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Teachers' interactive cognitions of differentiated instruction in a context of student talent development☆

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HIGHLIGHTS

- The nature of interactive cognitions depends on context, situation and person.
- Teachers often practice differentiated instruction, though in different forms.
- When differentiating, students' readiness is often taken into account.
- Teachers' differentiated instruction mainly resembles convergent differentiation.

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1. Introduction

There has been a great deal of research into differentiated instruction (DI) both in the Netherlands and abroad (Bosker & Doolaard, 2009; Dutch Inspectorate of Education, 2016; Graham et al., 2008; Tomlinson et al., 2003). DI is usually defined as taking differences between students into account in the process, product and content of teaching, whether proactively or reactively (Bosker & Doolaard, 2009; Tomlinson et al., 2003). Many studies have addressed the extent to which teachers respond to differences between students (Graham et al., 2008; Dutch Inspectorate of Education, 2016) and the effects of these actions on their students' learning outcomes (Deunk, Doolaard, Smale-Jacobse, & Bosker, 2015). A study examining teachers' perceptions of and knowledge about DI (Brighton, 2003) found that teachers consider DI to be important, given its positive effects on students' learning outcomes and motivation (Deunk et al., 2015). However, secondary school teachers often see it as impractical for classes of 25–30 students (Janssen, Hulshof, & Van Veen, 2016). Most research into DI focused on teachers' knowledge, beliefs and practices of DI and the effects it has on the students by using interviews, observations and student achievement results as research methods. To gain a better understanding of how teachers' knowledge is enacted in their practice, this study focuses on teachers' interactive cognitions of DI. Using videos of teachers' lessons to conduct stimulated recall interviews (SRIs) our goal was specifically to bring to light how teachers attempt to cater for differences between individual students in their lessons, and the interactive cognitions underlying their attempts. Greater insight into teachers' interactive cognitions during lessons should enable better support to be given to them in the implementation of DI. An important assumption for this study was that different teachers may have different interactive cognitions which affect how they adapt their practices, depending on the teacher him/herself, specific characteristics of the student the teacher is interacting with, and the type of teacher-student interaction. For this reason, it is not suitable to provide support to teachers as they implement DI in a one-size-fits-all approach.

The questions that we set out to answer in this study were: *What interactive cognitions regarding differentiated instruction do teachers have during teaching? How do they take different student characteristics into account in these interactive cognitions?*

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2. Theoretical framework

2.1. Differentiated instruction

2.1.1. The concept of differentiated instruction

Differentiated instruction can take two forms: between classes and within classes. Between classroom DI can be seen, for instance, in the structure of secondary education in the Netherlands, which tracks students in different school levels (Bosker & Doolaard, 2009). Within classroom DI occurs when the teacher makes pedagogical choices to take differences between students in a class into account. Regardless of whether it is being organized within or between classes, DI can be seen as "an approach which proactively takes individual differences between students into account" (Mastropieri et al., 2006; Richards & Omdal, 2007; Tomlinson et al., 2003). Differences between students can generally be divided into three different types of student characteristics (Tomlinson et al., 2003): *readiness*, *interest* and *learning profile*. The first concept, *readiness*, can best be defined using Vygotsky's zone of proximal development (ZPD) (Vygotsky, 1978): each student has a current level of performance of things (s)he can do without help and a level of performance that (s)he could achieve with help (the ZPD). It is the teacher's job to determine both levels and to provide individual students with appropriate teaching and guidance so that they reach their own ZPD. The second concept is *interest*: being motivated to learn a subject and finding it interesting helps students to learn easily and enjoy learning so they are willing to work at that subject. The third concept is *learning profile*: the students' gender, ethnicity, learning preferences and other aspects of their background can affect how they master the teaching material. By taking these student characteristics into account, the teacher creates an environment in which each student can be successful and develop his/her potential to the full (Subban, 2006). This DI, where teachers try to get as much out of every student as possible, has also been described as divergent DI (Bosker & Doolaard, 2009; Deunk et al., 2015). Another form of DI is convergent DI. Convergent DI refers to practices in which teachers define minimum goals for students and subsequently guide them to reach those goals. These two types of DI do not have to be considered as opposites.

2.1.2. Research into differentiated instruction

Various studies have provided evidence for DI's positive influence on students' performance at school (Deunk et al., 2015; Mastropieri et al., 2006; Richards & Omdal, 2007). In fact, DI contributes to higher learning outcomes in students of different age groups. Deunk et al. (2015), for example, point in their review to the cognitive effects of DI by ability grouping: various positive effects on the language skills of children in nursery school and on the reading skills of primary school students. Higher scores on standardized physics and chemistry tests were found by Mastropieri et al. (2006) and Richards and Omdal (2007) as a result of DI in secondary schools. In the study by Mastropieri et al. (2006), the DI consisted of students working in small groups of two or three on physics and chemistry tasks which were adapted in level of difficulty to be suitable for the students' abilities. The DI in Richards and Omdal's study (2007) took the form of *tiering*, a method which involved dividing the students into three ability groups. Then the content, process and product of the series of lessons central to the research project was tailored to suit the knowledge and skills of the students.

These studies found positive learning outcomes because of successful implementation of these methods of DI (Deunk et al., 2015; Mastropieri et al., 2006; Richards & Omdal, 2007). The implementation usually involved a lengthy and intensive process geared to the effective implementation of DI. The teachers were coached in this by researchers and workshop leaders and/or a supply of materials developed by the researchers was provided which students could work on at different levels (Deunk et al., 2015; Mastropieri et al., 2006; Richards & Omdal, 2007). However, that implementation is by no means always effective is clear from a recent report of the Dutch Inspectorate of Education (2016), which concluded that there is still very little DI being practiced in secondary school classrooms in the Netherlands. Studies by Mills et al. (2014) and Valli and Buese (2007) provide several examples of how, also from an international perspective, DI in classrooms is not always effective, even after interventions have taken place. Mills et al. (2014) for example report on how teachers after a statewide intervention in Queensland Australia, by means of an audit and workshops, implemented 'narrow' forms of DI, meaning they streamed students in different teaching groups, rather than considering individual student characteristics.

2.1.3. The complexity of differentiated instruction

DI is a complex task for teachers whether they are coached or not. This is because it requires them to make conscious and reasoned choices in what they do (Denessen & Douglas, 2015). These decisions should preferably also be taken proactively at different levels: the teacher chooses which student characteristics the teaching should be geared to and what learning activities will be expected of the students. This proactive approach to differentiated instruction is one of the greatest challenges for secondary school teachers, as they may interpret it to mean that they have to produce an individual lesson plan for all 25 to 30 students in each class, when they only have about 10 min preparation time for the whole class (Janssen, Westbroek, Doyle, & Van Drie, 2013; Janssen et al., 2016). In practice teachers make many decisions about how to teach a student during classroom teaching, when the situation demands it. Thus, alongside proactive DI, they are usually also engaged in reactive DI (Denessen & Douglas, 2015). It is important, therefore, when supporting teachers to implement DI, not only to focus on the proactive form, but also on the choices they make in the classroom, or the teachers' interactive cognitions during teaching.

2.2. Teachers' interactive cognitions

2.2.1. Interactive cognitions during classroom teaching

Our research addressed teachers' interactive cognitions *during* teaching. Research on teachers' cognitions frequently refers to the concept of practical knowledge in this context (Verloop, Van Driel, & Meijer, 2001; Meijer, 1999). Teachers' practical knowledge can be seen as knowledge that is active during teaching and accounts for the complexity of thinking-in-action (Munby, Russell, & Martin, 2001). It is the knowledge that underpins the teachers' actions. This is why this knowledge is also investigated in conjunction with the teachers' actions. Practical knowledge can be seen as comprising two elements: (1) knowledge and beliefs, and (2) interactive cognitions (Meijer, Verloop, & Beijaard, 2002). Knowledge and beliefs are the more stable cognitions that teachers have acquired over the course of their careers and which can serve as the basis for interactive cognitions. Therefore, research that only looks at teachers' knowledge and beliefs does not, by definition, give a complete picture of what guides their actions, argue McAlpine, Weston, Berthiaume, and Fairbank-Roch (2006). To study what goes on in teachers' heads when they are teaching, we also need to capture their interactive cognitions (McAlpine et al., 2006; Meijer et al., 2002). Interactive cognitions, being part of practical knowledge, are quite similar to concepts like thinking-in-action, however, they are focused on interactions that take place during classroom teaching (Meijer et al., 2002): in complex situations, like many