comprehensive picture of students' use of strategies by asking students to report their own strategies, in addition to the strategies in the questionnaire. We also refer to strategies like Help Seeking (Aleven, Stahl, Schworm, Fischer, & Wallace, 2003; Schunk, & Zimmerman, 2012), Emotion Regulation (Boekaerts & Pekrun, 2016; Wolters, 2003), and Delay of

Gratification (Bembenutty, 2009; Bembenutty & Karabenick, 2004), that could be a valuable addition to Wolters' questionnaire.

Concluding, the GIFI and Wolters' questionnaire provide a good start for studying the self-regulation of motivation. However, to get a better grip on the mechanisms underlying goals, motivational regulation strategies, and motivated behaviour, we need more comprehensive instruments. A broader ownership of respondents in the study on multiple content goals could facilitate goal research, as goals are quite personal and idiosyncratically determined. A broader ownership of respondents in the study on strategies could provide us with a more complete picture of the strategies students use. Therefore, we suggest that we should not work strictly from theory only, but also inductively, that is, from the respondents' point of view.

6.3.2. Implications for SRL: multiple content goals

In this section we discuss the implications of our studies for the theory of self-regulation of motivation in relation to multiple content goals. Looking at goal preferences (Chapter 4), our study shows that a group of goals is considered equally important. This group includes learning goals, social goals, and well-being goals. The attribution of similar importance to several goals simultaneously raises relevant questions: if these goals are considered equally important, what happens if one or more goals are thwarted? For students' well-being, is it necessary for all goals to be achieved, and must all goals be worked on simultaneously? The statement made by some students in the interviews – e.g., 'I want to enjoy school because otherwise it is difficult to focus on getting my diploma' – suggests a causal relation and indicates that some students perceive social goals and well-being goals as instrumental for obtaining their diploma. This finding confirms the findings by Lemos and Goncalves (2004) that goals can support each other, or, when a particular goal is not achieved, it can hamper the

fulfilment of another goal. This is modelled in Boekaerts' Dual Processing Model (Boekaerts, 2007; Boekaerts & Cascallar, 2006; Boekaerts & Corno, 2005; Boekaerts & Niemivirta, 2001). According to this model, students who perceive the task as congruent with their personal goals, values, and needs will walk the growth path, positively energizing the learning activity. Students who perceive that their personal goals do not match the learning activities will have difficulty focusing on learning activities and switch to the well-being path (Boekaerts, 2007). Seen from the perspective of this model, students tell us that it is important for researchers and educators to realize that the attainment of well-being goals and social goals are equally important to mastery goals. Indeed, the attainment of well-being goals and social goals may even be prioritized over the possible attainment of mastery goals. In the context of self-regulation, however, considering students to be agents in their learning process, these results show that the different goals that students pursue require students to regulate their behavior. Strategies can play an important role here, helping students to shift their focus temporarily from the well-being path to the mastery path.

Students' goal preferences raise other interesting issues. In addition to the group of goals that are considered equally important by most students, we distinguished roughly four additional goal patterns. What are the consequences of these specific goal preferences for students' motivational engagement? Quite a large group of students reported that it is important to have nice new things; in other words, they pursue Material Gain, either in combination with Safety or in combination with Superiority and Individuality. Seen from the perspective of the Dual Processing Model, one would expect that this would hamper the motivation for learning, as these goals are not related to goals that pave the mastery path. This would align with Self Determination Theory that states that extrinsic incentives can have detrimental effects on motivation for learning. However, in our study we did not find a relation between the goal Material Gain and motivational engagement, positive or negative.

Apparently, wanting to have nice new things does not automatically have negative consequences for the motivation for learning. Maybe the pursuit of such items is detrimental for learning only when used as a reward or punishment, or if it means that students spend valuable time on a job in order to earn money instead of learning. Taking these patterns in consideration, we need a more concrete specification of the goals that make students walk the well-being path or the mastery path; it would give us more insight in the process as depicted in the Dual Processing Model. Or we must use additional theories to understand the consequences of the patterns in goal preferences we found. The preference for all three ego goals – Material Gain, Superiority and Individuality – is, for example, congruent with the dimension of self-enhancement, as depicted in the model of basic human values by Schwartz and Bardi (2001), also described by Boekaerts and colleagues (Boekaerts, 2009; Boekaerts, De Koning & Vedder, 2006). Students who pursue these goals are driven by self-interest, which leaves little space for values that are situated opposite self-enhancement and express concern for others. The model by Schwartz & Bardi (2001) could also shed light on the consequences of another pattern we detected, especially among girls, namely the preference for the Safety goal. These girls adhere to learning goals, but also attach much importance to feeling safe and not taking risks. The questionnaire asked about risks in relation to alcohol and drugs, but also about taking risks in general. It is understandable that students want to feel safe, but extreme pursuit of safety can lead to avoidance of challenges, and to the conservation of the status quo, hampering change that is necessary to learn and develop. More research is needed to find out what the consequences of these goal patterns are for the motivation for learning.

6.3.3. Implications for SRL: motivational strategies and beliefs

The results of our study on motivational regulation strategies and their mediational function between motivational beliefs and motivational engagement have several implications. The most important implication we draw from this study is, that although students in pre-vocational secondary education use motivational regulation strategies, there is plenty of room for improvement as the use of these strategies was average to far below scale average: students do not regulate their behaviour extensively as a matter of fact.

The second implication concerns students' use of strategies in relation to their belief on the value of schoolwork. Our study shows that the more students valued their schoolwork, the more they used the motivational regulation strategies. These findings are consistent with the different phases in motivational self-regulation that are described by Boekaerts and Corno (2005), and Kuhl (1984, 2000). Students first have to decide whether they want to do their schoolwork (choice motivation), a decision that is partly determined by the value students attribute to schoolwork. Subsequently, when the choice is made, students move into the volitional phase, also referred to as volitional or executive motivation. This determines whether students will actually do schoolwork and regulate their behaviour to counteract distractions and competing goals. Wolters did not apply this distinction in the questionnaire on strategies, but in the literature (e.g., Boekaerts & Corno, 2005; Wolters, 2003) the same distinction is made for strategies. The term 'motivational strategies' is used for strategies that help students to make the actual choice to engage in schoolwork, whereas the term volitional strategies is used for strategies that help students to persist in doing schoolwork once they have made the choice to engage in schoolwork. Interest Enhancement can be labelled as a motivational strategy. We would like to see students use this strategy first, since this might help them to make the choice to engage in schoolwork. Subsequently, students can move on to volitional strategies to protect that choice, e.g. Self Consequating, Environmental Control,

Performance Self-Talk, and Mastery Self-Talk. The distinction is important for educational purposes, as different strategies are beneficial on different moment of self-regulation of motivation.

The third implication concerns the belief that one is competent to perform schoolwork successfully. Unlike the value belief, this belief does not seem to encourage students to regulate their motivation. This is not in line with several theories, nor with findings in previous studies. Apparently, the role that competence beliefs play in the self-regulation of motivation is not always that straightforward and requires a more elaborate approach. A first explanation is that students are ignorant to when and how strategies can be used: Even though one is capable of performing the task successfully, that does not mean that one does not have to cope with distractions or competing goals. In this respect, Bong (1999), Zimmerman, Bandura, and Martinez-Pons (1992), and Zimmerman (2000) made an interesting contribution. They distinguished between students' competence beliefs in relation to schoolwork and their competence beliefs in relation to self-regulation, that is, the belief that one is competent to cope with distractions and regulate one's motivation. Future research should incorporate this distinction in studies on the self-regulation of motivation. Another explanation of the lack of use of strategies in relation to the belief one is competent, could be the character of the belief. Students who believe that competence is related to intelligence and is innate and unchangeable, might see less value in the use of strategies than students who believe that competence is changeable, and related to exerted effort, a distinction made by Dweck (2006).

In conclusion, students seem to have little knowledge of motivational regulation strategies, or do not know how and when to use them. The obvious implication is that students need to learn what strategies are, and why and when they can be used. At this point I would like to refer to ongoing research by Smit, Boekaerts, & De Brabander (in preparation):

an intervention study to train the use of motivational regulation strategies. Previous intervention studies show that providing students with written motivational information on the importance of an activity ('why information') and how to proceed ('how information') increases their motivational engagement and improves their achievement (Eccles & Wigfield, 2002; Martens, De Brabander, Roozendaal, Boekaerts, & Van der Leeden, 2010; Vansteenkiste, Timmermans, Lens, Soenens, & Van den Broeck, 2008). However, in a study by Van Nuland, Boekaerts, and Martens (2010) with students from pre-vocational secondary education, written motivational information did not have an effect. Therefore, in our study, performed with six classes in pre-vocational secondary education, we actively involved students in acquiring why information on the usefulness of strategies and how information informing students on how to regulate their motivation. We used educational conversation and social learning activities, with, among other, vignettes: Students discussed and shared their knowledge and experiences about what distracts them and what motivational regulation strategies they can use. Subsequently, a number of times during the study students were asked to formulate intentions to use the strategies in case of distractions. Preliminary results show that students in the experimental group reported using strategies more extensively after the intervention. Furthermore, they reported more sense of autonomy. No results were found for motivational engagement, absenteeism, or achievement. These preliminary results suggest that students' sense of autonomy improved with increased knowledge and use of motivational regulation strategies. This may be attributed to their increased ability to take control of their own motivation for learning. However, we question the reported increased use of strategies, as it is not visible in any of the other motivational outcomes. Did students provide the answers that researchers want to hear? Were students, due to the repeated attention paid to strategies, merely more familiar with the concept of strategies? Or did students actually self-regulate their behaviour to a greater extent? The latter would be good news, but we would

like to see this reflected in motivational engagement and absenteeism as well. Unfortunately, we have to agree with Van Nuland et al. (2010) that influencing motivation is not as straightforward as might be concluded from studies with other samples.

The last implication, derived from the intervention study, concerns the difficulty to motivate students to participate in research. As our study progressed, the resistance to participation grew. This is evident in the increasing numbers of missing answers and in the comments made by students when I arrived for a next session: ‘not again.....’, ‘I already answered these questions’, ‘I want to continue with my schoolwork’. Admittedly, the last comment is rather funny, considering that the aim of our intervention is to stimulate students’ self-regulation of motivation. It is clear that students have to be motivated not only for schoolwork, but also to participate in research. From that perspective it was inspiring to see the enthusiasm with which students exchanged information with each other in the first two sessions about what distracts them and how they deal with distractions, discussing the vignettes with Wolters’ strategies.

6.4 Limitations and recommendations for future studies

The findings of the different studies in this dissertation shed some light on what influences students’ motivational engagement in pre-vocational secondary education. However, we want to discuss some limitations of the studies.

We start with limitations of a methodological nature. First, we mainly used self-report questionnaires with Likert scales. This enabled us to measure students’ perception of motivation and motivational engagement on a large scale. However, for more fine-grained information and for the interpretation of the findings, other instruments are necessary, such as additional interviews, or observations in combination with think-aloud protocols, capturing both visible behaviour and students’ mental states and coping activities. The second

methodological limitation concerns the correlational character of the studies, and the use of one-time measurements only. Although the findings are interesting and important, we cannot draw conclusions about causality. Moreover, we ignored the dynamic, reciprocal character of motivation. Though in most models motivation is depicted as a linear process – with achievement, effort, and pleasure/ interest as motivational outcomes, and need fulfillment, goals, goal orientations, and motivational beliefs as predictors – motivation is in fact a reciprocal or circular process (Bandura, 1991; Boekaerts & Cascallar 2006; Zimmerman 2000; Zimmerman & Schunk, 2008). Interest, for example, treated in our study as an outcome measure, can also be seen as a predictor, leading to stronger value beliefs, and good grades can, for example, boost students' feeling of competence. Online measurements and intervention research are necessary to establish the causal relations and the cyclical nature of motivational processes, not only in order to strengthen theories on motivational processes, but also to give teachers the necessary information on how to act. The third methodological limitation concerns the properties of Multi-Dimensional Unfolding (Chapter 4). This technique is used in marketing research to rank order and examine taste preferences. It is an excellent instrument for visualizing individual preferences of all respondents within one configuration. However, for our study we did not use a ranking order, but mean scores, derived from the Likert scales. As the scores were situated close to each other or may even be identical, a large group of goals clustered at the center of the configuration. In an ongoing study on goal preferences we used a different procedure, asking students to rank the sixteen goals on importance. We expect this to lead to a more discriminating and clearer configuration of students' goal preferences. Furthermore, Busing (Leiden University) is rapidly developing new and promising applications for MDU, including the possibility to add variables and test the significance. In our case, this will enable us to add aspects such as effort and pleasure. At a glance we will be able to see what goals students deem important

and whether this affects their motivational engagement significantly. It is clear that MDU will provide exciting possibilities in the near future.

In the next section we discuss limitations that concern the content of the studies. The first limitation of this nature has to do with the study of the self-regulation of motivation. We studied multiple content goals, motivational regulation strategies and motivational beliefs separately, while these aspects are a part of the self-regulation of motivation as a whole and are related. In our opinion we first needed more clarity, especially on how goals function, as much is still unclear. Future studies are necessary to obtain a more complete picture of the effect of goals and their position in the self-regulation of motivation as a whole.

The second set of limitations that is related to the content of the underlying studies, is the missing link between learning environments and motivational self-regulation. New forms of learning are often mentioned in the same breath as self-regulation, as if they were automatically linked. It is assumed that these forms of learning provide students with more opportunities to pursue their own goals and become agents in their own learning process (Boekaerts, 2006; Boekaerts & Cascallar; Boekaerts, De Koning, & Vedder, 2006). However, in a study by Schuitema, Peetsma, and Van Veen (2012) students did not report to self-regulate their learning or motivation more extensively in an innovative learning environment than in a traditional learning environment. Apparently, although a student-centred learning environment seem to offer the opportunities, this does not automatically lead to students using strategies or setting goals. In the classroom, specific attention should be paid to motivational processes and the opportunity to practice these processes. This will open up students' full potential to become active, self-regulating learners (Bandura, 1986, 1994). Intervention studies are necessary on how to train the use of strategies and help students set

goals that will support their learning process. Preliminary results from our intervention study on strategies, however, show that this is not an easy task.

The next set of limitations concern outcome measures. First, we asked students about schoolwork in general and did not focus on specific domains. Our results might be somewhat tempered, as it is well known that motivation differs over domains. Hence, a domain-specific approach might have led to clearer conclusions (Bong, 2004). Secondly, we focused on positive outcome measures only – e.g., pleasure, interest, effort, and achievement – while there may also be a downside to certain aspects of the learning environment, certain goals, and certain motivational strategies. For example, we did not detect a general tendency for less pleasure, interest, or effort, where the use of controlling strategies was reported, but, they could have an impact on, for example, stress and anxiety. Future research should include other variables to establish a more complete picture. Thirdly, we discuss the limitations of the use of effort and persistence, two aspects of motivational engagement as described by Reeve (2012). In our research, especially in the study on motivational regulation strategies, it seemed appropriate to measure persistence as well as effort. We assumed that if students used strategies, they would show more commitment and give up less quickly. In other words: we expected them to persist. However, students did not distinguish between effort and persistence. This was surprising, as the items in the persistence scale clearly differ from the items in the effort scale, in that the former emphasize the ability to sustain effort, even in the presence of distractions. The aggregation of the items into one scale was a pragmatic, but not a satisfactory solution as we could not prove the extra effort that might be committed as a result of strategy use. The outcome measure effort seemed to have more drawbacks. The learning environment (Chapter 2), students' beliefs, and the use of motivational regulation strategies (Chapter 5) showed a relation with effort, but there was no relation between effort and achievement. It is hardwired into our way of thinking that investing more effort in

schoolwork will lead to better results; students who do not perform well are often told that they must make more of an effort. A possible explanation for the missing relation between effort and achievement is that we measured the *quantity* of effort exerted, not the *quality* of effort. We can imagine students forcing themselves to stay put at their desk, chewing their pen, really making an effort to work, but not actually learning. We therefore advocate measures that measure effort more substantively, for example through students' use of cognitive and meta-cognitive strategies.

The limitations on outcome measures have led us to express our concern about the apparently unquestioning way that outcome measurers like effort, persistence, and achievement are used in research. For every study, not only the reliability but also the validity of the measurements for that particular sample, should be tested. Furthermore, in our opinion, we should go back even further, to the core aspects we aim to measure. How do the mechanisms that we presume present between effort, persistence, and achievement, work? What do we expect to see, and what do we want to achieve in the classroom? Moreover, how can a teacher in the classroom detect motivation or lack of motivation? Sometimes motivation is apparent when a teacher asks a question that piques curiosity: students move in their seats, show the tip of their tongue, consult with each other, want to respond, get color in their cheeks, and their ears turn red. Motivation can be visible in a buzz, in students' gestures, or a deep frown. When motivation decreases, for example when a subject is no fun, too difficult, easy, or boring, we see students zooming out, looking out of the window, fiddling with their hair. This, again, advocates not only for more observation research, but future research should pay specific attention on the manifestation of motivation in practice and the further operationalization of motivation.

6.5. Practical implications

The studies of this dissertation are motivated by the concern about the lack of motivation, higher absenteeism and higher drop-out rates in pre-vocational secondary education. Besides contributing to theories on motivation, the studies in this thesis may help educators with the question of how to enhance and increase students' motivation. Is the learning environment an instrument to tackle the problems mentioned above? Based on our first study the answer is affirmative: The learning environment made a difference in absenteeism, in the reported pleasure and interest in schoolwork, and the effort put into schoolwork. These are all indicators of motivational engagement. An obvious implication is that schools should design their learning environment according to social constructivist principles that meet the needs of students. The five characteristics listed by Savery and Duffy (2001) are very practical and constitute a clear basis for educators. However, it is not an easy task to implement such a learning environment. As Mayer (2004) states, the complexity of social constructivist learning is often underestimated, which may explain why the implementation of such a learning environment is often substandard (Roozendaal, Minnaert, & Boekaerts, 2005). Student-centred learning environments require teachers to take a different perspective on teaching, learning, and motivation, and to adopt roles that are different from the teachers' roles in a teacher-centred learning environment. For example, this study, together with a huge body of research, shows that granting students autonomy is beneficial for their motivation, provided this goes hand in hand with a feeling competence and with adequate instructional and emotional support. In my role as a teacher of secondary-school teachers and an educational consultant, I know that finding the balance between granting autonomy and providing the required structure and support is one of the questions that preoccupies both starting and more experienced teachers in secondary education. Simply repeating 'students need autonomy' as a mantra is not very helpful for teachers. Supported by other studies, our

findings also indicate that it might be advisable for educators to work on students' feeling of relatedness before they start working on students' feeling of autonomy.

The second question we asked in relation to the concerns we expressed is: is the self-regulation of motivation a suitable intervention point to tackle the problems mentioned above? When considering the implications of our findings on goals for practical use, the answer is yes, albeit with some reservations. We need to ask ourselves how we want to deal with students' goal preferences in the classroom. The goals one pursues is almost an ethical subject, as goals are quite personal, related to the individual. In our opinion is it not up to educators to approve or disapprove of certain goals. Furthermore, our insight in the benefit of certain goals is not sufficient to make recommendations about goals in the practice of the classroom. Educators can, however, mirror students' goals and the consequences for learning in order to show them what is more or less beneficial for learning. Subsequently teachers can help students to, as Boekaerts states, temporarily put certain goals on the back burner, and other goals on the front burner. Here, the use of motivational regulation strategies could prove to be useful.

Finally, do motivational regulation strategies offer possibilities to tackle problems of motivation, absenteeism and dropping out of school? We can answer this question affirmatively, but again, with some reservations: the reported use of strategies is related to motivational engagement, so this helps students to get more motivated, but we cannot automatically assume that this will reduce absenteeism and dropping out of school. However, teachers can contribute to raising students' awareness and knowledge of strategies and help them train and use strategies. This will make them less dependent on external circumstances, both now, in their future studies, and in their working career and lifelong learning (Kessels, 2005; Zimmerman, 2002). Also, judging from the results of our studies on motivational regulation strategies, the belief on value of schoolwork plays an important role, in the use of

strategies, but especially directly in motivational engagement. Students should require knowledge of motivational processes as a whole.

In conclusion, it is clear that school leaders and teachers are pivotal to students' motivation when it comes to the design of the learning environment. Paradoxical as this may sound, this also applies where students' self-regulation is concerned; it places high demands on educators. They should help students to understand how motivation works and how they can motivate themselves. Preliminary results from our intervention study on strategies show that this is not an easy task. The next important step is to further design and conduct intervention research on the self-regulation of motivation that is pragmatic, appeals to students from pre-vocational secondary education, and is suited for implementation in the reality of the classroom. The underlying studies together constitute a valuable stepping stone to intervention research in order to further strengthen students' motivation for learning, not only via the learning environment, but also via students as agents in their motivation for learning.

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Samenvatting (Summary in Dutch)

Het verkennen van aanknopingspunten om de motivatie van leerlingen in het vmbo te verbeteren.

Het onderwerp van dit proefschrift is ingegeven door de zorgen die we hebben over de motivatie voor schoolwerk van leerlingen in het voorbereidend middelbaar beroepsonderwijs (vmbo). In deze onderwijsvorm ligt de motivatie lager en de schooluitval hoger dan in andere vormen van voortgezet onderwijs. Met motivatie voor schoolwerk bedoelen we het plezier, de interesse, de inzet en het doorzettingsvermogen van leerlingen als ze met schoolwerk bezig zijn. Het belang van onderzoek naar mogelijkheden om de motivatie van deze leerlingen te verbeteren, wordt duidelijk als we bedenken dat: 1) ongeveer 60% van de leerlingen van het primair onderwijs instroomt in het vmbo; 2) het vmbo 4 jaar beslaat; 3) leerlingen 12 tot 16 jaar oud en leerplichtig zijn; 4) het vmbo de toegangspoort is voor een groot deel van onze beroepsbevolking. We hebben twee aanknopingspunten onderzocht: de leeromgeving en de zelfregulatie van motivatie. De algemene onderzoeksvraag luidt: Is de motivatie voor schoolwerk van leerlingen in het vmbo gerelateerd aan de kwaliteit van de leeromgeving en aan de regulatie van motivatie door leerlingen zelf?

In hoofdstuk 1 is het theoretisch kader geschetst voor de vier studies. Allereerst zijn we ingegaan op de leeromgeving. Veel vmbo-scholen hebben, om hun leerlingen te motiveren, hun leeromgevingen veranderd van meer traditionele leeromgevingen, in dit proefschrift gelabeld als docentgerichte leeromgevingen, naar leerlinggerichte leeromgevingen. Voor de effectiviteit van leeromgevingen in relatie tot motivatie is echter weinig empirisch bewijs. In onze eerste studie hebben we daarom de motivatie van leerlingen in een leerlinggerichte en een docentgerichte leeromgeving vergeleken. Leerlinggerichte leeromgevingen zijn vormgegeven volgens sociaal constructivistische principes: leerlingen construeren kennis aan de hand van opdrachten in een realistische, betekenisvolle context; ze hebben keuze in onderwerp en werkwijze; ze hebben toegang tot een veelheid aan bronnen; ze werken vaak samen aan opdrachten; docenten zijn niet alleen experts, maar ondersteunen en coachen leerlingen in hun leerproces. Meer traditionele, docentgerichte leeromgevingen kenmerken zich door de centrale rol van de docent. Deze bepaalt wat wanneer wordt geleerd en hoe. Er is vooral sprake van kennisoverdracht, waarbij de lesmethode de leidraad en belangrijkste informatiebron is. Kennis wordt vervolgens, vaak individueel, ingeoefend aan de hand van opdrachten uit de methode. De kenmerken van beide leeromgevingen in ogenschouw nemend, hebben we de zelfdeterminatie theorie gekozen als theoretisch kader om het verschil in motivatie tussen verschillende leeromgevingen te onderzoeken. Deze theorie veronderstelt dat mensen drie psychologische basisbehoeften hebben: de behoefte aan een gevoel van autonomie, een gevoel van competentie en een gevoel van verbondenheid (Deci & Ryan, 1985, 2000; Ryan & Deci, 2000). Onderzoek heeft uitgewezen dat het ondersteunen van deze basisbehoeften de motivatie van leerlingen voor schoolwerk verbetert; leerlingen hebben onder andere meer plezier en zetten zich meer in, dan in situaties waarin de basisbehoeften minder worden bevredigd. Op basis van De Brabander, Rozendaal en Martens (2009) hebben we daarnaast een onderscheid gemaakt tussen het gevoel van persoonlijke competentie en organisatorische competentie, in de veronderstelling dat leerlingen zich competent kunnen voelen door hun eigen kunnen en door de faciliteiten van de leeromgeving. We verwachtten dat leerlingen in de leerlinggerichte leeromgeving meer gemotiveerd zijn, omdat deze meer aan de basisbehoeften van leerlingen tegemoet lijkt te komen. De keuze in werkwijze en onderwerp, de ruimte die nodig is om een opdracht in een realistische context op te lossen, en de vrijheid om informatie op te zoeken in een veelheid aan bronnen, komt tegemoet aan de behoefte aan een gevoel van autonomie. Ten tweede maken keuzemogelijkheden ook dat leerlingen datgene kunnen kiezen waar ze zich competent in

voelen. Daarnaast wordt verondersteld dat kennis en vaardigheden begrijpelijker zijn –en dus het gevoel van competentie voeden- als ze zijn ingebed in een realistische context. Ten derde wordt verondersteld dat een coachende docent en de samenwerking met medeleerlingen aan opdrachten, tegemoet komt aan zowel de behoefte aan een gevoel van competentie als aan een gevoel van verbondenheid. Er zijn echter ook tegengeluiden. Vooral de mate van autonomie die leerlingen krijgen en de complexiteit die gepaard gaat met realistische, betekenisvolle opdrachten, zouden het gevoel van competentie, en daarmee de motivatie van leerlingen, ondermijnen.

Het is natuurlijk belangrijk om leerlingen te motiveren door middel van de leeromgeving, maar het is een externe vorm van motivatie-regulatie waarbij de verantwoordelijkheid voornamelijk bij de school en de docent ligt. Volgens de zelfregulatie theorie (Zimmerman, 1986) zijn leerlingen actoren in hun eigen leerproces. Het tweede aanknopingspunt is daarom de zelfregulatie van motivatie die leerlingen in staat stelt om zichzelf te motiveren en zich te wapenen tegen allerlei zaken die demotiveren. We bestudeerden drie aspecten: de doelen die leerlingen stellen, de motivatie-strategieën die leerlingen inzetten en de motivatie-overtuigingen die leerlingen hebben (Boekaerts, 1999b; Pintrich & DeGroot, 1990). De veronderstelling is dat doelen bepalen waar leerlingen naartoe werken, hoeveel energie ze in hun gedrag steken en hoeveel doorzettingsvermogen ze hebben. Onderzoek naar leerdoelen en sociale doelen laat zien dat doelen inderdaad van invloed zijn op motivatie voor schoolwerk, maar er is nog weinig onderzoek gedaan naar de multiple doelen die leerlingen nastreven. Het gebruik van motivatie-strategieën betreft de daadwerkelijke zelfregulatie van motivatie; het kan leerlingen helpen aan het werk te gaan en blijven, ook bij concurrerende doelen en andere aspecten die afleiden van schoolwerk. De veronderstelling is daarnaast dat het gebruik van strategieën deels bepaald wordt door de overtuigingen die leerlingen hebben over de waarde van schoolwerk en over hun eigen kunnen. Is het schoolwerk nuttig en ben ik voldoende competent om de taak succesvol af te ronden? Dan is het de moeite waard om strategieën in te zetten.

In dit proefschrift is geprobeerd antwoord te geven op de volgende onderzoeksvragen: (1) Wat is de relatie tussen de leeromgeving, de vervulling van de basisbehoeften van leerlingen, en hun motivatie voor schoolwerk, prestaties en schoolverzuim? (2) Wat is de relatie tussen de multiple doelen van leerlingen en wat zijn hun doelvoorkeuren? (3) Wat is de relatie tussen motivatie-strategieën, en motivatie en prestaties? En loopt de relatie tussen motivatie-overtuigingen enerzijds, en motivatie en prestaties anderzijds, via het gebruik van deze strategieën?

Zoals verwacht (Hoofdstuk 2) kwam de leerlinggerichte leeromgeving meer tegemoet aan de basisbehoeften van leerlingen dan de docentgerichte leeromgeving: leerlingen rapporteerden meer gevoel van autonomie, verbondenheid, en eigen competentie. Daarnaast rapporteerden ze ook meer gevoel van organisatorische competentie, dat wil zeggen, steun vanuit de organisatie. Ook plezier, interesse, en inzet voor schoolwerk van deze leerlingen lag hoger in de leerlinggerichte leeromgeving. Een andere belangrijke bevinding was het lagere schoolverzuim bij jongens in de leerlinggerichte leeromgeving. Dit is belangrijk omdat het lastiger is gebleken om jongens te motiveren en te binden aan onderwijs. Er zijn geen verschillen gevonden in prestaties. Dit betekent dat een leerlinggerichte leeromgeving, gebaseerd op sociaal constructivistische principes, gunstiger is voor de motivatie van leerlingen in het vmbo dan de meer traditionele, docent-gestuurde leeromgeving. We schrijven dat toe aan de mate waarin aan de basisbehoeften is voldaan, met name aan het gelijktijdig verlenen van autonomie en ondersteuning en verbondenheid, in de literatuur gelabeld als ‘autonomy-supportive teaching’: het ervaren van vrijheid is effectief als dat gepaard gaat met steun van de docent en een goede relatie met de docent.

Met de studies in hoofdstuk 3, 4 en 5 onderzochten we de regulatie van motivatie door leerlingen zelf. Meer specifiek, we onderzochten hun doelen, motivatie-strategieën en motivatie-overtuigingen. Een belangrijke bijdrage van dit proefschrift aan onderzoek naar motivatie, was de validatie van de vragenlijst voor multiële doelen (Hoofdstuk 3) voor leerlingen in het vmbo, gebaseerd op de doelen taxonomie van Ford en Nichols (...) en ontworpen door Boekaerts en collega's. De doelenvragenlijst bestaat uit de egodoelen Materiaal gewin, Individualiteit, en Superioriteit, en non-egodoelen, namelijk de doelen die gerelateerd zijn aan leren (Beheersen van stof, Managen van het leren), aan hulp (Hulp bieden, Hulp krijgen), aan welzijn (Zelfverzekerd zijn, Plezier hebben op school, Je thuis voelen in de klas), aan anderen (Gewaardeerd worden en Anderen waarderen), en de doelen Een goede relatie met je ouders, Zelfbepaling, Rechtvaardig behandeld worden, en Veiligheid. Uit de validatie bleek dat leerlingen deze 16 doelen onderscheiden. Daarnaast gaven leerlingen in interviews aan ook nog andere doelen belangrijk te vinden, waaronder het halen van hun diploma. Interessant is dat ze daar het doel 'Plezier hebben op school' automatisch aan koppelden: als je geen plezier hebt is het lastig om je diploma te halen. Daarnaast gaven leerlingen aan niet alleen een goede relatie met ouders, maar ook een goede relatie met de familie van belang te vinden. Tot slot vonden we, zoals verwacht, dat doelen zijn gerelateerd aan motivatie voor schoolwerk – in deze studie gemeten met plezier/interesse en inzet-, maar dat geldt slechts voor enkele doelen.

Met de studie in hoofdstuk 4 hebben we vervolgens de samenhang tussen doelen en de doelvoorkeuren van leerlingen onderzocht. Deze studie liet zien dat de leerlingen duidelijk onderscheid maakten tussen de egodoelen en non-egodoelen. Ze rapporteerden dat de egodoelen het minst belangrijk voor hen zijn en dat zij veel belang hechten aan de non-egodoelen. Naast deze doelvoorkeuren die voor alle leerlingen gelden, konden we unieke doel-patronen onderscheiden. Een vrij grote groep leerlingen vond het verwerven van het doel Materiele zaken belangrijk, het zij in combinatie met Veiligheid en Welzijn, hetzij in combinatie met Superioriteit en Individualiteit. Tegenover deze groep stond een groep die weinig tot geen waarde hecht aan Materiele zaken. Een tweede doelpatroon betrof de voorkeur voor het doel Veiligheid (voor meisjes) en een combinatie van Veiligheid en Welbevinden (voor jongens). Deze groep hechtte weinig tot geen waarde aan Individualiteit en Superioriteit. Deze doelpatronen leidde tot een aantal vragen voor vervolgonderzoek. Zit het nastreven van mooie, nieuwe, of kostbare zaken of het nastreven van een gevoel van veiligheid, leerdoelen in de weg? Betekent gelijke waardering van doelen dat zij tegelijkertijd nagestreefd worden? Is het bereiken van een bepaald doel voorwaardelijk voor het nastreven van een ander doel? Ondersteunen bepaalde doelen elkaar? Meer onderzoek werd aanbevolen om te bepalen hoe deze doelvoorkeuren en -patronen de motivatie voor leren beïnvloedt, of de patronen die we kunnen onderscheiden gelinkt zijn aan bepaalde respondentkenmerken, en of leerlingen in staat zijn om doelen bewust in te zetten om hun motivatie te reguleren.

Vervolgens hebben we het gebruik van leerlingen van motivatie-strategieën onderzocht (hoofdstuk 5). We zijn begonnen met de validatie van de vragenlijst voor motivatie-strategieën voor leerlingen in het vmbo (Hoofdstuk 5). Deze vragenlijst, ontwikkeld door Wolters (1998, 1999), beoogt de volgende vijf strategieën te meten: 'Omgeving controleren' (bv. je bureau opruimen, op een bepaald tijdstip leren), 'Schoolwerk interessant maken' (bv. de waarde van schoolwerk proberen te zien, er een spelletje van maken), 'Consequenties verbinden' (bv. jezelf een beloning beloven als je je schoolwerk afmaakt), 'Jezelf toespreken om te presteren' (bv. tegen jezelf zeggen dat je aan het werk moet omdat je goede cijfers wilt halen of beter wilt zijn dan anderen), en 'Jezelf toespreken om te begrijpen' (bv. tegen jezelf zeggen dat je aan het werk moet omdat je de stof wilt begrijpen). Uit de validatie bleek dat leerlingen de vijf motivatie-strategieën onderscheiden. Alleen 'een spelletje van schoolwerk maken' werd niet ervaren als dezelfde strategie als 'de

waarde van schoolwerk proberen te zien’, en is – voor deze studie- uit de vragenlijst geschrapt.

Vervolgens hebben we onderzocht of deze strategieën de relatie tussen motivatie-overtuigingen en motivatie voor schoolwerk – in deze studie gemeten met plezier, interesse, inzet en prestaties- mediëren. De studie liet zien dat motivatie-strategieën, die met deze vragenlijst bevraagd werden, slechts in beperkte mate gebruikt worden. Daarnaast was er, conform de verwachtingen, een relatie te zien tussen motivatie-strategieën en de motivatie voor schoolwerk (plezier/interesse en inzet). Het gebruik van strategieën medieerde bovendien deels de relatie tussen de waarde die leerlingen toeschrijven aan schoolwerk en de mate waarin leerlingen gemotiveerd zijn: hoe meer waarde des te meer strategiegebruik en des te hoger de motivatie. In tegenstelling tot de verwachtingen was een sterker gevoel van competentie wel gerelateerd aan een hogere motivatie voor schoolwerk, maar niet aan strategiegebruik. We hebben geen relatie gevonden met prestatie. Dit betekent dat motivatie-strategieën en ook de waarde die leerlingen hechten aan schoolwerk, goede aanknopingspunten zijn om leerlingen te motiveren. In de aanbevelingen gaan we hier verder op in.

Op basis van de onderzoeken in dit proefschrift hebben we een aantal aanbevelingen gedaan voor vervolgonderzoek. Ten eerste is gebleken dat de psychologische basisbehoeften uit de zelfdeterminatie theorie goed bruikbaar zijn om verschillen in motivatie tussen leeromgevingen te onderzoeken en duiden. Echter, gezien de complexiteit van een leeromgeving, zouden we meer variabelen in volgend onderzoek willen betrekken. We veronderstellen dat bijvoorbeeld de realistische context in de leerlinggerichte leeromgeving een bepaalde waarde aan schoolwerk geeft die motiverend werkt. De Unified Theory of Task-specific Motivation van De Brabander en Martens (2014) verenigt aspecten uit een veelheid van motivatietheorieën, inclusief de basisbehoeften van de zelfdeterminatie theorie. De eerste aanbeveling is om deze theorie te gebruiken om zo meer aspecten van leeromgevingen in relatie tot de motivatie van leerlingen te kunnen verklaren. Daarnaast formuleerden we op basis van onze bevindingen de hypothese dat leerlingen in de leerlinggerichte leeromgeving met meer autonomie kunnen omgaan omdat deze leeromgeving tegelijkertijd de behoefte aan een gevoel van competentie en verbondenheid bevredigt. De zelf-determinatie theorie maakt geen onderscheid tussen de basisbehoeften, maar vervolgonderzoek zou kunnen uitwijzen of in een bepaalde volgorde aan de basisbehoeften moet worden voldaan.

Ook de zelfregulatietheorie biedt aanknopingspunten voor de motivatie van leerlingen.

We hebben met deze studies meer inzicht gekregen in de multiple doelen die leerlingen nastreven, hoe de doelen samenhangen en wat de doelpreferenties en –patronen zijn van leerlingen. Nog onduidelijk is hoe deze doelen de motivatie voor schoolwerk van leerlingen beïnvloeden. Hoewel de assumptie is dat doelen richting geven aan ons gedrag, er voor zorgen dat we ons inzetten en dat we volhouden, hebben we slechts voor enkele doelen een relatie gevonden met motivatie voor schoolwerk. De derde aanbeveling is om verder te onderzoeken hoe doelen, en ook de door ons gevonden patronen in doelpreferenties, gerelateerd zijn aan motivatie.

Motivatie-strategieën en motivatie-overtuigingen zijn concrete aanknopingspunten gebleken om de motivatie van leerlingen te verbeteren; ze zijn gerelateerd aan motivatie en ze worden slechts in beperkte mate gebruikt. Onze vierde aanbeveling is daarom om in interventiestudies leerlingen meer bekend te maken met motivatie-strategieën en ze te trainen in het gebruik ervan. Daarnaast zou de overtuiging die leerlingen hebben over de waarde van schoolwerk ook in de training opgenomen moeten worden, aangezien dit zowel aan de motivatie voor schoolwerk als aan strategie-gebruik gerelateerd is. Het feit dat competentie geen relatie laat zien met strategiegebruik, zou kunnen duiden op een beperkt inzicht van

leerlingen in motivatie-processen. Immers: ook al voel je je competent om een taak goed uit te voeren, wil dat niet zeggen dat je niet afgeleid kan worden door allerlei factoren en dus geen strategieën nodig hebt. Een vijfde aanbeveling die we daarom doen is dat in het onderwijs meer aandacht besteed wordt aan motivatie en motivatieprocessen, aan de (zelf)kennis van leerlingen over hun doelen en overtuigingen, en wat dat betekent voor motivatie.

Bij de aanbevelingen voor vervolgonderzoek ook enige woorden over de wijze waarop we de verschillende constructen gemeten hebben. Ten eerste de doelen. Leerlingen lieten weten dat zij meer doelen nastreven dan in de vragenlijst zijn opgenomen. Ons onderzoek liet ook zien dat de vanzelfsprekendheid waarmee in de literatuur doelen worden gekoppeld aan motivatie niet strookt met onze eerste bevindingen: slechts een klein deel van de doelen is gerelateerd aan motivatie en niet helemaal op de manier die we op basis van theorie verwachtten. We bevelen aan om in vervolgonderzoek leerlingen zowel vanuit theoretisch perspectief als vanuit hun eigen perspectief te bevragen. Daarbij moeten we niet alleen vragen naar doelvoorkeuren, maar bijvoorbeeld ook naar concurrerende doelen, of het *nodig* is om een doel te bereiken en *wat* daar voor nodig is, wat er gebeurt als het streven naar een doel of het bereiken van een doel gefrustreerd wordt. Zo verwachtten we een vollediger en juist beeld te krijgen, en de theorie verder aan te kunnen scherpen. Ten tweede gaan we in op hoe we de basale indicatoren van motivatie voor leren, die veel gebruikt worden in motivatie onderzoek, hebben gemeten; plezier en interesse, inzet en doorzettingsvermogen. We hebben geen verband gevonden tussen deze indicatoren en prestaties. Dat is verrassend, aangezien we inzet vaak automatisch koppelen aan prestaties: als je hard genoeg je best doet, dan zal je ook beter presteren. Een verklaring kan zijn dat de wijze waarop inzet hebben gemeten vooral kwantitatief van aard is: uren aan je huiswerk zitten, bijtend op je pen, mag zeker gerapporteerd worden als ‘je best doen’, en ‘hard werken voor school’, maar zal weinig effect sorteren. We bevelen daarom aan om inzet op een meer kwalitatieve manier te meten, bijvoorbeeld aan de hand van het gebruik van cognitieve en meta cognitieve strategieën. In dit kader pleiten we ook voor een validatie van meetinstrumenten voor elke studie opnieuw, ook van de meest basale, vaak gebruikte concepten en al eerder gevalideerde instrumenten. In studie 4 (hoofdstuk 5) bleek bijvoorbeeld dat leerlingen geen onderscheid maakten tussen inzet en doorzettingsvermogen. We bevelen aan om een aantal stappen terug te doen en te onderzoeken wat we bedoelen met gemotiveerde leerlingen. Wat willen we zien en hoe gaan we dat meten? Gaat het om hogere prestaties? Gaat het om meer plezier en meer aandacht? Een combinatie van zelf-rapportage, observaties van leerlingen en gesprekken met leerlingen zijn nodig om de complexiteit van het construct motivatie te doorgronden.

Tot slot hebben we een aantal aanbevelingen gedaan voor de praktijk. De meest duidelijk aanbeveling die we vanuit ons onderzoek kunnen geven is om de leeromgeving zo in te richten dat aan de basisbehoeften van leerlingen wordt voldaan. De kenmerken van een leerling gestuurde leeromgeving, gebaseerd op sociaal constructivistische principes kunnen fungeren als richtlijn. De praktijk heeft echter uitgewezen dat het werken volgens deze principes niet eenvoudig is. Leren heeft in het sociaal constructivisme een fundamenteel andere betekenis dan in meer traditionele leeromgevingen en dat bepaalt de rol van de leerling, de rol van de docent en alle andere kenmerken van een leeromgeving. Het vraagt een andere houding en inzet van docenten.

Een aanbeveling voor de zelfregulatie van motivatie voor de lespraktijk is lastiger. Uit ons onderzoek en ook uit eerder onderzoek weten we dat sommige doelen negatief gerelateerd zijn aan motivatie, terwijl de studie naar doelvoorkeuren laat zien dat deze doelen voor sommige leerlingen belangrijk zijn. Aanbevelingen over het nastreven van doelen raken een ethische kwestie: kunnen we tegen leerlingen zeggen welke doelen zij wel of niet moeten nastreven? We zullen meer moeten denken in termen van leerlingen bewustmaken van hun

doelen en van wat die doelen betekenen voor hun motivatie, om ze vervolgens handvatten te geven om te leren omgaan met doelen die contraproductief zijn voor het leren.

Het onderzoek naar motivatiestrategieën en –overtuigingen legitimeert geen grote uitspraken over de toepassing in de onderwijspraktijk. We zien weliswaar een verband met motivatie voor schoolwerk, maar eerste resultaten van een interventiestudie laten zien dat het *trainen* van deze strategieën slechts het gevoel van autonomie van leerlingen versterkt, maar geen effect heeft op motivatie voor schoolwerk, zoals inzet, plezier, interesse of doorzettingsvermogen. Meer onderzoek is nodig om vast te stellen of het vergaren van kennis over motivatie en het trainen van vaardigheden, zoals het gebruik van motivatie-strategieën, leidt tot beter gemotiveerde leerlingen en daarom opgenomen zou moeten worden in het curriculum. Concluderend kunnen we stellen dat de leeromgeving, en, meer specifiek, de docent een centrale rol speelt in de motivatie van leerlingen. Dat geldt ook voor de zelfregulatie van motivatie, hoe paradoxaal dat ook mag klinken: leerlingen kennis en vaardigheden bijbrengen over motivatie, vraagt om inzet de docent.

De onderliggende studies vormen samen een waardevolle brug naar interventiestudies om de motivatie van leerlingen in het vmbo verder te versterken, niet alleen via de leeromgeving, maar ook door leerlingen als actoren in hun eigen motivatie voor leren.

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Tot slot, lief, kun je tegen de kapper zeggen dat yours truly weer kookt, afwast en de was doet.

Curriculum vitae

Karin Smit was born in 1961 in The Hague, the Netherlands. After she graduated from Het Vlietland College in Leiden in 1980, she obtained her educational bachelor for the subjects handicraft and textiles in 1987 at the Nieuwe Lerarenopleiding Zuidwest Nederland te Delft. From 1991 to 2000 she taught handicraft at Het Groene Hart Lyceum in Alphen aan den Rijn, where she also was class mentor and chair of the handicraft section. In 1999 she started a part time study Pedagogy at the Leiden University, simultaneously working for Bureau Blaauwberg, a consultancy Bureau in Leiden on economics and educational issues. She obtained her masters' degree in Educational Sciences (2007) with a thesis on the relation between the learning environment and students' motivation. In 2008 she started her PhD research at Leiden University, exploring perspectives on how to improve the motivation of students in pre-vocational secondary education. In 2013 she worked as a teacher at Leiden University and ICLON. Since 2014 she is appointed as an educator of teachers for secondary education at the Graduate School of Teaching (GST) and as an educational counsellor and trainer at the Centrum voor Onderwijs en Leren (COLUU), both at the University of Utrecht.