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

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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.

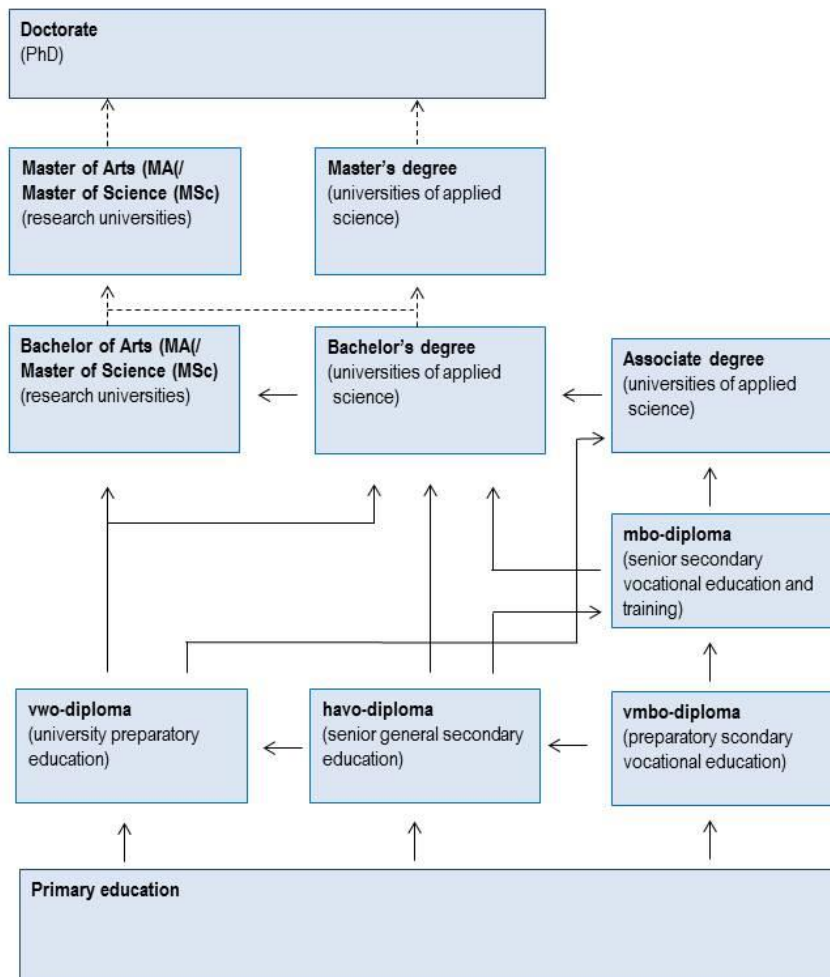


Figure 1: The Dutch educational system

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?

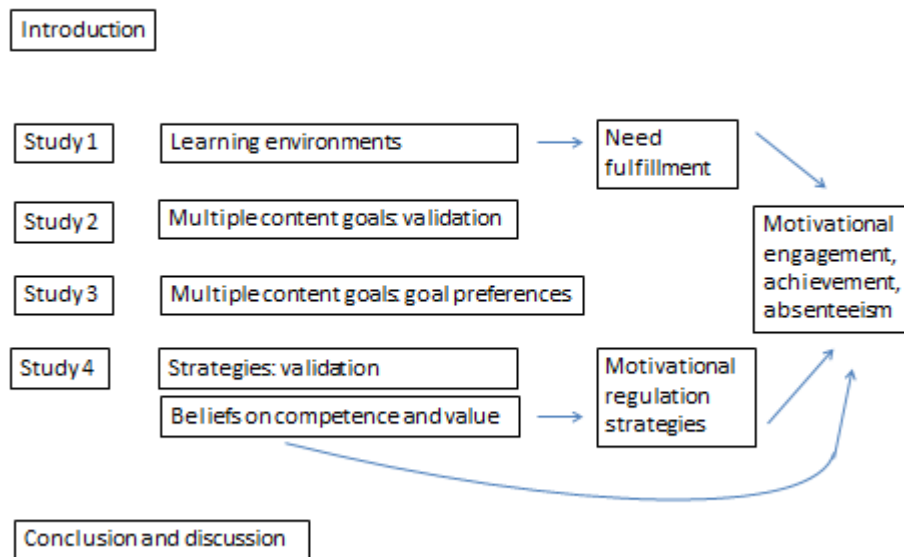


Figure 2 Overview of the studies in this dissertation

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.