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Teachers' decision-making: Data based or intuition driven?

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ABSTRACT

Teachers' decisions have an impact on pupils' educational trajectories, yet we know little about their decision-making. This study explored how teachers use data and intuition in the decision process in the case of grade retention. Semi-structured interviews were conducted with 17 primary teachers in Belgium. Results show that teachers use little data that are purposively collected to inform decision-making. Intuitive expertise appeared to be the most important bases of teachers' decisions. These findings stress the need for more insight in teachers' decision-making in general, and in teachers' intuition more specific. Only a full understanding of intuition and its impact on decision-making can help strengthen the positive contribution of expertise while also preventing severe bias.

1. Introduction

Teachers' hold important decision autonomy in areas of choice such as decisions related to the progress of pupils' educational trajectories, yet little is known about the way teachers make decisions (Earl and Katz, 2006; Harteis, Koch & Morgenthaler, 2008). The last decade has seen a body of research emerge on decision-making in education, predominantly starting from a rational approach focusing on data-based decision-making. The underlying rationale for this increased attention on data use is promising evidence that collecting and analysing data, and adding it to the decision process before the decision is made, will have a positive impact on the quality of educational decisions (Earl and Louis, 2013; Marsh, 2012; Rossi, Lipsey & Freeman, 2004; Schildkamp and Ehren, 2013). As a consequence, authorities increasingly expect schools and teachers to use data to justify and support educational decisions (Schildkamp and Ehren, 2013). This appears to be in contrast with the way that decisions are often made in practice. Research has pointed out that data use in schools is still limited (Schildkamp and Ehren, 2013). Programs and materials have been designed to improve teachers' data use, assuming that resolving hindering factors (for example, the lack of data literacy) by providing training and support will lead to an enhanced level of data-based decision-making in schools. This viewpoint mainly implies that teachers use a rational straightforward approach to decision-making. However, Kahneman and Frederick (2005) demonstrated that people do not always adhere to the principles of rational choice; instead they tend to rely on intuitive strategies, even when these strategies may generate systematic deviations from optimal decisions. Studies of decision-making in naturalistic settings suggest that teachers may not consider all data or the consequences of their alternatives (March 1994; Kahneman & Frederick, 2005; Klein, 2008). Relevant information about problems is not always sought and available data is often not used. These conclusions

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notwithstanding, research that takes into account both rational and intuitive bases of teachers' decision-making is scarce (Harteis et al., 2008).

In the light of dual-process theories, we postulate that the intuitive and rational bases are concurring strategies in teachers' decision-making. Through the rational system, teachers engage in the deliberate analyses of data to search for evidence that precedes the decision. In this case data use is a cyclical process, in which phases of interpreting and diagnosing data and taking actions follow each other before the decision is made Verhaeghe, Vanhoof, Valcke, and Van Petegem (2010). However, teachers' decision-making also operates through the intuitive system that enables them to use intuitive cues and to reach feelings of knowing a decision without conscious analysis (Dane and Pratt, 2007; Hogarth, 2001). In this regard, intuition may lead to immediate action without the interpretation and diagnosis of data. Different scholars have pinpointed the possible pitfalls of confirmation bias (Harteis et al., 2008; Kahneman & Frederick, 2005). This means that teachers' attention may be drawn by cues that confirm what they believe to be true.

The complexity of the problem that initiates the decision process is expected to have an impact on the extent to which rational and/or intuitive strategies are elaborated (Blackwell, Miniard, & Engel, 2006; Dane and Pratt, 2007; Shapiro & Spence, 1997). Decision theory suggests that rational strategies are especially suited to solving well-structured problems that allow for fixed procedures (Epstein, 2010). However, a great amount of educational problems are complex, involving multiple factors in changing situations. One might ask whether the rational frameworks that are prevalent in educational research on decision-making are fit to study these ill-structured problems in changing situations. A complex problem that has received a lot of attention in national as well as international literature is the decision concerning grade retention. International comparative research shows that Belgium has high repetition rates in comparison to other European countries (Eurydice, 2011); however, there seems to be limited information regarding how these retention decisions are made (Hall and Hord, 2006). It appears that in most schools, teachers' decisions are primarily based on intuition with little use of systematic data analysis (Creighton, 2007; Earl & Katz, 2006). Students' educational trajectories are affected profoundly by retention decisions, therefore it is important to question the way teachers make these decisions.

Due to the importance of teachers' decision-making and the lack of a solid research base taking into account the intuitive and rational bases in teachers' decision making, this study will start from the premise that decision-making for grade retention is a valuable case study by which to explore the role of data and intuition in the decision-making process of teachers.

The following research questions are set forward:

1. How do teachers use data and intuition in the decision process for grade retention?
2. What is the interplay between data and intuition in teachers' decision for grade retention?

2. Theoretical framework

2.1. Decision theory

Empirical research in the field of decision-making has a long history of studying rational models of decision-making (Harteis et al., 2012). Furthermore, there is a vast amount of research in education on data-based decision-making. However, the dual-process approach has become widely accepted, describing a model of human decision-making guided by both rationality and intuition (Evans, 2008; Hammond, 1996; Kahneman and Frederick, 2005). The rational system enables people to process information deliberately and to engage in purposeful analysis, while the intuitive system involves the automatic and relatively effortless processing of information and permits individuals to reach perceptions of knowing without conscious attention (Evans, 2008; Hammond, 1996; Kahneman and Frederick, 2005). According to Epstein (2010), the intuitive system operates by the hedonic principle (what feels good), while the rational system follows the reality principle (what is supported by evidence). Although firmly established as a model of decision-making in the field of cognitive science, the dual-process approach has not yet found its way into educational research and only limited attempts have been made to study intuition in the context of teachers' decision-making (Harteis et al., 2008).

Starting from this dual-system thinking, we will draw on two lenses. Theories on data use provide us with a valuable starting point by which to study the rational bases of teachers' decision-making. Second, we will explore the intuitive bases of teachers' decision-making. According to Epstein (2010), the content of the intuitive system consists primarily of generalizations from experience and feelings of knowing.

2.2. Rational bases of decision-making

Broadly speaking, data-based decision-making is the process by which teachers collect and analyse data to guide and support educational decisions (Dane and Pratt, 2007; Ikemoto & Marsh, 2007). Data use has been described as a cyclical process, in which phases of interpreting and diagnosing data and taking actions follow each other (Verhaeghe et al., 2010). In most data use research, data that is used as input for this cyclical process need to be collected in a deliberate and systematic manner to separate purposeful data use from casual data-gathering. However, in practice teachers are often confronted with data that were not deliberately or systematically gathered, such as observations during daily practice. Although these

randomly collected data teachers are confronted with during daily practice may provide them with valuable information, these data are more subject to bias than data that were collected deliberately and systematically (Kahneman and Frederick, 2005). Without a clear purpose, a pre-set goal or approach, attention will be guided by teacher's personal knowledge and beliefs (Dane and Pratt, 2007). Teachers, as all people, have the tendency to see things that confirm existing beliefs and to (unconsciously) avoid data that points to the contrary (Kahneman and Frederick, 2005). Since the aim of this study is to provide a clear view of data in the decision-making process of teachers, we decided to search for both categories of data. Further, quantitative (i.e., test results, socio-economic indicators) as well as qualitative data (i.e., observations, collegial consultation) will be taken into account. We delimited the concept data by only focusing on data that is directly related to the pupils. Thirdly, we stress the importance of taking into account context, input, process, and output data, in order to understand what is happening in schools (Hulpia, 2004). On the micro-level, context data may, for example, be related to expectations from parents, input data may be related to socio economic indicators, process data may be related to pupils' work ethic during lessons and output data may be related to test results.

In literature on data use, the conceptual distinction between 'data' and 'information' sometimes lacks clarity. In this study we chose to make a clear conceptualization based on Vanhoof, Mahieu and Van Petegem (2009), who define data as facts, numbers or measures that are easy to store and exchange. We would like to add that data may be captured on paper or digitally, but data may also be found in audio or visual observations. Data, as such, makes no valuable contribution to the decision-making process since it embodies no meaning without a code, legend or framework that facilitates interpretation. When a code, legend or framework is added to data it becomes information and may serve as a valuable information source in the decision-making process.

To summarize, in this study we will define data as '*all cognitive, social and emotional indicators that are directly related to the pupil*.' This data becomes information when a code or legend is added.

2.3. Intuitive bases of decision-making

Intuition refers to the domain specific capability to reach an appropriate decision without deliberately analysing various data (Kahneman and Frederick, 2005; Myers, 2002). So, in contrast to data-based decision-making, the intuitive bases of decision-making refer to information processing that is not based on data. As a type of cognitive process, intuition has been studied in different disciplines and from different perspectives. Three facets of the intuition phenomenon that are commonly related to the educational view on intuition are related to (a) recognition, (b) affect and (c) bias (Epstein, 2010; Harteis et al., 2008). From this perspective, a theoretical model will be outlined in the subsequent paragraph for the intuitive bases of teachers' decision-making.

An emerging body of research has begun to study intuition from the perspective of expertise (Harteis et al., 2008; Hogarth, 2001; Kahneman and Klein, 2009). From this point of view, intuition derives from a personal cognitive framework that was developed through teachers' experiences, which facilitates spontaneous pattern recognition (Harteis et al., 2008; Klein, 2008; Myers, 2002). Throughout their careers, teachers acquire a great junction of declarative and procedural knowledge about pupils, learning and teaching that can be used in the decision-making process (Epstein, 2008). These individual knowledge structures based on expertise enable teachers to recognize cues in the splash of information that surrounds them during daily practice (Kahneman and Klein, 2009; Klein, 2008; Simon, 1987). A cue can be seen as a signal that (un) consciously attracts attention, elicits known patterns and suggests plausible action (Klein, 2008). Cues are used to make probabilistic inferences about pupils based on prior experiences with similar cases, they bring expectancies and thus they may inform decision-making.

Affect is also one of the main aspects of intuition (Dane and Pratt, 2007; Epstein, 2008; Slovic, Finucane, Peters, & MacGregor, 2002). In the context of teachers' decision-making affect is experienced as a feeling that allocates positive or negative attributes to a pupil (Slovic et al., 2002). This aspect of intuition is often also reflected by the term 'gut feeling' (Epstein, 2010) or 'affect heuristic' (Slovic et al., 2002): a feeling without a logical rationale (Benner and Tanner, 1987). Affect lies at the basis of the hedonic principle of intuitive decision-making: the decision has to feel good for the teacher (Epstein, 2008).

Nevertheless, next to the body of research that identifies intuition as an important aspect of expertise, a vast amount of research identifies intuitive decisions as biased. An important bias is related to the conservation of beliefs (Hubbard, Datnow, & Pruyn, 2014; Kahneman, 2003); because intuition refers to recognizing patterns and feelings of knowing, it is likely that teachers will have more confidence in their intuition than in the alternatives suggested by data (Downey and Kelly, 2011). Therefore, teachers tend to seek for data that confirms what they believe to be true and try to avoid data that point in other directions (Kahneman and Frederick, 2005). This so-called confirmation bias also suggests that teachers might try to interpret new data in a way that makes them consistent with prior beliefs. However, since intuition derives from personal experiential knowledge and affectively charged feelings, intuition does not necessarily create a truth condition. Intuition is not necessarily valid and this might lead to decision errors (Earl and Louis, 2013).

In practice, the intuitive and rational bases of teachers' decision-making are assumed to be interrelated concurring information processing systems (Spencer, Detrich, & Slocum, 2012). The dual-process approach has become widely accepted as a model of human decision-making guided by both rationality and intuition (Evans, 2008; Hammond, 1996; Kahneman and Frederick, 2005). The intuitive system is considered to be a valuable resource for weighting the best data available in relation to values and context and to make sense of data (Bertrand & Marsh, 2015; Spencer et al., 2012). An emerging body of

research studies the intuitive bases of decision making from the perspective of expertise (Harteis et al., 2008; Hogarth, 2001; Kahneman and Klein, 2009). From this point of view, a framework of personal knowledge that was developed through teachers' experiences enables experts to recognize intuitive cues in the load of information that surrounds them (Klein, 2008). However, as described above, a vast body of research also shows the possible pitfalls of intuition. According to Kahneman and Frederick (2005) errors of intuitive decision making can be detected and corrected by the rational part of decision making. Data-based decision making can challenge and complement intuitive judgments by collecting and analysing data to add additional information to the process, before the decision is made (Earl and Louis, 2013).

2.4. Research context

This study concerns the first grade of primary education in Flanders, the Dutch speaking part of Belgium. In 1998, the OECD suggested that repetition rates in Flanders would substantially decrease when they were also based on data instead of merely on teachers' intuition (Kovacs and Hasan, 1998). The 2011 Eurydice study also showed that there were still high repetition rates in Belgium in comparison to other European countries and that there was a lack of insight as to how these decisions were made (Eurydice, 2011).

In Flanders, the official decision for grade retention is usually made at the end of the academic year in a pupils' counsel. The teacher then formulates his or her advice concerning the transition of the child using cognitive or socio-emotional arguments to underpin this decision to the other members of the pupils' counsel principal, care-coordinator and in exceptional cases a representative of the School Advisory Services. Although officially the decision to retain is a team decision, in practice it appears that in many cases the counsel mainly confirms the decision suggested by the individual teacher. This stresses the importance of questioning the way the individual teacher makes his or her decision concerning grade retention. Therewithal, it is important to know that in Belgium there is no general obligation to use standardized tests, and that teachers can develop and use their own tests or use existing tests that are related to a certain teaching method.

3. Method

3.1. Context and participants

The study was conducted in Flanders with 17 teachers working in first year of primary education. 13 female and four male teachers participated; three teachers had 7–10 years of teaching experience, 11 teachers had 11–20 years, and three teachers had more than 20 years of experience as a teacher. A random sampling strategy was used to select a sample in the population of all teachers teaching in the first year of primary education in Flanders (Miles, Huberman, & Saldaña, 2014). Based on a complete and up-to-date list of all primary schools in Flanders provided by the Ministry of Education, the researcher randomly selected 30 schools. Concurrently, a web-based call was set out on the website of the School Advisory Services. A single researcher called the selected 30 schools and a direct contact with the teacher from the first grade was arranged. Teachers were selected on the following basis: (a) they had a recent case of grade retention and (b) a minimum of five years of experience as a teacher. Due to the choice for the specific case of grade retention and the relation between intuition and expertise stated above, these were the prevalent conditions. Moreover, studies that have identified expert teachers often use five years of experience as a criteria (Palmer, Stough, Burdenski, & Gonzales, 2005). 12 teachers met the premised criteria and agreed to take part in the interview. Five teachers volunteered as a response to the web-based call. All 17 teachers signed for informed consent and participation was voluntary.

3.2. Interviews and procedure

With the aim of exploring the decision-making processes of teachers and providing in-depth answers to the present research questions, we used a qualitative research design including semi-structured in-depth interviews. Participating teachers answered open questions regarding their decisions on grade retention. We asked the teachers in the interviews why they made the decision for grade retention in a specific case. When the teachers defined a specific problem that led to the decision for grade retention, we asked them how they were able to identify that problem. Further, we also asked the teachers which data they had searched to elaborate the problem before the decision was made. Also, we asked the teachers which decision arguments had been prevalent when the final retention decision was made. According to Klein (2008), if you can get teachers to tell you about tough cases, you have a pathway into their perspective. Moreover, according to decision theory, ill-structured problems under changing conditions, and in which high stakes are involved, are especially suited to studying the intuitive bases of decision-making (Epstein, 2010; Harteis et al., 2012). The critical incidents method focuses attention on the key elements that were important during the process being described (Klein, 2008). Therefore, we started from a decision on grade retention that teachers found hard to make. Some decisions on grade retention might be straightforward, whereby the use of different information sources in the decision-making process might remain rather limited and would therefore not provide us with a rich case. This study aimed to explore the role of teachers' intuition and its impact on decision-making with an authentic task. Several studies on intuition were conducted in test situations. However, the test situation is artificial and its significance for professional work situations is unclear (Harteis et al., 2008). The in-depth interviews had an average duration of one hour and were conducted by a single researcher. The same interview protocol was used in all 17 interviews to

assure methodological consistency (Cohen, Manion & Morrisson, 2008). All interviews were audio-recorded digitally and the files were saved for reasons of reliability (Cohen et al., 2008). Peer-debriefing sessions were conducted in which the different methodological choices, data analysis procedures and interpretations were critically examined (Cresswell and Miller, 2000).

3.2.1. Analysis

The interviews were transcribed ad verbatim and analysed using the qualitative software package, NVivo 10. The content analysis method was applied in analysing the interview data (Flick, 2002). To capture variations in the data and the intuition that teachers use in the decision-making process on grade retention, in step one, all bases of decision-making from half of the transcripts were listed and variation in these descriptions was explored inductively. Researcher A (first author) provided interview fragments with an open code, staying as close as possible to the original text (Miles et al., 2014). In step two, these open codes were discussed with researcher B (second author) to see whether the codes were valid in terms of the text fragments behind them. This resulted in the need to concretize and refine codes. In step three, researchers A and B came to an agreement on the conceptualization of the codes (see Table 1). A deductive approach was used in step four of the coding process. Two randomly selected interviews were analysed by both researchers and the inter-rater reliability (Cohen's Kappa) found to be 0.95 (Miles and Huberman, 1994). Disagreements between the coding of both researchers were discussed to assure validity. In the last step, all interviews were analysed by researcher A based on the final coding scheme. Theory, as well as from the input of participants, was searched for similarities and differences in the interviews to deduce cross-case interview results (Miles and Huberman, 1994).

4. Results

4.1. How do teachers use data and intuition in the decision process for grade retention?

First, we asked the teachers in the interviews how they were able to identify a specific problem that led to grade retention. The interviews show that most teachers recognized the problem in an early stage of the academic year, even before test results came in. The teachers in the interviews feel that their experience as a teacher enables them to see things that deviate from the expected standard. Examples of these cues mentioned by the teachers in the interviews are a puzzled look on a child's face when a question is asked, the determination that a child is easily distracted, that a child cries easily or when a teacher notices a certain kind of mistake in an exercise. These intuitive cues are said to provide teachers with an idea of how this pupil will evolve during the rest of the school year, because it reminded the teachers in the interviews of similar cases in the past. Further, according to the teachers in the interviews, they get to know pupils' competencies quiet fast because they work with them every day. This personal alliance is said to enable teachers to gain insight in pupils' strengths and weaknesses even before test results come in. In most of the cases we studied in the interviews, the recognition of a possible problem based on intuitive cues will trigger immediate action without steps being undertaken for further diagnosis of the problem. The teachers in the interviews will for example give pupils extra time or assistance with exercises because the teacher tries to resolve the problem he or she has defined. Other examples from the interviews are extra resources that are provided (e.g. charts to support counting) or pupils that are placed in front of the classroom to prevent distraction. We illustrate our findings by means of the story of Henry (teacher 7) as an example of how the teachers in the interviews described how they recognized the problem that led to grade retention.

In 99% of the cases it's my intuition that tells me when something is wrong. There are always things that come back and you start to recognize them. The look on his face, an attitude or a reaction can recall a pupil you had in the past. Then you think, he went along this road. How shall I put it? It's an intuition, a gut feeling. If they experience difficulties with certain issues, then you can

Table 1
Conceptualisation of codes.

	Code	Conceptual characteristics
Rational bases of decision-making	Quantitative data	– Numeric cognitive, social and emotional context, input, process and output indicators directly related to the pupil – Clear measures that allow statistical calculations, for example, test results, attendance figures
	Qualitative data	– Non-numeric descriptive cognitive, social and emotional context, input, process and output indicators directly related to the pupil – Based on sensory observations, for example, conversations with parents, observations of a pupil
Intuitive bases of decision-making	Recognition	– Specific cues that attract attention in the amount of information and that reminds the teacher of similar cases in the past; for example, a specific injury might evoke a case of child abuse and thus alarm the teacher
	Gut feeling	– Feelings of knowing without a rationale; for example, a teacher might have the feeling that a child is unhappy, without having clear evidence

already tell: this will be a problem. I know it sounds strange, but during the first two weeks, I have a pretty clear picture of who is going to make it and who is not.'

Secondly, we asked teachers which data they sought to elaborate the problem they had defined. In the interviews there were little examples of a deliberate and systematic search for data. We extensively studied the interview data to find examples of teachers who deliberately collected and analysed data to come to a deeper understanding of the problem. We also sought for examples of teachers who deliberately collected data to challenge the problem they defined based on intuitive cues. First, we found few examples of teachers who deliberately and systematically collected data to gain more insight in the problem they had recognized. In almost all of these cases, teachers used qualitative data such as conversations with colleagues (in most cases the care coordinator) and parents or observations in the classroom to come to a deeper understanding of the problem. In some cases, teachers looked at the kind of mistakes pupils made at tests or tried to see an evolution in test results. In two cases, the teacher asked a second party (a person from the pupil counselling services – the care coordinator) for a structured observation or an extra testing to come to a deeper understanding of the underlying problem. However, we found no examples in the interviews of teachers who deliberately searched or analysed data to challenge their assumption. The interviews strongly show that teachers rely on the recognition of intuitive cues to define and understand the problem that might have an impact on the transition to secondary education. Based on their experience, most teachers feel that they have a pretty clear picture of pupils' strengths and weaknesses and of how things will evolve during the year.

In the search for data, almost all teachers relied on data that were randomly collected during daily practice. The most important data source in this matter mentioned by the teachers in the interviews are observations during daily practice. After the teachers in the interviews recognized the problem of a specific pupil, they all describe how insight in the problem and its consequences for the pupil's educational trajectory emerged through observations during daily practice. These observations were predominantly related to pupil's work ethic and socio-emotional processes.

Secondly, also results from non-standardized tests are used by teachers to gain more insight in the problem they have recognized. A small minority of the teachers in the interviews used the results of standardized tests to define or to explore the transition problem. The main reason why teachers do not take into account the results of standardized tests appeared to be that the teachers in the interviews raise serious doubts about the validity and reliability of standardized tests.

4.2. What is the interplay between data and intuition in teachers' decision process?

In this study, we wanted to gain insight in the mutual influence between data and intuition. The interviews learned us that intuition (1) strongly determines which data is being payed attention to (2) is used to make sense of data and (3) determines which information deriving from data is taken into account in the decision for grade retention.

First, the interviews showed that teachers are confronted with a lot of data, such as pupils' files, observations in the classroom, test results or exercises, but teachers do not pay attention to all these data. According to the teachers in the interviews, their intuitive expertise allows them to define a problem in an early stage, even before test results come in. Based on this problem definition, they will focus their attention on data they feel they need to gain more insight in pupils' strengths and weaknesses. So, in the second phase of the decision process, the search for data is predominantly led by teachers' intuition.

For example Maria (teacher 1) explains:

'I believe my intuition is reliable because I highly value knowing my pupils. The strong feelings of mutual trust enable me to identify problems very quickly. [. . .] My intuition tells me, this isn't right. It's my intuition that tells me when I have to search for data. It is possible that test results make me realize that something is wrong, but in most cases it is the other way around. I have never been surprised by test results.'

Secondly, the interviews show how teachers use their intuitive expertise to make sense of data. In this study, we saw that observations are put forward as the most important data source in the decision process. According to the teachers in the interviews, their intuitive expertise helps them make sense of everything they see happening in the classroom. Based on their experience, teachers describe how important cues emerge out of all the observations during daily practice. Further, also test results were mentioned as a source of information in the decision for grade retention. Again, teachers describe how they need their intuition to understand what these test results mean.

'Test results may off course provide valuable information, but you have to combine this information with you own experiences. What impression did I get when I observed this pupil?' (Peter, teacher 11)

The importance of sense-making especially seemed to be the case for the results of standardized tests. When the results of the standardized tests differ from teachers' own assessments, most teachers tried to find an alternative interpretation that explained the discrepancy. For example, Lisa (teacher 16) explains that she is reluctant to see a problem with the transition of a particular pupil because this pupil's results of the standardized tests were below the standard.

'This pupil, she was good in mathematics but she failed her standardized test. That happens frequently. I can only use that specific vocabulary of the standardized test. Children are often attached to the way I explain things, and then the standardized tests do not coincide with what happens in the classroom. Than I have to explain to the parents that these test results don't provide a right image of their child. These are standardized tests, so we have to take them. In a way, I will take them into account.

In most cases, they don't differ that much from our judgment, but sometimes they do. The most important consequence is that you have to explain this to the parents.'

The same applies in the opposite direction: when standardized tests point out that a pupil reached the standard to go to second grade, but when the teacher feels the pupil would benefit from grade retention, the pith of the matter lies in the assessment of the teacher. For example, Peter (teacher 11) explains how you need your expertise as a teacher to interpret the results of standardized tests and to understand what they mean in relation to a promotion to the subsequent grade.

'There was this girl, I felt that she was a her wits end, she stood on tiptoes in order to follow the rest of the group. Her mother, she acknowledged that her daughter was not able to go to second grade. I was under the opinion that she was not ready to go to second grade, but then . . . (silence) The results of her standardized test were okay . . . . That is a difficult one. I have learned that grade retention is a complex matter. You have to understand how they get to a certain result, you have to understand what that result means. It is in the best interest of the child.'

Thirdly, intuitive feelings also appeared to determine which information deriving from data was taken into account when the decision for grade retention was made. The intuitive feeling that the decision for grade retention was in the best interest of the child was of crucial importance for almost all teachers in the interviews. The teachers feel that they are able to see the bigger picture while test results are only a snapshot. Although most teachers in the interviews say to take into account test results, they stress that −above all − it is important that the decision feels right. If they believe in the decision they make, they feel as though they have acted to the best of their ability. The interviews show this to be a decisive criterion when making the decision for grade retention.

'When all the data seem to be negative, I put this next to my intuition, then we decide: what is in the best interest of the child?' (Mila, teacher 15)

'My intuition is very important when I have to make the decision for grade retention. If the decision does not feel right, whatever the results, I will not make the decision. I wouldn't be able to forgive myself if it turned out wrong.' (Maria, teacher 1)

5. Conclusions and discussion

5.1. Conclusions

A great deal of teachers' decisions have an effect on pupils' educational trajectories, yet we know little about how teachers make decisions (Earl and Louis, 2013; Harteis et al., 2008). Therefore, this study aimed to gain further insight into teachers' decision making. Specifically, we explored the role and the interplay of data and intuition in teachers' decision process on grade retention.

In the first phase of the decision process that led to grade retention, teachers' intuition appeared to play a prevalent role since it was predominantly used to recognize the problem. In the great majority of the cases in our study, no steps were undertaken to analyse data to come to a further diagnosis of the problem. Nevertheless, policy makers expect schools to use data from accountability, as well as school development perspectives (Earl and Louis, 2013; Schildkamp et al., 2012). In this regard, this study shows, at least in Flanders, a rather pessimistic picture. Despite the efforts that are made to enhance and support data use in schools, teachers' data use is still limited. Although research points out that decisions based on data better correspond with pupils' needs than those merely based on intuition, teachers are still convinced of the contrary. Teachers believe that their intuition, based on experience and a personal connection with their pupils, leads to better knowledge of pupils' competences and special needs. This finding coincides with research of Kahneman and Klein (2009) stating that, although intuition is not necessarily valid, teachers have high faith in the validity of their intuition since it is based on personal experiences and feelings (Kahneman and Klein, 2009).

Further, we concluded that the data that teachers use in making the decision for grade retention are systematically and deliberately collected to a limited extent. Nevertheless, it is a prevalent condition in most data use literature to separate data use from casual data gathering that might be used to confirm existing beliefs (e.g. Earl and Louis, 2013; Schildkamp & Ehren, 2013). Insights from other fields of study stress the possible pitfalls of confirmation bias. Individuals tend to seek for data that confirms what they believe to be true and try to adjust data that points in another direction (Kahneman and Klein, 2009). This also applies for the teachers in our study. The results of standardized tests are questioned and alternative explanations are sought when these results do not correspond with teachers' intuition. Observations, said to be the most important data in making the decision for grade retention, are not guided by a goal or specific question, instead they are governed by teachers' intuitive expertise. In this manner, observations might mainly reproduce and reinforce existing beliefs about pupils. Different authors have warned against decision errors related to this confirmation bias (Earl and Katz, 2006 Kahneman & Frederick, 2005). In this study, we found no proof of teachers searching for data to challenge their assumptions. When teachers seek for data that confirms what they believe to be true and avoid data that questions their beliefs, their decisions might be one-sided or simply wrong (Earl and Katz, 2006; Kahneman & Frederick, 2005).

Decisive arguments to make the decision for grade retention are informed by teachers' intuition to a great extent. Based on their experience, teachers recognize cues reminding them of similar cases from the past. Further, teachers' gut feelings (feelings of knowing without a rationale) are crucial in making the decision for grade retention. When teachers recognize patterns, and when the decision feels good, they have strong faith that they have acted to the best of their ability. This

coincides with the hedonic principle of intuitive decision-making: the most important evidence lies in the fact that the decision feels right (Epstein, 2010). Research has pointed out that this hedonic principle of decision-making is one of the most important reasons why it is so hard to challenge intuitive judgment by data (Downey and Kelly, 2011; Epstein, 2008).

Regarding the interplay between data and intuition, we concluded that intuition guides the search for data and determines which data is taken into account when the decision is made and which data is not. Further, teachers use their intuition to make sense of data in order to understand what data, such as test results, mean in a particular case. In this study, intuition is used as a guiding and interpretative framework to accept, reject and understand the data that teachers are confronted with in their daily practice. Deliberate and systematic collection and analyses of data appeared to be scarce.

5.2. Implications for theory and practice

The findings of this study highlight the value of deliberately and systematically collecting data to inform teachers' decision-making to prevent confirmation bias. At the same time, this study draws attention to the prevailing dominant role of intuition in teachers' decision making. If we want to gain more insight into the role and impact of data on teachers' decision-making, first we will have to gain a more in-depth insight into the content of teachers' intuition and its impact on the decision-making process. Further research is needed to elaborate our understanding of teachers' intuition and teachers' decision-making processes. The prevalent models on data-based decision-making will need to be broadened and refined by acknowledging the role of intuition in order to grasp a complete understanding of teachers' decision-making in practice. The findings in this study may serve as a valuable starting point in regard to this.

For policy and practice these findings are important to understand the (non) effectiveness of training programs on data use. Training programs and support that do not take into account the intuitive bases of teachers' decision-making may not lead to the desired results. A valuable suggestion for teacher education is to raise awareness on the prevalent role of intuition in teachers' decision-making and the possible pitfall of confirmation bias. When teachers gain more insight in decision-making and bias, this may increase their intrinsic motivation to use data in the decision-making process as a valuable counterweight for human intuition.

5.3. Limitations

We want to mention some limitations of this study related to our specific case and methodology. Firstly, we examined the decision for grade retention in first grade of primary education (teaching six year olds) to explore teachers' decision-making processes. This provided us with a valuable case, but it also brings limitations. Other decision strategies may be applied, or other data sources may be used, when teachers make other decisions or even the same decision in another grade. Future research can make valuable contributions to the body of research when they use the findings of this study as a starting point to explore teachers' other educational decisions.

Although the authors stress the need to study intuition in naturalistic settings with authentic tasks, this methodology has its limits (Klein, 2008). Intuition can hardly be verbalised and has to be assessed indirectly by studying recognition and gut feeling (Klein, 2008). Further, the quality of an intuitive decision in a professional field can be determined only afterwards. In the case of grade retention, it is very difficult to assess the quality of the retention decisions that were made. In this matter, we can only describe to what extent teachers use rational or intuitive processes, but we cannot assess the quality of these processes in relation to the quality of the decision. Our conclusions are based on statements and narratives teachers made during the interviews. This contextualized and personal view of teachers' way of thinking enabled us to get a deep and enriched insight in teachers' decision processes. Our aim was not to provide objective proof for their statements. From a conceptual and methodological point of view one might even question whether that would be possible.

5.4. In summary

In this study we conclude that teachers' decision-making processes are affected by intuitive expertise and feelings of knowing to a great extent. Teachers hardly use data that are collected deliberately and systematically to inform decision-making. We suggest that intuition needs to be acknowledged in educational decision theories and teacher education. Only a full understanding of intuition and its impact on decision-making can help strengthen the positive contribution of expertise, but at the same time prevent severe bias.

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