Thesis

Autism Spectrum Disorder, Interpersonal Teacher Behavior and Motivation

A study into interpersonal teacher behavior and its association with pupil motivation in special education

Student: E. Thissen

Studentnumber: 9434402

Mentor: PhD. M. van der Schaaf

Assessor: PhD. M. van der Schaaf

2e Assessor: PhD. T. Mainhard

Institution: Utrecht University

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Abstract The purpose of this study is to find out to what extent interpersonal teacher behavior is displayed in specialized Autism Spectrum Disorder learning situations and the way pupils are motivated in these. Special Educational Needs schools for children with severe behavior problems in the Netherland tend to create special classes for ASD pupils. There is hardly any information about the effect of separate classes for a diagnosed disorder like autism within specialized schools. To get insight in this, the first research question focuses on the way teachers interpret their own interpersonal teacher behavior compared with the way pupils perceive this. For both teacher and their pupils, interpersonal teacher behavior is measured by the Questionnaire on Teacher Interaction. The second question is about the displayed interpersonal teacher behavior and the way pupils are motivated. Therefore the pupils QTI is related with the pupils Motivation Strategies Learning Questionnaire. Questionnaires are taken after a mathematics lesson and the questions are related to this. The reason for mathematics is ASD students' preferred structured and clear character of these lessons. The participating Special Educational Needs schools are all situated in Limburg, a province in the South of the Netherlands. In this study pupils and teachers perceive the displayed interpersonal teacher behavior mainly equal. The displayed teacher behavior can be characterized as dominant. Next to this teacher behavior has also reasonable aspects of cooperative behavior. Dominant behavior has its effect on pupil motivation. It has moderate effect on the motivation variable anxiety which pupils sometimes perceive during mathematics lessons. On basis of the results more insight is gathered in the way interpersonal teacher behavior is displayed within specialized ASD environments. Next to this how pupils are motivated and its relation with interpersonal teacher behavior. This is a contribution to the ongoing development of interpersonal teacher behavior and motivation of ASD pupils in Special Educational Needs schools.

1. Introduction

In the Netherlands, education for children with special educational needs is traditionally based on the indicated problem(s) of the child. Therefore is a diagnostic research often the start for special needs for pupils. The Diagnostic and Statistical Manual of Mental Disorders 4th edition (henceforward 'DSM-IV'), is used as point of departure to enrol a child in a school for special educational needs (WEC Raad, 2006). This is followed by the creation of a learning environment which is adapted to the diagnosed disorder(s). Next to this, teachers' schooling in special educational needs is based on working in an environment adapted to the diagnosed disorder. Teachers learn to handle the typical aspects which go along with a diagnose. This also goes for teaching children with diagnosed Autism Spectrum Disorder (henceforward 'ASD'). ASD children with a severe behavior disorder are placed in, so called, ´cluster 4 education´. This is special education for children with behavior problems and/or disorders. One of the disorders seen in these schools is ASD.

The complex factor with ASD is that every single diagnosed person has an own typical pattern within the autism spectrum. For children with ASD this means that problems manifest in different ways, so every ASD pupil has a different disorder profile. Teachers in cluster 4 education have to deal with these profiles with mostly common guidelines like give structure and be clear. The diversity within the spectrum often combined with other disorders or problems make it difficult to work with this population. To get more insight in the typical character of ASD classes and its effect on ASD pupils research is necessary.

To respond the special needs of ASD pupils cluster 4 schools tend to create classes for ASD only. Teaching ASD children in this environment includes: working with special materials, using visual support, giving structure and decreasing stimulus factors (Berckelaar-Onnes, 2004; Preis, 2007). This to handle the difficulties ASD pupils have with changes and unexpected situations. Special Educational Needs courses for ASD also focuses on this and learn teachers to take care of a structured environment, give clear instructions and be predictable in behavior (Baltussen, Clijsen, Leenders, Hansen, & de Wilde, 2003; Saskatchewan Education Special Education Unit, 1998). A method like TEACCH (Treatment and Education of Autistic and related Communication Handicapped Children), developed in the early 70ies, is based on these principles. TEACCH is often used in an ASD learning environment to create predictability, routine, structure and consistency. In general, working in special ASD classes is arranged in this

way. However, since ASD is a disorder within a spectrum one can doubt whether it is wise to educate ASD children in a uniform approach? Especially when this approach is not based on individual pupil characteristics of social interaction and verbal communication, which are crucial factors for pupil learning in the classroom (Goh & Fraser, 2000). Since teacher and pupil behavior influence each other and such interpersonal relations are important for pupil achievement, (Wubbels, Brekelmans, & Hooymayers, 1991) how does this evolve in the special created cluster 4 ASD environment?

Teacher and ASD pupil interaction is an unreclaimed area of research. A reason for this might be the impairment, in this case communication and interaction, which can cause problems researching this subject. In spite of these problems research might give more insight in the possibilities of ASD children in learning situations. To conceptualize the classroom environment between teachers and ASD pupils, teacher behavior is analyzed from an interpersonal perspective. Next to this the way ASD pupils are motivated in relation with the perceived interpersonal teacher behavior. Teaching ASD pupils focuses on structure and being clear to respond the special needs which go along with autism. This is based on 60 years of autism research (Berckelaar-Onnes, 2004). Most of the research is focused on the impairment within the autistic spectrum resulting in detailed prescriptions of forms of autism. Research in specialized classes for ASD pupils mainly focuses on the earlier mentioned structure and clearness. There are no examples of studying teacher pupil interaction and its relation with motivation in specialized ASD-settings. To get more insight in ASD pupil's perception of interpersonal teacher behavior the Model for Interpersonal Teacher Behavior (MITB) is used. This model is based on the Leary research on interpersonal diagnosis of personality and developed by Wubbels, Créton & Hoogmayers (1985). With this model it's possible to describe teacher behavior on two dimensions; influence (dominance-submission) and proximity (opposition-cooperation) or eight scales (leadership, helpful/friendly, understanding, freedom/responsibility, uncertain, dissatisfied, admonishing, strict). The relation between interpersonal teacher behavior and the way ASD pupils are motivated in a specific environment has also no research history. Teachers' interpersonal relationships with pupils are potentially powerful factors influencing pupil motivation and performance (Wentzel & Wigfield, 1998). With this as starting point the research focuses on interpersonal teacher behavior and pupil motivation. This led to the adoption of the model for interpersonal teacher behavior (Wubbels, Creton & Hoogmayers) and the expectancy-value model of motivation (Pintrich, 1989).

Interpersonal Teacher Behavior is based on two elements; the communication systems approach and a model to describe the relation between teacher and pupil in terms of teacher behavior. The communication systems approach is the assumption that every behavior that someone displays in the presence of someone else is communication. This means that "one cannot not communicate when in the presence of someone else, whatever a person's intentions are, others will infer meaning from this behavior (Wubbels & Brekelmans, 2005, p.7)." For a disorder as autism this means that although social interaction and communication are problematic there is interaction. In this perspective the question arises: how do ASD pupils perceive the interpersonal interaction with their teacher? This leads to another question; which processes exist when a teacher displays certain behavior? To get insight in this area pupil motivation is also a subject of this study. It is the search for displayed interpersonal teacher behavior and the way pupils are motivated. The reason for motivation is that pupils often refer to the teacher to explain their level of motivation for a subject. Motivation is an important factor because of its influence on pupil achievement (Ruiz, 2006; Lapointe, 2005). It gives insight in processes that influence the academic performance or school dropout of pupils. Pupils often refer to their teachers when it comes to motivation or lack of motivation (Cocorada, Luca, & Pavalache-Ilie, 2009). From this point of view it is interesting to explore if there is an association between interpersonal teacher behavior and pupil motivation. Specially how this evolves in ASD learning environments. In this study: What is the result of displayed interpersonal teacher on motivation of ASD children? The challenge is to find new leads or evidence for the existing methods of educating pupils with ASD in spite of their communication and interaction problems.

The present study focuses on the context of mathematics lessons because this subject for most ASD pupils responds the, earlier mentioned, need for a structured and predictable environment (Vermeulen, Mertens, & Vanroy, 2010). The reason for this is that information and instruction during mathematic lessons can easily put in a format which is clear and emphasizes relevant study material with little trivialities (Saskatchewan Education, 1999). This is the educational setting for investigating teacher pupil interaction and motivation. This study addresses two questions one about interpersonal teacher behavior, and the other the way pupils are motivated in their environment related with the behavior of the teacher;

1. Do ASD pupils and their teachers perception on interpersonal teacher behavior differ and what behavior is perceived during the mathematic lesson?

2. What is the relationship between the perceived dimensions of interpersonal teacher behavior and motivation of ASD pupils during mathematics?

The fact that interpersonal teacher behavior and the relationship with motivation in ASD learning environments has not been studied before makes this study explorative in nature. In the following section in succession, Dutch education for children with ASD, interpersonal teacher behavior, and motivation are discussed.

2. Theoretical framework

2.1 Dutch Education for children with Autism Spectrum Disorder

Autism has a research history which goes back to the 1940ies of the 20th century. In that period Kanner and Asperger first published accounts of autism. They focused on one aspect of ASD namely the narrowing of relationships to people and their environment. They used the term autism to describe this behavior. Further research in the 1970ies made clear that autism is a triad of impairment (Wing & Potter, 2002). This led to the use of the term autism spectrum disorder and agreement about criteria for the diagnosis of ASD. Two very detailed and commonly used schemes to diagnose autism are 'The Diagnostic and Statistical Manual' (DSM) of the American Psychiatric Association and the 'International Classification of Diseases' (ICD) of the World Health Organization' (Baron-Cohen & Bolton, 2001; Frith, 2003). A diagnosis, based on these schemes, is about impairment in the areas of communication, social skills and behavioral flexibility. The impairment pattern differs with every individual with ASD. That is why autism is called a 'spectrum' of disorders with a variety of symptoms and degrees of disability involved (Berckelaar-Onnes 2004; Boutelle, 2008). The triad of impairment makes it possible to investigate and diagnose ASD. Overtime research led to the discovery of several forms of autism. Because there is no cure for ASD (Kraijer & De Bildt, 2007), treatment is focused on adequate interventions to improve the quality of life adapted to the typical form of ASD. Since the first accounts of autism a general approach developed to respond special needs of autistic people. This has also its effects in educational settings.

Even through the individual diversity there are several forms of autism within ASD. All these are based on the early mentioned triad of impairment of DSM-IV but have a different

profile. In DSM-IV (1994) and DSM-IV-TR (2000) the forms of ASD are all grouped together under ‘pervasive developmental disorders’. The distinctive forms are; Autistic Disorder, Rett’s Disorder, Childhood Disintegration Disorder, Asperger Disorder, Pervasive Developmental Disorder Not Otherwise Specified (henceforward PDD-NOS) (American Psychiatric Association, 1994, 2000). Rett’s Disorder and Childhood Disintegration Disorder are a small part of the spectrum and are seldom seen. The other three forms are often mentioned as autism without using the distinctive criteria. The main reason for this is that aspects of autism (typical speech, fascination for certain subject or objects, interaction difficulties) can be seen at autistic disorder, Asperger disorder and PDD-NOS. But next to similarities there are also clear differences. The first to mention is autistic disorder. Typical for this form of ASD is that 75% of these diagnosed autistic people have low IQ and other mental problems (Berckelaar-Onnes 2004; Boutelle, M. 2008; Kraijer & de Bildt, 2007). This goes along with at least six features of the spectrum. Second is Asperger disorder which was first described by Asperger in 1944. Within this form, autistic people have well developed speech and have no problems with communication. They often speak very formal and tedious, their intelligence is average or high and they mostly go to regular schools (Simpson, 2003; Vermeulen 2005; Vermeulen & Fontelli, 2008). The third form is Pervasive Developmental Disorder Not Otherwise Specified (PDD-NOS). This diagnosis is given when an individual demonstrates impairments in communication, social skills and behavioral flexibility. The diagnose PDD-NOS is used when the autistic criteria don’t match with the other forms of the spectrum (DSM-IV; DSM-IV RV-TR; Vermeulen & Fontellli). Typical of PDD-NOS is that minimal 3 aspects of the spectrum lead to the diagnosis PDD-NOS. This doesn’t mean that problems for the person and the environment are less in relation to other forms. PDD-NOS is about describe threshold PDD problems which do not match with other categories (Minderaa, 2007). Therefore PDD-NOS is sometimes mentioned as the rest group. The population of this study is about these three groups of autism; autistic disorder, Asperger and PDD-NOS. Although it’s diversity in educational settings these three features of autism are mostly respond by an universal approach to respond the special needs of the individual with ASD.

The area of special educational needs is growing over years although several initiatives from the department of education to reduce this. Since the beginning of the 1990’s the policy of the Dutch Government is integration of pupils with special educational needs in regular schools. This started with ‘Weer Samen Naar School’. The aim of this intervention was to make the regular teacher more competent to support pupils with special needs. In 2003 this was followed

by ‘Leerling Gebonden Financiering’. Since then pupils with a diagnosed disorder receive a budget to support their special needs. This can be used to go to a school for special educational needs or get extra support in regular schools (www.Rijksoverheid.nl). This intervention is part of the process to confine the expansion of special educational needs schools (Franke, 2008). Next to this the aim of this intervention was to develop regular schools to respond the call for special needs of individual pupils. The newest initiative is ‘Passend Onderwijs’ which goes on in august 2013. ‘Passend Onderwijs’ means that each child should get education which fits the best with its talents and limits (www.Rijksoverheid.nl). Next to this the 110.000 pupils in specials schools should reduce to 70.000 pupils over time. Remarkable is that despite all interventions cluster 4 schools still expand. A major reason for this is the still growing group of ASD pupils.

In the Netherlands various educational settings provide special needs adapted to ASD pupils. The choice for a specific setting is based on the form of autism and how this influences the behavior displayed. Pupils with autistic disorder, especially the 75% with other disorders and/or handicaps, mostly go to Mytyl or Tytyl schools (www.wec-raad.nl). Mytyl schools are for pupils with physical handicaps and Tytyl schools for mental handicaps. These schools called cluster 3 and are equipped to respond the special needs which come along with the mental and/or physical disabilities involved. ASD pupils with less severe disabilities go to regular schools or cluster 4 schools. Most of these pupils are diagnosed Asperger and PDD-NOS. Regular education is an option for ASD pupils with little problems in adaption to the environment and little behavior problems. For these pupils and their teachers it is possible to get extra help from specialists to adapt teaching and the environment (Schuman, 2007). When it is hard for pupils to cope with the structure of the regular education with as result behavior problems than cluster 4 education is suitable. Especially when structure, clarity and predictability are needed to regulate behavior (Drost & Bijstra, 2008; Stoutjesdijk & Scholte, 2009). Regardless of the Dutch government policy to force back transition of pupils to special educational need schools, cluster 4 is still growing. One of the causes is the transition of ASD pupils from regular schools to special educational need schools (Dijkxhoorn, 2007). The reason for this is that regular school can’t respond the special needs of these pupils. Within cluster 4 schools there is a tendency to react on the growing group ASD pupils by the creation of special classes for ASD pupils.

Traditionally cluster 4 education was for children who were hard to handle in regular schools. About 100 years ago the first schools for street children were founded (Roozendaal, 1995). The population of these schools consisted neglected children and/or children with behavior problems. These children are still seen in cluster 4 schools but there is also room for

children with diagnosed disorders like ASD. Despite of the knowledge of the individual differences of ASD, a common approach has emerged over the last decades. This can be characterized by a lot of structure, clarity and predictability (De Bruin, 2009; Vermeulen, 2005). Early mentioned TEACCH is an example of a method that brings this in practice. The foundation of this approach is arranged in the second half of the 20th century around the DSM criteria and focuses on cognitive theories that might explain ASD. These theories are: 'Theory of Mind', 'Executive Functioning Theory' and 'Central Coherence Theory' (Berckelaar-Onnes, 2004). Theory of Mind is the ability to attribute mental states to oneself and others. Executive Functioning Theory refers to cognitive skills such as planning, strategy use, cognitive flexibility, working memory and inhibitory control. Finally, Central Coherence Theory is the limited ability to understand context or to 'see the big picture'. In cluster 4 schools, this knowledge leads to classes set up especially for ASD. The common assumption is that an equipped learning environment leads to maximum results for ASD children (Vermeulen). Teachers working with ASD children behave in line with DSM-IV criteria and the cognitive theories related to autism. Communication and socialization are the DSM-IV areas on which cluster 4 teachers focus their behavior (Scholte, 2007). Interventions on these areas, like structuring by the use of pictogram's and schemes, positively affect the third area of impairment, central coherence (Preis, 2007). All in all these interventions in general lead to a strict and predictable approach with treatment of the disorder in the centre (Berckelaar-Onnes; Vermeulen). This knowledge in relation with the growing group of diagnosed ASD pupils led to the creation of special classes for autism only. Although these classes respond the special needs of ASD and commonly used in Dutch cluster 4 schools, this approach is hardly based on empirical evidence (Preis). The question arises what the effect is of these special ASD classes on pupils and their teachers. How do recommendations evolve in practice?

Next to this another question arises. In special education a change of focus developed over time. Usually the diagnosed problem was the direction point for teachers. Now there is a tendency to take a close look at the child the disorder and his or her environment. This is an ecological view on special needs of a child (Van der Wolf & Van Beukering, 2009). The interaction between actors and environment in the system round a child provides important information to respond problems because of their disorder. All this information is used to connect special needs of the child with the approach of the teacher and adaption of the environment (Van Beukering, Meijer & Pameijer, 2001). The result of this is that next to the pupil also its environment is an important source of information. This means that school is also part of

the system. Similar to the traditional ASD approach, the more ecological approach in cluster 4 schools has little scientific background. Both approaches have in common the adapted teacher pupil interaction to respond the special ASD needs. This is essential to support ASD pupils in their development (Vermeulen, Mertens, & Vanroy, 2010). Therefore this is seen as point of departure in this study. Despite of problems for all people with ASD regardless of the intelligence (Noens, 2007) research in ASD classroom environment with interaction in the centre is vital to get new leads for the future. This to get insight in the special character between ASD pupils and teachers in an adapted environment and the effect of these.

3. Interpersonal Teacher Behavior; the effect on the other involved

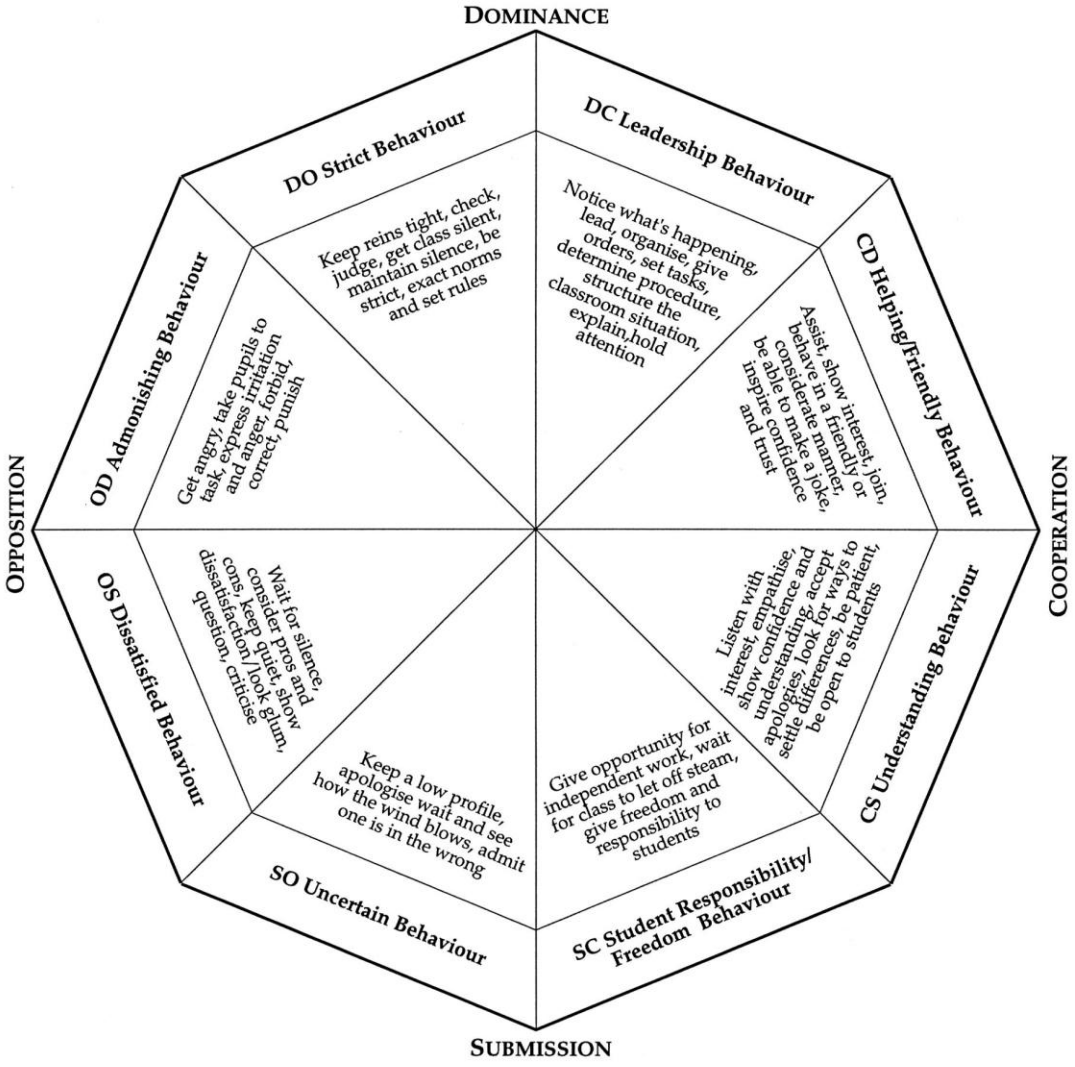
Traditionally cluster 4 education is an environment in which discipline, conflicts and stress dominate the atmosphere in the class. The method to handle classroom problems is mainly based on practical experience with little scientific evidence. Cluster 4 teachers focus on the relation with the pupils. Appropriate teacher-pupil relationships are important to pupils as well as their teachers. A teacher is, knowingly or unknowingly, a forming factor for pupils. The relation between teacher and pupil is an important asset in this process of forming . Specially for pupils who often had bad expierences in relations (Van der Wolf & van Beukering, 2009). Investigating interpersonal teacher behavior concerns the relation between teacher and pupils. Research in this area led to insight on pupil learning, instructions strategies, preventing discipline problems, teacher stress, teacher burn out, and fostering teachers' professional development (Fraser & Walberg, 2005; Goh & Fraser, 2000; Kagan & Tippins, 1991; Wei, den Brok, & Zhou, 2009; Wubbels & Brekelmans, 2006; Wubbels, & Levy 1993; Wubbels, Brekelmans, & Hooymayers,1991). The aim of investigating Interpersonal teacher behavior in cluster 4 education is to contribute by raising questions about teaching children with special educational needs, more specific special classes for ASD pupils.

Interpersonal teacher behavior focuses on two elements; the communicative systems approach and a model to describe teacher-pupil relationships in terms of teacher behavior (Den Brok, Brekelmans, & Wubbels, 2006). The communicative systems approach deals with the effects on others involved in communication. The basic assumption is that any behavior in the vicinity of another is communication (Watzlawick, Beavin, & Jackson, 2001). Therefore it is not possible to not communicate with each other when people come into contact. The teacher-pupil relationship is described by the model for interpersonal teacher behavior (Wubbels & Levy,

1993). This model is based on research of Leary (1957) to ‘interpersonal diagnosis of personality’. Leary has focused on describing the interaction between people by the use of two axes; proximity and influence. The origin for use in education lies in research into ‘Disorderly Situations in the classroom’ of Wubbels, Créton, and Hooymayers (1985). They concluded that certain characteristics of the teacher relate to the peace and atmosphere in the classroom. Further research has shown that it is also possible to detect teacher characteristics which break the vicious circle of disorder and improve the atmosphere in the lesson. These characteristics are all based on communication on two axes; the influence axe with domination and submission, the proximity axe with cooperation and oppositions.

The axes are the base for describing eight sectors on interpersonal teacher behavior. The influence axe represents the degree of dominance and submission displayed by the teacher, while the proximity axe describes the level of cooperation and opposition between teacher and pupils (Levy, Wubbels, & Brekelmans, 2003). The two axes are the fundament for the eight behavior sectors placed in a circle. Each part has its own characteristics.

Table 1 Model for Interpersonal Teacher Behavior, Wubbels & Brekelmans (2005, p.31)



It is possible to investigate communication in the classroom with these axes, because all human communication can be graphed in this model (Wubbels & Levy, 1993). Interpersonal teacher interaction can be described in two ways. First, it is possible to make an interface between the ends of the axes in sectors. There are two sectors within dominance and cooperation. The sector closest to dominance starts with dominance followed by cooperation (Dominance Cooperation, DC). Logically the other sector starts with cooperation followed by dominance. (Cooperation Dominance, CD). In this way, there is a distinction in eight different sectors. These eight sectors are connected with types of behavior; Leadership, Helpful / Friendly, Understanding, Pupil Responsibility / Freedom, Uncertain, Dissatisfied, Admonishing and Strict. These types of behavior are an indication of the behavior someone displays in a certain situation.

Table 2 Sectors, Behavior types and Examples of Interpersonal Teacher Behavior.

Sector	Behavior types	Example
DC Dominance/ Cooperation	Leadership	He/ she is a good leader
CD Cooperation/ Dominance	Helpful/ Friendly	He/ she is someone we can count on
CS Cooperation/ Submission	Understanding	If we want to say something he/she will listen to us
SC Submission/ Cooperation	Pupil Responsibility/ Freedom	He/ she gives us lots of free time in the classroom
SO Submission/ Opposition	Uncertain	He/ she is uncertain
OS Opposition/ Submission	Dissatisfied	He/ she looks dissatisfied
OD Opposition/ Dominance	Admonishing	He/ she gets angry
DO Dominance/ Opposition	Strict	He/ she is strict

Secondly the axes can be used without dividing behavior in sectors. The characterisation of interpersonal teacher behavior is done by the two axes. Teacher behavior can be described as dominant (influence axe), submissive (influence axe), cooperative (proximity axe) or opposition (proximity axe). In sum the model for Interpersonal Teacher Behavior can explain teacher pupil relationship in several ways.

In education, this leads to study teacher-pupil relationship by pupils' perception of the behavior of their teacher's behavior in a specific situation (Wubbels & Brekelmans, 2006). To make this possible Wubbels developed ´Questionnaire on Teacher Interaction´ (QTI). The aim of using QTI is to create more understanding of classroom environment factors that influence pupil outcomes. Research in this area has a broad spectrum. Studies in several countries at elementary, secondary, and higher education levels indicate a strong and positive relation between perceptions of Influence and Proximity of their related subscales and cognitive and affective pupils' results (Wubbels & Brekelmans, 2005). Investigating the connection between the teacher-pupil relationships and affective outcomes display a much more consistent pattern than studies investigating the relationship with cognitive outcomes (Goh & Fraser, 2000). Overall, effects on the Proximity axe are a bit stronger than effects on the Influence axe. In research between the perception of teachers and pupils, teachers reported higher ratings of their own leading, helpful/ friendly and understanding behavior than did their pupils (Wubbels & Brekelmans). Whereas they reported lower perceptions of their own uncertain, dissatisfied and admonishing behavior on their pupils. Instead of using more broad terms dominance/submission which are related to the influence axe and opposition/cooperation which are related to proximity axe. The choice of using the QTI in a particular way depends, next to the research question, on the gathered data.

For ASD pupils a teacher with clear and predictable behavior responds the specials needs which go along with the diagnosed disorder. When this behavior is explained with the ends of the two axes of 'the model of interpersonal teacher behavior' a teacher should be dominant and cooperative. Dominant behavior (strict subscale with leading subscale) to respond the need for structure and clearness. Cooperative behavior (helpful/friendly subscale with understanding subscale) to respond the special needs of the pupils. In this way a teacher creates an adapted environment and attitude. A teacher should not show submissive behavior (Responsibility/Freedom subscale with uncertain subscale) because this leads for ASD pupils to unpredictable behavior and situations. It is difficult for ASD pupils to interpret emotions which goes along with submissive behavior. This is also for teacher behavior which can be related to the opposition dimension (dissatisfied subscale with admonishing subscale). The behavior which goes along with this is for ASD pupils hard to interpret.

In sum from the two axes point of view; teachers in cluster 4 ASD environments should show dominant and cooperative behavior which can be characterized as strict, leading,

helpful/friendly, understanding behavior. This behavior is in line with predictability and clearness which is important for ASD pupils.

The expectancy-value model of motivation

Motivation is a commonly investigated subject in different areas. It has a prominent role in education when it comes to achievement (Martin, 2007; Meece, Wigfield, & Eccles, 1990; Pintrich, 2000). Traditionally motivation in educational settings is a static feature; a person is motivated or not motivated. Motivation research has developed over years and now has a wide range of applications. It is multifaceted phenomenon with several components resulting in many different features of motivation as a subject for research. Motivation research has progressed to the point where there are clear and distinct constructs that have differential relations with one another. By example; motivation in educational settings is often seen as a result of changing pupils beliefs about themselves and their performance (Lehman, Kauffman, White, Horn, & Bruning, 2001). Self-efficacy and attribution theories are substantial for this feature of motivation. In their study, Bernaus and Gardner (2008) explain that motivation can be based on Deci and Ryan's self-determination theory and the social context model of Clément. In this study motivation is described from the expectancy –value model of motivation (Pintrich, 1989). The way this model is build is subject of discussion in this part of the study.

The expectancy component of motivation

The expectancy component is a combination of self-efficacy and attribution theories (Lehmann, et al., 2001). Self-efficacy is about the perception of one's own competence. It is related to attribution theories because it is about control of learning beliefs (Duncan & McKeachie, 2005). Both self-efficacy and attribution have to do with own perception of capacities to perform for a specific task. This is based on character combined with early experience, which is influenced by interaction (by example pupil teacher interaction).

Self-efficacy depends on past performance, verbal persuasion, and the emotional state of a person (Wentzel & Wigfield 1998; Van der Wolf & Van Beukering 2009). Self-efficacy is related to attribution theory and based on the experience that good results leads to belief that learning can be controlled. According to attribution theory there are three factors that an

individual personally can influence: locus of control, stability, and controllability (Duncan & McKeachie 2005). Locus of control is when a good result of an individual is related to the amount of effort that the pupil exerted on the task; b.e. If I try hard and behave like I should, then I must be able to learn. Stability is about good results over a longer period with as result confidence that it is possible to get a good result for the next task for this subject. Controllability has to do with the idea that one has influence on the process and the therefore the result. Pupils with high self-efficacy and/or adaptive attributions display increased effort, resilience and persistence on educational tasks in classrooms (Bandura, 1997; Pajares, 1996). According to this view it seemed likely that enhancing messages from teachers to pupils with efficacy and attributions-to-effort would increase motivation and engagement of pupils (Duncan & McKeachie, 2005). Therefore is expectancy, affected by the teacher pupil interaction, an important part of motivation.

The expectancy component of motivation and ASD

For ASD pupils the expectancy component of motivation depends on the difficulties related to the diagnosed disorder. Difficulties because of impairment in communication, impairment in social interaction and unusual situation with the result an unpredictable environment. To respond this, ASD learning settings are based on control and planning resulting in a predictable environment for pupils (Vermeulen, Mertens, & Vanroy, 2010). When it comes to self-efficacy, the first part of the expectancy component of motivation, this is an important factor. Self-efficacy is about the perception of own competence. For ASD pupils the prepared environment has positive effect on competence feelings because it creates emotional stability. Routines and structure provide clearness in a for autistic people chaotic world (De Bruin, 2009). This makes a stable performance over time possible and with this positive beliefs about own competences, and after a while a realistic judgement on performance. It is to question of this process develops at ASD pupils because of their difficulties with transfer experience from one situation to another.

Attribution, the other part of the expectancy component of motivation is about locus of control, controllability and stability. From an ASD point of view the last two aspects stability and controllability can be linked to a predictable learning environment (Berckelaar-Onnes, 2004). The predictable environment supposes to create stability for ASD because hardly anything changes over time. Procedures and rules stay the way they are because of the problems with

changes. Therefore is it also to question if locus of control has the positive impact on motivating ASD pupils. This because of their problems with transitions between activities and the lack of seeing cause and effect (Saskatchewan Education, 1999). Therefore it is not to say that ASD pupils match their effort with result when it comes to locus of control. Overall it is to predict that the expectancy component of motivation has for ASD pupils its restrictions.

The value component of motivation

The value component of motivation is about the importance of a learning task for a pupil. It has to do with how important, interesting, or useful a given task or activity is to the individual (Wigfield, Eccles, Roeser, & Schiefele, 2008). It has three components; intrinsic goal orientation, extrinsic goal orientation and task value ((Pintrich & De Groot, 1990; Pintrich, Anderman, & Klobucar, 1994; Wolters & Pintrich, 1998). These are an essential part when it comes to engagement in learning and classroom practice.

Intrinsic goal orientation is related to learning, more specific when a person wants to learn. Intrinsic goal orientation has been defined in terms of interest for a particular subject of activity, attitude, importance and enjoyment (Wigfield, et al., 2008). From a psychological point of view intrinsic goal orientation is related with the free choice for a specific task or subject. A teacher has a dominant role in the creation of this kind of freedom in classroom settings. Pupils, who are intrinsically motivated have positive achievement characteristics like the use of deeper cognitive strategies, relate new knowledge to early gathered knowledge and persistent when facing challenging tasks (Cauley & Mc Millan, 2010).

Extrinsic goal orientation is related to learning when a person must learn because of an external factor; b.e. a good mark at mathematics is very important for me. Extrinsic goal orientation is about seeking external rewards and avoiding punishments with a focus on grades and approval from others (Duncan & McKeachie, 2005; Myers, 1999; Van der Wolf & Beukering, 2009). Pupils who are extrinsic motivated show great concern with how their abilities judged by others, by example their teacher (Cauley & McMillan, 2010). Extrinsic motivation can develop when teachers compare pupils with each other or when grades and praise are involved. Praise has a more stable effect over time collate to grades and comparing pupils (Deci, Koestner & Ryan, 2001; Deci & Ryan, 2002). Extrinsic goal orientation frequently brought in relation with intrinsic goal orientation. Mainly that extrinsic rewards in educational settings can be viewed as

coercing or bribing pupils to learn (Ruiz, 2006). This undermines and decreases the development of intrinsic motivation and is not stable over time (Deci & Ryan; Ryan & Deci, 2000). The use of extrinsic motivation can have effect for pupils to learn concepts. Therefore, Ruiz (2006) suggests that a teacher should use a combination of intrinsic and extrinsic motivational factors that fits best for individual pupils. Bearing in mind that extrinsic motivation activities which negatively influence the emotional state of pupil should be used frugal.

Task value has to do with the value one gives to a specific task. Therefore it is usually conceptualized as characteristics of the individual (Wigfield, et al., 2008). Characteristics can depend on preference for a certain subject or task; b.e. It is important for me to learn mathematics in this class. In sum the value component has to do with the reasons pupils engage in a task and differ depending on the person and situation. Task value is important because it leads to more involvement in learning (Wolters & Pintrich, 1998). It has to do with attainment value, interest value and utility value. Attainment value is about the importance of the activity to the individual. Interest value has to do with how much an individual is interested in the activity. It has similarities with intrinsic motivation, because the personal drive for achievement. Utility value, on the other hand, is related with extrinsic motivation and is the perceived usefulness of an activity (Wentzel & Wigfield, 1998; Wigfield, et al.). The result of positively influencing task value components is increase opportunities for pupil learning and classroom interventions .

The value component of motivation and ASD

The value component of motivation described from an ASD point of view has several implications. Again this heavily depends on the prepared classroom environment and tuned approach of teachers. The first value component aspect, intrinsic motivation, of ASD pupils mainly depends on the adaptation of the environment (Preis, 2007) and the fascination for a specific subject (Vermeulen, Mertens, & Vanroy, 2010). The availability of preferred materials combined with structure and clearness provides ASD pupils more opportunity to engage in learning situations. The learning environment is prepared to function despite a certain impairment and this positively affects intrinsic goal orientation.

It is hard to say if the second value component, extrinsic goal orientation, affects ASD pupils. Basically they don’t seek for rewards or avoid punishment which is important within

extrinsic goal orientation. Their lack of desire for contact with other people heavily influences this (Berckelaar-Onnes, 2004; Vermeulen, Mertens & Vanroy, 2010). Mostly ASD pupils don't get the feelings which go along with a compliment or correction. Impairment in interaction is an obstacle for this. Therefore it is expected that ASD pupils don't give much about extrinsic stimulations which influence feelings.

The third value component, task value is more complicated when it comes to its relation with ASD. Task value depends on the reasons to engage in a task and is divided in attainment, interest and utility. Attainment has to do with the importance of a task for an individual person. By example mathematics is important for me. Interest has to do with how interesting a task is. Both, attainment and interest, are positively influenced when an ASD pupil is fascinated by the subject but this can differ very much between individuals. It is to question if utility value has its effect on ASD pupils. Utility is the perceived usefulness of an activity (Wentzel & Wigfield, 1998; Wigfield, Eccles, Roeser & Schiefele, 2008). Autistic people have difficulties seeing relations between actions and results. The connection between how useful it is to do an action because of the expected result is not necessary made by ASD pupils. When it comes to task value for ASD pupils a teacher should focus on attainment and interest by the use of a certain fascination. By example when a pupil is fascinated by planes, make learning examples with planes. It is difficult to make constructive use of utility because of the impairment to relate early achieved results to new situations. The result of positively influencing task value components like attainment and interest is increasing opportunities for pupil learning and classroom interventions (Vermeulen, Mertens & Vanroy, 2010).

The anxiety component of motivation

Anxiety is the third component of pupil motivation. It depends on personal characteristics and the emotional state of a person. Therefore this can differ for subjects but also for situations. Anxiety or test anxiety is about pupils' worry and concern over tasks, exams, or tests (Duncan & McKeachie, 2005). It's about belief in failure or succeeding a specific task. Anxiety can be divided in worry and emotion. Negative thoughts or worry and emotions which lead to anxiety heavily influence pupils functioning (Ruiz, 2006). When anxiety plays a role it's an obstruction for the engagement of pupils in learning activities (Martin, 2008). Next to this it also negatively influences intrinsic motivation. Therefore is anxiety an important factor when it comes to motivate pupils.

The anxiety component of motivation and ASD

Because of the impairment of ASD pupils and unexpected situations in education anxiety is commonly seen in learning situations. Anxiety exists when a learning setting is unpredictable (Saskatchewan Education, 1999). For ASD pupils this can already exist when materials don't fit to their special needs. By example when a task has open questions it takes appeal on a person's creativity and own interpretation which is difficult for ASD pupils. It is hard for them to make their own structure out of for them unstructured situations. This often causes panic and anxiety. The early mentioned clearness, structure and adapted teacher behavior reduce the anxiety of pupils in learning situations. When this is arranged it causes reduction of worry feelings and growing emotional wellbeing of ASD pupils (Berckelaar-Onnes, 2004). Autistic people who get what they expect in their learning environment have less anxiety and are emotional stable. This is a main reason for ASD pupils and their parents to involve special education. The expectation is that ASD pupils have relatively low anxiety in specialized ASD classes.

On the basis of the literature review it appears that anxiety, value and expectancy as components of motivation all have their own contribution in motivating ASD pupils. In this study the learning environment is tailored to the special needs of autism. This should have positive result on wellbeing and functioning on ASD pupils in the class. Therefore it is to expect that pupils show high expectancy and value combined with low anxiety during mathematics. In brief special educational needs schools for autistic pupils give a base for a certain amount of motivation.

As stated, the aim of this study is to explore which interpersonal teacher behavior is displayed in ASD learning environments and how pupils are motivated in these. Theoretically, interpersonal teacher behavior is build on two axes; one axe about influence (dominance – submission), and the other axe which has to do with proximity (cooperation – opposition) (den Brok, Fisher, Wubbels, Brekelmans, & Rickards, 2005). Motivation is seen as the result of expectancy, value and anxiety. Research questions are:

1. Do ASD pupils and their teachers perception on interpersonal teacher behavior differ and what behavior is perceived during the mathematic lesson?

2. What is the relationship between the perceived dimensions of interpersonal teacher behavior and motivation of ASD pupils during mathematics?

To answer these questions the questionnaires, QTI and MSLQ, are used. In the next section these instruments, data collection and data analysis are explained further on.

Method

This study can be characterized as theory based explorative research. The boundaries of this study led to the adoption of the QTI and the MSLQ to investigate interpersonal teacher behavior and motivation. The data gathered from these questionnaires are quantitative in their nature. The QTI was taken from pupils and their teachers, the MSLQ from pupils only. First the pilot group preserved data, after this the actual study group. The data is collected to get input for examining ASD pupils and teachers in their specialized setting.

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Data collection

The gathered data of this study involved pupils and teachers from, the earlier mentioned, specialized ASD classes in cluster 4 schools. The data collection took place in September (the pilot group) and November/ December 2009 (the actual study). Three different cluster 4 schools were involved and the provided data came from 14 classes. All classes are specialized for ASD diagnosed pupils. Two of these classes are placed in the pilot group, the other 12 classes in the actual study. In the pilot group this results in 23 completed QTI questionnaires (2 teachers and 21 pupils) and 21 completed MSLQ questionnaires (pupils only). After checking on outliers the 12 classes delivered 120 completed QTI questionnaires (12 teachers and 108 pupils) and 108 MSLQ questionnaires (pupil only).

A pilot study was carried out with two classes in one school to gather information about the instruments and the procedure. The instruments were checked on their reliability, the procedure was tested on clearness of the task for the pupils and if they could fill in both questionnaires. Because pupils had to fill in both questionnaires the decision was made to choose for the QTI with 32 items instead of 48 items.

The pupils had to fill in two questionnaires after a mathematic lesson and they had to respond on that lesson. The total time taken by the pupils to respond the questionnaires was 30 minutes for the fastest pupil and 50 minutes for the last pupil. Although the pilot QTI showed difficulties with reliability, which is explained further on, the questionnaire was not replaced for a version with more items. This to avoid extra time for the pupils to complete the questionnaires. The pilot group did not show major problems with filling in the questionnaires. A few pupils had questions about a specific item. These questions did not show a pattern and there was no reason to change questions. Most arising questions were about the differences between QTI and MSLQ scales (QTI four-point Likert response scale and MSLQ seven-point Likert scale). Therefore the procedure to introduce the two questionnaires changed after the pilot and in two separate instructions for the QTI and the MSLQ. In this way it is possible to focus the pupils on a new questionnaire and explain that MSLQ items have a different scale compared to the QTI. With this interference the actual study took place. The pupils' QTI and MSLQ are used for investigating interpersonal teacher behavior and the association with motivation. The displayed interpersonal teacher behavior is studied by comparing the pupils QTI with their teachers QTI. The first questionnaire to fill in was the QTI. When all QTI questionnaires were completed the MSLQ introduction was given to the pupils. After this the pupils answered the MSLQ. When this was finished the last part of the data gathering was responding questions from pupils and their teachers.

Participants

The pupils (n=21, mean age=11,4), teachers (n=2 mean age=44) of the pilot group and pupils (n=108, mean age=10,9), and teachers (n=12, mean age=33,6) of the actual study are from so called 'cluster 4 schools', schools for special educational needs. These schools are situated in Limburg, a province in the South of the Netherlands. As well the pupils as the teachers in this study participate in specialized classes for diagnosed ASD. All the pupils are diagnosed with ASD and their age was ranged from 9 to 13 years. They were all placed in sixth, seventh or eighth grade. In common most autistic people are male, one of nine people with ASD is female (Vermeulen, Mertens, & Vanroy, 2010). In this study male pupils are also dominant compared to female pupils, almost 90% of the pupils involved are male. This proportion is different for the teachers. The teachers of the two classes in the pilot group are both female, ten of the teachers in the actual study are female and two are male.

Questionnaire on Teacher Interaction (QTI)

The data collection about the perception of pupils and teacher on teachers' interpersonal behavior were gathered by means of the QTI. This questionnaire with an interpersonal perspective on teaching was developed by Wubbels, Creton, and Hooymayers (1985). On the work of Leary (1957) they created a model to describe interpersonal relations in educational settings; the Model for Interpersonal Teacher Behavior (MITB). Based on MITB the QTI is created to map students' and teacher' perceptions on interpersonal teacher behavior. The original Dutch version consists 77 items answered on a five-point Likert scale. The QTI has shown over years high validity and reliability in various countries; e.g. Australia (Rickards, Den Brok, & Fisher, 2005); Canada (Lapointe & Legault, 1999); Korea (Lee, Fraser & Fisher, 2003), Turkey (Telli, den Brok, & Cakiroglu, 2007) Belgium (Van Petegem, Aelterman, Rosseel, & Creemers, 2006; Van Petegem, Aelterman, Van Keer & Rosseel, 2008); The Netherlands (Den Brok, Brekelmans, & Wubbels; 2006), USA (Fraser & Walberg, 2005). The instrument is translated in several languages; English, French, German, Hebrew, Russian, Slovenian, Swedish, Norwegian, Swedish, Finnish, Spanish, Mandarin Chinese, Singapore Chinese, Indonesian and Turkish (Wubbels & Brekelmans, 2006). For this study the validated French version (Lapointe & Legault, 1999) of the QTI (translated into Dutch) is distributed among pupils and their teachers. This version contains 32 items and eight for each of the four dimensions. All questions are answered on a four-point Likert scale (never, sometimes, often, always).

To describe the perception of pupils and their teachers about interpersonal teacher behavior it is possible to use the model for interpersonal teacher behavior is several ways. First it is possible to use the two axes to describe the displayed behavior. One axe is about influence with two dimensions dominance and submission; to what degree is the teacher in control in the pupil-teacher relationship. The other axe has to do with proximity with two dimensions cooperation and opposition); the degree of cooperation between pupil and teacher (Den Brok, et al., 2005). Next to the axes it is possible to use the eight subscales to describe the perceived interpersonal teacher behavior. In this study axes with the dimensions are chosen above the subscales. The reason for this lies in the fact that each class is investigated individually and groups are small and it is hard to get reliable subscale scores.

The dimensions of the pilot are obtained with the following Cronbach's alpha coefficients scores; dominance .72, cooperation .72, submission .72, opposition .68,. The reliabilities

(Cronbach's alpha's) for the pilot range between .68 and .72. To get these alpha coefficients it was necessary to remove several questions:

- Dominance dimension; question 8, 16, 24 are removed
- Cooperation dimension; no questions are removed
- Submission dimension; question 20, 21 are removed
- Opposition dimension: question 31 is removed

Because of the explorative character of this study and the satisfactory reliability of the four dimensions the actual study is done with the adapted questionnaire resulting in following reliabilities; dominance .57, cooperation .75, submission .54, opposition .78. The reliabilities of the actual study range between .54 and .78. The diagnosed disorder of ASD pupils might be a reason for the low reliability scores before removing a few questions. In the 'Conclusion and Discussion' section this is subject for discussion further on. The perceived interpersonal teacher behavior of the pupils on the four dimensions are also subject of the second question in this research; the displayed interpersonal teacher behavior and the possible relation with pupil motivation. Therefore the next section is about the MSLQ.

The Motivated Strategies for Learning Questionnaire (MSLQ)

To gather information about the second subject in this study, pupil motivation, the MSLQ (Pintrich & De Groot, 1990) is used. This instrument is based on the expectancy-value model of motivation which is described before. The MSLQ has next to motivation (31 items on three motivation components) also a self-regulated learning strategies part (50 items related to cognitive strategy use and self-regulation). The complete version (motivation and self-regulated learning strategies) of the MSLQ includes 81 items, all scored on a seven-point Likert-type scale (1 not at all true of me, 7 very true of me) (Duncan & McKeachie, 2005). Because this study focuses on motivation only, self-regulated learning strategies categories of the MSLQ are not involved. The motivation part of the questionnaire contains items related to pupils' motivational beliefs on three components; expectancy, value, and, anxiety. The expectancy component (two subscales; control of learning beliefs, 4 items and self efficacy for learning and performance, 8 items) refers to the pupils belief about the ability to perform on a task. The value component (three subscales; intrinsic goal orientation, 4 items, extrinsic goal orientation, 4 items, and task value, 6 items) has to do with the pupils interest and importance given to a task. It is about

reasons of engagement in a task (Duncan & McKeachie, 2005). Anxiety is about the emotional reaction of a pupil to a given task (5 items and no underlying subscales) (Pintrich, 1989). The three components together make the construct of motivation.

The MSLQ is build on the assumption that cognitive strategies which are important for learning achievement go along with motivation which implies high expectancy, high value and low test anxiety (Wentzel & Wigfield, 1998; Lapointe Legault & Batiste, 2005). The MSLQ is used in many situations to study motivation in educational settings. By example Lapointe, Legault et al. used the MSLQ for comparing learning disabled, average and talented students motivation. Andreou and Metallidou (2004) and Andreou (2004) investigated the relation between academic self-efficacy and bullying among elementary school students with the MSLQ. Chung, Chang, Liang, Shih, Lin & Chen (2010) conducted the MSLQ to investigate if the use of a Lego robot task enhance sixth graders student motivation to learn whether there is help. Next to many different learning settings the MSLQ is used for both individual and group motivating strategies (Dolezal, Welsh, Pressley, & Vincent, 2003).

The described ASD population in relation with the MSLQ was not a subject of study before, although the MSLQ was used for investigating motivation of learning disabled pupils is several situations. By example Pintrich, Anderman, and Klobucar (1994) examined cognitive and motivational variables of pupils with learning disabilities (n= 19) and pupils without learning disabilities (n= 20). The pupils with learning disabilities displayed lower levels of metacognitive knowledge and reading comprehension. There was no difference on self-efficacy, intrinsic orientation, or anxiety. The earlier mentioned study of Lapointe et al. (2005) used the MSLQ for comparing motivation between learning disabled pupils (n=111), average pupils (n=224) and talented students (n=258) during mathematics. There were no significant results on the three components for the learning disabled group pupils. Whitaker, Sena, Lowe, and Lee (2007) studied the relationship between students with and without learning disabilities and different aspects of test anxiety. The actual study was on a sample of 774 elementary and secondary pupils. 195 pupils with learning disabilities and 579 students with no learning disabilities. They used the anxiety component of the MSLQ for their Test Anxiety Inventory for Children and Adolescents (TIACA). The result of this study was that learning disabled pupils predicted higher cognitive obstruction/inattention and worry scores and lower performance enhancement/facilitation anxiety and lie scores. They also discussed the implications for personnel who work with learning disabled pupils. All these studies had something to do with pupils who ask for special attention in the educational setting but had no specific relation with

ASD. For a relation between ASD and student motivation the Gardner (2009) study has some connections. The subject of this study among college students is conceptualizing the relations between executive functions and self-regulated learning. The MSLQ was used to get insight in motivational drive of the students. The relation between executive functions and motivation is interesting from an ASD point of view. People with ASD have problems with executive functions more special planning and organizing their learning activities (Vermeulen, Mertens, & Vanroy, 2010). Gardner discovered that motivational drive is a significant predictor for the executive functions; cognitive strategy use, metacognitive strategy use, and academic effort regulation. In ASD environments the classroom setting and teacher behavior are adapted to students' special needs so they can handle problems with executive functions. The question raises how are ASD students motivated in these. In sum, the MSLQ is used in different educational settings for pupils and students with their own background. This study follows this pattern in a specialized ASD setting.

Before the actual study the MSLQ was piloted on a group of 21 pupils. Just like with the QTI there were no problems with the separate items of the questionnaire. Following Cronbachs alpha coefficients were reported for the three motivation components (pilot, actual study); expectancy component (.73, .74), value component (.70, .85), anxiety component (.80, .59). The reliabilities (Cronbach's alpha's) from the pilot ranged between .70 and .80 while the actual study ranged between .59 and .85. To get a decent alpha value for the pilot value component it was necessary to remove question 16 and 17. The Anxiety component has a low alpha coefficient in the actual study which might be because of the number of items which is less than 10 items (5 items) and then it is difficult to get a decent Cronbach Alpha value (Palant, 2007). All other scores are more than .7 which is considered to be satisfactory to good. Because of this and the explorative character of the present study the described motivation components and subscales were used for research on interpersonal teacher behavior and its associations with pupil motivation.

Data Analysis

Measures were taken in September (pilot), November and December (actual study) 2009. The questionnaires were taken after a mathematics lesson. The QTI was taken from the pupils and teachers, the MSLQ from pupils only. For the actual study four dimensions (dominance, cooperation, submission, opposition) of the QTI were used. Motivation is measured

with the MSLQ on three dimension (value, expectancy, anxiety). The two questionnaires were analyzed in SPSS to get answers on the two research questions. First the pupil QTI and teacher QTI by a independent t-test for each class to get insight in the significance of differences between pupil/teacher perception of the displayed interpersonal teacher behavior. Second the pupil QTI and pupil MSLQ by canonical correlation for the possible relation between the perceived interpersonal teacher behavior and the motivation of students. The statistical procedure will be explained further on.

Data analysis QTI of pupils and teachers

The first objective of this study was to investigate the relation between pupils and teachers on their perceptions of four dimensions (dominance, cooperation, submission, opposition) of interpersonal teacher behavior. To do this an independent t-test in SPSS was executed for every class. The first step was classifying the data in four dimensions of interpersonal teacher behavior. After this the data was checked on outliers. This was done using z-scores to find outliers (Field, 2009). Outliers were found on all dimensions. After checking the answers which produced the outliers seven participants were removed from the actual study as suggested by Garson (2011).

The prepared data is further investigated by a independent t-test. Because the independent t-test is a parametric test several assumptions must be done. The sampling distribution must be normally distributed, data must be measured at least at interval level, homogeneity of variance, and the scores of pupils and teachers must be independent (Field, 2009; Garson, 2011; Pallant, 2007). The first assumption, normal distribution, of the four dimensions was checked by Normal Q-Q Plot. The four dimensions have a reasonably straight line in the Normal Q-Q plot, which suggests a normal distribution (Garson). The second assumption, that data must be measured at interval level, is also responded . Homogeneity of variance, the third assumption, can be assumed for all dimensions. The last assumption is the independence of pupil teacher scores. To respond this assumption several interventions are made. The questionnaires are anonymous and after filling in the questionnaires they were placed upside down on the corner of the table and also collected upside down. During the instruction, before filling in the questionnaires, this is told to teachers and pupils. They were also told that these questionnaires had no influence on their functioning and that no individual scores

were made afterwards. With this the collected data is not influenced by any other measurement (Pallant, 2007).

A considerable number of independent t-tests are used to compare groups therefore a Bonferroni-correction is applied. This involves a more stringent alpha level to judge the statistical significance. The t-test was done for all dimensions and for all classes. Therefore all classes have an own score for pupils and teacher on the four dimensions. Next to this all dimensions have a pupil teacher score for all classes. This makes it possible to take a look from different angles on the results of the teachers and pupils.

Data analysis of Pupils QTI in relation with Pupils MSLQ

The second objective of this study is to investigate the relation between interpersonal teacher behavior and pupil motivation. Therefore the pupil QTI and pupil MSLQ outcomes are analyzed by canonical correlation. This analyze method gives insight in the possible association between interpersonal teacher behavior and pupil motivation. With canonical correlation the predictor variables (interpersonal teacher behavior; dominance, cooperation, submission, opposition) are optimized to maximize the linear correlation with the criterion variables (motivation: value, expectancy, anxiety) and explain the relation between many-to-many relationships (Garson 2011; Sherry & Henson, 2005). For canonical correlation reliability should be .7 or higher and there should be at least 10 observations per individual variable. Because this study is exploratory in its nature, these requirements are relaxed somewhat (www.mvstats.com). The data is checked on outliers and missing values. Outliers were found with z-scores and are replaced (Field, 2009). An important assumption for canonical correlation is multivariate normality which means that all variables and all linear combinations of variables are normally distributed (Sherry & Henson). The conducted canonical correlation analyses responses to this assumption.

Canonical correlation analysis generates the largest possible correlation between the two variables (Sherry & Henson, 2005). This results in a set of equations which is called the canonical function of canonical variate. An advantage of Canonical Correlation is reducing the probability of committing Type I error in the research (Sherry & Henson). Within this study Canonical Correlation minimizes this because of the simultaneous comparison of the interpersonal teacher variables and de motivation variables. The technique is consistent with the

purpose of the research to search for the association between predictor variable en criterion variable; interpersonal teacher behavior and motivation. The results of the described analysis will be presented in the next part.

Results

Pupil and teacher Questionnaire on Teacher Interaction

After this the objective was to compare ASD pupils' perceptions with the perception of their teachers about interpersonal teacher behavior. The independent-means t-test (Field, 2009; Pallant, 2007) was assigned for the four dimensions ,dominance, cooperation, submission, opposition, of interpersonal teacher behavior.

Table 3 Significant differences between Pupils and their Teacher for interpersonal teacher behavior dimensions dominance, cooperation, submission, opposition

	Dominance *mean*		Cooperation *mean*		Submission *mean*		Opposition *mean*	
	Pupil	Teacher	Pupil	Teacher	Pupil	Teacher	Pupil	Teacher
Class 1	3.15	4.00	2.95	3.88	1.80	1.67	1.71	1.57
Class 2	3.20	3.00	3.17	3.75	1.95	2.00	1.27	1.29
Class 3	3.08	2.80	3.36	3.50	2.02	2.17	*1.14 sig*	*1.71 sig*
Class 4	2.90	3.00	3.23	3.75	2.38	2.33	1.82	1.57
Class 5	3.28	2.80	3.48	3.50	2.00	2.00	1.70	1.43
Class 6	2.86	2.80	3.23	3.75	1.60	2.17	1.37	1.57
Class 7	2.93	3.20	3.51	3.62	2.11	2.17	1.40	1.71
Class 8	3.22	2.60	3.50	3.00	2.37	1.83	1.53	1.71
Class 9	3.28	3.00	*3.35sig*	*2.50sig*	2.02	1.67	1.60	1.86
Class 10	3.45	3.00	3.14	4.00	2.39	2.00	1.71	1.00
Class 11	3.13	3.20	3.33	3.50	2.26	2.00	1.49	1.43
Class 12	3.29	3.20	3.74	3.63	2.19	1.83	1.34	1.71

The results of the independent t-test in table 3 show several aspects of interpersonal teacher behavior in cluster 4 education. First when the perception of pupils and their teachers is taken by class, class 1, 4, 11 have remarkable results. In class 1, 4 and 11 the pupils perceive less leadership and cooperation and more submission and opposition compared to their teacher. These differences are not significant. Second a pattern on the four dimensions occurs. Teachers and pupils perceive often dominant and cooperative interpersonal teacher behavior and sometimes submission and opposition. The differences between pupils and teachers are

only in two classes each on occasions significant different. A significant difference occurs in class 3 between pupils and their teacher as it comes to opposition. Pupils have a Mean of 1.14 which is closest to never and their teacher has a Mean of 1.71 (SE =.07) which is an indication of sometimes. Class 9 has a significant difference between pupils and their teacher on cooperative behavior. Remarkable is that the teacher has a significant lower score, Mean 2.50, compared to the pupils, Mean 3.35 (SE=.07) . Pupils often perceive cooperative behavior while their teacher is in the middle between often and sometimes. Table 4 shows the range of the scores from the 12 classes between the pupils and the teachers on the four dimensions and the mean and standard deviation of all pupils and all teachers. This shows that on the average pupils and their teachers mean scores go in the same direction with range scores which are more quirky .

Table 4 Range of Mean, Mean and Standard deviation

Dimension	Range mean Pupils 12 classes	Mean and standard deviation all pupils	Range mean Teachers 12 classes	Mean and standard deviation all teachers
Dominant	Range 2.86-3.45	M 3.16, SD .43	Range 2.60-4.00	M 3.05, SD .35
Cooperative	Range 2.95-3.74	M 3.32, SD .41	Range 2.50-4.00	M 3.53, SD .41
Submission	Range 1.60-2.39	M. 2.10, SD .44	Range 1.67-2.33	M 1.94, SD .30
Opposition	Range 1.14-1.82	M 1.51, SD .36	Range 1.00-1.86	M 1.55, SD .23

Overall, table 3 and 4 show that cluster 4 pupils and their teachers perceive that the displayed behavior is often cooperative (Helping/Friendly, and Understanding) and dominant (Leadership and Strict). This means that teachers notice what is happening, exact norms and set rules, behave in a friendly or considerate manner, show confidence and understanding (Fisher, Waldrip, & Den Brok, 2005). While sometimes the behavior can be characterized with the dimensions submission (Responsibility/Freedom, and Uncertain) and opposition (Dissatisfied, and Admonishing). Keeping in mind that few items were deleted because of reliability, specially three items related to the strict subscale which is part of the dominant dimension. In the conclusion and discussion this will be explained further on.

Pupils Questionnaire on Teacher Interaction and Pupils Motivations Strategies Learning Questionnaire

Pupils motivation variables, value mean 5.22, expectation mean 5.02, anxiety mean 3.33 (seven-point Likert scale, 1 not at all true of me, 7 very true of me), show that pupils in ASD settings are motivated. The association between students' perception of their teachers' interpersonal behavior and perception of their own motivation during mathematics is analyzed by Canonical Correlation. This technique is appropriate to examine the relationship between two variable sets and is conducted using four interpersonal teacher behavior variables (dominance, cooperation, submission, opposition) with three motivation variables (value, expectancy, anxiety). Whereas motivation variables are criterion variables and interpersonal teacher behavior variables predictor variables. The analysis yielded three functions with squared canonical correlations of .24 (Function 1), .09 (Function 2), .01 (Function 3). Overall the full model (Function 1) across all functions is statistical significant with a Wilks's λ of .76 criterion, $F(12, 267{,}51)=2{,}39$, $p<..01$. This means that that there is a relationship between the variable sets (www.mvstats.com). The full model is statistically significant and explained about 24% of the variance shared between the variable sets what may be considered a small to medium effect size (Pallant, 2007).

There are three functions after the dimension reduction analysis. The first function, 1 to 3, is the statistical significant full model and is mentioned before. The other two functions 2 to 3 $F(6{,}204)=1{,}07$ $p= .38$, and 3 to 3 $F(2{,}103)= .49$ $p=.61$, are not statistical significant and sufficiently weak so as not to warrant interpretation therefore they are not involved in analysis further on (Sherry & Henson, 2005). The canonical correlation effects only for the first function is considered noteworthy for this study while it explains 19% of the shared variance.

Table 5 Canonical Interpersonal teacher behavior predicting pupil motivation for function 1 (the full model)

Function 1			
Variable	Coef	Rs	R2s (%)
Expectancy	.065	-.384	14.75
Value	-.803	-.487	23.72
Anxiety	.919	.690	47,61

Dominance	-.885	-.718	51.55
Cooperation	.203	-.128	1.64
Submission	.512	.476	22.66
Opposition	.407	.362	13.10

Table 5 presents for Function 1 the standardized canonical correlation function coefficients, structure coefficients and the squared structure coefficients for each variable. Canonical weights, variables with relatively larger weights contribute more to the variates (www.mvstat.com). As mentioned before is motivation the criterion variable set in this study. The relevant criterion variable is anxiety, this is supported by the squared structure coefficient (47.61%). The second criterion variable is value (23,72%) and the third variable is expectancy (14,75%) which has de lowest standardized canonical correlation function coefficient. Anxiety and expectancy are both positively related while value is inversely related to the other motivation variables.

The predictor variable set, interpersonal teacher behavior, in Function 1 shows that dominance (51,55%) is the primary contributor. The secondary contribution to Function 1 is provided by submission (22,66%), following by opposition (13,10%) and cooperation (1,64%). Because the structure coefficient for dominance is negative, it is negatively related with criterion variables expectancy and anxiety and positive related with value. Submission, opposition and cooperation are all positively related with expectancy and anxiety and negatively related with value. The results of the statistical tests in this study will be discussed in the next section.

Conclusion and Discussion

Adapted settings for ASD pupils in cluster 4 schools have little scientific background. The present study was launched to get more insight in these by investigating the displayed teacher behavior and the way pupils are motivated in these. More specific this study was carried out to explore the perceived interpersonal teacher behavior of pupils and their teachers and its relation with pupil motivation. The perception of pupils and their teachers hardly show significant differences and show a reasonable constant pattern which can be characterized as dominant and cooperative. The association between the perceived behavior and student motivation is

mainly build on dominant teacher behavior which has its effect on motivation by low level of anxiety. Other correlations were not significant.

The differences between pupils and their teachers on the perceived interpersonal teacher behavior are little. This means that the way teachers think they act has little differences with the way it is perceived by their pupils. Two classes each on one dimension (cooperation and opposition) show significance difference between teacher and pupils. Teacher behavior in cluster 4 classes special for ASD pupils can be characterized as dominant and cooperative. This is an indication of small differences between pupils' and teachers' perceptions (Brekelmans & Wubbels, 1991). Which is also the fact in this study. Next to this there is no pattern in higher or lower scores specific for teachers or their pupils on the dimensions. By example there is no tendency of teachers who perceive their own behavior as more cooperative than their pupils. Wubbels & Brekelmans (2005) found that teacher perceive themselves as more leading, helpful/ understanding and less dissatisfied and admonishing compared to their pupils which is not pattern in this study.

Pupils and their teachers responses on QTI during mathematics in specialized cluster 4 classes show often dominant, cooperative behavior and sometimes mentioned as submission and opposition. This general impression shows that teachers are in control and give structure to the classroom situation (Lee, Fraser, & Fisher, 2003). Next to this they empathize, are patient and inspire to confidence and thrust. This approach responses to the special needs of ASD pupils such as structure, consistency, clarity. With this teacher behavior pupils know what to expected and this predictability makes it possible to anticipate on what comes next. This predictability is especially important for ASD pupils to feel at ease in their environment (Berckelaar-Onnes, 2004; Saskatchewan Education, 1999).

With these results should be kept in mind that dominant behavior, which is build on strict and leading behavior, has only one item which is related to strict behavior and four items to leading behavior. The reason for this is the low reliability from three out of four strict items. This is remarkable because the subscale strict is about keep reins tight, be strict, check, judge, get class silent, maintain silence, exact norms and set rules (Lee, Fraser, & Fisher, 2003; Wubbels & Levi, 1993). These aspects of the strict subscale match with the prescribed teacher behavior in ASD settings to provide clear expectations and help pupils to act appropriate (Vermeulen, Mertens, & Vanroy, 2010). A reason for the problems with the strict subscale items might be the impairment in communication in relation with central coherence problems. For the strict

subscale this means that the meaning of a question depends on the situation and the pupils interpretation. The questions of the strict subscale are; ‘Our teacher gives good explanation’, ‘Our teacher is strict during mathematics’, ‘Children have to work hard with this teacher’. The ASD communication problems results in more difficulties, compared to pupils without ASD, with terms like ‘good’ which can have more explanations. ‘Good’ has a different meaning when it is used as grade or to express ‘good explanation’, this transfer is difficult to make for ASD pupils. Because of these problems the interpretation of strict subscale items might differ and could be a reason for the low reliability scores. Three other subscales each have one item which is deleted. Item 20 of subscale responsibility/freedom, ‘We may choose what we want to do’. Item 21 of subscale uncertain ‘Children are brutal to our teacher’. And question 31 of subscale admonishing ‘The children are a bit afraid of our teacher’. These items might also cause some interpretation problems. Further research with QTI in ASD setting should focus on this to solve the reliability problems.

Other limitations are that at least ten students in a class should supply the data and at least two classes of pupils should complete the QTI for each teacher (Wubbels & Brekelmans, 2005). The investigated classes do not always have the necessary 10 pupils and the teachers only have one class so it is not possible to get data from two classes or more. Traditionally cluster 4 classes are small and teachers have one class so it is not possible to respond this recommendations.

The second objective of this study is to define the relation between interpersonal teacher behavior and pupil motivation. The perceived interpersonal teacher behavior can be characterized as dominant and cooperative while pupil motivation variables are displayed by above average value and expectancy combined with below average anxiety. Interpersonal teacher behavior and its association with motivation is analysed by canonical correlation. The result of these is that there is an association between interpersonal teacher behavior and motivation, more specific dominant behavior is a contributor for low anxiety. No other significant results were found, but this is also remarkable.

Dominant teacher behavior as predictor variable has positive influence on criterion variable anxiety of pupils in ASD cluster 4 setting. A teacher who displays dominant behaviour is; structuring the classroom situation, leading, noticing what is happening, organising, giving orders, giving tasks, explaining, holding attention, determining procedures (Wubbels & Levi, 1993). This behavior responds to ASD pupils’ need for routines and structure to provide

clearness in a for them chaotic world. This makes a stable emotional state over time possible and reduction of worry and emotions. Therefore dominant teacher and its association with little pupil anxiety is realistic.

ASD pupils indicate that value and expectancy are above average contributors for motivation. For value this is probably build round task value and intrinsic motivation and less extrinsic motivation. Expectancy it is because of self efficacy and attribution connected to the structure in the class. The equipped learning environment and approach makes it possible to do tasks and know that one is able to do this. Because of this the learning situation, ASD pupils can function without worry and stay emotional stable. Pupils with high expectancy resulting in high self-efficacy and/or adaptive attributions display increased effort, resilience and persistence on educational tasks in classrooms (Bandura, 1997; Pajares, 1996). According to this view it seemed likely that enhancing messages from teachers to pupils with efficacy and attributions-to-effort would increase motivation and engagement of pupils (Duncan & McKeachie, 2005). But the above average scores of value and expectancy are not supported by its relation with interpersonal teacher behavior. The problem might be the ASD pupils' problems with transitions between activities and the lack of seeing cause and effect (Saskatchewan Education, 1999). Therefore they don't link their personal development with the displayed teacher behavior.

The present study has a several limitations. First to mention the generate results to other populations. This because of the relatively small sample which is located is one region in Limburg, a province in the Netherlands. Next to this the study took place in specialized cluster 4 classes for ASD pupils only. Therefore, results cannot be generated to other cluster 4 populations or other education settings. Second canonical correlation is a primarily descriptive technique which is used in the present study to explore what effects specialized ASD setting have by investigating interpersonal teacher behavior and student motivation. The result of this is a raw practice picture of a specific educational setting which should be studied more detailed in future. By example; further research should also focus on qualitative methods to investigate which way questionnaires, specially the QTI, can be adapted to the special character of the studied population.

In an ASD environment teacher and their pupils gave their perception on interpersonal teacher behavior, pupils also about motivation. Although teacher behavior can be characterized as dominant and cooperative, whereas pupil motivation by value and expectancy combined with low anxiety, there is little association between these. Collecting data about teacher behavior and

motivation will hopefully support the ongoing search for special needs of ASD pupils in educational settings.

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