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## Studying motivation in classrooms

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# 4

## Development of observed need supportive teaching in social constructivist, traditional, and combined schools for prevocational education

**This chapter is based on:**

Stroet, K., Opdenakker, M.-C., & Minnaert, A. (2014, submitted). Development of observed need supportive teaching in social constructivist, traditional, and combined schools for secondary vocational education.

## Abstract

The first years of secondary education are precarious for students, as their commitment to education tends to decline. Teaching practices can be critical in this regard. Yet, little is known on how teaching practices develop over time or differentiate between types of schools in this period. In the present study, in 20 math classes belonging to types of schools with contrasting educational approaches, at four time-points spread over the school year, daily teaching practices were videotaped and coded to assess levels of need supportive teaching from the perspective of Self-Determination Theory (Deci & Ryan, 1985; Ryan & Deci, 2000). Multilevel analysis showed declining trends for two out of three positive dimensions of need supportive teaching, i.e. for autonomy support and involvement, but not for structure. Regarding the negative dimensions, decreasing trends were found for chaos, but not for autonomy thwart and disaffection. Further, differences were found between types of schools. Net levels of need supportive teaching were higher in social constructivist than in traditional schools, and, even more so, than in schools that combined elements of both. Levels of structure were higher in social constructivist than in combined schools (approaching significance), levels of autonomy thwart were lower in social constructivist than in the other two types, and levels of disaffection were lower in both social constructivist and traditional schools (approaching significance) than in combined schools. In the last step of the analyses, these differences between types of schools were examined qualitatively to establish what teaching practices had induced them.

### Keywords

self-determination theory  
social constructivism  
early adolescence  
teacher-student interactions  
prevocational education

## 4.1 Introduction

Schools can be classified into types by the views on instruction that ground their educational approach. Two types of schools that are prominent and contrasting in their views on learning and instruction are traditional and social constructivist schools. Over the past decades, many schools in Western countries have incorporated social constructivist views on instruction, thereby aiming to stimulate students to organise and regulate their own learning processes and to foster their motivation (Boekaerts, de Koning, & Vedder, 2006). Social constructivist schools are student-centred and emphasise that for learning to occur students have to build up and combine their prior knowledge with new knowledge and restructure and reconsider their own understanding (Marshall, 1988; Shuell, 1996). In contrast, schools that work in accord with more traditional views on instruction are much more teacher-centred and emphasise the importance of knowledge reproduction. In this latter type of schools, the teachers take a large responsibility for students' learning processes by disseminating knowledge, largely through lectures and verbal exchanges (Shuell, 1996), and by structuring the course material (Gibbs, 1992; Boekaerts & Niemivirta, 2000; Bolhuis & Voeten, 2001).

It is the teachers who bring the educational approach of their school into practice; yet research comparing daily teaching practices between types of schools is scarce. An encompassing theoretical framework for examining teaching practices is Self-Determination Theory (SDT; Deci & Ryan, 1985; Ryan & Deci, 2000). Based on SDT, teacher-student interactions can be classified as beneficial or detrimental to students' learning outcomes. This classification is based on the assumption that people have fundamental needs for autonomy, competence, and relatedness that can be supported within teacher-student interactions, thereby fostering students' learning, or thwarted, thereby undermining students' learning. Indeed, a wide array of research is indicative of positive associations of need supportive teaching with students' motivation and school achievement (for reviews see Reeve, 2002; 2009; Niemiec & Ryan, 2009; Chapter 3).

Theoretical notions on instruction are shared more between SDT and social constructivist views than between SDT and traditional views; e.g. as SDT and social constructivism share their emphasis on providing students with appropriate levels of own responsibility. This does not imply that daily teaching practices in social constructivist schools are more need supportive than in traditional schools, however, as implementing educational theory in practice tends to have much broader consequences than accounted for in theory (Slavin, 2012). In the present study, we examined how teaching practices developed over the course of the year in three types of schools for prevocational education. We included schools that were prototypically traditional, prototypically

social constructivist, and schools that combined elements of both. We decided to include this latter type as combined schools are common and as prior research has suggested distinctive mechanisms to be operative in this type of schools (Rozendaal, Minnaert, & Boekaerts, 2005; Chapter 2). For the purpose of assessing levels of need supportive teaching, we analysed large amounts of videotaped lessons using a rating sheet that we developed for this aim.

The present investigation was conducted in the context of the first year of Dutch prevocational education. This context is particularly suitable as the importance of teaching practices for students' learning has been stressed for the first year after the transition toward secondary education specifically (e.g. Eccles et al., 1993) and as in the Dutch educational system schools can be categorised into types based on their educational approaches. Further, we focused our investigation within the subject-domain of math. We choose to focus on math classrooms as math is a key-subject in the curriculum and as, in the Netherlands, lessons can be compared relatively well as differences in terms of subject-content between schools are small. Next to the present study being among the first to compare daily teaching practices between types of schools, its longitudinal perspective and its relying on observations instead of student perceptions of need supportive teaching render it unique among prior SDT-research as well.

Below, we discuss prior research on time-consistency in teaching practices (4.2.1). Then, we pursue a classification of traditional, social constructivist, and combined schools (4.2.2), we discuss the theoretical underpinnings of SDT and the three dimensions of need supportive teaching (4.2.3), and we elaborate on prior research on the link between traditional, social constructivist, and combined instruction and SDT (4.2.4). Next, we discuss the present investigation and we formulate some focus points and preliminary expectations (4.2.5).

## **4.2 Theoretical background**

### **4.2.1 Teaching practices in the first years of secondary education: Time consistency**

The first years after the transition toward secondary education have been argued precarious in terms of the development of students' academic interests, commitment to education, and motivation (e.g. Goodenow, 1993). Evidence indicates that teaching practices do matter for this group of students, for example as teachers' social support is found to have very substantial effects on these early adolescents' emotions, motivational beliefs, and, via emotions and motivational beliefs, math achievement (Ahmed, Minnaert, Van der Werf, & Kuyper, 2010). In the present

study, we choose to focus on students in their first years of prevocational education because in the Netherlands it is this group of students that has been reported to lack motivation especially (Dutch Inspectorate of Education, 2005). In the Dutch educational system, the prevocational track of secondary education is the lowest of three mainstream tracks that is attended by more than half of the students (Dutch Inspectorate of Education, 2012) and offers an educational program that has a balanced focus on theory and practice.

Longitudinal research on teaching practices is scarce. Given the importance that is given to teaching practices for fostering early adolescents' learning, the lack of longitudinal studies among students in this age group is surprising particularly. Below, we provide an overview of the small body of relevant studies we could trace, including, but not excluded to, SDT-research. Because it seems probable that changes in teaching practices over the course of the school year represent both a general effect of a teacher and his/her class getting acquainted and an effect that is grade-specific, we discuss empirical evidence of relevance for establishing either of these two trends or the combination of both in the first years of secondary education.

First, studies on the development of quality indicators over the course of the school year typically indicate small but persistent declines. Such a decline has been found in grades 7-11 for student perceived interpersonal teacher behaviour (Wubbels, Créton, & Hooymayers, 1985) over the first sixteen week of the school years (Mainhard, Brekelmans, Den Brok, & Wubbels, 2011), as well as in grade 7 over the complete school year (Opdenakker, Maulana, & den Brok, 2012). In addition, declining trends were found in various student perceived quality indicators in grade 7 (Maulana, Opdenakker, & Bosker, 2013) and in observed quality indicators in grade 6-9, particularly so at the end of the school year (Evertson & Veldman, 1981). Finally, two SDT-studies showed declines in observed involvement over the course of grade 7 (Maulana, Opdenakker, Stroet, & Bosker, 2013) and in grade 3-5 of elementary school in student perceived involvement between the beginning and the end of school years but not in student perceived autonomy support or structure (Skinner & Belmont, 1993).

Second, in a study focusing on grade-specific differences a declining trend was found in students' perceptions of school climate (including student autonomy and clarity and consistency in school rules) in spring over the course of grade 6-8 (secondary education; Way, Reddy, & Rhodes, 2007). Finally, in a cross-sectional study, students who had entered secondary education in grade 6 were found to experience lower levels of classroom quality in their first year of secondary education than students who were still in elementary school, while students who had entered in grade 5 were not (Holas & Huston, 2012).

In conclusion, most of the studies described above focused on student perceptions of teaching

practices, although two studies using observational measures were available as well (Evertson & Veldman, 1981; Maulana et al., 2013). The findings suggest declining developmental trends in quality indicators of teaching practices. The present study being aimed at comparing developments of need supportive teaching between types of schools, we continue by pursuing a classification of prototypical traditional, social constructivist, and combined schools.

#### **4.2.2 Prototypically traditional, social constructivist, and combined schools**

For classifying instruction as social constructivist, based on the wide spectrum of literature on this topic, criteria have been formulated by Oostdam, Peetsma, Derriks, and van Gelderen (2006). According to these criteria social constructivist instruction can be distinguished from traditional instruction as: (1) more attention is paid to higher-order skills of self-regulation and metacognition, (2) students share responsibility for their own learning process and the learning goals they choose, (3) more formative instead of summative evaluation methods are used to evaluate students' work, (4) learning takes place within an authentic context, and (5) learning is considered to be a social activity. In traditional instruction, on the other hand, (1) all lessons are taught in the same groups of students, (2) these lessons mostly consist of the teacher explaining subject matter frontally and students working on assignments that the teacher provides to the class as a whole, and (3) more summative than formative evaluation methods are used.

We classified schools as 'prototypically social constructivist' when they met all of the five criteria of social constructivist instruction, none of those of traditional instruction, and had worked in accord with social constructivist views for at least several years. We classified schools as 'prototypically traditional' when they met all of the criteria for traditional instruction, none of the criteria for social constructivist instruction, and had worked in accord with traditional views on instruction for at least several years. We classified schools as 'combined' when elements of both traditional and social constructivist instruction had been merged. In this type of schools, the lessons for a substantial part consist of the teacher explaining subject matter frontally and the students working on assignments that are provided by the teacher to the class as a whole. At the same time, in these lessons more attention is paid to higher-order skills of metacognition and self-regulation than is the case in traditional schools and, at times, students are required to share responsibility for their own learning process and the learning goals they choose.

We continue by a discussion of SDT, and the three dimensions of need supportive teaching.

### 4.2.3 Self-Determination Theory

According to SDT, students should be provided with opportunities to exercise and elaborate their own interests and to pursue those goals they (have come to) personally value. Learning contexts that are optimal in providing these opportunities satisfy students' needs for autonomy, competence, and relatedness. The need for autonomy refers to people's inherent desire to be causal agents and to experience volition. For students to experience autonomy in their learning, it is of importance not so much by whom their actions have been initiated, but to which degree they consider these actions personally interesting or valuable. The need for competence refers to people's innate striving to exercise and elaborate their interests and to seek challenges (White, 1959), while feeling effective in doing so. The need for relatedness, finally, pertains to the desire to form and maintain strong and stable interpersonal relationships, to connect with and be accepted by others, and to belong (Baumeister & Leary, 1995; Bowlby, 1979; Harlow, 1958; Ryan, 1995). According to SDT, when people feel related to an individual or a social group, they will consider adopting the values of related others when encouraged to do so. For students to experience relatedness and to feel encouraged to adopt positive values regarding schoolwork, it is of importance that they feel accepted and supported by their teachers, as well as stimulated to work on school tasks.

Based on the SDT-argument that people have fundamental needs for autonomy, competence, and relatedness, three dimensions of need support/thwart have been described. These three dimensions complement each other in their effect on students' general level of need satisfaction (Connell & Wellborn, 1991). A need supportive teaching style is not a prescribed set of techniques and strategies (Reeve, 2006) and because a statement cannot be detached from the situation in which it has been uttered teacher-student interactions should always be interpreted in their context (e.g. Malinowski, 1930). The first positive dimension of need supportive teaching is *autonomy support* what includes adopting students' perspectives and providing explanatory rationales when choice is constraint. The first negative dimension is *autonomy thwart* what incorporates the assertion of power to overcome students' complaints or display of impatience for students to produce the right answer. The second positive dimension is provision of *structure*, including communication of clear and consistent guidelines and expectations and providing of step-by-step directions and constructive feedback versus the negative dimension of *chaos*, including providing contradictory expectations, not being available when students have questions, and discouraging them. The third positive dimension is *involvement* versus the negative dimension of *disaffection or rejection*, referring to the distinction between showing as opposed to not showing interest in the individual students, understanding of what is of importance for them, and availability to offer support.

We proceed with a discussion of research that is of relevance for linking prototypical traditional,



social constructivist, and combined schools with dimensions of need supportive teaching.

#### 4.2.4 Link three types of schools and need supportive teaching

As we mentioned in the Introduction, studies comparing between teaching practices in types of schools are scarce. Research is available, however, that links elements of traditional, social constructivist, and combined educational approaches with dimensions of need supportive teaching. We will discuss these studies below as they provide information on how and why educational approaches and need supportive teaching might be related. For two reasons, however, we do not consider the results of these studies directly translatable into differences between types of schools. First, because elements might interact in their effects on need supportive teaching. Second, because indirect effects that have resulted of implementing educational approaches in practice cannot always be taken into account at forehand as prior research on such indirect effects is largely lacking.

Firstly, social constructivist instruction has been linked with autonomy support as opposed to autonomy thwart. Provision of autonomy support is somewhat embedded in social constructivist views on instruction as students are expected to self-regulate their learning and share responsibility for their own learning processes and the learning goals they choose. In addition, by making connections with real-world situations teachers can stress the importance of the learning task, and, thereby foster relevance (Resnick, 1987). Further, evidence indicates that cooperative learning, what is related to the characteristic of social constructivist instruction of learning being considered a social activity, enhances students' perceived autonomy (Hänze and Berger, 2007); according to the authors because students have more leeway in structuring their learning process than is the case in traditional settings. Finally, it is argued that typically interactions with teachers and peers in a (social) constructivist setting tend to provide the students with choices as well as a sense of controllability, and, thereby allow them to experience agency (Nie & Lau, 2010; Smit, de Brabander, & Martens, 2013). However, although, from a theoretical perspective the link between social constructivist instruction and provision of choice appears straightforward, empirical evidence on this link is not conclusive. A study by Sturm and Bogner (2008) showed, for example, that students perceived higher levels of choice and value when they were taught in a student-oriented setting in which they self-guided their work in small groups of students, but only so when they were provided an introduction that prepared them for the learning task.

Secondly, traditional instruction has been linked with provision of structure as opposed to chaos. Evidence indicates that less well-defined problems tend to decrease students' feelings of competence because they feel they acquire less control over their school outcomes (Schunk, 1991).

In traditional schools the teachers have a large responsibility for students' learning processes, whereas in combined and social constructivist schools this responsibility is shared between teachers and students to a much larger degree. Consequently, particularly these latter two types of schools would be expected to be at risk for providing their students with too little clarity and instructional guidance. Indeed, social constructivist instruction has regularly been criticised for not providing students with sufficient instructional guidance (Kirschner, Sweller, & Clark, 2006; Mayer, 2004; Anderson, Reder, & Simon, 2000). Although limited provision of instructional guidance is by no means a defining characteristic of social constructivist instruction (Oostdam, Peetsma, & Blok, 2007), it does not seem implausible that it would be a potential risk when implementing social constructivist instruction in practice (see also Hickey, Moore, & Pellegrino, 2001). Prior research has suggested potential negative effects of implementing elements of social constructivist instruction only (Felner & Jackson, 1997; Rozendaal et al., 2005; Chapter 2) as is done in combined schools.

Thirdly, it has been argued that in social constructivist schools teachers develop stronger relationships with their students as they are expected to function as coach and engage in dialogues with students (Savery & Duffy, 2001). Although strong teacher-student relationships provide teachers with opportunities for involvement as well as disaffection, we do not consider this link strong enough to have implications for establishing links in terms of levels of need supportive teaching.

#### 4.2.5 Present investigation

The first research question of the present study concerns the development of observed need supportive teaching over the course of the first year of prevocational education. Based on the small body of available research on the development of quality indicators of teaching practices over time, we hypothesised negative developmental trends for the three positive dimensions of need supportive teaching (autonomy support, structure, and involvement) and positive developmental trends for the three negative dimensions (autonomy thwart, chaos, disaffection).

The second research question concerns the development of need supportive teaching over the course of the school year in three types of schools for prevocational education: Prototypical traditional, combined, and social constructivist schools. Although prior evidence is available that links elements of traditional, social constructivist, and combined educational approaches with dimensions of need supportive teaching, the present study is among the first to compare teaching practices between types of schools. Therefore, the expectations and focus points we formulate are preliminary only. First, for the positive dimension of autonomy support we expect levels to

be highest in prototypically social constructivist and lowest in prototypically traditional schools, while we expect a reversed pattern for the negative dimension of autonomy thwart. Second, for the positive dimension of structure and the negative dimension of chaos focus points are the levels of its components of clarity and no clarity and guidance and no guidance in the three types of schools.

## 4.3 Method

### 4.3.1 Participants

A total of twenty grade-7 classes (first year of secondary education) at the prevocational level of secondary education ('vmbo') and their teachers in math participated in the data collection. In total 16 teachers in math (6 of which female, teaching in 40% of the classes) were involved; the reason for this total being less than 20 is that in some cases a teacher taught in two of the participating classes. The size of the classes varied from 17 to 31 students. All classes used one of the two textbooks that are used by a large majority of schools in the Netherlands ("Getal en Ruimte"<sup>1</sup> (60%) and "Moderne Wiskunde"<sup>1</sup> (30%); Noordhoff publishers, personal communication, January 2, 2014).

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The 20 participating classes were equally divided over 10 schools; 4 of which prototypically traditional, 4 prototypically social constructivist, and 2 combined. The selection of these schools consisted of three steps. Initially, we included all schools that were state-funded (as nearly all schools in the Netherlands are) in the central and northern part of the Netherlands, that did not have a religious denomination, and offered prevocational education (a total of 141 schools). Schools in the southern part of the Netherlands were excluded for pragmatic reasons, while religious schools were excluded because we wanted to match the three types of schools on the basis of denomination. The first step involved coding relevant information available through the websites of schools, using the criteria of Oostdam et al. (2006; described in section 4.2.2). Based on these coding, we excluded schools from the selection that clearly were 'neither social constructivist nor traditional' (e.g. Montessori schools), and we temporarily categorized the remaining schools as being 'social constructivist', 'traditional', or as 'unknown based on website-information'. The second step involved gathering further information on the remaining schools. The information we gathered included a list of schools that had been drawn up for the purpose of the study by Oostdam et al. (2006), information on membership of schools of networks closely relating to the ideas of social constructivist schools, and information from the Dutch Inspectorate on daily practices.

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<sup>1</sup> Groningen, the Netherlands: Noordhoff Publishers

Based on all information gathered, a list was constructed of 30 schools (10 prototypically social constructivist, 12 prototypically traditional, and 8 combined schools) meeting all the criteria of their respective types as defined in section 4.2.2). The third step involved selecting and contacting these schools based on secondary matching criteria of area (urban/rural; low/high average SES) and school size. Because the prevocational track is streamed further into classes that are composed of students with comparable levels of prior achievement, we could select classes that were similar in this respect as well.

### 4.3.2 Measures

Over the course of the school year 2010-2011, there were 4 measurement occasions; starting approximately 11 weeks after the start of the school year, and being approximately 9 weeks apart from each other. At each measurement occasion, in each of the 20 classes, at least 1 and whenever this was considered desirable (e.g. when we were not sure the first lesson we videotaped was a regular lesson) 2 lesson(s) in math were videotaped. In the end in 57 of 80 cases we videotaped 2 instead of 1 lesson, yielding a total of 137 (80 + 57) videotaped lessons. Classrooms were equipped with two cameras: One 'fixed' camera, which faced the class, and one 'action' camera at the back of the class operated by a cameraman, which was directed to the teacher, or, when the teacher was talking with an individual or small group of students, to teacher-student interactions. In order for all teacher-student interactions to be audible on the videotapes, including softly spoken interactions with an individual or small group of students, the teachers were asked to carry a small wireless microphone. The videos were shot by four cameramen in total: Three trained university students and the first author. The cameramen always tried to limit interference to an absolute minimum, so the teacher and the class could proceed with their lesson as usual. It was made clear to both the teachers and the students that the interest of the study was in normal classroom communication, and it was emphasised that all material would be processed anonymously. Before the start of the study, consent letters had been sent to the parent(s)/guardian(s), none of whom declined participation of their child.

*Need supportive teaching.* In the Appendix of this dissertation, the rating sheet we developed to assess need supportive teaching is presented. This rating sheet is based on examination of existing rating sheets (i.e. Reeve, Jang, Carrell, Jeon, & Barch, 2004 (autonomy support); Wiebenga, 2008 (need supportive teaching); Maulana, Opdenakker, Stroet, & Bosker, 2013 (involvement)), as well as an extensive review of available SDT-literature on practices of need support and thwart within teacher-student interactions (e.g. Ryan, 1982; Belmont, Skinner, Wellborn, & Connell, 1992; Deci & Ryan, 1994; Deci, Ryan, & Williams, 1996; Assor, Kaplan, & Roth, 2002; Alfi, Katz, & Assor,

2004; Stefanou, Perencevich, DiCintio, & Turner, 2004; Katz & Assor, 2006; Reeve, 2006; Tsai, Kunter, Lüdtke, Trautwein, & Ryan, 2008; Jang, Reeve, & Deci, 2010; Vansteenkiste, Niemiec, & Soenens, 2010; for complete information on theoretical grounding see the Appendix of this dissertation), and includes not only the three dimensions of need supportive teaching, but also its respective components.

We used 'teacher-student interaction' as unit of analysis what implicated that each teacher-student interaction was coded as either providing students with one or more components of need support or thwart, or as not being relevant in terms of need support or thwart. A teacher-student interaction was defined as the whole of conversation that regarded one topic; e.g. when a student posed a question and the teacher responded, the whole of conversation on the topic of this question made up one teacher-student interaction. Occasionally, codes referred to complete lessons instead of to teacher-student interactions (see rating sheet in Appendix). Teacher-student interactions were interpreted in terms of their providing support or thwart of a component of need supportive teaching from what we considered the perspective of the student(s) and within their context of a complete lesson, thereby following the notions that what makes teaching need supportive can be something different for the one student than for the another (e.g. Deci, 1975), and that a statement cannot be detached from the situation in which it has been uttered (e.g. Malinowski, 1930). Examples of codings are discussed elaborately in Chapter 5. All our codes were linked to the complete video fragments they related to, so we could adequately map both frequency of occurrence and duration. For the positive dimensions of autonomy support and structure and the negative dimensions of autonomy thwart and chaos we considered durations of teacher-student interactions to most properly indicate expressions of need support/thwart. For example, as longer provision of step-by-step directions seemed indicative of higher levels of structure or as the more time teachers took to provide autonomy support, the higher levels of autonomy support appeared. For the positive dimension of involvement and the negative of disaffection, however, for two reasons we considered frequency the most appropriate indication of its expression. First, because, more than is the case for the other dimensions, utterances seemed to provide involvement or disaffection rather independent of their duration. Second, because we found expressions of involvement and disaffection often to be manifest in part of a teacher-student interactions only, so that a focus on durations would somewhat mask the data.

All coding was conducted by the first author. For the purpose of enhancing validity and establishing reliability of the rating sheet we followed several steps. First, the video material of two classes (one prototypically traditional and one prototypically social constructivist) was studied in-depth, and the codes of large amounts of fragments were discussed among the authors and with

university students, thereby following recommendations on data sessions by Heath, Hindmarsh, and Luff (2010). Second, another researcher working on SDT coded some of the video-material to establish interrater reliability. To establish levels of agreement with the first author, for two lessons the unweighted kappa coefficient (Cohen, 1960) was calculated, yielding values of .70 for the dimension of autonomy support/autonomy thwart, .71 for structure/chaos, and .75 for involvement/disaffection. Third, in the coding process, when in doubt, the coder discussed fragments with other researchers working on SDT to reach a decision. Finally, to determine reliability of final coding, we used four videos to calculate the intrarater reliability, yielding values of the unweighted Kappa coefficient of .78 for the dimension of autonomy support/autonomy thwart, .85 for structure/chaos, and .83 for involvement/disaffection.

### 4.3.3 Analytical approach

The coded teacher-student interactions were used to calculate per class, per measurement occasion, the percentages of lesson-time teachers provided autonomy support, autonomy thwart, structure, and/or chaos, and the frequencies per hour teachers expressed their involvement or disaffection. For determining net levels of need supportive teaching per class, per measurement occasion, durations of the negative dimensions (autonomy thwart, chaos, and disaffection) were subtracted from durations of the positive dimensions (autonomy support, structure, and involvement).

For the purpose of answering our research questions, we used Hierarchical Linear Modelling (HLM) analysis, thereby following a multilevel approach to take into account the longitudinal and hierarchical structure in the data. First, series of unconditional models were used to estimate the proportion of variance within classes and between classes (Table 2).

Second, the effect of 'time' on levels of need support and thwart was modelled (Table 3, models 1) to estimate the development of the (positive and negative) dimensions of need supportive teaching over the course of the school year. In these models, the linear effects of 'time' were always included as fixed effects; random slopes of 'time' for classes, polynomials to the second degree, and random slopes of '(time)<sup>2</sup>' for classes were included only when this significantly improved the fit of the model. The significance of the increase in fit of models 1 relative to comparison models that did not include 'time' or '(time)<sup>2</sup>' as explanatory variables (not presented) was determined by means of  $\chi^2$  tests on the decrease in deviance with a minimum of 1 ('time') to a maximum of 6 degrees of freedom ('time', '(time)<sup>2</sup>', variance random slope and covariance random intercept and slope 'time' and '(time)<sup>2</sup>').

Third, the 'types of schools' were added to the model as explanatory variables (Table 3, models 2 and 3). The significance of the increase of fit of these series of models in comparison to the models

1 was determined by means of a  $\chi^2$  test with 2 degrees of freedom (for models 2: intercepts for combined and social constructivist schools; traditional schools functioned as reference groups. For models 3: Intercepts for traditional and social constructivist schools; combined schools functioned as reference groups). A (fictitious) example of how  $\beta$ -coefficients in models 2 and models 3 should be interpreted is that a  $\beta$ -coefficient of 1 for 'combined' in models 2 for autonomy support would mean that in combined schools on average teachers are autonomy supportive in 1% more time of the lessons than in traditional schools.

Fourth, we further examined the significant differences we had found between types of schools in the fourth step of the analyses. It was our aim to identify teaching practices that were shared between classes belonging to the same type of schools and had induced the differences between types of schools. For this intend, we selected the video-material that we had coded in terms of the (positive or negative) dimensions of need supportive teaching for which we had found differences between types of schools. We conducted a qualitative analysis of this video-material, thereby using our more detailed coding of specific components of the dimensions of need supportive teaching as input.

## 4.4 Results

### 4.4.1 Development over the course of the school year of dimensions of need supportive teaching

In the graphs presented in Figure 1, developments of dimensions of need supportive teaching are shown. From the first graph it can be seen how levels of autonomy support and autonomy thwart were comparable initially and separated over the course of the year as autonomy support decreased and autonomy thwart increased. From the second graph it is visible how levels of structure were higher than levels of chaos. In the third graph, it is displayed how levels of teacher involvement initially appeared higher than levels of disaffection while the decrease in teacher involvement and the increase in disaffection resulted in a reversed pattern at the end of the year.

In Table 1 descriptive statistics are presented. The results in Table 2 showed that for need supportive teaching total, autonomy support, and structure a little more variance was attributable to the class level than to the occasion level, while for autonomy thwart, chaos, and disaffection this was the other way around. For involvement, the amount of variance attributable to class level was relatively small as most variance was attributable to the occasion level.

The results as presented in Table 3 revealed a negative developmental trend for the total



level of need supportive teaching (-3.07), thereby confirming our hypothesis. For autonomy support, we found a negative developmental trend as well (-1.01), while the developmental trend for autonomy thwart did not differ significantly from 0. For structure, again, the developmental trend did not differ significantly from 0, while for chaos, unexpectedly, a negative developmental trend was found (-.38) that approached significance. Finally, for involvement, we found a negative developmental trend (-1.13), while for disaffection the developmental trend did not differ significantly from 0.

**Table 1** Means (M) and Standard Deviations (SD) for the positive and negative dimensions of need supportive teaching

	t1	t2	t3	t4
	M (SD)	M (SD)	M (SD)	M (SD)
Autonomy support	5.98 (7.76)	5.80 (9.72)	4.38 (4.38)	3.19 (3.65)
Autonomy thwart	5.59 (6.34)	7.74 (7.13)	7.64 (6.62)	8.73 (9.50)
Structure	9.93 (10.6)	11.3 (11.4)	10.5 (11.9)	10.6 (10.9)
Chaos	2.20 (3.57)	2.98 (3.65)	1.93 (1.87)	1.24 (1.68)
Involvement	7.69 (4.45)	7.07 (6.74)	5.88 (3.02)	4.51 (2.07)
Disaffection	4.77 (6.09)	5.98 (6.36)	5.93 (5.21)	6.36 (7.02)

**Table 2** Distribution of the total variance over the class and occasion level

Variable	Total	Autonomy support	Autonomy thwart	Structure	Chaos	Involvement	Disaffection
Class	62.0%	51.9%	30.9%	53.6%	40.5%	4.5%	49.5%
Occasion	38.0%	48.1%	69.1%	46.4%	59.5%	95.5%	50.5%

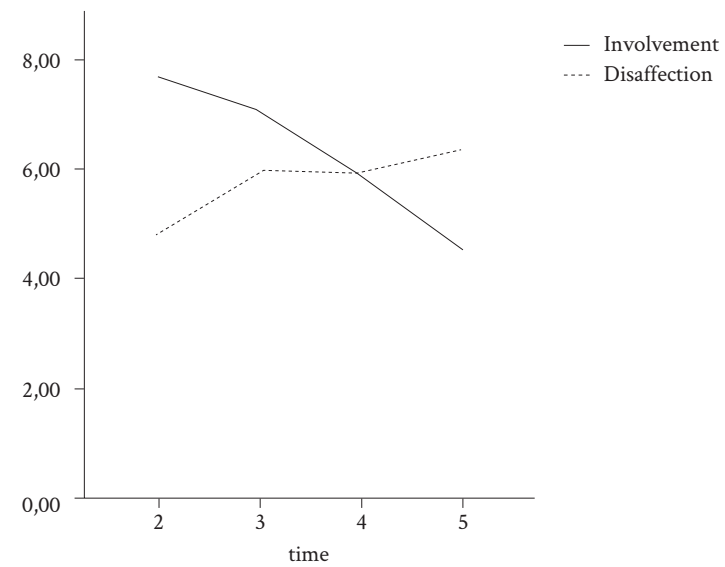
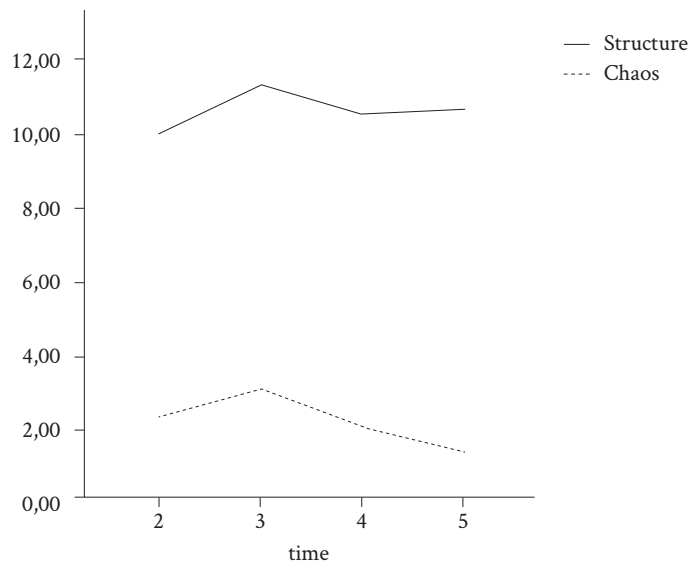
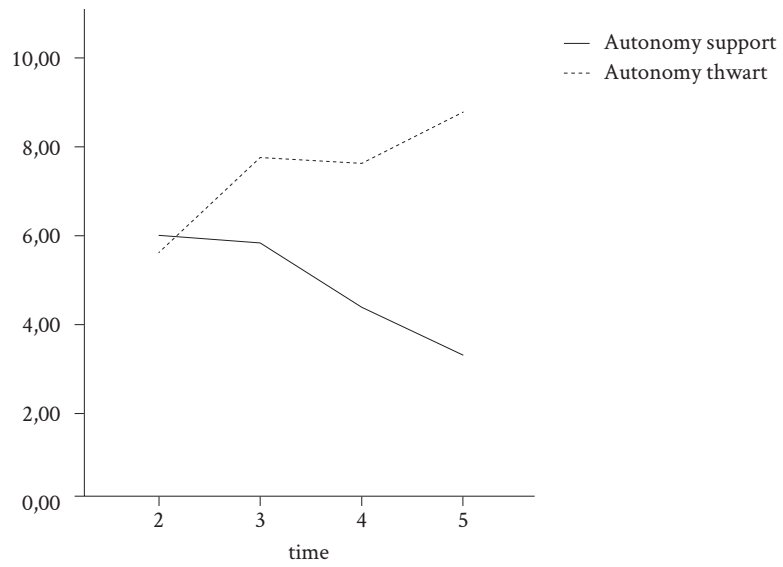
#### 4.4.2 Associations between types of schools and levels and development over time of need supportive teaching

Not included in the analysis is our coding per lesson (instead of per teacher-student interaction; see rating sheet). Analysis of this coding revealed that in all three types of schools almost all teachers did typically seem available to answer students' questions; both on guidelines and expectations and on content (elements of the positive dimension of structure). Moreover, for all three types of schools, it appeared uncommon for the teachers to come across as unfair in the sense of treating students inconsequent (an element of the negative dimension of disaffection).

From Figure 2, developments of need supportive teaching in the three types of schools are



**Figure 1** Development over time of need supportive teaching and its respective (positive and negative) dimension



**Figure 2** Development over time of need supportive teaching and its respective (positive and negative) dimensions in traditional, combined, and social constructivist schools

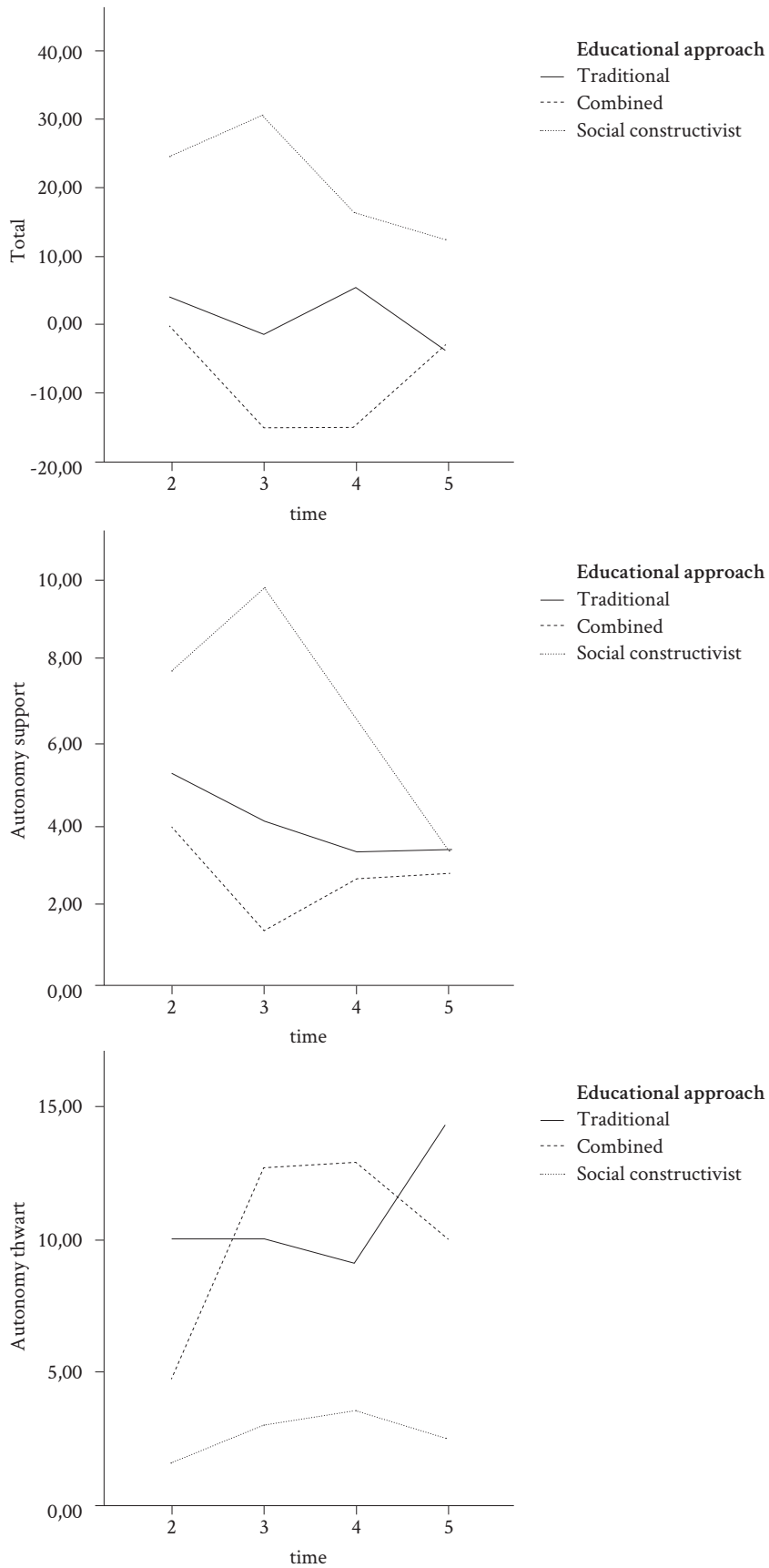


Figure 2 continued

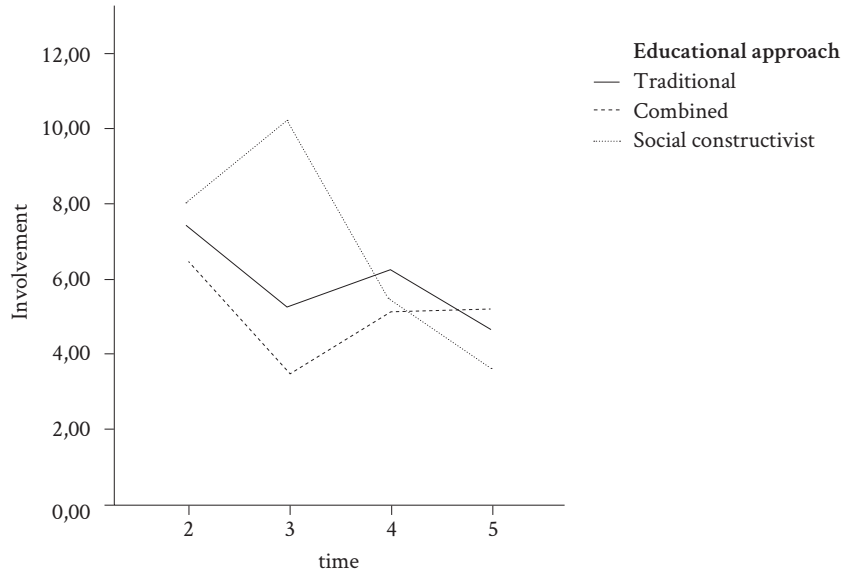
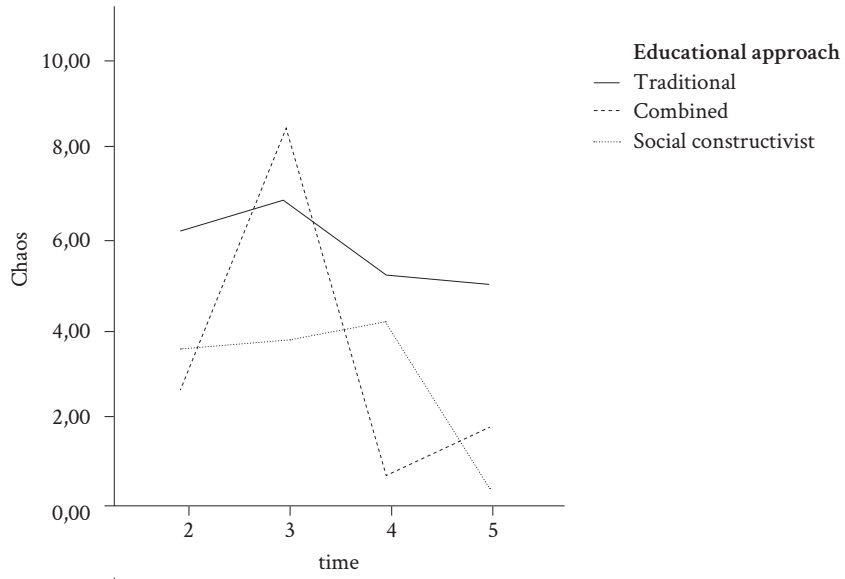
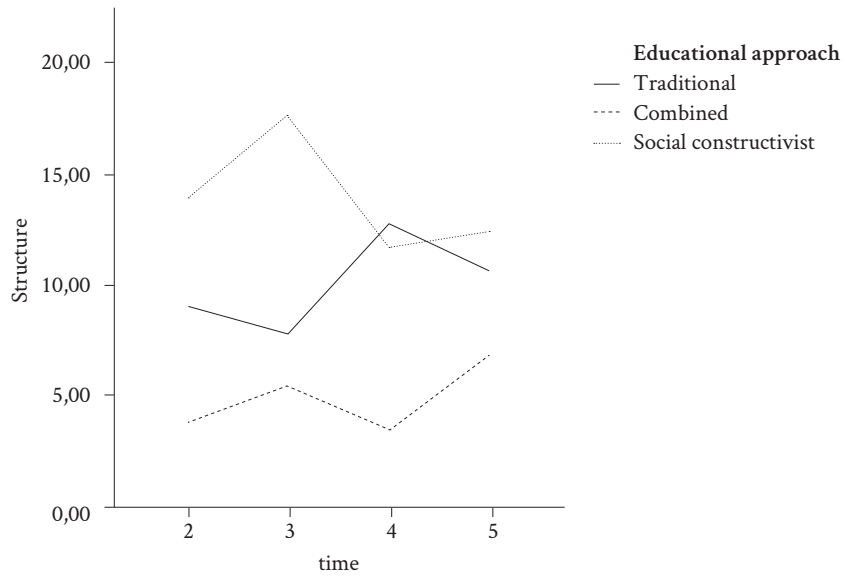
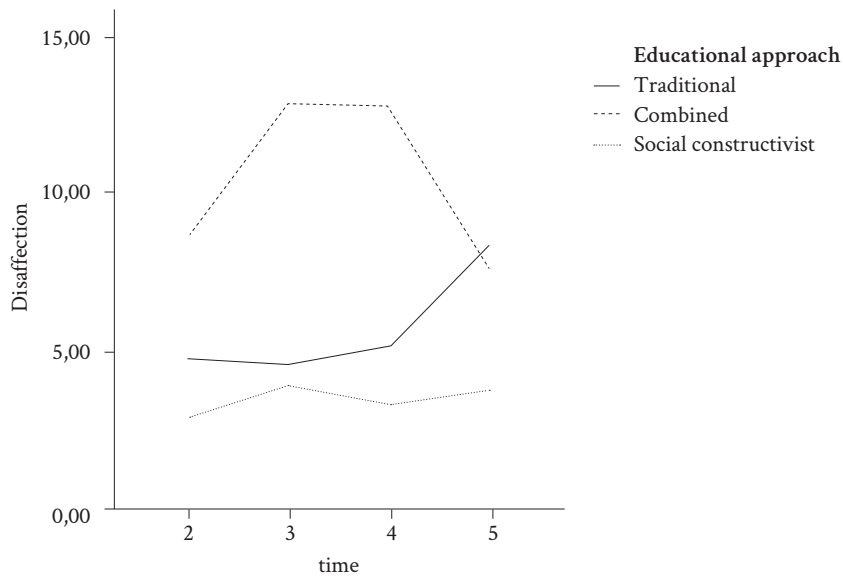


Figure 2 continued



visible. The results as presented in Table 3 revealed to what degree need supportive teaching appeared associated with types of schools. For the total net levels of need supportive teaching, the results did not indicate significant differences between traditional and combined schools, whereas these levels appeared higher in social constructivist schools than in traditional schools (19.75), and, even more so, than in combined schools (28.99). For autonomy support, the results did not indicate significant differences between the three types of schools. For autonomy thwart, the results did not indicate significant differences between traditional and combined schools, whereas the levels of autonomy thwart appeared lower in social constructivist than in traditional schools (-8.17), and than in combined schools (-7.39). For structure, the results did not indicate significant differences between traditional and combined schools, nor between traditional and social constructivist schools, whereas the levels of structure appeared higher in social constructivist than in combined schools (9.09; this difference approached significance). For chaos, the results did not indicate significant differences between types of schools. For involvement, the results did not indicate significant differences between the types of schools. For disaffection, the results showed higher levels in combined schools than in traditional schools (4.73; this difference approached significance), and, even more so, than in social constructivist schools (-7.02), whereas the results did not indicate significant differences between traditional and social constructivist schools.

**Table 3** Results from the HLM analyses predicting levels of need support and thwart by time and by type of school

Variable	General			Autonomy support						Autonomy thwart				
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 3			
	$\beta$	SE	$\beta$	SE	$\beta$	SE	$\beta$	SE	$\beta$	SE	$\beta$	SE		
<i>Fixed effects</i>														
Intercept	15.37	6.21	9.31	7.32	.08	9.48	7.54	1.77	6.70	2.23	5.36	2.88	4.69	2.06
Time	-3.07*	1.56	-3.07*	1.56	-3.07*	1.56	-1.01*	.48	-1.01*	.48	-1.01*	.48	1.03	.64
Traditional					9.23	10.43					1.34	3.15		
Combination			-9.23	10.43					-1.34	3.15				
Social constructivist			19.75*	8.52	28.99*	10.43			2.78	2.57	4.12	3.15		
<i>Random effects</i>														
<i>Class level</i>														
Var. intercept	373.73	135.22	236.70	92.22			24.11	9.29	21.37	8.43			17.33	8.51
<i>Occasion level</i>														
Var. intercept	213.00	38.93	213.24	38.93			20.52	3.75	20.52	3.75			36.28	6.62
Decrease deviance	4*		8*				5*		2				3	

Note: \*  $p < .05$ ,  $\hat{p} < .10$

**Table 3** continued

Variable	Autonomy thwart			Structure			Chaos									
	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3								
	$\beta$	SE	$\beta$	SE	$\beta$	SE	$\beta$	SE	$\beta$	SE						
<i>Fixed effects</i>																
Intercept	8.11	2.09	7.33	2.40	10.15	2.89	9.62	3.57	4.43	4.59	3.11	.77	.55	1.60	1.37	1.68
Time (Time) <sup>2</sup>	1.03	.64	1.03	.64	.16	.79	.16	.79	.16	.79	-.38 <sup>^</sup>	.23	2.02	1.34	2.02	1.34
Traditional			.79	2.06					5.19	4.99			-.47 <sup>^</sup>	.26	-.47 <sup>^</sup>	.26
Combination	-.79	2.06					-5.19	4.99							-1.21	1.23
Social constructivist	-8.17*	1.68	-7.39*	2.06	3.90	4.08	9.09 <sup>^</sup>	4.99							-1.45	1.00
<i>Random effects</i>																
<i>Class level</i>																
Var. intercept	2.23	3.94			63.83	24.68	52.64	21.16			3.33	1.43	3.39	1.43	2.93	1.29
<i>Occasion level</i>																
Var. intercept	36.28	6.62			55.19	10.08	55.19	10.08			4.59	.84	4.35	.79	4.35	.79
Decrease deviance	17*				0		3				6*		3		2	

Note: \* p<.05, <sup>^</sup> p<.10

Table 3 continued

Variable	Chaos				Involvement				Disaffection					
	Model 4	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4		
	$\beta$	SE	$\beta$	SE	$\beta$	SE	$\beta$	SE	$\beta$	SE	$\beta$	SE		
<i>Fixed effects</i>														
Intercept	.17	1.82	9.29	1.30	9.08	1.44	8.22	1.65	5.76	1.07	5.73	1.43	10.46	2.02
Time	2.02	1.34	-1.13*	.45	-1.13*	.45	-1.13*	.45	.52	.46				
(Time) <sup>2</sup>	-.47 <sup>^</sup>	.26												
Traditional	1.21	1.23					.86	1.41					-4.73 <sup>^</sup>	2.48
Combination													4.73 <sup>^</sup>	2.48
Social constructivist	-.24	1.23			.95	1.15	1.81	1.41					-2.29	2.02
<i>Random effects</i>														
<i>Class level</i>														
Var. intercept			1.38	1.98	.91	1.84			18.26	7.30	11.70	5.24		
<i>Occasion level</i>														
Var. intercept			17.39	3.18	17.39	3.18			18.66	3.41	18.66	3.41		
Decrease deviance			6*		2				1		7 <sup>^</sup>			

Note: \* p<.05, <sup>^</sup> p<.10

### 4.4.3 Further examination of differences between types of schools

The results as presented in section 4.4.2 revealed differences that were significant or approached significance between types of schools for the dimensions of autonomy thwart, structure, and disaffection. Below, we further examine these differences to identify teaching practices that were shared between classes belonging to the same type of schools and had induced the differences between types of schools.

#### 4.4.3.1 Autonomy thwart

For autonomy thwart the lower levels in social constructivist than in the other two types of schools appeared mainly induced by the teachers in these latter types of schools being more controlling. More specifically, whereas the teachers in the traditional and combined schools regularly provided their students with answers before they had time to reflect by themselves, thereby disrupting their natural rhythm, for the teachers in the social constructivist schools this was very uncommon. Further, for the teachers in the combined schools but not for the teachers in the other two types of schools it was rather common to disrupt students' natural rhythm by not allowing them to realise the action plans they had initiated.

#### 4.4.3.2 Structure

For structure, we found the higher levels in social constructivist than in combined schools (approaching significance) primarily induced by the teachers in the former type of school spending more time on guidance in the sense of providing step-by-step directions, thereby adjusting to the students. In these interactions with individual or small groups of students, the teachers tended to elaborate on content and to monitor and adjust to the students' prior understanding.

#### 4.4.3.3 Disaffection

For disaffection, the higher levels in combined schools than in traditional schools (approaching significance) and in social constructivist schools seemed induced mainly by it for all teachers in the combined schools being more common to talk to the students in an unfriendly tone and to treat them unfair in the sense of being inconsequent.

## 4.5 Discussion

In the present study, we aimed to further understanding of how teaching practices develop over



time and relate to educational approaches of schools. For this intend, in three types of schools for prevocational education we examined teaching practices from the perspective of Self-Determination Theory. At four moments spread over students' first year, teaching practices were coded using an observational measure that assessed need supportive teaching.

The first research question concerned the development over time of need supportive teaching across types of schools. For net levels of need supportive teaching the results showed declining developmental trends, thereby corroborating the small body of prior research on the development of quality indicators of teaching practices over time. Further, for the positive dimensions of need supportive teaching of autonomy support and involvement we found declining trends over the course of the school year, and, for the negative dimension of chaos, unexpectedly, we found a somewhat decreasing trend (approaching significance). For the dimension of structure (positive), autonomy thwart, and disaffection (negative) results were not indicative of differences over time.

These findings lay bare gaps in current educational theory and point towards directions for future research. Firstly, because the results suggest that as a result of getting acquainted with their classes teachers are triggered to develop a less need supportive teaching style. Thus far, little is known about the mechanisms that could be at play here. Why do teachers become less autonomy supportive and involved as the school year advances? But also, why do levels of chaos decrease? Future research is needed to sort out answers to these questions and to generate insights that are of use to advance educational practice.

Secondly, the declining trends we found could potentially explain the decrease in student motivation and engagement a large body of research is indicative of (e.g. Anderman & Maehr, 1994; Wigfield, Byrnes, & Eccles, 2006; van der Werf, Opdenakker, & Kuyper, 2008). Although it is increasingly recognised that teaching practices have an important effect on early adolescents' motivation, research sorting out the longitudinal relationship between both is scarce (see e.g. Chapter 3 for a review of SDT-studies). The findings of the present study point toward the potential fruitfulness of such investigations that we would, therefore, recommend for future research.

The second research question concerned a comparison of need supportive teaching between prototypically traditional, social constructivist, and combined schools. The results indicated differences between types of schools in levels of need supportive teaching. Specifically, we found net levels of need supportive teaching to be higher in social constructivist than in traditional schools and, even more so, than in combined schools, while the results did not indicate differences between traditional and combined schools. As we will discuss below, for the respective (positive and negative) dimensions of need supportive teaching the results partly corroborated and partly

contradicted prior research on singled-out elements of the educational approaches. Because the present study was among the first to compare teaching practices between types of schools we had refrained from formulating hypotheses. Below, we will discuss findings in the light of the preliminary expectations and focus points we formulated.

For autonomy support we did not find differences between types of schools. Thereby, findings did not support our preliminary expectation that levels would be highest in prototypically social constructivist schools and lowest in prototypically traditional schools. This finding is surprising as the importance of autonomy support is explicitly embedded in social constructivist views on instruction. Future research is necessary to sort this finding out, but among plausible explanations is that autonomy supportive teaching is expressed not so much in teacher-student interactions but much more, for example, in choices incorporated in assignments that are provided to students. Partially in line with preliminary expectations, for autonomy thwart we found lower levels in the prototypically social constructivist than in the other two types of schools. These differences appeared induced by the teachers in the prototypical traditional and combined schools more regularly disrupting the students' natural rhythms. This finding suggests that indeed, as would be expected based on prior theorizing, teachers in prototypically social constructivist schools tend to provide their students with a sense of controllability and provide some leeway in structuring their learning processes. Interestingly, for combined schools findings did not indicate the same. Future research is necessary to sort out why the teachers in the combined schools appeared as triggered to thwart the autonomy of students as teachers in traditional schools, despite elements of social constructivist instruction being incorporated in the former type of schools.

For the positive dimension of structure and the negative dimension of chaos, we had anticipated that especially combined and social constructivist schools could be at risk for providing relatively little structure and much chaos. The results indicated lower levels of structure in the combined than in the social constructivist schools (approaching significance), while no differences were apparent with traditional schools. For chaos no differences were found between types of schools. These findings do not substantiate the argument that social constructivist schools are more at risk for providing little structure and much chaos than are traditional schools, they do, however, somewhat corroborate prior research suggesting potential detrimental effects of implementation of elements of social constructivist instruction only (Felner & Jackson, 1997; Rozendaal et al., 2005; Chapter 2). Specifically, the findings indicated the teachers in the combined schools to spend less time on providing students with individual guidance (a component of structure) than did the teachers in the social constructivist schools. Future research is necessary to sort why it is that the teachers in the combined schools tended to provide their students with relatively little guidance.

For teacher involvement, the results were not indicative of differences between types of schools, while for disaffection we found lower levels in combined schools than in social constructivist and traditional schools (approaching significance). These differences appeared induced by it being more common for the teachers in the combined schools to talk to the students in an unfriendly tone and treat them unfair in the sense of being inconsequent. Again, we recommend future research to focus on sorting out what triggered these relatively high levels of disaffection in combined schools.

Several limitations of the present study can be thought of. The first of these, we already made reference to above, is that in our analysis we did not include everything that was going on in students' learning contexts, but focused on what happened in teacher-student interactions only. For the future, it would be of interest to combine studies on comparisons between types of schools of teacher-student interactions with studies focusing on other aspects of the learning context, e.g. content of assignments and peer-interactions, to get a more complete picture of students' learning contexts in different types of schools.

Second, the participating teachers and students being aware of the video cameras that were present in their classrooms might have affected their behaviour. Potentially this could be considered a limitation of the present study, especially as having cameras in the classrooms is more common practice in social constructivist and combined schools than in traditional schools. We tried to counteract this potential limitation by regularly emphasising the fact that all video-material would be processed anonymously. From our conversations with the teachers in all three types of schools we did not get the impression that either the teachers or the students behaved different from how they would normally have. This impression was strengthened by the fact that both teachers and students regularly indicated to have forgotten about the cameras being present.

In conclusion, despite these limitations findings advance understanding of how teaching practices develop over time and relate to educational approaches of schools. Particularly intriguing for educational practice and for future research is, firstly, the finding that teachers appear triggered to engage in less need supportive teaching as the school year advances. And, secondly, the finding that teachers in combined schools are less need supportive than teachers in prototypical traditional and social constructivist schools.



