Designing instruction and learning for cognitively gifted pupils in preschool and primary school

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Abstract

Young gifted children perform in the top ten per cent in assessments of cognitive, social, expressive or other abilities. The study first considers why, and how, cognitively gifted pupils in particular may face enforced underachievement as early as in preschool. A longitudinal multilevel model is developed to represent various types of interaction between individual pupil variables, home variables, and early educational variables. The theoretical model is then used to design optimal instructional and learning conditions for gifted and other pupils from the start of preschool. The conditions are elucidated in a set of educational, ICT, and learning guidelines to improve play and learning practices in preschool and primary school. Some initial experiences in implementing the guidelines in Dutch preschools and primary schools are discussed and compared with school conditions for pupils with emotional and social disorders.

Keywords: cognitively gifted pupils; underachievement in preschool/primary school; inclusive education; multilevel improvement of early education; optimal instructional and learning conditions
Introduction

Every child has a specific genetic basis of potential abilities that require cognitive, social, emotional, motor, and other types of stimulation by the environment to develop adequately (Gagné 2011; Gallagher 1975; Mooij 1992). Diagnosis, assessment, and identification of very high ability levels with a particular child may use different procedures (Brown, Renzulli, Gubbins, Siegle, Zhang, and Chen 2005), which can be influenced by statistically tail end amplifications of group average differences (Gagné 2011). Therefore, ‘giftedness’ or high ability is defined as placing in the top ten per cent in terms of performance in the corresponding specific competences (cf. Colangelo, Assouline, and Gross 2004; Gagné 2011; Mönks and Lehwald 1991).

Renzulli (1978, 1988) emphasised that gifted performance is based on interactions between above-average general abilities, high levels of task commitment, and high levels of creativity. Task commitment and expressions of creativity are closely related to the characteristics of the environment, suggesting that the educational environment is relevant to cognitive giftedness and its development. In this respect ‘inclusive education’ appears to have the same implications both for exceptional pupils potentially achieving at the highest levels and for those achieving at the lowest levels or with specific disabilities or special educational needs (cf. De Boer, Pijl, and Minnaert 2011).

Sternberg and colleagues (Sternberg and Grigorenko 2002; Sternberg and Lubart 1995; Sternberg and O’Hara 2000) investigated variations in personal abilities, specific characteristics of the environment, and rate of growth in expertise owing to successes in learning or practising. In preschool and primary school, then, the actual instructional and learning characteristics are relevant in promoting or challenging the motivation and achievement of cognitively gifted pupils. Parkhurst (1922) analysed the characteristics of regular schooling and showed that cognitively gifted pupils who are not intellectually
challenged during their early years at school tend to develop negative feelings towards preschool/primary school; their consequent low level of motivation and poor work habits lead to their becoming early underachievers (cf. Durkin 1966; Karnes and Johnson 1991; Mooij 1992). Like other pupils, cognitively gifted pupils need to activate their cognitive, social and emotional abilities somewhat above their actual performance levels in order to experience authentic challenges and motivating successes in learning (Sternberg and Grigorenko 2002).

Research shows that, at the chronological age of four, children differ by about five to six years in their level of psychological development and actual cognitive and social performances (cf. Keleman 2010; Mooij 2000). Compared with their age-mates, then, cognitively gifted or highly able children may be some years ahead psychologically (Baroody 1993; Colangelo et al. 2004). Preschool undoubtedly offers most of these children new experiences and social situations, but children are often grouped only according to age in regular preschool and primary school. In such groups or classroom contexts, whether or not gifted children are under-challenged for a number of years depends on the degree to which play and other curricula can be differentiated (Durkin 1966; Lubinski 2004). The same kind of situation may exist in curricula intended for gifted pupils, however. A study by Purcell, Burns, Tomlinson, Imbeau, and Martin (2002) revealed a huge gap between curricula, textbooks, and programmes designed for gifted learners in the USA and the actual learning needs of such learners. A similar conclusion can be drawn for other countries (cf. Lohman 1990; Mooij, Hoogeveen, Driessen, Van Hell, and Verhoeven 2007; The Scottish Government 2009). In this respect Gagné (2011) speaks about the ‘grade/age lockstep’ of educational systems around the world.
A first research question then concerns why, and how, cognitively gifted pupils in particular may face serious underachievement problems in preschool and primary school. The aim is to explain the potential problems experienced by these pupils and to understand the specific characteristics and instructional conditions that may be conducive to psychologically adequate development and learning processes of young gifted pupils. The second research question, consequently, concerns the theoretical elaboration of instructional conditions that are expected to optimise the development and learning of cognitively gifted pupils in preschool and primary school. Here the aim is to design learning conditions optimised to meet the special needs of young gifted pupils, either in regular preschool/primary school or in special needs programmes. Some lessons learned in achieving such conditions in both types of school will be discussed. Finally, the relevance of such conditions in the design of instruction and learning for cognitively or socially low-ability pupils will be stipulated.

**Explaining the problems of gifted pupils in preschool and primary school**

**Personal identity dimensions**

Gallagher (1975) and Mehlhorn (1988) emphasise that a person’s innate potential abilities interact with and are influenced by the environment, thereby transforming themselves into the personal identity dimensions in which a child expresses cognitive, social, emotional, senso-motor and other types of performance (cf. also Magnusson and Allen 1983). One key concept with respect to learning potentials, in particular of cognitively gifted children, is ‘self-regulation’ (Zimmerman 2000). For example, by using some environmental hints and cues, such children may learn to read and write
even before entering preschool (Byrne 1998; Durkin 1966; Mooij 1992). As a gifted child exerts more control over his or her own learning processes in the various identity dimensions, the degree of his or her ‘self-regulated learning competence’ will increase; this usually motivates him or her to select and carry out more complex learning tasks (cf. Bowerman 1978; Van den Boom, Paas, Van Merriënboer, and Van Gog 2004).

Gardner (1983) defines a theory of ‘multiple intelligences’, differentiating between linguistic, logical-mathematical, spatial, musical, bodily-kinaesthetic, interpersonal, and intrapersonal intelligence. Mooij (2000) carried out quantitative research involving the parents and teachers of 966 four-year-old children just starting preschool. He concentrated on seven competence domains reflecting preschool practice. They concern social interaction/communication, general cognition, language proficiency, (preliminary) arithmetic, senso-motor level, level of emotional expressiveness, and the child’s expected educational behaviour/motivation. The domains reflect the child’s personal identity dimensions at the start of his or her school career. They interact with the genetic base of the child, and the level of development levels for each one can be used to assess his or her level of performance upon entering preschool: see Figure 1. In terms of Gagné (2011) these identity dimensions and their assessment by parents and teachers may indicate giftedness, or the possession and use of outstanding natural abilities or aptitudes, in at least one ability domain.

Figure 1 about here

**Home influences**

Variables defining the family or home situation interact with a child’s identity dimensions and influence their development from a very young age, as is demonstrated in various in-depth case studies (Durkin 1966; Mooij 1992, 1994). An important home
variable is the degree to which the parents or care-takers stimulate and enable the child to express him- or herself in one or more of the identity dimensions: see Figure 1. Variety in the stimulation provided by parents or care-takers, combined with their interest in the child’s positive development and learning experiences, are necessary for a child to grow and develop harmoniously. The level of educational attainment at home is important in this respect, as was shown in secondary analysis of national data to estimate the value-added by preschools and primary schools in the Netherlands (Roeleveld, Mooij, Fettelaar, and Ledoux, 2011). Having parents who have achieved a higher level of education, especially the mother, makes it more likely that a gifted child in particular will get the intellectual, social, emotional and creativity conditions that he or she needs.

These home variables are thought to influence the development of the child’s identity dimensions and self-regulation potentials and performance levels: see Figure 1. Pino-Pasternak and Whitebread (2010) focus on the influence of parental behaviour on children’s self-regulation and self-regulated learning (SRL). They refer to Moss and Strayer (1990) to clarify that mother-child problem solving differs between gifted and non-gifted preschoolers. Compared with mothers of non-gifted children, mothers of gifted children encourage them to use meta-cognitive strategies significantly more often. For example, they wait longer to provide assistance, stimulating their children’s active participation and independent problem solving (cf. also Clark 1992; Robinson, Burns, and Winder Davis 2009).

**Preschool and primary school influences**
Interactions in a multilevel system context

In preschool and successive school situations, individual pupil variables are continuously affected by, and influence, environmental variables that define the instructional and learning situations (cf. Magnusson and Allen 1983). These variables may refer to the personal characteristics of the other pupils in class, for example, or to the teacher’s pedagogical, managerial and teaching characteristics, or to the various play and learning situations throughout school. At the beginning of a pupil’s school career, his or her starting or entry-level characteristics on the identity dimensions are most relevant as initial foci of the interactions with the environmental variables at school. In subsequent days and weeks, a pupil’s development and learning are shaped by simultaneous interaction processes between his or her entry-level characteristics and educational and other characteristics at multiple levels (see Durkin 1966; Mooij 1992, 1994). The pupil’s individual cognitive, social, emotional and motivation abilities and self-regulation capacities interact directly with the cognitive, social, emotional, and motivation characteristics of the other children in his or her small group or class; at the same time, the functioning of this group is influenced by the flexibility of the preschool or primary school’s organisation of play and learning processes, the educational policy of the school board, national standards for learning achievement, or outcomes of international research comparing learning achievement across countries (cf. Collier 1994; Cronbach 1983; Earle 2001; Minne, Rensman, Vroomen, and Webbink 2007; Mooij and Smeets 2009). Attending preschool and primary school thus involves functioning individually within an all-encompassing educational system where individual pupils may be nested within small groups, which in turn are usually nested within classes within the schools, which are themselves nested within school boards and districts, and so on. Different educational levels are thus hierarchically related, whereas
different variables at the various instructional levels may influence one another and interact simultaneously.

**Variables and interactions at pupil, small group/class, and preschool level**

For a child in preschool, it is the variables at the individual, small group and/or class, and preschool levels that have the biggest impact, relatively speaking, on its development in terms of identity dimensions and self-regulation capacities: see Figure 1. In terms of Gagné (2011), these types of impact are relevant to develop the initial giftedness or outstanding natural abilities into academic talents resulting from systematic stimulation and learning. He states that talent development is characterised by six main elements: (1) enriched curriculum; (2) clear and challenging excellence goal; (3) selective access criteria; (4) systematic and regular practice; (5) regular and objective assessment of progress; (6) personalised accelerated pacing.

From the perspective of learning psychology, at *individual level* the entry-level characteristics of *each pupil* should be used as the initial criteria for giving the pupil both individual and group level – or multilevel – instructional support in the preschool environment (cf. Lubinski 2004; Mooij 1999a, 1999b, 2000). This requirement does not appear to be fulfilled in regular education, as became clear also in the ‘grade/age lockstep’ of Gagné (2011). In addition, a pupil’s cognitive information processing capacities are important for understanding the possible causes and emergence of potential preschool problems, particularly in cognitively gifted pupils (Overtoom 1991). Baeten, Kyndt, Struyven, and Dochy (2010) present the outcomes of studies focusing on factors that encourage or discourage a ‘deep approach’ to learning in school. Deep learning refers to meaningful learning by means of pupil-centred methods intended to foster understanding; ‘surface learning’, on the other hand, aims to have pupils
reproduce learning materials (cf. Marton and Säljö 1997). High ability or gifted pupils need a deep approach to learning (Baroody 1993; Lohman 1990). They have the capacity to grasp and understand essential information much more quickly and effectively than other pupils, and possibly their teachers too. For a high ability pupil, adequately differentiated levels of play and instruction, including deep-level differentiation in the content of play and learning activities, are necessary to continue promoting the pupil’s development and learning in the identity dimensions.

If the individual level of play or instruction in preschool is too far below a gifted child’s abilities for a few weeks or more, the child will usually become disinterested in preschool, try to engage in other, more challenging activities, or become disruptive and socially isolated (Durkin 1966; Mooij 1992). Detailed or low-level instructional learning guidance is generally suitable for novice learners or low-ability learners, but this level of specificity holds back more autonomous and experienced learners (Lohman 1990). Kalyuga (2007) uses the term ‘expertise reversal shift’ to describe the effect whereby knowledgeable learners do not progress when confronted with detailed external guidance instead of minimal instruction and learning support to achieve far-reaching outcomes. He identifies this shift in the early school years as well, stating that ‘even preschool children could be experts in solving some specific classes of tasks, for example, paper-folding tasks’ (p. 511). The phenomenon of expertise reversal in relation to enforced cognitive underachievement of gifted preschoolers by their educational environment has been demonstrated in reading, writing, and mathematics (Baroody 1993; Durkin 1966; Mooij 1999a, 1999b).

At small group level or class level, the mean performance of the pupils’ development in identity dimensions and their degree of heterogeneity, for example in cognitive, social, emotional or motivation development levels, may block or hinder the
adequate development and learning of a gifted child (Colangelo et al. 2004; Gagné 2011; Mooij 1994). Mooij and Driessen (2008) carried out a secondary analysis of national cohort data on Dutch pupils in integrated regular preschools and primary schools. Longitudinal analyses per pupil compared language and arithmetic achievement in 2004 with language and arithmetic achievement in 2002 for pupils transitioning from preschool grade 2 (five years old) to primary school grade 4 (seven years old), and from grade 4 to grade 6 (nine years old). The results showed that during the transition from grade 2 to grade 4, the pupils scoring lowest on both language and arithmetic in preschool grade 2 (deciles 1, 2 and 3) attained relatively higher scores in the 2002–2004 period, whereas the pupils in deciles 6–10 had a relatively lower score in 2004. Moreover, the pupils in deciles 1 and 10 gained or lost the most, relatively speaking. A comparable pattern emerged during the transition from grade 4 to grade 6. Compared with the high ability pupils in grades 2–4, the high ability pupils in grades 4–6 no longer lost as much ground. This demonstrates that the biggest hindrances, relatively speaking, occur in the preschool period and the lowest grades of primary school. In addition, studies of highly able pupils reveal statistically significant relationships between changes in class characteristics and in the class teacher’s perception of the pupil’s behaviour and functioning (Mooij and Driessen, 2008). These results reflect the negative influences of ‘class size’, ‘age-based monitoring’, ‘class mean performance’, and ‘non-acceleration’ on the transition of high ability pupils from preschool (grade 2) to primary school (grade 4).

Other relevant characteristics of the class teacher concern the teacher’s attitude or sensitivity towards the individual development of each child in the group (Durkin 1966; Jewett, Tertell, King-Taylor, Parker, Tertell, and Orr 1998). Also important are the teacher’s degree of differentiated alertness (‘with-it-ness’) when all the children in the
class are engaged in playing and learning processes simultaneously (Kounin 1970) and his or her degree of directness and clarity in class management behaviour (Kounin 1970; Meijer 2003). These teacher characteristics are in turn reflected in the disciplinary behaviour of the pupils (Kounin 1970): see Figure 1.

At preschool and primary school level, particularly important conditions for gifted pupils are the direct and integrated availability of curricular resources and materials suitable for the full spectrum of development and learning levels of all pupils, and corresponding enrichment opportunities that stimulate interest, self-regulation and deep learning (Hodge and Kemp 2000; Gallagher, 1975). Pedagogical and flexibly structured integration of educational materials across small groups and grades is necessary, for all pupils.

Cross-level interactions (social comparison processes and effects)
In addition to level-specific influences as sketched in the above section, reciprocal influences or longitudinal process interactions may exist between variables located at different levels. A pupil will perceive the abilities, performances and achievements of other pupils in his or her small group or class and use this information in processes of social comparison relating his or her own efforts or results to those of the other pupils (cf. Bowerman 1978). A positive comparison result will usually enhance the pupil’s self-concept, motivate more learning and increase self-regulation in learning, whereas a negative comparison result will decrease the pupil’s self-concept and lead to withdrawal or a shift to other activities (cf. Marsh, Chessor, Craven, and Roche 1995). Davis (1966) named this effect the ‘frog-pond phenomenon’ to indicate that, generally, a person feels better and is more motivated when he or she is ‘a big frog in a small pond rather than a small frog in a big pond’. However, in a regular preschool or primary class
characterised by age-based play and instruction and mean-based play and learning levels, a pupil initially achieving highest on cognitive competences such as language or (preliminary) arithmetic will encounter social isolation and educationally enforced underachievement (Baroody 1993; Byrne 1998; Durkin 1966; Mooij 1992, 1994). Another effect on behaviour in both high and low ability children is their developing inattentive and disruptive behaviour (Bennathan and Boxall 1996; Kounin 1970) which – depending on the teacher’s managerial and instructional measures – may increase the behaviour and motivation problems of pupils initially scoring either relatively highest or lowest on the identity dimensions. The social comparison effect has been shown to function in ways specific to school subjects and in small groups of pupils within classes (Van den Eeden, Terwel, and Mooij 1993).

In the course of preschool and primary school, the within-school experiences lead to the development of a number of specific new variables that can be assessed for each pupil (Van den Eeden et al. 1993). These school subject-specific variables concern specific behaviour, achievement, relative achievement, feelings of competence, and a positive or negative attitude or orientation towards the school subject: see Figure 1. For example, research shows that specific changes in small group or class differentiation and instruction procedures affect school subject-specific social comparison processes, related learning activities and self-concept processes, and the corresponding achievement outcomes (cf. Delcourt, Loyd, Cornell, and Goldberg 1994; Mooij 1987). In addition, individually differentiated motivation processes and effects can occur owing to simultaneous social comparison processes involving specific achievement variables at school level (cf. Baeten et al. 2010; Bowerman 1978; Karnes and Johnson 1991; Van den Eeden et al. 1993).
To summarise, in regular school practice but also in educational programmes designed specifically to support highly able or underachieving pupils, simultaneous multilevel interactions and the corresponding social, emotional, motivational, and cognitive effects on individual pupils can be very complex and difficult to interpret. Longitudinal understanding and analysis (such as presented in Figure 1) are needed to correctly perceive, explain, and reduce the possible problems of gifted pupils in regular or special preschools or primary schools, based on information from or assessments at different levels simultaneously (see also Butler-Por 1987; Colangelo et al. 2004; Mooij 1992). Furthermore, cognitive high ability pupils – defined as pupils who perform cognitively in the top ten per cent – need accurate differentiation of curricula by achievement level and deep learning, and adequate variations in individual and small-group instruction and learning from their very first day in preschool. They should also continue to receive support throughout preschool, primary school, secondary school and higher by means of diagnostically adequate small group, class and school differentiation and learning (Butler-Por 1987; Fakolade and Adeniyi 2010; Gottfried and Gottfried 1996; Renzulli and Reis 1997) so as to prevent educationally enforced underachievement and related problems.

**Optimal instructional – learning design for gifted pupils**

*Optimal instructional and learning conditions*

Given the above information on pupils with specific educational needs, educational programmes for cognitively gifted pupils in particular should focus on fostering multilevel instructional and organisational characteristics conducive to high ability pupils on the one hand, and the corresponding learning processes and outcomes on the
other. Paying adequate attention to self-regulation of learning in school practice (Perels, Gürtler, and Schmitz 2005), and supporting teachers in structuring pupils’ self-regulated learning and deep-level processing can be assumed to positively affect the self-regulative processes and learning effects of cognitively gifted pupils in particular. The expected effects will become stronger, and more valid ecologically, as pupils are allowed to take more initiative and responsibility in class, given a coherent pedagogical and instructional structure throughout the preschool or primary school (cf. Parkhurst 1922; Rozendaal, Minnaert, and Boekearts 2005; Zimmerman 2002).

At pupil level, self-regulative competence-based learning is expressed in learning cycles consisting of the following stages: (1) estimation of the level of difficulty of one or more learning tasks, followed by selection of tasks to be performed; (2) offering various types of support or coaching for learning or carrying out the learning tasks; and (3) assessment or evaluation of the learning results according to specific criteria or norms, followed by selection of follow-up or other types of task, going back to stage (1) in the cycle. Increasing a child’s self-regulation or learner control by providing supporting information, or ‘scaffolding’, functions as a main prerequisite for taking the next motivated and effective, or competent, learning steps (Brush and Saye 2001; Mooij 2008). Each learning cycle has to be integrated into the diagnostic, instructional, managerial, and systemic aspects of the learning processes at the school.

**Diagnostic, instructional, managerial, and systemic aspects of learning**

Traditionally, we determine a person’s cognitive ability by administering tests that assess different types of cognitive intelligence and lead to a score or intelligence quotient (IQ) (Gallagher 1975; Mehlhorn 1988). Researchers, however, argue against using only IQ tests (Hodge and Kemp 2000; Robinson and Robinson 1992; Roedell,
Jackson, and Robinson 1980) or achievement tests (Hocksema 1982; Shaklee and Handsford 1992) to determine giftedness in education. Kuo, Maker, Su, and Hu (2009) and Walsh, Hodge, Bowes, and Kemp (2010) point out that observation and screening by parents or carers and teachers, adequate determination of learning progress, and portfolio assessment can all be used for a more comprehensive identification of giftedness in educational programmes. Diagnostics may then involve one or more parents or other coaches or experts screening a child’s performance; considering former learning results; testing using criterion-based or norm-based instruments; and having a teacher, coach, peer, parent, or another person provide evaluations or other types of assessments (cf. also Brown et al. 2005).

A diagnostic task can, for example, be part of a structured set of play or learning tasks or an ‘instructional line’ of such a set. This line may in turn be one of many sets of instructional lines that can be combined into learning arrangements which, in combination, form a specific curriculum. A diagnostic indicator may therefore serve as a criterion that refers to specific curricular activities to be performed. Integrating both criterion-based and normed indicators in instructional lines will secure adequate differentiation and instructional support for continuous learning progress at individual, small group and class, or school level. The most relevant curricular concepts and their diagnostic assessment based on standardised and normed measurements specify a ‘pedagogical-didactic kernel structure’ of competence domains (cf. also Earle 2001; Kemp 2000). Diagnostic and instructional learning aspects must be managed in order to organise and adequately evaluate subsequent learning processes in good time for individual pupils, small groups of pupils (cf. Kreijns, Kirschner, and Jochems 2003; Van den Boom et al. 2004), groups or classes, schools, or higher organisational levels.
The corresponding managerial aim is to achieve multilevel transparency and an optimal balance between individual and group-based learning progress and the related assessment, given the pedagogical choices made and the budgets available. The related systemic aspect of learning indicates that a pupil belongs simultaneously to a family, one or more peer groups outside school, and one or more small groups or classes in the preschool or primary school where he or she spends many hours every week. The pupil may also have contact with youth health care professionals, for example (Black, McCormick, James, and Pedder 2006; James, Black, McCormick, Pedder, and William 2006).

**Multilevel differentiation, ICT support and strategies to optimise learning**

Adequate multilevel differentiation of curricular materials and procedures is therefore the first dimension of educational conditions that improve education and learning for gifted and other pupils. Internet-based Information and Communication Technology (ICT) can also assist in registering, integrating, evaluating, and reporting instructional, learning, and evaluation processes in various ways, integrated across different learning situations and organisational levels (Blumenfeld, Fishman, Kraycik, Marx, and Soloway 2000; Crook 1998; European Agency for Development in Special Needs Education 2001; Ely 1999; Gustafson 2002). If designed to support the diagnostic, instructional, managerial, and systemic learning aspects referred to in the previous section, ICT can act as the second dimension representing conditions for optimal learning (Mooij 2007; Sinko and Lehtinen 1999). The third dimension empowers the combination of the first two dimensions in school practice; it concerns conditional strategies to improve the pupils’ development and learning, including self-regulation of learning. Combining these three educational dimensions and the diagnostic, instructional, managerial, and
systemic learning aspects results in a pattern of guidelines for optimal learning in flexible multilevel educational contexts: see Table 1.

Table 1 about here
In Table 1, guidelines 1.1–1.5 specify the pedagogical-didactic kernel structure of competence domains, including the most relevant curricular concepts and their diagnostic assessment based on both criterion measurements and standardised and normed measurements, if possible. Competence domains may include identity dimensions such as in Figure 1, for example, or may concern social-emotional performance; general intelligence; language; arithmetic/mathematics; physical-medical aspects; general psychological characteristics; and motor activities (cf. Byrne 1998; Gallagher 1975). Diagnostic indicators must be integrated with corresponding sets of curricular learning tasks and activities in order to build instructional lines reflecting learning arrangements to be used by pupils. For example, a teacher can use test information at national level to select one or more concepts/subconcepts referring to specific skills assessed by means of a pupil monitoring test, and connect specific criterion-based curricular tasks or school-based evaluation activities to self-made instructional lines, resulting in specific learning arrangements for specific types of pupil.

Guidelines 2.1–2.5 of Table 1 present Internet-based ICT support for building and providing a pedagogical-didactic kernel structure, initially at national level. ICT assistance can thus provide integrated assessment and evaluation procedures for all schools, teachers and other professionals, and learners. ICT can also help structure, enhance, and promote the use of differentiated curricular-based instructional lines and corresponding learning and assessment procedures. Various types of users associated with schools can then select instructional lines or create or adapt these lines to one or
more pupils, small groups, classes, or schools (cf. Clark and Estes 1999; Reynolds 2005).

Guidelines 3.1–3.5 of Table 1 first of all concern the screening of a pupil’s initial or entry-level characteristics in preschool (cf. Colangelo et al. 2004; Durkin 1966). Mooij (2000) has developed a psychometrically controlled screening procedure using the identity dimensions in Figure 1 for both parents or carers and preschool teachers. The procedure estimates a child’s level of competence in the seven domains by comparing the child’s behaviour with the behaviour of same-age peers. This is a comparison most parents can make in order to evaluate their child’s behaviour. The resulting information can be used to check and compare the parents’ and preschool teacher’s views of the child. The results can also be used to select and assign level-adequate play materials or instructional lines/sublines just above the individual child’s actual competence levels, in different areas of development or school subjects (cf. Bennathan and Boxall 1996; Tymms, Merrel, and Henderson 2000).

From the instructional point of view, it is also important to immediately and mutually control prosocial relationships between pupils and teachers in small groups, classes and preschools or primary schools (Chen 2006; Skinner, Bryant, Coffman, and Campbell 1998). Collaborative social and didactic procedures can be integrated into instructional lines and learning arrangements in order to stimulate pupils’ prosocial learning (cf. Chen 2006; Hepler 1998; Kaplan, Gheen, and Midgley 2002; Kreijns et al. 2003). The instructional support offered must take into account entry-level differences between pupils with respect to competence, magnitude of learning steps, speed and accuracy in learning, use of meta-cognitive strategies, and degree of self-regulation during learning. From a managerial point of view, collaborative self-regulation in small groups enables the teacher to concentrate on those pupils most in need (cf. Cameron,
Cook, and Tankersley 2011). Overall, by applying the guidelines in Table 1, it becomes possible to improve each learner’s progress continually across different learning situations and educational sectors.

**Multilevel hypothesis**

If gifted pupils have access from the beginning of preschool to multilevel instruction at levels appropriate to their initial competence, as outlined in Figure 1 and Table 1, they will effectively engage in instructionally supported and self-regulated learning processes at their own levels. At the same time, schools and teachers will be able to concentrate on relatively slower or less adequate learners at their own levels. Once such educational differentiation becomes part of school practice, the traditional, age-based preschool and primary school system will be transformed into an instructionally supportive, ICT-based managerial system, meeting the needs of different types of pupil. This transformation will improve the learning processes and educational careers of both high and low ability pupils, but the high ability pupils in particular. A multilevel hypothesis expressing this transformational expectation is formulated as follows:

As differentiation of learning materials and procedures (dimension 1), integration by and use of ICT support (dimension 2), and strategies to improve development and learning (dimension 3) are achieved at multiple educational levels in preschool and primary school, multilevel differentiation and evaluation of learning processes will improve. This will result in better self-regulation and higher social, emotional, motivation, and cognitive learning outcomes for pupils who initially deviated most
from the mean in their group or class, or their peers’ norm, in particular the high ability pupils.

**Discussion**

**Conclusions**

The answer to the first research question clarified why, and how, gifted pupils may be confronted with various problems of educationally enforced underachievement in regular preschool or primary school. The theoretical elaboration took the form of a longitudinal multilevel model: see Figure 1. It became clear that, to ensure that cognitively gifted or high ability children remain motivated in preschool and primary school, they need specific cognitive, motivational, emotional, and social stimulation that fits their individual genetic basis but also their potential and actual abilities and achievement levels, including self-regulation abilities in play and learning. Giftedness therefore needs to be detected and supported earlier in preschool or primary school than is usually the case (cf. also Shore 1996; Clark 1992).

The answer to the second research question described what can be done to develop and create psychologically adequate, pedagogically and didactically optimal instructional conditions for gifted and other pupils. One approach involves using sets of guidelines to design differentiated educational, ICT, and learning improvement support for different pupils (see Table 1). The theoretical assumptions underlying these guidelines were summarised in a multilevel hypothesis concerning specific preschool/primary school conditions and corresponding learning effects for cognitively gifted pupils in particular.
The approach in Table 1 differs from the usual support activities for cognitively gifted pupils, such as enrichment, compacting, and part-time participation of gifted pupils in extra or plus classes. These activities are meant to offer gifted but also underachieving pupils more challenging assignments after they have finished their regular play and learning processes (cf. also Gagné 2011; Purcell et al. 2002). The guidelines in Table 1, however, emphasise diagnostic stringency in both normed and criterion-based play and learning processes, learning arrangements and extra projects, and self-regulation from a pupil’s very first day in preschool. This may mean, for example, that four-year-old gifted pupils function at language or math levels typical of seven- or eight-year-old pupils in regular education, even if the gifted pupils are placed in their age group. Enrichment and extra or plus classes only start some years later; they have their basis in age-based education and use this basis as a reference for additional differentiation. The support provided by extra or plus classes may result in negative longitudinal effects for cognitively gifted pupils, however (see Mooij et al. 2007). That is because such classes are attended by different types of pupil, such as high ability pupils, underachieving pupils with cognitive, social, emotional or behavioural problems, and high ability pupils who no longer have adequate learning strategies. Moreover, as with enrichment and compacting, part-time extra support offers much too little and comes much too late for many gifted pupils. This interpretation is in line with Colangelo et al. (2004), Delcourt et al. (1994), Gagné (2011), and Marsh et al. (1995).

**Developing inclusive preschool and primary school practice**

A number of trials are being conducted at Dutch preschool and primary schools to explore the conceptualisations, guidelines, and procedures put forward in Table 1. One pilot is taking place in a regular preschool and another in a special education
programme for cognitively gifted pupils. Initial results demonstrate that, in both pilots, this innovative approach is meeting psychological, pedagogical, and professional problems in preschool/primary school practice at different levels. For example, teachers, school principals and school boards may appreciate or evaluate information about high ability and underachieving gifted pupils differently. They may perceive underachievement as intentional pupil behaviour instead of the pupil’s adaptation to inappropriate play, instructional, and learning processes. Positive attitudes towards, or expertise concerning giftedness and its educational urgency are not self-evident in preschool/primary school practice, paralleling the situation arising from the inclusion of pupils with different types of disability (see De Boer et al. 2011). Mooij and Smeets (2009) report about school conditions that have to be fulfilled in order to deal adequately with children with emotional and behavioural disorders (EBD) who vary in many respects. They concentrate on how mainstream primary schools design different instructional situations to support pupils with EBD in practice, and how this design could be improved to enhance positive effects on the functioning of pupils with EBD in particular. Three sets of educational conditions seem most relevant; the instructional and social-emotional environment, the system of detection and intervention, and the support given to teachers and schools. Case studies at 12 mainstream primary schools in the Netherlands show that the schools focus on providing an adequate social-emotional environment and a corresponding system to detect and manage EBD. However, they lack a coherent pedagogical-didactic structure to integrate diagnosis, special or mainstream curricular levels and materials, and reliable or valid evaluation of social learning results. In addition, they mostly lack a systematic approach to obtaining information from and collaborating with parents and other professionals or external agencies.
The actual trials for cognitively gifted pupils clarify that preschool and primary school teachers hardly know how gifted pupils aged four or five act, function and learn at levels typical of children some years above their chronological age. To develop inclusive practice it is therefore very important to start screening each new pupil in preschool, and for both parents and preschool teachers to be involved, since parents can inform the teacher about the child’s characteristics and, if relevant, giftedness. The next step is to clarify the distinction between curricular criterion-based and normed-based evaluation and testing in preschool and primary school, and to combine these two approaches in pedagogically responsible ways for different types of pupil. For example, pupils who achieve relatively low in one or more respects, more or less average pupils, and gifted pupils initially performing in the top ten percent. For all types of pupils, however, education should support their talent development (cf. Gagné, 2011) which implies that educational differentiation should match relevant pupil characteristics from the start in preschool. The actual experiences demonstrate that this preventative innovation to develop inclusive education for cognitively gifted pupils requires much more practice support for preschool and primary school teachers and principals than is presently the case (cf. also Yeung 2011; Zhang 2011).

**Note on contributor**

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References


Brush, T., and J. Saye. 2001. Defining hard and soft scaffolding in technology-enhanced student centered learning environments. Paper presented at the conference of the Association for Educational Communications and Technology (AECT), November 8-10, in Atlanta, USA.


Table 1. Educational conditional dimensions, learning aspects and guidelines for optimal learning.

<table>
<thead>
<tr>
<th>Learning aspects</th>
<th>Educational conditional dimensions</th>
<th>Differentiation of learning materials and procedures</th>
<th>Integration and use of ICT support</th>
<th>Strategies to improve development and learning</th>
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</thead>
<tbody>
<tr>
<td>Diagnostic</td>
<td>1.1. Identify a pedagogical-didactic kernel structure for different domains and subdomains</td>
<td>2.1. Facilitate construction and use of a pedagogical-didactic kernel structure</td>
<td>3.1. Use a learner’s entry-level characteristics to start instructional lines</td>
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<tr>
<td>Instructional</td>
<td>1.2. Structure domains of competence in terms of skills, subskills and instructional lines</td>
<td>2.2. Enhance structuring and flexible use of instructional lines and learning arrangements</td>
<td>3.2. Create and control pro-social relationships in and around school</td>
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<tr>
<td></td>
<td>1.3. Include criterion-based and normed indicators to evaluate learning progress</td>
<td>2.3. Facilitate differential instruction, collaborative learning, and self-regulation</td>
<td>3.3. Use collaborative didactic procedures to stimulate self-regulation across grades</td>
<td></td>
</tr>
<tr>
<td>Managerial</td>
<td>1.4. Organise and match flexible groups of learners and teachers/coaches</td>
<td>2.4. Encourage differentiated and multilevel evaluation of learning progress</td>
<td>3.4. Concentrate teacher coaching on those pupils most in need of this</td>
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<tr>
<td>Systemic</td>
<td>1.5. Use integrated systems for monitoring, evaluation, and administration</td>
<td>2.5. Integrate instruction and learning across different contexts and points in time</td>
<td>3.5. Apply multilevel indicators to improve instruction and learning throughout school</td>
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</tr>
</tbody>
</table>
Figure 1. Environmental home and preschool/primary school influences on a pupil’s development (three-level model).

- **Personal variables** (entry-level character, preschool)
  - Genetic base

- **Environmental variables** (home, school)
  - Parents’ stimulation
  - Parents’ education level

- **Personal variables** (primary school)
  - Identity dimensions:
    - Social-communicative level
    - General cognitive level
    - Language proficiency level
    - Pre-arithmetic level
    - Emotional-expressive level
    - Senso-motor level
    - Expected educ. behav./motiv.

  - Pre-/primary school variables:
    - Integrated curricular resources
    - Integrated enrichment possibilities

  - Small group and/or class level:
    - Teacher’s child sensitivity
    - Teacher’s with-it-ness
    - Teacher’s management
    - Pupils’ mean developmp./achievem.
    - Heterogeneity of pupils’ achievem.
    - Pupils’ disciplinary behaviour

  - Pupil level:
    - Degree of individual instruction
    - Differentiation content complexity

- **Interdependent relationships**
- **Causal relationships**

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Figure 1.