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Title: Differentiated instruction in practice: a teacher perspective
Issue Date: 2018-05-23

Chapter 5

Teachers' sense-making processes during two years of an innovation aimed to differentiate instruction[1]

Abstract

In the current study teachers' sense-making of an innovation during which they experimented with differentiated instruction was studied during two school years. Using answers to a questionnaire, 15 teachers' sense-making processes were characterized by three types of search for meaning: assimilation, adaptation, and toleration. We further specified the teachers' sense-making through their experienced sources of ambiguity and uncertainty (limited resources and conflicting goals) and a detailed description of their personal frames of reference. We concluded that the teachers varied in their types of search for meaning during both school years, though most teachers were found to use assimilation in the second school year. Their experienced sources of ambiguity and uncertainty and their personal frames of reference, though becoming more similar to each other, still differed after two school years. A possible reason for the variety in teachers' sense-making is the freedom they had in the implementation of differentiated instruction: several teachers were positive about this from the start, others needed more support and guidance. This study hereby provides additional insight in the advantages of freedom in the implementation of an innovation, but also show the importance of proper support and guidance to ensure effective implementation.

5.1 Introduction

Research on educational innovations has shown that these often do not turn out in practice the way they were designed in theory (Luttenberg, Van Veen, & Imants, 2013; März & Kelchtermans, 2013; Van Veen, Zwart, Meirink, & Verloop, 2010). The way an innovation is implemented is influenced by its objectives and the context in which it is to be implemented (the innovation's situational demands) as well as by "the dynamic process by which individuals and groups [of teachers] make meaning from the environments in which they operate" (März & Kelchtermans, 2013, p.15). Luttenberg, Van Veen et al., (2013) argue that this sense-making is an interaction between teachers' perceptions of the situational demands and their personal frames of reference. Teachers' sense-making of innovations can be seen as a process, as noted by März and Kelchtermans (2013), for teachers dynamically try to find coherence between their own personal frame of reference and the contextual factors during the course of the innovation.

In the current study, we explore this dynamic process of sense-making in the same context as the studies described in chapters 3 and 4: GUTS. In this context teachers might perceive that they have space to innovate and take risks (Allen & Penuel, 2015), which is especially relevant regarding the criterion that teachers had to plan for differentiated instruction (DI) in their GUTS lessons. Research on DI has shown that it is an educational approach that teachers have difficulties implementing (Janssen, Hulshof, & Van Veen, 2016; Tomlinson et al., 2003). Thus, especially in the case of DI it appears to be important that teachers perceive the space to be self-determined and to try out different educational approaches (De Neve, Devos, & Tuytens, 2015). On the other hand, an innovation with space to innovate and take risks can be interpreted as having too little structure, causing teachers to be confused and experience ambiguity (Schmidt & Datnow, 2005). In sum, different teachers experience and handle

innovations (to implement DI) differently, especially a loosely-structured innovation like GUTS (Luttenberg, Van Veen, et al., 2013; Schmidt & Datnow, 2005; Tricarico & Yendol-Hoppey, 2012). It is therefore interesting to study teachers' sense-making processes in such a context. To characterize teachers' sense-making, we will use Luttenberg, Van Veen, et al.'s (2013) types of search for meaning combined with a typification of the sources of ambiguity and uncertainty the participating teachers experienced throughout the innovation (Allen & Penuel, 2015). We aim to get a comprehensive understanding of the dynamic process of teachers' sense-making and thus study the teachers at two points in time, each one year apart (März & Kelchtermans, 2013). This leads to the following research questions: *How can teachers' sense-making of an innovation to differentiate instruction be typified in terms of type of search for meaning and sources of ambiguity and uncertainty? How does this sense-making change over two school years?*

5.2 Theoretical framework

5.2.1 Differentiated instruction

Teachers who differentiate their instruction aim to proactively take their students' individual learning needs into account in the process, product, and content of their teaching (De Neve, et al., 2015; Deunk, Doolaard, Smale-Jacobse, & Bosker, 2015; Tomlinson et al., 2003). Two general forms of DI can be distinguished: convergent and divergent DI (Bosker & Doolaard, 2009; Deunk et al., 2015). Convergent DI is the aim, when teachers hold minimum goals for the whole class and guide all students towards those goals. In divergent DI, teachers guide each student to reach their maximum learning potential. Much research has already been done into the effectiveness of DI (both convergent and divergent) on student learning (e.g., Deunk et al., 2015), teachers' perceptions and practices of DI (e.g., Brighton, 2003), and how they can incorporate it into their practice (e.g., Tomlinson, Brimijoin, & Narvaez, 2008). DI appears to be beneficial for students' achievement,

motivation, and engagement (Deunk et al., 2015; Graham et al., 2008), but many problems have been described in the literature regarding the incorporation of DI into practice (Hertberg-Davis & Brighton, 2006; Janssen et al., 2016; Smit & Humpert, 2012; Tomlinson et al., 2003). Teachers may not view DI as a challenge to innovate their teaching, but rather as a burden (Smit & Humpert, 2012). Many teachers see DI as an impractical approach, especially when it comes to planning proactively for it (Janssen et al., 2016). Contextual factors like support during the implementation of DI are of great importance (Hertberg-Davis & Brighton, 2006). When DI is to be implemented in a school, but the principal does not provide the teachers with a safe environment for change, implementation is unlikely to happen as planned (Hertberg-Davis & Brighton, 2006). As a result of these and other experienced problems with the implementation of DI, certain DI practices remain an add-on in many cases, instead of a fully implemented pedagogical approach (Smit & Humpert, 2012).

5.2.2 Educational innovations
In most studies on DI, its implementation of DI is dealt with as an educational innovation (e.g. Puzio, Newcomer, & Goff, 2015; Smit & Humpert, 2012). Previous studies on educational innovations have shown that their implementation does not come easily. Often the implemented innovation is not exactly as it was intended to be (März & Kelchtermans, 2013; Van Veen et al., 2010). Most of these educational innovations were designed with the goal of increasing student achievement, motivation or other learning outcomes, but lacked an explicit and elaborated theory of improvement (Van Veen et al., 2010; Wayne, Yoon, Zhu, Cronen, & Garet, 2008). This is often visible in the design of these innovations: different (theoretical) ideas on how to enhance student learning are creatively combined into an innovation that is carried out in a school, expecting that student outcomes will increase. What seems to be overlooked is *how* these ideas are to be

implemented and with that, the crucial role of teachers in the implementation is often underestimated.

Teachers are at the center of educational change (Schmidt & Datnow, 2005). In many cases of educational innovation, teachers are expected to take innovations as these are offered by the school or government and implement them as intended (Luttenberg, Van Veen, et al., 2013). However, schools and teachers have their own characteristics (local area, administrators, students, etc.) that have a powerful influence on implementation processes (Luttenberg, Imants, & Van Veen, 2013; März & Kelchtermans, 2013). In addition, teachers' prior knowledge influences how they interpret innovations (Allen & Penuel, 2015; Spillane, Reiser, & Reimer, 2002), and emotions play a role in these processes, especially when it comes to teachers' own classroom practices (Ketelaar, Beijaard, Boshuizen, & Den Brok, 2012; Schmidt & Datnow, 2005; Van Veen & Lasky, 2005). These personal influences often result in adapted innovation practices, and diversity in the actual implementation across schools. Especially when innovation designs are less structured and specific, implementation is diverse (Schmidt & Datnow, 2005). In other words, there is an interaction between the situational demands of the innovation (characteristics of context in combination with characteristics of the innovation) on the one hand, and teachers' dynamic processes of sense-making of the innovation, on the other hand (Luttenberg, Van Veen, et al., 2013; März & Kelchtermans, 2013). Ketelaar et al. (2012) describe this "teachers actively position themselves in relation to an innovation" (p.273).

5.2.3 *Teachers' sense-making*

In the current study, teachers' sense-making is defined as the interaction between teachers' personal frames of reference and their perceptions of the situational demands (Ketelaar et al., 2012; Luttenberg, Van Veen, et al., 2013; Spillane et al., 2002). The teachers'

personal frames of reference consist of current practices, prior knowledge, beliefs, and other characteristics that influence how they perceive and interpret the world around them (Allen & Penuel, 2015; Spillane et al., 2002). For example, teachers' beliefs about how students should be taught or their ideas on how to practice DI influence how they will perceive an innovation that is aimed at stimulating student talent development through DI. The situational demands are the external expectations that are placed on teachers coming from policy, school, an innovation, etcetera (März & Kelchtermans, 2013). Although these demands can be considered objective, teachers will perceive them in their own way. Consequently, when studying sense-making, *perceptions* of the situational demands should be taken into account. However, the context in which teachers' sense-making takes place is not merely background, but a constituent element in that process (Spillane et al., 2002). Hence, both the objective situational demands and teachers' perceptions of these demands are important elements for understanding teachers' sense making processes.

Studies on sense-making describe and classify in different ways the processes teachers go through when they are confronted with (new) situational demands in a structural manner. Luttenberg, Van Veen, et al. (2013), as mentioned in section 1.3.3, describe the sense-making process as different types of search for meaning: (a) *assimilation*; (b) *accommodation*; (c) *toleration*; or (d) *distantiation*.

In the context of the implementation of the *Next Generation Science Standards* in the US, Allen and Penuel (2015) analyzed teachers' interviews for the sources of ambiguity and uncertainty they experienced in order to describe the sense-making processes they went through. This method stems from the idea that sense-making occurs when teachers go through 'crises' because they experience ambiguity and uncertainty (Allen & Penuel, 2015; Weick, Sutcliffe, & Obstfeld, 2005). Sense-making is then a way to resolve or deal with these ambiguities and uncertainties (Weick et al., 2005). Sources of this

ambiguity and uncertainty can include conflicting goals, limited resources, and role ambivalence (section 1.3.3) (Allen & Penuel, 2015).

5.2.4 The dynamic process of sense-making

Teachers' sense-making processes can have a large influence on the implementation of innovations. For example, when a teacher experiences limited access to resources, and searches for meaning through assimilation, an adjustment of the teaching practices might occur in terms of minor variations to what the teacher already knows and does, rather than as a truly different way of teaching (Spillane et al., 2002). The innovation thus will be implemented in an adapted form, or the school (or other stakeholders) will decide to adapt the innovation because of the outcomes of teachers' sense-making processes. These processes will then be influenced by new innovations or by colleagues adapting the innovation differently (Ketelaar et al., 2012; März & Kelchtermans, 2013; Spillane et al., 2002). These recurrent effects of the sense-making process show that teachers' sense-making is not only a complex, but also a dynamic process (Ketelaar et al., 2012).

In the current study, we will focus on the process of sense-making, and particularly on its dynamic element. More specifically, differences in how individual teachers make sense of an innovation at different points in time will be examined.

5.3 Method

5.3.1 Context: The innovation: GUTS

The current study took place within the innovation GUTS. As described in section 1.4, in GUTS teachers designed and taught GUTS lessons to stimulate differentiated student talent development and thereby increase the students' motivation and achievement. This innovation in which the teachers did not have to follow a set curriculum and had a lot of freedom, could provide them with the

necessary autonomy teachers need to implement DI (De Neve et al., 2015; McTighe & Brown, 2005).

GUTS was implemented in the school in cooperation between researchers from the university and a group of administrators and teachers in the school. During the whole course of the implementation process – from 2013-2014 to 2015-2016 – the teams from both institutions met regularly to discuss the innovation. Each year it was evaluated and the teams decided what changes would be made within the innovation. Table 5.1 provides an overview of the characteristics of the innovation in each of the three school years.

Table 5.1 Details of GUTS and its main differences throughout the school years

School year	Grades involved	Details of GUTS
2013-2014	7	10 GUTS lessons through the year in three subjects (two in subject 1, four in subject 2, four in subject 3). Lessons took place on Wednesday afternoons between November and June at the end of the school day and lasted 100 minutes.
2014-2015	7, 8	8 GUTS lessons per semester, a different subject each semester: thus, more time per subject. Times of the lessons alternated. Several regular lessons had to be canceled to free up time for the GUTS lessons. Again, lessons lasted 100 minutes. In the second semester, classes combined students from 1st and 2nd grades.
2015-2016	7, 8, 9	GUTS lessons for 7 and 8 as in 2014-2015. The GUTS lessons had their own place in the schedule and regular lessons no longer had to be canceled. Again, the moment in the day alternated. 9th grade did not follow GUTS lessons, but carried out a personal project.

Note: The personal project of the 9th grade is not explained in detail, as this and teachers' participation in that was beyond the scope of the current study.

5.3.2 Participants

In this study, 15 teachers (seven male) from the school where GUTS took place, participated voluntarily. The teachers represented four different subject clusters within the school: Humanities, STEM (Science, Technology, Engineering, and Mathematics), Arts, and Languages. Teaching experience among these teachers ranged from two to 28 years. Table 5.2 provides an overview of the different teachers (names are pseudonyms) and their subjects.

Table 5.2 Descriptives of the participating teachers

Subject	Teacher (sex)
English language	Sarah (f), Helga (f), Gideon (m)
Dutch language	Rita (f), Frank (m)
Chinese language	Nicole (f)
German language	Quint (m)
Spanish language	Julia (f)
French language, Drama	Irma (f)
Art & Design, Art History	Paula (f), Mark (m)
PE	Leon (m)
Mathematics	Alex (m)
Biology	Kate (f)
History	Otto (m)

5.3.3 Instruments

In most of the studies focused on sense-making, retrospective interviews were carried out, in which teachers were requested to explicate their sense-making (Luttenberg, Van Veen, et al., 2013; Weick et al., 2005). In the current study, to make sure all teachers were asked the same questions and to decrease the chances of getting socially desirable answers, a questionnaire was developed (Ballou, 2008; Trobia, 2008). In this questionnaire, the teachers had to respond to five open-ended questions. Table 5.3 shows the specific questions in the questionnaire and what these aimed to measure.

Table 5.3 Concepts, variables and questions in the questionnaire

Concept	Variable	Questions
Perception of situational demands	*Attitude to GUTS*	What do you think of GUTS until now? Please elaborate in a few sentences.
Personal frame of reference	*Perception of differentiated student talent development*	What is, according to you, differentiated student talent development? As a teacher, how can you stimulate each students' talent development?
	Practice of DI	When planning your lessons, do you plan (how) to differentiate your lessons? If so, could you elaborate to what extent you plan your differentiation? What student characteristics do you take into account when differentiating instruction? (for example readiness, interest, learning profile)

We used a direct approach asking teachers how they understood differentiated student talent development, and what they thought of GUTS as an innovation to this. Questions on differentiated instruction were designed based on the review article by Tomlinson et al. (2003). The questions were open-ended, to provide teachers an opportunity to elaborate as much as they wanted and in their own words (Roulston, 2008). As Table 5.3 shows, the teachers' attitudes to the innovation were considered to represent their perceptions of the situational demands, as these include both teachers' opinions of the innovation

and what they perceive the innovation to be. The teachers' perceptions and practices were together considered to be their personal frames of reference, in line with Spillane et al.'s (2002) description of the teachers' personal frames of reference, as described above.

5.3.4 Procedure
Both school years, the questionnaire was administered by the end of October/beginning of November (halfway through the first semester), digitally and on paper. The teachers first got an invitation to fill in the questionnaire digitally; if they did not respond or if they said they had lost the link to the digital questionnaire, they received the questionnaire on paper. Each administration of the questionnaire was around the same time the first GUTS lesson of the school year took place.

<u>*Data coding*</u>
To explore the teachers' sense-making, their perceptions of the situational demands were coded according to how they felt about GUTS and the sources of ambiguity and uncertainty they experienced (Allen & Penuel, 2015). These codes were used to compare teachers' perceptions of the situational demands with their personal frames of reference to characterize their types of search for meaning per school year (Allen & Penuel, 2015; Luttenberg, Van Veen, et al., 2013). The teachers' personal frames of reference were also coded to further specify their sense-making.

<u>Teachers' perceptions of the situational demands</u>
As described above, teachers' attitudes to GUTS were considered to be a measure of their perceptions of the situational demands. Teachers' attitudes to GUTS were coded for how they felt about the project (positive, ambivalent, or negative). If teachers felt positive about GUTS, they were considered to experience no sources of ambiguity

and uncertainty. However, if they were ambivalent or expressed negative feelings, the explanations for those feelings were labelled as their sources of ambiguity (Allen & Penuel, 2015). These explanations were further categorized in *limited resources* and *conflicting goals*. When teachers mentioned having limited access to (proper) resources and time, the source of their ambiguity was *limited resources*. When teachers said they did not think GUTS was executed correctly according to their perceptions of differentiated student talent development, this was typified as a *conflicting goal*.

Teachers' personal frames of reference

The teachers' personal frames of reference were retrieved from their perceptions of differentiated student talent development and their practices of DI. We first coded the answers to both questions on teachers' perceptions of differentiated student talent development. The answers were coded for mentioning the four criteria of a GUTS lesson (enrichment, autonomy, higher order learning, and differentiated instruction), and whether the teacher considered talent development as situated within a school subject or to occur regardless of school subject.

Next, the practices of DI were coded. We considered DI to be the main approach with which differentiated student development could be stimulated, and this was also communicated to the teachers. Since the idea of GUTS was to challenge students to develop their talents, which means that divergent DI would be preferable, the answers to the two questions on their practices were coded for convergent or divergent DI. Although, in several cases none of the two was coded as it was not always possible to distinguish one of the two types of DI from their answers. Teachers' practices were coded as convergent if they mentioned main lesson goals that all students should accomplish (Bosker & Doolaard, 2009). If a teacher mentioned having extra assignments for weak and/or strong students, this was

not valued as having students achieve different goals, more in line with their own competences. Divergent DI was coded if a teacher mentioned helping every student achieve as much as possible (Bosker & Doolaard, 2009).

Data analysis
Types of search for meaning
Teachers' perceptions of situational demands were then compared with their personal frames of reference, and it was determined whether their personal frames of reference or their perceptions of the situational demands of the innovation were more dominant. Table 5.4 provides explanations of when we thought a teacher's type of search for meaning could be characterized as _assimilation_, _accommodation_, or _toleration._ In the current study, _distantiation_ was not considered a type of search for meaning

Teachers' sense-making processes
After all data for both school years were coded and analyzed, both cross- and within-case analyses were made across the school years. The aim of these analyses was to explore whether teachers' sense-making changed between 2014 and 2015 and how this happened for the individual teachers. In addition, we compared the changes in teachers' sense-making with the changes that were made to GUTS.

The quality of the analyses was ensured by inviting an independent coder, a researcher familiar with research into DI, to code five teachers, and afterwards discussing the results. In this discussion, the coding scheme as well as the coding process was discussed and agreement was reached on several minor adjustments of the scheme and process. The adjustments consisted mainly of defining the different codes and rules for assigning codes more clearly. For example, initially the codes convergent or divergent DI for each answer regarding teachers' practices of DI were assigned. However, after discussion it was decided that the teachers' answers regarding

Table 5.4 Types of search for meaning as described by Luttenberg, Van Veen et al. (2013) and the applied definitions in the current study

Type of search for meaning	Description
Assimilation	There is a match between teachers' perceptions of GUTS and their personal frames of reference regarding differentiated student talent development. Also, they are positive or ambivalent towards GUTS, but mainly stay true to their own frame of reference. (Most teachers who felt ambivalent and were placed in this category had *limited resources* as source of ambiguity.)
Accommodation	There is a match between teachers' perceptions of GUTS and their personal frames of reference regarding differentiated student talent development. However, they feel somewhat ambivalent or negative towards GUTS and feel they have to adapt their personal frames of reference to the situational demands of GUTS. (Most teachers who felt ambivalent and were placed in this category, had *conflicting goals* as source of ambiguity; teachers who felt negative and were placed in this category, had *limited resources* as source of ambiguity.)
Toleration	Teachers are ambivalent or negative towards GUTS when they have to do something during GUTS that is different from what they want to do (in total or within GUTS). (Teachers who felt ambivalent were positive about the idea behind GUTS, but had *conflicting goals* and *limited resources* as sources of ambiguity; teachers who felt negative and were placed in this category were negative about the idea behind the innovation, and had *conflicting goals* and perhaps *limited resources* as source(s) of ambiguity.)
Distantiation	Not used in the current study. Teachers had to teach GUTS lessons and could not simply give a regular lesson if they distanced themselves from the innovation. In addition, if teachers did decide to organize their GUTS lessons so that they would be very similar to their regular lessons, this would not be clear from the questionnaires.

their practices sometimes did not provide all the information necessary to confidently code those practices as convergent or divergent DI.

5.4 Results

5.4.1 Teachers' search for meaning and sources of ambiguity

<u>Fall 2014</u>

Table 5.5 shows the results regarding the teachers' sense-making as typified by their search for meaning, the sources of ambiguity and uncertainty they experienced and personal frames of reference in 2014. The table shows that seven teachers' types of search for meaning could be characterized as *assimilation*. Three of those teachers experienced no sources of uncertainty and ambiguity and three experienced *limited resources*. Only Mark appeared to have *conflicting goals* as a source of ambiguity. Mark was mainly very pleased with GUTS and seemed to be able to do as he liked, but he made the following remark regarding the goals of the intervention: "I really enjoy doing GUTS, but especially with [pre-university students] or kids that (…) really like my subjects."

Four teachers were assigned to *accommodation* as type of searching for meaning. These teachers experienced either *conflicting goals* and *limited resources,* or only *conflicting goals* as sources of ambiguity. They thus experienced such differences between their own frame of reference regarding how GUTS should be executed and the situational demands, that they adjusted their frame of reference to what was expected of them in GUTS. Irma (*limited resources* and *conflicting goals*) said: "[It is] not clear enough what is expected from us (teachers) and kids. (…) Why [is it] not reward[ed] with a grade? But [it is] also a lot of fun!" Thus, Irma did what was expected of her and enjoyed teaching the GUTS lessons, but she perceived that one of GUTS' goals (transfer of knowledge and motivation to regular lessons) conflicted with one of her own (reward students with grades). In addition, she experienced not to have the proper resources at her

Table 5.5 Teachers' sense-making by type of search for meaning and source of ambiguity in 2014

2014	Perceptions of the situational demands: Source of ambiguity	None	Limited resources	Conflicting goals	Both
	Type of search for meaning				
	Assimilation	**Otto –** Divergent DI, providing autonomy, and higher order learning regardless of subject **Gideon –** DI, providing autonomy, and higher order learning within subject **Paula –** Convergent DI, within subject	**Nicole –** Convergent DI, and enrichment within subject **Sarah –** Convergent DI within subject **Rita –** DI within subject	**Mark –** Convergent teaching, and enrichment within subject	
	Accommodation			**Julia –** DI, and enrichment within subject **Helga –** Convergent DI within subject	**Irma –** Convergent DI **Leon –** DI within subject
	Toleration			**Frank –** Convergent DI, and providing autonomy within subject **Kate –** Convergent DI within subject **Quint –** Convergent DI, and enrichment regardless of subject **Alex –** Convergent DI regardless of subject	

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disposal to receive guidance in what was expected of her (and her students).

Finally, the four teachers who could be typified as using *toleration* as type of search for meaning in 2014, had *conflicting goals* assource of ambiguity and uncertainty. They participated within GUTS as was expected of them, but their goals for GUTS differed from the actual goals of GUTS. Quint explained this as follows: "The development of talent is focused on 'school subjects'. This is a rational choice, but in my opinion, other factors like getting an idea of your underlying competences, play an important role in developing and using your talent." Quint participated in GUTS as was expected of him, but appeared to maintain his own personal frame of reference.

Fall 2015

Table 5.6 provides the results for the teachers' sense-making in 2015. In the school year 2014-2015 GUTS was embedded within the daily schedule replacing regular lessons. In 2015-2016 the school stopped replacing regular lessons with GUTS, thus embedding GUTS lessons within the regular timetable.

What stands out in Table 6 is that in 2015 most teachers (n=10) could be characterized as using *assimilation* as type of search for meaning in GUTS. Also, within *assimilation*, more teachers (n=3) experienced *conflicting goals.* These three teachers said they liked the project, but still had some reservations. For example, Sarah stated: "A nice addition but on the other hand, not something new for English (…). Also, what I am concerned about most is that I often hear about the kids not enjoying it and it is an extra addition to their workload." Especially interesting in this category are Kate, Quint, and Alex, whose types of search for meaning were labeled with *toleration* the year before. These teachers' changes in type of search for meaning might be related to the changes that were made to GUTS each year. Those changes were made because the school and team of researchers felt that GUTS needed to fit better within the school.

Three teachers' types of search for meaning within GUTS could be typified as *accommodation,* and they experienced *conflicting goals* as a source of ambiguity and uncertainty. Two of them (Gideon and Nicole) could be characterized with *assimilation* the year before, and either experienced no sources of ambiguity (Gideon) or experienced *limited resources* (Nicole). In 2015, both searched for meaning through *accommodation* and experienced *conflicting goals*. Nicole's response when asked what she thought about GUTS: "(…) I think it would be best if the students do not get extra lessons as an extra challenge, but have to do something outside the classroom. With the subject Dutch language [they can], for example, start a school newspaper, with the subject Music [they can], for example, start a band, (…). I probably sound really negative about GUTS, which I am not, but the way we designed it now, to me, is quite boring."

The number of teachers assigned to *toleration* as type of search for meaning fell from four in 2014 to two in 2015. Only one, Frank, was assigned to *toleration* in both years. His sense-making remained largely the same. He continued to believe that the goals he held for differentiated student development conflicted with the goals of GUTS: "I don't think GUTS makes students get better grades. Many students see GUTS as something [obligatory]…" Julia, the other teacher assigned to *toleration* in 2015, not only experienced *conflicting goals*, but also *limited resources*: "I think (…) the real challenge is not there, because GUTS is mandatory for everyone. (…) you are not 'special' when you receive GUTS lessons. Secondly, the way it is going now, students get sorted into subjects of their second or even their third choice. This is not stimulating, nor motivating. (…)."

Table 5.6 Teachers' sense-making by type of search for meaning and source of ambiguity in 2015

2015 Perceptions of the situational demands: Source of ambiguity / Type of search for meaning	None	Limited resources	Conflicting goals	Both
Assimilation	**Otto –** Divergent DI, providing autonomy, and higher order learning regardless of subject **Mark –** DI, and providing autonomy within subject	**Rita –** DI, and providing autonomy within subject **Paula –** DI, and providing autonomy within subject *Leon – DI within subject* ***Helga – Convergent DI, and providing autonomy within subject*** *Kate – DI within subject*	**Sarah –** Convergent DI, and providing autonomy within subject **Quint –** Convergent DI, and enrichment regardless of subject **Alex –** Convergent DI within subject	
Accommodation			*Nicole – Convergent DI within subject* *Gideon – Divergent DI, providing autonomy, and higher order learning within subject* *Irma – Divergent DI*	
Toleration			**Frank –** Convergent DI within subject	*Iulia – Divergent DI, providing autonomy and enrichment, regardless of subject*

Note: *italics* indicate differences in the teachers' source of ambiguity between 2014 and 2015; underlines indicate differences in the teachers' type of search for meaning between 2014 and 2015

5.4.2 Teachers' sense-making

We aimed initially to characterize teachers' sense-making through their types of search for meaning and their experienced sources of uncertainty and ambiguity (see section 5.1). However, when reviewing the teachers' personal frames of reference in more detail, we noticed that teachers with identical types of search for meaning (and experienced sources of ambiguity) still differed from each other. During the analysis of teachers' perceptions of the situational demands (i.e., related to the question *'What do you think of GUTS until now?'*), we noticed that their responses also held information about what they thought the innovation, or differentiated student talent development, *should* be. The question *'What is, according to you, differentiated student talent development?',* was initially aimed at measuring teachers' perceptions of differentiated student talent development. In addition, the answers to this latter question were not always consistent with the answers to the first question. In other words, for some of the teachers their thoughts about what differentiated student development *should* be did not coincide with their perceptions of differentiated student talent development. Julia, for example, explained differentiated student talent development to be exactly what is aimed for in GUTS: "Providing students with a talent for a specific subject an opportunity to further develop their talent, knowledge and practices for that subject further. Students should largely be responsible for the design of their learning process and determining their goals." However, as can also be seen at the end of 5.4.1, she perceives that participating in GUTS should be a reward for performing well in the subject, rather than a place to follow your interest: "The real challenge is not there, because GUTS is obligatory for everyone. All students have to do it, you are not 'special' when you are doing GUTS. (…) it is not a reward for your hard work and/or talent."

Thus, when analyzing the teachers' types of search for meaning, we tried to take teachers' perceptions of differentiated student talent development as well as what they perceived that

differentiated student talent development *should* be into account. Teachers' personal frames of reference were used to understand their sense making into further detail, as depicted in Tables 5.5 and 5.6. This analysis showed that even teachers with identical types of search for meaning and who experienced the same sources of ambiguity and uncertainty, differed in their sense-making (Tables 5.5 and 5.6).

A first glance at Tables 5.5 and 5.6, shows that all teachers, except Mark in 2014 (his personal frame of reference holds convergent teaching and enrichment), saw DI as an important way of stimulating differentiated student talent development. Furthermore, all teachers' personal frameworks held some connection to the criteria for GUTS (autonomy, higher-order learning, enrichment, and DI). However, very few teachers formulated their perception of differentiated student talent development as holding all four criteria for GUTS. In 2014, the two teachers' personal frames of reference that held the most GUTS criteria (three out of four) were Otto's and Gideon's, who were both assigned to *assimilation* as type of search for meaning, without sources of uncertainty and ambiguity. However, in 2015, this similarity with the criteria appeared to be irrelevant to how Gideon made sense of GUTS: he had *accommodation* as type of search for meaning and experienced *conflicting goals*.

Table 5.5 also shows that three teachers viewed differentiated student talent development as something that should focus first and foremost on the student. These teachers explained that as a teacher you should first look at where the student's talents lie and then at how you (the teacher) can adapt your teaching of the subject matter to that talent. This is opposed to the views of most teachers who believe that talent development is situated *within* the subject: thus, that as a teacher you should figure out what the student's talents within the subject are and aim to develop those further. These three teachers, held that perception (regardless of subject) can be found in *assimilation-none* (Otto) and *toleration-conflicting goals* (Quint and Alex). This perception

in theory conflicts with one of the criteria for GUTS and how GUTS is set up, as it is situated *within* subjects. Otto did not see this as a problem, apparently: "I totally love it. I have seen faces light up when I explain that GUTS is theirs and not mine. That they can take the lead in direction, purpose, enjoyment and presentation." In 2015 Quint and Alex moved to searching for meaning through *assimilation-conflicting goals*. For Quint, it seems that although he fitted best in *assimilation* in 2015, he apparently still held perceptions that were somewhat similar to those he held in 2014 regarding GUTS: "Now we have chosen with our subject, to have a measurable end point, we can see whether these lessons really lead to better achievement. Every round, GUTS is getting closer to its goal. It provides us space to experiment with other pedagogical approaches."

Comparing Table 5.6 with Table 5.5, teachers still seem to be scattered across types of search for meaning and sources of uncertainty and ambiguity. Teachers with similar frames of reference made sense of GUTS in different ways, through different types of search for meaning and with different sources of ambiguity. However, in 2015 many teachers (n=5) appear to have added *providing autonomy* to their perceptions of differentiated student talent development. This broadening of their personal frames of reference seems to have occurred especially among teachers who used *assimilation* as type of search for meaning. All these teachers, except Helga, also used *assimilation* as type of search for meaning in the previous year. Julia also added *providing autonomy* to her personal frame of reference and changed in her type of search for meaning; however, this change was from *accommodation* to *toleration*. Another change in Julia's personal frame of reference could be found in her point of view regarding stimulating differentiated student talent development. Although in 2014 Julia thought that differentiated student talent development was situated *within* subjects, in 2015 she perceived it to be a development that should be *regardless of* subject.

In sum, it is clear that teachers with similar personal frames of reference make sense of GUTS in different ways: for example, some through *assimilation* with no sources of ambiguity, others through *accommodation* with *limited resources* and *conflicting goals* as sources of ambiguity. In 2015 most teachers seemed to have changed in their process of sense-making. Most teachers used *assimilation* as type of search for meaning, though their sources of ambiguity still differed.

5.5 Conclusion and discussion

In this study, we aimed to answer the following questions: *How do teachers make sense of an innovation to differentiate instruction in terms of type of search for meaning and sources of ambiguity and uncertainty? How does this sense-making process change over two school years?* After exploring 15 teachers' personal frames of reference and their attitudes towards the innovation GUTS in two school years, we found that teachers make sense of this minimally structured innovation in very different ways. This is in line with Schmidt and Datnow's (2005) conclusion that teachers' sense-making shows greater diversity in less structured reforms than in more structured reforms. Also, it adds to the literature stating that educational innovations often have a variety of outcomes when a clear theory of improvement is lacking (Van Veen et al., 2010; Wayne et al., 2008). GUTS did not have a distinct theory of improvement: several criteria were described which, if implemented by the teachers, were supposed to help students develop their talents, but what specifically had to change in teachers' practice was not made explicit (Van Veen et al., 2010; Wayne et al., 2008).

Teachers' sense-making in the current study was defined using types of search for meaning (Luttenberg, Van Veen, et al., 2013), which were further specified through the sources of ambiguity and uncertainty (Allen & Penuel, 2015) they experienced and their personal frames of reference. In order to come to these classifications, teachers'

personal frames of reference with regard to differentiated student talent development (perceptions and self-reported practices) were combined with their perceptions of the situational demands (attitudes towards GUTS). In this study, like in previous studies, it appeared that teachers' sense-making is a complex process (Luttenberg, Van Veen, et al., 2013; März & Kelchtermans, 2013). The complexity of this process became especially apparent during the analysis of the teachers' perceptions of the situational demands. These perceptions appeared to also hold perceptions of what the teachers thought differentiated talent development *should* be. For some teachers, these perceptions differed from what we found in their personal frames of reference, when we explicitly asked for their perception of differentiated student talent development. Thus, when we analyzed the teachers' types of search for meaning, we found that the teachers' personal frames of reference could be context-dependent: when teachers are explicitly questioned about their personal frames of reference they might answer from their idea of how regular, everyday classroom practice looks, but when they were asked about their experiences with an innovation, they seemed to perceive the concept central to that innovation differently (Spillane et al., 2002). We would therefore argue that when exploring the teachers' types of search for meaning it should be taken into account that teachers might hold more than one personal frame of reference at the same time, which might depend on the question asked: what their perceptions are, or what their experiences are.

We therefore conclude that in the context of an innovation that is added to the regular curriculum, teachers' sense-making cannot be defined by merely categorizing their types of search for meaning. In the current study we saw that teachers' sense-making could change over time and that a number of variables, like the context from which teachers reasoned, seemed to be involved in influencing their sense-making processes (Spillane et al., 2002).

5.5.1 Sense-making as a dynamic process through type of search for meaning
Considering the diversity of teachers' sense-making of GUTS, it appeared in the current study that their sense-making became more similar as time passed and the innovation changed. Some changes to the innovation were also made to make sure there was a better fit between GUTS and what the teachers said they would prefer to do in GUTS. This adds to the literature explaining teachers' sense-making as a dynamic process (März & Kelchtermans, 2013). Specifically, in the second year of data collection most teachers were similar in their sense-making, which was typified as *assimilation*. According to Spillane et al. (2002) it is possible that this greater similarity in the sense-making of teachers shows an advance in the level of implementation of GUTS is advancing. That the number of teachers grouped under *toleration* also decreased seems to be in accordance with Luttenberg, Van Veen, et al.'s (2013) conclusion. They stated that coherence between the different aspects of teachers' work is achieved as they participate in the process of an innovation, rather than a given at the start of the innovation. It should be noted however, that even though more similarity was observed regarding type of search for meaning, the teachers still experienced different sources of ambiguity. Teachers thus made sense of GUTS in their own, unique, ways.

5.5.2 Sense-making through sources of ambiguity
GUTS appeared to be an interesting context for exploring teachers' sense-making. In the GUTS lessons teachers had space to take risks and innovate in ways they often feel they are not able to, because teaching in the regular curriculum restricts them to certain routines (Allen & Penuel, 2015). But, this freedom in the specific design of a GUTS lesson might have left some teachers confused, because they felt that not enough structure was provided (Schmidt & Datnow, 2005). The teachers who experienced *limited resources* as the source of their ambiguity mentioned a high workload, or not being properly

equipped. Thus, for some teachers, additional guidance and support to learn how to participate in such a lightly structured innovation might be helpful (Schmidt & Datnow, 2005). An example of such support is that from a school leader who is supportive of changes towards more DI (Hertberg-Davis & Brighton, 2006; Ketelaar et al., 2012). The school leader could also support collaboration between teachers, possibly in the form of professional learning communities or mentoring (De Neve et al., 2015; Ketelaar et al., 2012).

5.5.3 Teachers' personal frames of reference

Teachers' need for guidance within GUTS may also explain the discrepancies we found between the teachers' personal frames of reference when we explicitly asked them about their perceptions of differentiated student talent development and their frames of reference we found in their attitudes to GUTS (their context-dependent frames of reference). The teachers' personal frames of reference regarding talent development could be called narrow, as they often contained only two of the four GUTS criteria. In addition, especially in 2014, despite the character of GUTS, where students should be challenged to develop their talents, most teachers said to plan for and practice convergent DI. This is similar to findings by Mills et al. (2014), who found that in their context without specific guidelines on how to implement DI, teachers held *narrow* views of DI. However, their context-dependent frames of reference were defined more broadly. This could mean that the space teachers were given within GUTS could indeed help them to see possibilities to innovate and take risks, and think of the best ways to help students develop their individual talents, although guidance is still needed. For that matter, not all teachers in this study considered this space sufficient, especially those with a narrower personal frame of reference. Looking at these subgroups of teachers and their sense-making processes, it appears valid to conclude that other variables apart from the teachers' perceptions, practices, and

attitudes, play a role in teachers' sense-making (Spillane et al., 2002). We would argue that one of these variables is a teachers' starting point in their sense-making process. One group of teachers (*assimilation-none*) seemed to experience GUTS as an opportunity to innovate and was not bothered by the design criteria. Another group (*toleration-both/conflicting goals*) experienced the few criteria there were as conflicting with their own views on talent development. It is possible that this subgroup of teachers would have benefitted from more guidance and support to understand and implement this innovation.

5.5.4 Limitations and future research

In the current study, we were not able to identify causes for the discrepancies within the teachers' personal frames of reference, nor was it our intention to do so as we did not expect to find these discrepancies. Neither did we study what this meant for the teachers. This would be an interesting subject for future research. In the literature, teachers' personal frames of reference are made up of many different variables (Luttenberg, Van Veen, et al., 2013; Spillane et al., 2002). As mentioned above, the starting point of teachers' sense-making processes might be one of those variables that would be interesting to study further. In addition, it is possibly the interplay of all those different variables that becomes clear when researchers explore a specific concept (differentiated student talent development): teachers may hold one broad frame of reference, but when researchers zoom in they discover other details.

Questionnaires were used to typify teachers' dynamic sense-making processes during GUTS. Using this method it appeared possible to gather information from 15 teachers at two moments in time, with exactly the same questions (Trobia, 2008). In addition, in the current study, we chose to use a questionnaire because it reduced the chances of getting the socially desirable responses teachers might have given in face-to-face interviews (Ballou, 2008). However, using semi-

structured interviews in addition to the questionnaire (at different points in time) may provide extra information on the influence of the changes made to GUTS over time on the teachers' sense-making. In addition, looking at our results, especially the discrepancies, it may be interesting to further elaborate on this topic using retrospective interviews with teachers in which they are shown their sense-making processes and asked whether they indeed feel that way and to elaborate on that. These interviews would also provide a space for teachers to explain their emotions at different points in time (Schmidt & Datnow, 2005), as these also play an important role in teachers' sense-making (Ketelaar et al., 2012).

Finally, what we did find is that teachers' sense-making is a complex and dynamic process. This process needs further attention in research, as stated above, but also in the practice of implementing DI. The current results show that it is important to give teachers space to innovate and take risks, but also guidance and support in the implementation of DI. Guidance and support needs will not be the same for all teachers, as they all have a unique way of sense-making.

Chapter 6
Discussion