Chapter 36
Differentiation and Students with Special Educational Needs: Teachers' Intentions and Classroom Interactions

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Abstract Differentiation is mainly linked to differences in learning capacities, but studenss differ in more domains: differences in motivation, behavior and special educational needs (SEN) are equally relevant. In line with the world-wide trend towards inclusive education, the aim of this chapter is to shed light on Dutch teachers' intentions to differentiate, as well as possible differences in interactions between teachers and students with and without SEN in regular secondary vocational educational education. We first analyzed teachers' online diary entries with regards to their intended differentiation practices for the next lesson. We coded what kind of intentions arise, the level of detail and quality of these intentions and to what kind of differentiation is referred (only cognitive, or possibly also differentiation on domains of behavior, motivation, or students with SEN). Second, we focused on one-to-one classroom interactions between teachers and students with and without special educational needs. We analyzed to what extent there are differences between the interactions of students with and without SEN in terms of teachers' need-supportive teaching and students' engagement. Together, these studies contribute to our understanding of differentiation intentions and practices with regards to meeting the needs of all students in diverse classrooms.

Keywords Differentiation · Special educational needs · Intentions and classroom interactions

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1 Introduction

A worldwide educational trend is that towards more inclusive education of students with special educational needs (SEN) (such as learning difficulties or behavioral problems) into regular schools, resulting in classrooms being more diverse in terms of students' educational needs (De Boer & Kuijper, 2021). In 2014, the Wet op Passend Onderwijs (The Duch Law on Tailored Education) was implemented in the Netherlands. The aim of the law was to guarantee appropriate education for all students, regardless of their SEN. Although special education still exists in the Netherlands, there is a continuous striving towards including more students with SEN in regular education, with extra support allocated on the school level (Ledoux & Waslander, 2020). This increased diversity has gone hand in hand with an expectation of teachers to be aware of these differences and able to adapt their teaching to the individual needs of learners. Indeed, the ability to differentiate teaching has been named as one of the key characteristics of high quality, effective education (Hamre & Pianta, 2005; Deunk et al., 2018; Tomlinson & Imbeau, 2010).

Differentiation at its core is (pro-actively planned) adaption of education to the diverse needs of students (Van Geel et al., 2019; Smale-Jacobse et al., 2019). According to Deunk et al. (2018), differentiation comprises both a careful monitoring of the students' progress and adapting instruction to differences in these levels of progress. The emphasis in this definition is on the (cognitive) levels of the students. Tomlinson defines differentiation in a broader sense, as "an approach to teaching in which teachers proactively modify curricula, teaching methods, resources, learning activities, and student products to address the diverse needs of individual students and small groups of students to maximize the learning opportunity for each student in a classroom" (Tomlinson et al., 2003, p. 120). The 'needs of students' can relate to the level of skill or understanding, but also to differences in interest or learning profiles.

Differentiation practices can take different forms in the classroom. The first step is usually monitoring progress and assessing the needs of the students in preparation of the lesson (Keuning & Van Geel, 2021; Roy et al., 2013). Consequently, teachers can differentiate in content (offering different sources of information and assignments of varying level of difficulty) or in the learning process (by offering additional or different support to some students). Additionally, teachers can differentiate in the end product (by allowing the students to work on different kinds of end products to assess progress on learning goals) or in shaping the learning environment (by providing quiet space for students to work independently, and simultaneously offer space for group work (Tomlinson et al., 2003; Tomlinson & Imbeau, 2010).

Although differentiation is viewed as an essential component of effective teaching, it has also proven to be a notoriously difficult skill for teachers (Van de Grift et al., 2014). This might be because beginning teachers first need to master more basic teaching skills like general effective instruction, classroom management and so on, before this effective instruction can be tailored to the needs of individual students. A challenge in this aspect is that teachers need to attend to the needs of

many students at the same time. Carefully adapted instruction to one student might be detrimental to the other students if the rest of the class is neglected for too long (van de Pol et al., 2015). This might explain why differentiation does not always lead to positive student outcomes (Deunk et al., 2018); differentiation that is not carefully planned and grounded in other dimensions of effective teaching, will not obtain effect.

Because differentiation has proven to be one of the most complex skills for teachers, it requires the teachers to *proactively plan* instruction in response to differences in student levels of readiness, interests and learning profile (Tomlinson & Imbeau, 2010). These authors also know from experience, however, that 'very few' teachers take differentiation into account when planning their lessons (Tomlinson & Imbeau, 2010). Teachers' intentions to differentiate matter because they have proven to be an important prerequisite for teachers' actual inclusive practices in the classroom (Yan & Sin, 2014), although these practices are usually assessed through self-reports rather than observed behavior (Opoku et al., 2020).

As stated before students differ in more than just their cognitive level. This means that "*differentiation according to students' educational needs*" can refer to many different things. A framework for understanding of the (special) educational needs of students can be found in the self-determination theory (Ryan & Deci, 2000). Students have, according to this theory, three basic psychological needs: autonomy, competence and relatedness. The need for autonomy refers to the student's need to be an active agent in shaping one's own learning process and to have a sense of control and choice in the learning environment. Teachers can facilitate the student's feelings of autonomy by providing autonomy support which entails showing respects towards students, fostering relevance and providing the students with meaningful choices (Stroet et al., 2013). The need for competence entails the feeling of being able to attain goals that are personally relevant for students. Teachers can support this by providing structure and adapting their instruction to the student's level of understanding. This strategy closely aligns with adapted, differentiated instruction. Concluding, the need for relatedness refers to the need to have meaningful relationships with both peers in the classroom and with the teacher. Teachers can play an important role here by showing involvement with their students, by dedicating time and resources to the student, and by showing respect and personal interest in their students (Stroet et al., 2013). In sum, self-determination theory can help us better understand what needs are relevant for students, and consequently how differentiated instruction can attend to differences in those needs.

Looking through the lens of self-determination theory, the position of students with SEN in regular education is a vulnerable one. Students with special educational needs (both behavioral as well as learning problems) are relatively often socially neglected or rejected in the classroom (Rademaker et al., 2020; Majorano et al., 2017). Furthermore, teachers report less feelings of closeness and more conflicts with students with challenging behavior, which in the long run can undermine students' need for relatedness (Zee et al., 2017). Regarding the need for autonomy, although the teacher-student relationship might be conflictuous for students with behavioral problems, these students, too, benefit from an autonomy supportive

learning climate (Savard et al., 2013). And finally, regarding the need for competence, especially students with learning problems are at risk for experiencing lower levels of self-efficacy at school (Burden, 2008; Majorano et al., 2017). This raises the important question to what extent teachers are able to fully meet the needs of learners with special educational needs, and makes an exploration of teachers' differentiation skills and practices all the more relevant.

The necessity of differentiation as a component of effective teaching is widely acknowledged, yet teachers seem to struggle to meet the needs of all of their students, especially students with special educational needs. Many studies in the field of (inclusive) education focus on general attitudes towards inclusive education (Van Mieghem et al., 2020) and differentiation (Schwab, 2018). Yet, to increase our understanding of the complexity of differentiation we need to move beyond this and zoom in on what is happening in teachers' lesson-to-lesson intentions and practices. The aim of this chapter is twofold. First, we aim to better understand teacher's intentions to differentiate in each lesson and how these intentions relate to other teacher skills. Second, we aim to zoom in on moment-to-moment interactions between teachers and individual students in the classroom, in order to test whether teachers are able to differentiate according to the three basic psychological needs of students with and without special educational needs. Our research questions are as follows:

1. *What are teachers' intentions for their upcoming lesson, and to what extent do these relate to differentiation practices? (study 1)*
2. *To what extent are there differences in teacher's degree of need-supportive teaching in individual interactions with students with and without special educational needs (SEN)? (study 2)*

2 General Method

2.1 Design

Within the project 'Differentiation Inside Out', fourteen secondary school teachers and 230 students were followed in an intensive longitudinal, observational design for the duration of one school year. Differentiation intentions, practices and efficacy were assessed through interviews, short Ecological Sampling Method (ESM, ecological momentary assessment) questionnaires and lesson observations. Student outcomes (relating to motivation and basic psychological needs) were assessed similarly through ESM questionnaires relating to specific lessons. The Ethical Committee of the department of Educational and Pedagogical Sciences (University of Groningen) approved of the study design and procedures (October 2017). In order to answer the research questions, we describe two studies that were part of this larger project. The first study focuses on the lesson-specific intentions of teachers as described in the ESM questionnaires. The second study zooms in on one-in-one

teacher-student interactions of students with and without SEN that took place in the video-recorded lessons.

3 Study 1: Lesson-Specific Intentions of Teachers

3.1 Method

3.1.1 Participants

In study 1, fourteen teachers who taught second year pre-vocational education (in Dutch: vmbo-gtl/mavo) in regular secondary education on eight different schools throughout the Netherlands participated. The teachers taught either mathematics (n = 3), English (n = 2) or Dutch (first language) (n = 9). Teachers were on average 35.4 years old (SD = 9.1). Their teaching experience ranged from less than 5 years to more than 20 years. Prior to the start of the study, the teachers were informed on the aim and procedures of the study and signed an informed consent form.

3.1.2 Procedure and Instruments

All teachers participated with one (in one case two) of their classes in the study for approximately 20 consecutive weeks during one school year, starting between the end of October and early December. The teachers were interviewed and participated in three waves of classroom observations (see Study 2). They were also asked to complete two to four short ESM questionnaires per week via the web platform u-can-act (Blaauw et al., 2019), resulting in a maximum of 40–60 repeated measurements per teacher. Compared to questionnaires which measure teachers' intentions 'in general', the advantage of ESM questionnaires are an elimination of recall bias, and a better understanding of the situated and changing nature of teachers' intentions (see Shiffman et al., 2008). At the end of the data collection period, the teachers received a small incentive in the form of a gift certificate, which is common for participants involved in intensive data collections. At the end of each lesson they taught the class with whom they participated, the teachers automatically received a text message on their phone with a personal link to their diary questionnaire. After 12 closed questions on teachers' perception of their own need-supportive teaching during the lesson and their self-efficacy relating to differentiation, the teachers were asked two concluding open questions. First, their intentions for the last lesson they taught was repeated from their previous diary entry, and teachers were asked to what extent they had realized their intentions. Second, teachers were asked for their intentions for the next lesson that they were going to teach this particular class. They could type their answer in a text box. For the purpose of this study, the answers to these last two questions were analyzed.

3.1.3 Analysis

The answers teachers gave about their intentions for the next lesson were analyzed using a combination of closed and open coding, which allows us to account for the richness of the qualitative data (Flick, 2009) while also ensuring a link with the literature on effective teaching. As a first step, we coded all intentions on the domains of the ICALT (Van de Grift, 2007) which measures different domains of effective teaching. The ICALT is based on an empirically derived hierarchy of teaching skills and comprises on the one hand more basic skills such as fostering a positive classroom climate and providing effective instruction for all students, and on the other hand the more complex skills of 'teaching learning' to students, and differentiation. In case the teachers' answers could not be fitted into one of the ICALT domains, new codes were added. The second step was to further analyze the intentions that referred to differentiation. We coded teachers' intentions with regards to differentiation based on the ways in which was differentiated (based on Tomlinson et al.'s (2003) distinction between content, process, product or learning environment) and on the student characteristics that were mentioned in response to which the differentiation took place (differentiation based on level/pace of students, on interest, or on learning profile (including behavior). Similarly, there was room for adding additional codes to these main categories through open coding. The coding was performed by the first author; in case of doubt, the codes were discussed with the second author. The codes were further analyzed descriptively.

3.2 Results

In total, the 14 teachers filled out 477 diary questionnaires. Because some entries contained more than one intentions, 551 codes were assigned. In the first step, we analyzed to which teaching domain of teaching behaviour (ICALT, Van de Grift et al., 2014) the intentions referred. In addition to the domains included in the ICALT, we found another type of intention in addition: the intention to motivate students (for instance by making the content appealing to them). Of the 551 intentions, 121 referred to differentiation. These differentiation intentions were further analyzed in step 2.

3.2.1 Teachers' Intentions in Relation to the ICALT Domains

As we can see in Table 36.1, 23.6% of all teachers' intentions were coded as related to differentiation. The most prominent were intentions relating to instructions (34.5%) such as giving informative feedback or clearly stating lessons goals. Teachers also formulated intentions for more 'basic' teaching skills like classroom organization (11.5%) or providing a positive classroom climate (4.9%). Interestingly,

Table 36.1 Examples from the data and number of intentions per domain (percentages between brackets)

Domain	Number of intentions (%)	Examples
No intention	53 (10.3)	*"Nothing special"* *"I don't know, that is after the vacation, I'll see then."*
Climate	25 (4.9)	*"I want to be a bit more positive."* *"Keep the calm."*
Instruction	177 (34.5)	*"Try to make the lesson goals clearer."* *"The next lesson […] is on grammar. The class is struggling with this and I hope to provide more clarity on this subject by providing many examples."*
Organization	59 (11.5)	*"Make a planning for the last period."* *"Offering structure."*
Activating students	26 (5.1)	*"I hope to make some time next lesson for activating methods."* *"Tomorrow I'm going to do an escape room on reading skills. I hope to achieve that they will discuss and work together."*
Teaching learning	12 (2.3)	*"I am going to let them apply the theory they have learned […]."* *"Sharing reading strategies with one another."*
Differentiation	121 (23.6)	*"Differentiating more in processing the theory."* *"We are going to repeat the content of ch. 2. [The students] who don't have questions can practice, the students who have questions I will help individually or in small groups."*
Motivating students	6 (1.1)	*"I want to put the content in a context that is more fun, in order to make a connection to the students experiences."* *"Stimulating and motivating the students for the content."*
Other	72 (14.0)	
Total	**551 (100)**	

in about one in ten diary entries (10.3%), teachers indicated to have no specific intentions for the next lesson.

3.2.2 Description of Teachers' Differentiation Intentions

In Table 36.2, we further specified the differentiation intentions of the teachers by coding in which *classroom* the differentiation took place: content, process, product or learning environment *element* (Tomlinson & Imbeau, 2010). By far, most (71%) differentiation intentions had to do with differentiating in the learning process. Teachers for instance described how they intended to give weaker students additional instruction while stronger students could work more independently, or to offer instruction on different levels.

In addition to specifying the classroom element, we also analyzed which student characteristics the teacher considered in their intended differentiation (differences in student levels, interests or learning profiles). Most intentions (67.7%) referred to

Table 36.2 Differentiation intentions labeled by classroom element

Classroom element	Number of intentions (%)	Example
Content	19 (15.7)	*"Students can choose between different assignments […]."* *"Different options for assignments: more challenging for the stronger students […]."*
Process	86 (71.1)	*"Extra explanation when the rest are working independently."* *"Instructions on different levels."*
Product	0 (0)	
Learning environment	1 (.8)	*"I let several students work in the hallway. This made the classroom quieter which caused the students to be more focused on the task."*
Not specified	15 (12.4)	*"Try to differentiate more."*
Total	**121 (100)**	

differentiation for students of different levels of understanding (for instance, providing assignments or instructions on different levels, offering extra help when weaker students needed it). Only 7 intentions (5.7%) referred to differences in student interest or learning profile (for instance, by letting students choose between reading their own novel in class or picking one from the school library). In the other intentions, the student characteristic was not specified (26.4%).

3.3 Discussion

This study provided a unique insight into teachers' short-term intentions regarding their teaching and differentiation practices. Several things stood out from our data. First and foremost, differentiation as such was relatively rare in teachers' intentions (only mentioned in 23.6% of cases). Teachers more often formulated intentions relating to more basic teaching skills such as providing overall good quality instruction, creating a positive classroom climate and classroom management. As Van de Grift et al. (2014) remarked, there is an observable hierarchy in the complexity of teaching skills, and teachers' intentions may reflect differences in skill levels between teachers. Teachers who are preoccupied with more basic aims might have less cognitive space to pro-actively plan for differentiated instruction.

Looking more in depth at teachers' differentiation intentions, one result was that these intentions are often formulated briefly and in very general terms. This might have had to do with the method of data collection (a brief questionnaire), but it might also be a reflection of their actual intentions. The latter case would be worrisome, as we know from the literature that differentiation is a complex skill that requires pro-active planning (Tomlinson & Imbeau, 2010). Also, detailed and specific behavioral intentions more often lead to actual behavior than vague and non-specific plans (Osch et al., 2010).

4 Study 2: Differentiated One-on-One Interactions Between Teachers and Students with and Without SEN

4.1 Method

4.1.1 Participants

From the fourteen teachers described under Study 1, we selected a subsample of seven teachers for a detailed analysis of video-recorded individual teacher-student interactions. These teachers all chose one of their classes (second year pre-vocational education (in Dutch: vmbo-gtl) to participate in the study for the duration of one school year. The students in these classes were all asked to participate, resulting in a sample of $n = 166$ (43.98% male). In addition, their parents were also asked for informed consent.

4.1.2 Procedure and Instruments

During the school year, three waves of data collection took place at the beginning, middle and end of the school year. For this study, only the data of the first wave are presented. The teachers were asked to conduct their lessons as they normally would. The lessons were filmed with one camera at the back of the classroom, one camera at the front of the classroom and one small wearable camera that could be attached to the teacher's clothing. Because of the focus on individual interactions between teachers and students, only the segments that contained interactions between the teacher and either a single student or a small group of students were transcribed and coded. An interaction begins with the teacher addressing one particular student, or the student making contact with the teacher, for instance by asking a question. The interaction ends with the teacher walking away or addressing another student. The interactions lasted anywhere between a few seconds to several minutes.

Each interaction was coded on the three dimensions of **need-supportive teaching**: autonomy support, structure and involvement on a Likert scale ranging from −3 to 3 with a coding scheme based on Stroet (2014). Below in Table 36.3, examples of behavior on the negative and positive side of each scale are summarized. After training, inter-observer agreement was established on 5 complete lessons (437 interactions). The levels of agreement (intra-class correlations between observers) were 0.736 for autonomy support, 0.677 for structure and 0.808 for involvement, indicating moderate to good levels of agreement.

Special educational needs were assessed from the perspective of the teacher. Teachers were asked to indicate for each student whether students were perceived as having special educational needs, and if so, what the nature of the special educational needs were. These descriptions were afterwards classified in three main categories: behavioral problems, learning problems, or 'other' problems (e.g. a physical disability). With a map of the classroom, the teachers also indicated which student

Table 36.3 Coding scheme need supportive teaching

Autonomy support	**Autonomy thwart**
Choice	Control
Fostering relevance	Forcing meaningless activities
Showing respect	Showing disrespect
Provision of structure	**Chaos**
Clarity	No clarity
Guidance	No guidance
Encouragement	Discouragement
Informational feedback	Evaluative feedback
Involvement	**Disaffection or rejection**
Affection	Disaffection
Attunement	No attunement
Dedication of resources	No dedication of resources
Dependability	No dependability

Based on Stroet (2014)

sat where. In this way, the interaction data could be coupled to the SEN data. The researchers who coded need-supportive teaching were not aware of the presence or absence of special educational needs of the students on the video.

4.1.3 Analyses

Because of the nested structure of the data (interactions are situated in lessons, which are situated in classes/teachers) we performed multilevel analyses. After a check of the assumptions, we estimated multilevel regression models with SEN (recoded as dummy variables) as the explanatory variable, and the three dimensions of need-supportive teaching as outcome variables (one dependent variable per model).

5 Results

5.1 Descriptive Statistics

In total, 2302 one-on-one teacher-student interactions were coded. Of these interactions, 26% (598 interactions) occurred between a teacher and a student with some form of SEN. Looking at behavioral problems and learning problems separately, 16.9% of all interactions that took place were between a teacher and a student with a behavioral problem, while 11.1% of all interactions were between a teacher and a student with a learning problem (note that these percentages do not add up to 26% because students can also have both a learning problem as well as a behavioral

Table 36.4 Descriptive statistics of dependent variables

	Minimum	Maximum	Mean	St. dev.
Autonomy support	−3	3	0.04	0.96
Structure	−3	3	0.45	0.81
Involvement	−3	3	0.43	1.00
Total need-supportive teaching	−6	7	1.21	2.01

problem). Table 36.4 lists the descriptive statistics for the four dependent variables. All variables showed an approximate normal distribution.

5.2 Differences in Teacher-Student Interactions Between Students With and Without SEN

Figures 36.1 and 36.2 show the differences in need-supportive teaching between interactions with students with and without SEN (learning problems and behavioral, respectively). We tested the relation between either two forms of SEN and the three dimensions of need-supportive teaching with multilevel regression models. Although the data has a three-level structure (interactions within students within teachers), exploratory analyses showed that the variance explained at the teacher level was negligible (intra-class correlations ranged between 0.01 and 0.07). Therefore, our final models consisted of two levels (interactions within students). We estimated 8 models (2 independent * 4 dependent variables). The results of the final, random intercept models are summarized in Table 36.5.

Looking first at the differences in need-supportive teaching towards students with, versus students without learning problems, the total score on need-supportive teaching was higher for students with learning problems ($t(1389) = 2.60$, $p < .01$). There was no difference in the level of autonomy support offered to students with, versus students without learning problems ($t(2058) = .44$, $p = .33$). The degree of structure offered by teachers was higher for students with learning problems ($t(1405) = 3.00$, $p < .01$). Similarly, we see a higher degree of involvement for students with learning problems ($t(2054) = 2.18$, $p < .01$).

Comparing students with behavioral problems to students without the problems, the pattern of results was somewhat comparable to the results for learning problems, but the observed effects were smaller and none were statistically significant. Although teachers also tended to provide a higher level of need-supportive teaching to students with behavioral problems, the difference is not significant ($t(1389) = 1.31$, $p = .10$). Again there was no difference in the level of autonomy support offered to students with, versus students without behavioral problems ($t(2058) = .45$, $p = .33$). The same holds true for the degree of structure offered in one-on-one interactions ($t(1405) = .93$, $p = .18$). Teachers tended to show a higher level of involvement towards students with behavioral problems compared to students without behavioral problems, but this trend was not significant ($t(2054) = 1.19$, $p = .12$).

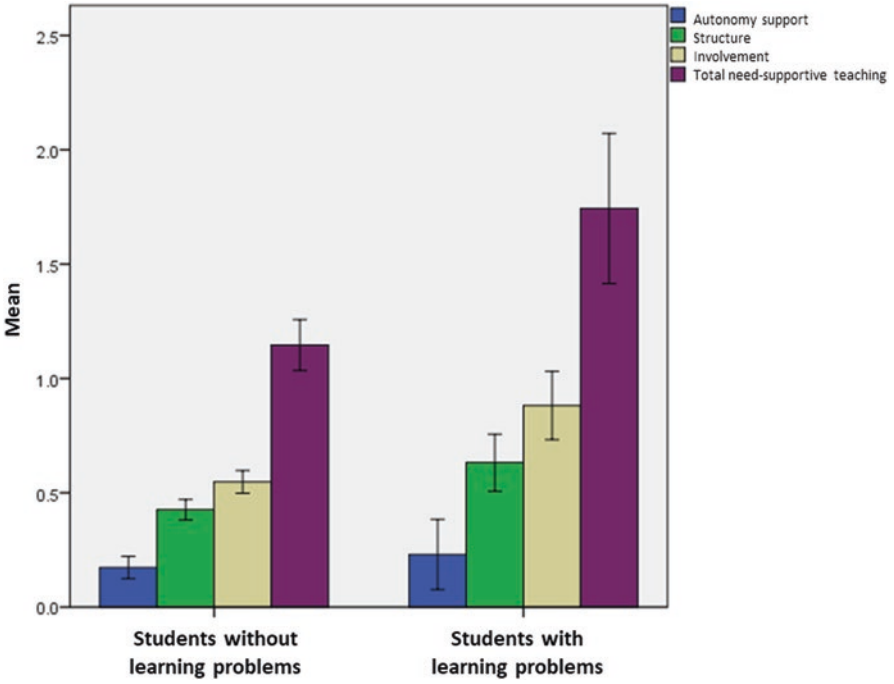

Fig. 36.1 Levels of autonomy support, structure, involvement and total need-supportive teaching towards students with and without learning problems

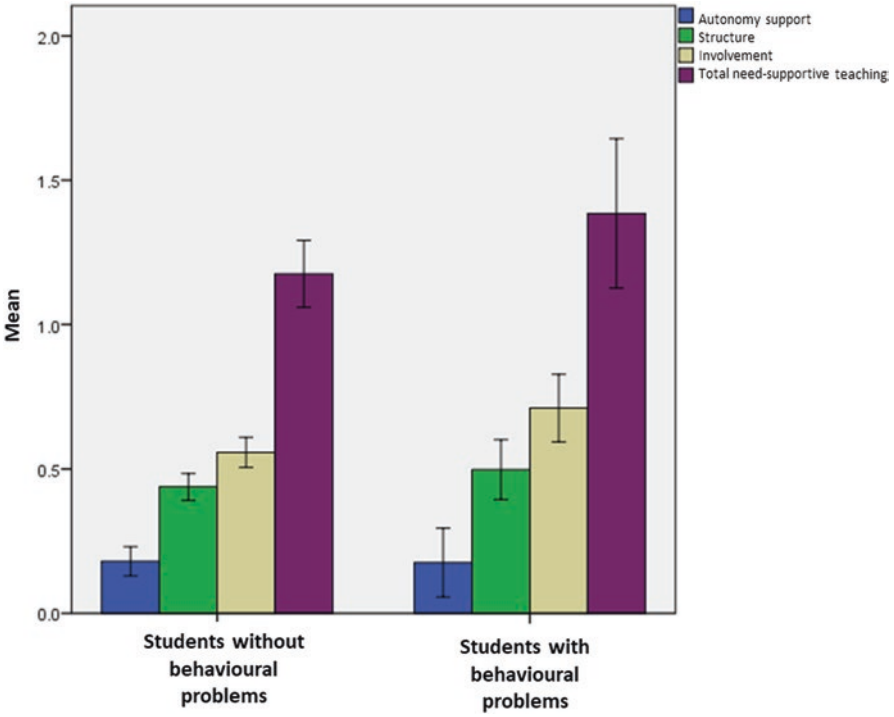

Fig. 36.2 Levels of autonomy support, structure, involvement and total need-supportive teaching towards students with and without behavioral problems

Table 36.5 Results of the multilevel models relating SEN (learning (LP) or behavioral problems (BP)) to dimensions of need-supportive teaching

	Dimension = Total need-supportive teaching			Dimension. = Autonomy support			Dimension. = Structure			Dimension. = Involvement		
	empty	LP	BP	empty	LP	BP	empty	LP	BP	empty	LP	BP
ICC	.10	.09	.10	.04	.04	.04	.03	.03	.03	.10	.09	.10
Coefficient (SE)		.64 (.25)	.27 (.20)		.04 (.09)	.03 (.07)		.24 (.08)	.06 (.07)		.24 (.11)	.11 (.09)
T-value (df)		2.60 (1389)	1.31 (1389)		.44 (2058)	.45 (2058)		3.00 (1405)	.93 (1405)		2.18 (2054)	1.19 (2054)
p-value		<.01	.10		.33	.33		<.01	.18		.01	.12

6 Discussion

From our data, we see small overall differences between the one-on-one interactions of teachers with students with and without SEN. Especially for students with learning problems, we see that teachers tend to show more involvement and an overall higher degree of need-supportive teaching. A similar (non-significant) trend is visible when comparing students with, versus students without behavioral problems. This does not align with previous research on the more often problematic teacher-student relationship when students have SEN, Based upon previous research on the more often problematic teacher-student relationship when students have SEN, one would expect a lower degree of need-supportive teaching. Next to the relatively small sample of teachers, perhaps this could have something to do with the fact that we used observations of interactions as they occurred at the very start of the school year, instead of the more aggregated impressions of closeness and conflict that teachers reported in questionnaires in previous studies (Zee et al., 2017). Teachers also provide more structure in interactions with students with learning problems, compared to students without learning problems. Offering structure in interactions with individual students means monitoring what students understand and adjusting instruction and feedback accordingly, which is what we also measured in our data. This kind of adaptive teaching is also a core element of differentiation (Deunk et al., 2018). The fact that the teachers in our sample did this, and to a larger extent for students who are known to have learning difficulties, is a positive indicator for their ability to differentiate instruction on a micro-level.

7 General Discussion: Linking Intentions to Differentiate to One-on-One Interactions

The aim of our two studies was to analyze teachers' intentions regarding differentiation on the one hand, while on the other hand examining the differences between one-on-one interactions with students with and without special educational needs.

In our two studies, we see on the one hand that teachers' often *do not formulate intentions* relating to differentiation between students with different educational needs or abilities. On the other hand, we see in the naturally occurring one-on-one interactions that teachers *do act* differently towards individual students with and without SEN, although these differences are small. Together, these two studies highlight two important aspects of teaching in general and differentiation in particular: pro-active planning of lessons on the one hand, and on the other hand the more improvisational skill of adjusting one's behavior and instruction from moment to moment in response to the emerging behavior of different students in the classroom (Sawyer, 2011). Differentiation is a particularly complex skill that can take a long time to master. Therefore, pro-active planning is considered a key element of differentiation (Tomlinson & Imbeau, 2010; Van Geel et al., 2019). It is in that sense worrying that only a small portion of teachers' intentions related to differentiation and that the intentions that did, were mostly formulated briefly and in very general terms. This might be an impediment towards actually implementing differentiation in the classroom.

Concerning teachers' actual behavior in one-on-one interactions, we see, however, that teachers in general show at least moderately positive levels of need-supportive teaching, and somewhat more towards students with SEN on some dimensions. As adaptive teaching is an important element of both need-supportive teaching as well as differentiation, this can be seen as a positive indicator of teachers' ability to differentiate in the 'improvisational' sense. However, me must emphasize that offering need support in individual interactions is, although a key condition, only part of differentiation practices in the classroom. We did not assess, for instance, whether teachers differentiate in the sense of grouping students according to ability, offering extra instruction time or adjusted goals for students with varying levels and needs or provide different assignments for different students. Two important goals for future research are therefore, first, to assess differentiation on the level of the whole lesson. Second, we studied intentions and teacher behavior currently in two separate studies. A logical next step would be to see whether we can predict teachers' actual differentiation practices from their intentions: is formulating detailed plans for differentiation in one's next lesson(s) a necessary prerequisite for implementing differentiation?

The added value of the studies presented here is that they inform us about the intra-individual level of differentiation. Although we investigated differentiation only in a relatively small sample of teachers, the intensive data collected provide a unique and ecologically valid insight into teachers' intentions as well as their behavior in interactions with students. This will allow us to make more detailed predictions of lesson-to-lesson differentiation in the future. Next to looking at differences between teachers in their teaching practices, we need to know more about why differentiation 'works' in some lessons and moments, but not in others. This will allow us to not only understand differentiation better at a fundamental level, but also provide 'differentiated' support for teachers who wish to improve their teaching skills.

7.1 Implications for Research and Practice

Given that we only described teachers' intentions relating to differentiation, future research needs to focus on to what extent intentions for differentiation relate to actual differentiation practices, both at the classroom as well as on the individual level. In teacher education and professionalization programs, more attention can be paid to teachers' intentions and lesson plans for differentiation. A third important implication of our study is that teachers can be made more aware of their intentions given the need for pro-active planning of differentiation practices.

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