

RD4 in brief (www.rd4-rekenen.nl)

In 2011 a handbook for teachers was published on the subject severe difficulties on mathematics and dyscalculia. This handbook was realized with funds of the Dutch Ministry of Culture and Education (OCW). The assignment of the Ministry was to first work on prevention of difficulties and if there are learning difficulties, then try to reduce and prevent further difficulties.

As a follow up of the handbook, a diagnostic instrument was developed, based on the core ideas as described in the handbook. This was done in three steps. The first step was subject of a doctoral study and lead to a paper based version of the instrument. The study concerned the development of early mathematics in grade K1 - grade 3 (in Dutch grade 1-5). The second step was the development of a digital version, which resulted in RD4. RD4 in English means: a diagnostic instrument for analyzing severe mathematics difficulties on 4 levels of Action Theory (Figure 1). This part was also funded by the Ministry of OCW. Working with RD4 started in September 2016. After that, RD4 was further developed to grade 6 (in Dutch grade 8), again funded by the Ministry of OCW.

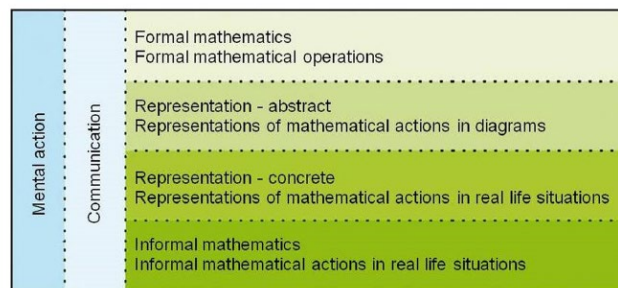


Fig. 1 Levels of action (Van Groenestijn 2002; Van Groenestijn et al., 2011). Level 1: informal mathematics and informal procedures; Level 2: representation of real life mathematical actions and situations; Level 3: representation of abstract models and diagrams; Level 4: formal mathematical operations

Traditional standard tests on mathematics focus mainly on the proficiency of doing computations. This is the top level four of the Action Theory. This way of testing assumes the idea that the child understand mathematics, which is not always obvious. The development of mathematical concepts takes mainly place on the lower levels, starting from informal actions which cannot be tested by a standard test. With RD4 we try to analyze the children's understanding of mathematics on the lower levels, together with proficiency on the top level. This is executed in individual interviews. The digital RD4 offers a matrix that horizontally follows the half year progress system according to the Dutch SLO curriculum and Cito standard tests through all levels of primary school. Vertically it lines out all subdomains of mathematics in primary education. Each cell in the matrix offers a set of items, based on the four levels of Action Theory. A navigator makes it possible to move top down and from left to right through the matrix, or the other way. The manual describes the way of doing the interview. In a first session the interviewer selects a starting level, based on the level of the standard test (Cito), and moves top down through that level. The navigator leads the interviewer to the first question in every cell. In a second session the interviewer selects a set of items based on the results of the first session, and asks the prescribed questions in an adaptive way horizontally by moving the navigator to left and/or right, up to the highest level the child can achieve. The questions are open, the interviewer asks the child to tell its way of reasoning and doing the computations, but the answers can only be right or wrong. The interviewer selects the final score and at the same time, the program marks the same score in color in the matrix. In the end of the interview the matrix shows the achieved profile of the child in four colors. This is a qualitative result. Based on the profile, teachers can finetune their mathematics instruction to the development of the child. The total interview may take about 1,5 hour, depending on the difficulties the child shows, the grade (e.g. E4) and the starting level.

The matrix RD4

In RD4 the colors were changed to red, orange, yellow and green, respectively level 1,2,3,4. This was done to get a better colored profile in the end. The color grey means 'no result'.

The matrix shows the result (profile) of a diagnostic interview with a child in grade E4. Starting level was E3. The profile enables the teacher to finetune mathematics instruction to the development of the child.

Leerlijn	Onderwerp	E1	M2	E2	M3	E3	M4	E4	M5	E5	M6	E6	M7	E7	M8
T	1 Op volgorde tellen	T1-E1	T1-M2	T1-E2											
	2 Subteren	T2-E1	T2-M2	T2-E2											
	3 Resultatief tellen	T3-E1	T3-M2	T3-E2	T3-M3	T3-E3									
	4 Verder tellen	T4-E1	T4-M2	T4-E2	T4-M3	T4-E3	T4-M4	T4-E4	T4-M5	T4-E5	T4-M6	T4-E6	T4-M7	T4-E7	T4-M8
5 Terugtellen	T5-E1	T5-M2	T5-E2	T5-M3	T5-E3	T5-M4	T5-E4	T5-M5	T5-E5	T5-M6	T5-E6	T5-M7	T5-E7	T5-M8	
6 Tellen met sprongen				T6-M3	T6-E3	T6-M4	T6-E4	T6-M5	T6-E5	T6-M6	T6-E6	T6-M7	T6-E7	T6-M8	
7 Positioneren				T7-M3	T7-E3	T7-M4	T7-E4	T7-M5	T7-E5	T7-M6	T7-E6	T7-M7	T7-E7	T7-M8	
G	8 Veel / weinig / ordenen	G8-E1	G8-M2	G8-E2	G8-M3	G8-E3	G8-M4	G8-E4	G8-M5	G8-E5	G8-M6	G8-E6	G8-M7	G8-E7	G8-M8
	9 Samenstellen	G9-E1	G9-M2	G9-E2	G9-M3	G9-E3	G9-M4	G9-E4	G9-M5	G9-E5	G9-M6	G9-E6	G9-M7	G9-E7	G9-M8
10 Splitsen	G10-E1	G10-M2	G10-E2	G10-M3	G10-E3	G10-M4	G10-E4	G10-M5	G10-E5	G10-M6	G10-E6	G10-M7	G10-E7	G10-M8	
11 Getallen schrijven	G11-E1	G11-M2	G11-E2	G11-M3	G11-E3	G11-M4	G11-E4	G11-M5	G11-E5	G11-M6	G11-E6	G11-M7	G11-E7	G11-M8	
12 Getallen benoemen	G12-E1	G12-M2	G12-E2	G12-M3	G12-E3	G12-M4	G12-E4	G12-M5	G12-E5	G12-M6	G12-E6	G12-M7	G12-E7	G12-M8	
OA	13 Optellen		OA13-M2	OA13-E2	OA13-M3	OA13-E3	OA13-M4	OA13-E4	OA13-M5	OA13-E5	OA13-M6	OA13-E6	OA13-M7	OA13-E7	OA13-M8
	14 Aftrekken		OA14-M2	OA14-E2	OA14-M3	OA14-E3	OA14-M4	OA14-E4	OA14-M5	OA14-E5	OA14-M6	OA14-E6	OA14-M7	OA14-E7	OA14-M8
	15 Aanvullen / Schatten		OA15-M2	OA15-E2	OA15-M3	OA15-E3	OA15-M4	OA15-E4	OA15-M5	OA15-E5	OA15-M6	OA15-E6	OA15-M7	OA15-E7	OA15-M8
	16 Aftalen / Hoofdrekenen		OA16-M2	OA16-E2	OA16-M3	OA16-E3	OA16-M4	OA16-E4	OA16-M5	OA16-E5	OA16-M6	OA16-E6	OA16-M7	OA16-E7	OA16-M8
VD	17 Vermenigvuldigen		VD17-M2	VD17-E2	VD17-M3	VD17-E3	VD17-M4	VD17-E4	VD17-M5	VD17-E5	VD17-M6	VD17-E6	VD17-M7	VD17-E7	VD17-M8
18 Delen		VD18-M2	VD18-E2	VD18-M3	VD18-E3	VD18-M4	VD18-E4	VD18-M5	VD18-E5	VD18-M6	VD18-E6	VD18-M7	VD18-E7	VD18-M8	
M	19 Meten met lengte						M19-M4	M19-E4	M19-M5	M19-E5	M19-M6	M19-E6	M19-M7	M19-E7	M19-M8
	20 Meten met gewicht						M20-M4	M20-E4	M20-M5	M20-E5	M20-M6	M20-E6	M20-M7	M20-E7	M20-M8
	21 Meten met inhoud						M21-M4	M21-E4	M21-M5	M21-E5	M21-M6	M21-E6	M21-M7	M21-E7	M21-M8
VH	22 Verhoudingen						VH22-M4	VH22-E4	VH22-M5	VH22-E5	VH22-M6	VH22-E6	VH22-M7	VH22-E7	VH22-M8
VB	23 Verbanden							VB23-E4	VB23-M5	VB23-E5	VB23-M6	VB23-E6	VB23-M7	VB23-E7	VB23-M8