Chapter 4

At-risk students and the role of implicit theories of intelligence in educational professionals’ actions

This chapter is based on:
Tickstra, M., & Minnaert A. (under review). At-risk students and the role of implicit theories of intelligence in educational professionals’ actions
Abstract

Implicit theories of intelligence play a role in teacher’s actions. Adaptive instruction in and out of the classroom is important to optimise learning processes, especially in the case of at-risk students. This study explored to what extent implicit theories of intelligence play a role in the actions of educational professionals around at-risk students. 44 teachers and 57 support professionals participated in this research. Data were analysed separately for teachers and support staff. 34% of the actions of the teacher can be explained by implicit theories. However, in denominational schools this is 61%. SEM showed mediation effects of multiple belief factors in the actions of support staff. Implicit theory of intelligence predicts the belief in IQ testing, which precedes the belief in consequential validity of tests (i.e., link to actions according to test outcomes). These results indicate a strong influence of implicit theories of intelligence in educational practice.
Introduction

The behaviour of teachers in the classroom has an impact on students’ learning outcomes (Pakarinen et al., 2010), students’ behavioural outcomes (Skinner & Belmont, 1993) and students’ social wellbeing (Jennings & Greenberg, 2009). Moreover, the impact sustains into later grades (Konstantopoulos & Chung, 2011) and, thus, the ultimate development of students. Especially in the case of at-risk students, teachers’ behaviour might have an enormous impact on learning outcomes. Students classified as at-risk in their learning progress often show learning delays as a consequence of environmental causes (such as immigrant or low SES families) or caused by learning difficulties (such as reading or arithmetic problems). Consequently, at-risk students need more coaching than the rest of their peers, resulting in more one-to-one contacts in which the teacher plays a crucial role. In practice, this often results in challenging situations where the teacher needs to guard the whole classroom and to coach at-risk students at the same time. Furthermore, in order to achieve as best learning results as possible, teachers should adapt instruction to the level of their students. According to Vygotsky (1978) the teacher should teach in the Zone of Proximal Development of each student. This Zone of Proximal Development (ZPD) is the difference between the actual independent achievement of the student and the performance level of the student when tailored help is provided (Lidz, 1995). Teaching in the ZPD helps fulfilling the student’s learning potential, which contributes to the development of the student.

The above-mentioned aspects can be seen as the core principles of teachers’ actions in the classroom. However, teacher’s actions in the classroom are presumed to be influenced by implicit theories of intelligence. Dweck and colleagues demonstrated in their extensive research that implicit theories affect people’s judgments and reactions (Dweck, Chiu, & Hong, 1995). The influences of teachers’ beliefs has been studied for longtime (Wiedl, 1980) and has been demonstrated to influence behaviour (Azjen, 2005). More specifically, Bandura (1993) described the influence of teachers’ beliefs to quality of teaching and their behaviour in the classroom, which in turn has its impact on the
school career of students (Gibbs & Powell, 2012). Beliefs that have been demonstrated to play a role during teaching processes refer to a broad terminology (Pajares, 1992), for example teachers’ self-efficacy beliefs (e.g., Tschannen-Moran & Woolfolk Hoy, 2001), teachers’ perceptions (e.g., Pelletier, Seguin-Levesque, & Legault, 2002), teachers’ attributions (Gibbs & Gardiner, 2008), or teachers’ feeling of responsibility (e.g., Lauermann & Karabenick, 2011). Next to these examples, the influence of people’s implicit theories on their behaviour has been investigated. Implicit theories can be seen as beliefs that have been constituted subconsciously within an individual, thus, people are often unaware of the theories that they support.

People’s implicit theories can be general, but are mostly domain-specific. In this article we focus on the implicit theories on intelligence, referring to the extent to which an individual considers intelligence as malleable or not (Dweck, et al., 1995). Studies in the domain of implicit theories of intelligence mainly focused on the impact of an individual’s implicit theories on the achievement goals of this individual (e.g., Dinger & Dickhäuser, 2013), as was originally initiated by studies of Dweck (see also Dweck & Leggett, 1988). In turn, achievement goals determine an individual’s behaviour. According to Minnaert (2013) achievement goals are considered to contribute to school success of students substantially, but the way in which achievement goals influence one’s learning outcomes remains complex. He underlined the need for more research in this area. According to Leroy, Bressoux, Sarrazin, and Trouilloud (2007) teachers’ implicit theories influence the atmosphere in the classroom. Ames (1992) pointed at the influence of classroom structure to students’ goals. This gives an indication for the role that implicit theories play during learning processes of students. However, studies that explicitly address the link between teachers’ implicit theories and its influences on students’ learning outcomes are executed to a much lesser extent (Wolters & Daugherty, 2007). A first step in this issue is to investigate the assumed relationship between implicit theories and behaviour of teachers. Following this assumption, classroom practices of teachers are supposed to affect students’ learning outcomes.
People adhere to either an entity view or an incremental view on intelligence (Dweck et al., 1995). The entity theorists hold the opinion that intelligence is a stable trait and something that can hardly be changed. Individuals that support the incremental view, consider intelligence rather as malleable and subjective to change. These different views imply differences in achievement goals, since achievement situations are experienced contrastingly (Dweck & Leggett, 1988). An entity theorist assumes an achievement situation as a situation to demonstrate skills oriented towards evaluation, resulting in performance goals. Whereas incremental theorists are oriented towards learning goals, since achievement situations are regarded as learning opportunities (Dinger & Dickhäuser, 2013). Consequently, these views have their influence on classroom practices. For instance, teachers with an entity view of intelligence are more likely to be focused on performance and direct instruction practices. Whereas incremental theorists envision mastery-oriented learning and focus on the learning process instead of the learning results solely.

Teaching in the ZPD is, thus, influenced by these implicit theories of intelligence. This, in turn, has its impact on educational opportunities of students. For instance, in the case of low performing students, an entity teacher would only adapt instruction in such way that these students get supplementary practice or extra assignments, or opt in favor of exclusion, since low scores on achievement tests indicate a low ability to learn. Entity teachers, do not expect these students to learn, resulting in more stigmatisation and self-fulfilling prophecies. On the contrary, an incremental teacher would provide instruction that is adapted to the level of the student, since low scores on achievement tests indicate that these students needs more (or other) opportunities to learn. Exploring a student’s ZPD is, likewise, more common among incremental theorists.

Due to deviating results from the rest of their classmates, at-risk students are frequently eligible to assessment procedures. These assessment procedures often include IQ tests. Accordingly, outcomes of intelligence testing are interpreted differently by entity or incremental theorists. Moreover, entity theorists will attach great importance to the
outcomes of an IQ test, whereas incremental theorists will approach these outcomes as a starting point for adaptive support.

The influences of teacher’s implicit theories on particular groups of at-risk students have been investigated previously. Literature can be found about the group of gifted students (Baudson & Preckel, 2013; García-Cepero & McCoach, 2009). However, information about SEN students seems to be scarce. Jordan and Stanovich (2001) underlined in their research that teachers’ beliefs affect the instructional processes, and had even greater influences in the group of at-risk students. Teachers who had an incremental view, and therefore felt responsible for their students’ learning processes, were more frequently involved with at-risk students than teachers with an entity view. The need for more in-depth examination of the influence of teachers’ beliefs on their educational actions is underlined by several researchers (e.g., García-Cepero & McCoach, 2009).

**Aim of the present study**

Since the content and manifestation of instruction is extremely important for the group of at-risk students, a closer look is needed in the process among educational professionals involved with teaching these children. The current study aims at the exploration of a relationship between implicit theories of intelligence and actions of educational staff with regard to the care process of at-risk students. At-risk students often undergo assessment procedures eligible for individualised education plans (IEP), resulting in interventions and adapted instruction. Therefore, next to teachers, support professionals were taken into account. These professionals administer the assessments and assist teachers in their instructional processes. But in what way play implicit theories part in the educational professionals’ actions in practice? As mentioned above, entity and incremental theorists approach at-risk children differently. However, the extent to which these implicit theories play their role in daily practice remains unclear. Therefore, this study addresses this issue from a practical point of view. The role of implicit theories will be investigated with respect to actions in practice.
There is plenty of evidence that background variables such as years of teaching experience, and level of grade play a role in teachers’ beliefs (Bol, Stephenson, O’connell, & Nunnery, 1998; Leroy et al., 2007; Wolters & Daugherty, 2007). Therefore, these variables have been taken into account. If actions can indeed be explained by implicit theories, then, do amount of experience, and the grade in which the educational professionals work, interact in this relationship? Moreover, the influence of school ethos on teachers’ beliefs has been highlighted by Gibbs and Powell (2012). They underlined the importance of collective beliefs: Teachers are often influenced by collective beliefs that are prominent in a school. As illustrated by Opdenakker and Van Damme (2006), the type of school and denomination contribute to collective beliefs inside schools, which affects students’ outcomes. Therefore, it was also investigated whether the type of school (defined as denominational or public school⁴) influenced the relationship between implicit theory and behaviour.

**Method**

**Sample**

The study was carried out in the western part of The Netherlands. This specific area of the Netherlands is confronted with a large population of ethnic minorities. In comparison to other parts of The Netherlands, teachers in this area are confronted with more at-risk students in their classrooms having more serious problematic home situations. The issue of adapting instruction to the level of students is very common in schools in this area. Due to the high incidence of immigrant children, schools often receive financial aids from the government, which can be used for extra assistance inside or outside the classroom.

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⁴ In this, denominational schools refer to schools that hold a Christian point of view in their education, whereas public schools are not explicitly grounded in an ideology. Students in public schools are not restricted to a certain religion. The division does not account for differences in financial aid.
In The Netherlands elementary school begins with Kindergarten (at age 4) and continues until grade 6 (at age 12), after which children attend secondary education. The ‘care process’ at regular education is organised in different levels where school psychologists, special services coordinators, remedial teachers, and teachers are involved (Imants, Van der Aalsvoort, De Brabander, & Ruijsenaars, 2001). Generally, when teachers remark problems with a student, the school’s special services coordinator assists the teacher in these problems. In the case of persistency of problems, the special services coordinator asks help from a school psychologist working at an educational advisory agency.

For this study, school psychologists working for an educational advisory agency were asked to participate. Each school psychologist would then distribute the questionnaire to one special services coordinator with whom they worked and three teachers with whom the special services coordinator worked. One teacher represented the first two years of elementary school (Kindergarten), another teacher grade 1 to 3, and the third teacher represented grade 4 to 6 of elementary school to provide a representative sample of teachers. It was aimed for to obtain a response of 50 school psychologist, 50 special services coordinators, and 150 teachers. A total of 44 teachers and 57 support professionals (21 special services coordinators and 36 school psychologists) participated in this research, which reflects a response rate of 40.4% in total.

**Measures**

Implicit theories of intelligence (ITI) were assessed by three items that indicated the view on intelligence, either as an entity or incremental theory. The original items (Dweck et al., 1995) were converted to teacher items and translated to Dutch. Next to these items, the behaviour of teachers and support staff in case of an at-risk student was assessed by a content-driven questionnaire. Since the study was explorative by nature, and the items needed to address behaviour that was adapted to the level of each professional, a different version for teachers and support staff was used. Depending on the version, the questionnaire consisted of 17 or 18 statements that had to be answered on a 1 to 5 Likert scale.
**Teacher questionnaire.** The ITI- items proved to be reliable in our sample, as indicated by a Cronbach’s alpha of .77 in this version. A principal component analyses (PCA), graphical representations and other ad-hoc descriptive data analyses revealed that in the teachers’ questionnaire one factor emerged (α = .73 ; 9 items) explaining 33% of the total variance. Examples of items are *I observe problems in learning progress of a student when the student obtains low scores on achievement tests that I administered, and I evaluate instruction I provide to the at-risk student with the special services coordinator.* This factor was called “actions in case of an at-risk student”. A higher score on this factor reflects more consistency in actions undertaken by the teacher in case of an at-risk student.

**Support professional questionnaire.** The ITI- items had an Cronbach’s alpha of .75 for support staff. The PCA’s in the support professionals’ questionnaire showed two factors that could be distinguished. The first factor was composed of three items (α = .58) and reflected the belief that IQ testing is a correct estimator of learning capacities, called “belief in IQ testing”. One of the items was e.g., *The administration of an IQ test is enough for the estimation of a child’s learning capacity.* The higher the factor score, the more faith to IQ testing (i.e., the score reflects learning capacity of students perfectly).

The second factor was related to three items (α = .55) describing the link from test score to actions in practice, shortly the “belief in consequential validity of tests”. For example, *Test outcomes have a binding effect upon the advice I give to teachers.* A high score was indicative of more value attributed to results of testing, implying a more performance oriented view on capacities. The authors note that several items were not taken into account, since these did not load on any of the factors, though the other items had very high loadings on one of the two factors.

Both factors could, thus, clearly be separated according to the data. Moreover, both factors explained 55% of the total variance.
Analyses

Hierarchical regression analyses were carried out to investigate the possible influences of background variables on the relationship between the ITI-items and the other factor for teachers’ questionnaire. Careful interpretation of the two factors that emerged from the PCA’s in the support professionals’ questionnaire showed that one factor reflected upon belief in IQ testing and the other upon belief in consequential validity of tests. Therefore, a strong grounding for testing mediational effects appeared. By making use of the Lisrel program, Structural Equation Modeling (SEM) was used to test the mediation effects between different components of the support professionals’ questionnaire.

Results

Teachers

The correlation between the implicit theory of intelligence factor and the other factor was .58 ($p \leq .01; N = 38$). Ergo, 34% of the actions of a specific teacher in this sample can be explained by the implicit theory of intelligence this teacher has. Hierarchical regression analyses investigated the moderating effects of background variables in the relationship between implicit theories of intelligence on the one side and “acting in case of at-risk student” on the other side. Experience of teacher, and the group in which the teacher works, did not significantly moderate this relationship. More interestingly, it appeared that the variable “type of school (public vs. denominational)” did play a moderating role in this relationship. As can be seen in Table 1, the analysis resulted in a significant additive 9% in the variance explained by adding the interaction effect between type of school and implicit theory in the relationship between implicit theory and actions of the teacher ($\Delta R^2 = 0.92, \Delta F = 5.45, p = .03$).
Table 1 | Hierarchical regression analyses predicting ‘acting of teacher’ from implicit theories of intelligence, and type of school, and interaction between both predictors

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>ΔR²</th>
<th>ΔF</th>
<th>Sign. ΔF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Implicit theory</td>
<td>.58</td>
<td>.34</td>
<td>18.13</td>
<td>.00</td>
</tr>
<tr>
<td>Implicit theory; Type of school</td>
<td>.58</td>
<td>.00</td>
<td>.02</td>
<td>.88</td>
</tr>
<tr>
<td>Implicit theory; Type of school; Implicit theory * type of school</td>
<td>.65</td>
<td>.09</td>
<td>5.45</td>
<td>.03</td>
</tr>
</tbody>
</table>

Note. N = 38, distributed over 10 public and 10 denominational schools

Actually, as showed in Figure 1, this interaction effect between ITI and actions in case of an at-risk student appears to be much stronger in denominational schools than in public schools. In denominational school implicit theories of intelligence explain 61% (ΔR² = 0.61, ΔF = 20.6, p = .001, N = 15) of actions of the teacher, compared to only 20% (ΔR² = 0.20, ΔF = 5.2, p = .03, N = 23) of actions in public schools. This effect was not subjective to outliers, as was tested by the Leverage and Cook criteria.
Support professionals

Hierarchical regression analysis revealed no moderating effects of background variables in this group on the relationship between implicit theories and both factors. Structural equation modeling showed that there was a full mediational model between these variables. The model tested the effect of implicit theories of intelligence, via belief in IQ tests, on the belief in consequential validity of tests, as dependent variable. This model had a very good fit, since the margin of error was small (90% CI RMSEA [0.00, 0.00], \( p = .998 \)) and the sources for unexplained variance in the model were trivial (SRMR = .004). There were no direct effects of implicit theories on the belief in consequential validity. As can be seen in Figure 2, implicit theory of intelligence predicts the belief in IQ testing, which, in turn predicts the consequential validity of tests.
Discussion

Since the influence of implicit theories of intelligence (either entity or incremental) in practice needed to be investigated, this study aimed at an in-depth exploration of actions of educational professionals in the case of at-risk students. These students are often confronted with the consequences of stigmatisation and self-fulfilling prophecy, need more coaching from teachers and support professionals, and are often eligible for assessment procedures. This study explored the underlying principles for the educational professionals’ actions to give an insight in quality of care processes around at-risk students. Support staff (i.e., school psychologists and remedial teachers) and teachers were asked to fill in a questionnaire. The ad hoc constructed questionnaire was composed of items that reflected upon practice and items that reflected one’s implicit theory of intelligence (from Dweck et al., 1995). Data analysis showed clear distinctions between the level of the teacher and the level of support staff. Therefore, results will be listed separately for both groups of participants.

In respect of teachers, results show that implicit theories play a prominent role in their actions in the classroom in the case of an at-risk student. In this sample, 34% of the variance on the factor “actions of a teacher” can be explained by either an entity view or...
an incremental view on intelligence. Moreover, this study showed that this relationship is moderated by type of school. Analyses showed that the prediction of teachers’ actions by their implicit theories is more robust at denominational (Christian) schools than at public schools. Differences between both types of schools have been found previously in educational studies. However, as Opdenakker and Van Damme (2006) underline, these differences are often related to other variables.

The positive correlation coefficients for both type of schools indicate that the more a teacher supports the entity view of intelligence, the more consistency is showed in acting in the case of an at-risk student. Thus, teachers know better what they need to do in case of an at-risk student if they support the entity view. However, their actions are in line with the entity view, reflecting a more performance oriented approach as explained in the introduction. Consequently, stigmatisation and self-fulfilling prophecies could occur in these situations. On the other hand, as was shown in Figure 1, there is a lack of teachers that do support the incremental view on intelligence showing a high consistency in their actions. The more incremental view on intelligence, the less consistency in actions of the teacher. Hence, some teachers do support a more dynamic (i.e., incremental) view on intelligence, but they do not know how to act accordingly. This indicates a lack of declarative knowledge or a lack of procedural knowledge in the actions of teachers. These effects are more robust at denominational schools.

With regard to support professionals, i.e. special services coordinators and school psychologists, implicit theories do also play a role, though differently. Next to the factor describing implicit theory of intelligence, two other factors emerged from the questionnaires. One factor reflecting the belief in IQ testing and another factor reflecting the belief in consequential validity of testing. Background variables appeared to be of less importance in this group, since these did not moderate on relationships between the factors. The SEM modeling showed that there was a full mediational model between the factors, implying that implicit theories predict the belief one has about IQ tests, and, in turn, explains the way people act according to these tests. The consequential
validity of tests is, thus, caused by implicit theories people have. This means that the way people think about intelligence affects their opinion about the quality of these tests, and thus, their interpretations. If one supports the more static view on intelligence (an entity theorist), this individual will hold more account to IQ testing results, which will result in more static decision making processes. One might regard this model rather as logical, but when applied to the educational practice, it is rather disastrous. Due to a stronger focus on IQ testing results, learning problems will be regarded as a problem of the students, instead of a reciprocal effect between teacher and students. Less attention will be drawn upon the role of the teacher in adapting to the level of the student. Consequently, the teacher will not teach in one Zone of Proximal Development.

As demonstrated by this study, implicit theories of intelligence play a substantive role in the educational care process around at-risk students. In this group of students the identification of learning disabilities, or the admission to remedial activities, is a frequently occurring issue. In each of these decision making events, implicit theories play a role. In turn, the impact on educational opportunities of at-risk students is immense. These findings suggest that educational professionals should develop awareness of the influence of these implicit theories on all their actions. Educational professionals should strive towards a model of constant reflecting upon one’s own actions and of those professionals around them. Teachers should be supported in their instructional practices. School directors should create opportunities for their teams in order to consult each other’s work. An incremental view on intelligence should be supported in order to create learning opportunities and exploration of a students’ ZPD rather than a focus on performances (as is often the case with entity theorists).

There are, however, some limitations to the results of this study. The relatively low response rate (40.4%) may have caused biased results. Moreover, the sample size was rather small (44 teachers and 57 support professionals). Although the statistical grounding of some results might be regarded as thin, the authors would like to emphasise this small sample size which probably caused a problem of power. The alpha’s of the
factors would have been higher if the test would have been lengthened. According to Carmines & Zeller (1979) and Cortina (1993) interpretation of alphas should be done with caution, as it is subjective to the number of items used. The reliability of the scores on the separate factors is, therefore, above threshold, even in the case of a low average inter-item correlation, since only three items have been used in some factors. This implies that evidence might have been even stronger when the study would have been carried out with more items, and in a greater sample distributed nationally instead of a specific area in the western part of the Netherlands. Moreover, due to the high incidence of at-risk students in this specific area, it is estimated that people hold a more flexible approach to these students than in the rest of The Netherlands. A nation-wide sample would probably have proved an even more persisting role of implicit theories of intelligence in educational practice. Furthermore, results are based on self-reported questionnaires which are always sensitive to socially acceptable answers.

To conclude, these results show that we should be very attentive to implicit theories on intelligence of educational professionals. They play a prominent role in processes in the classroom, and outside the classroom, in case of at-risk students. These results have clear implications for the implementation of educational interventions. If the aim of a specific educational intervention is to change behaviour of educational professionals, this study indicated that more processes come into play when interpreting the effects of the intervention. Behaviour might not be changed due to persistent implicit theories people have. Accordingly, this study paved the way for interventions that intervene on beliefs and behaviour at the same time. Since both aspects cannot be seen apart from each other, one should strive toward a change in both aspects in order to achieve sustainable effects in behaviour.

With regard to the consequential validity of testing procedures, the study also had implications. The study demonstrated that implicit theories play a role in the interpretation of, and actions according to test outcomes. This means that not so much the outcome itself, but rather the interpretation play a prominent role in psycho-
educational practice. More focus upon the interpretation of test outcomes and the translation to practical guidelines, in other words the consequential validity of tests, is requested for. After all, the future of individual at-risk students often depends on few assessment outcomes.
“The unexamined life is not worth living.”

(Socrates)