Documentary analysis of learning dispositions promoted within the transition between Grade R and Grade 1 in the South African Curriculum and Assessment Policy

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This paper emerges from a broader research study investigating the promotion of key productive learning dispositions within policy and teacher assessment practices across a selection of Grade R and Grade 1 teachers in schools in the Grahamstown district. The paper reports on the findings of a documentary analysis of curriculum policy in terms of learning dispositions promoted. It points to the need for more explicit dispositional discourse and progressive unpacking of the transition between dispositions promoted in the formative Grade R year and the first year of formal schooling in curriculum documents.

Introduction and contextual background

This paper emerges from a broader masters research study conducted as part of the South African Numeracy Chair Project (SANCP) at Rhodes University that aims to research sustainable ways forward to the challenges of numeracy education in South Africa and beyond. Research within this project points towards student mathematical learning dispositions being an underexplored area and one which requires increasing attention (e.g. Graven, Hewana & Stott, 2013; Graven & Heyd-Metzuyanim, 2014; Graven, 2014) as well as the need for early intervention in numeracy learning. The broader study investigated the following questions:

> What productive learning dispositions are promoted in current curriculum policy documents and assessment criteria in Grade R and Grade 1? What are the similarities and differences in dispositions promoted across the curriculum and those promoted in assessment guidelines and support documents across these grades?

This paper reports partially on findings from a qualitative research study underpinned by a socio-cultural theoretical perspective that foregrounds learning as changing ways of being (Lave & Wenger, 1991; Wenger, 1998). Within this broad theoretical perspective two key analytic frameworks were used (for both the documentary and teacher practice analysis) that cohere with the view that learning dispositions (ways of being, habits of mind) must be prioritised. In particular the work of Kilpatrick et al. (2001) and Carr & Claxton (2010), in defining essential elements of key productive learning dispositions, were combined to enable the development of an indicator matrix used for the above mentioned analysis.

The analysis of the following policy documents, related to the Grade R to Grade 1 transitions, and in terms of the promotion of learning dispositions, area focus of this paper:

1. Curriculum and Policy Assessment Statements (CAPS) for Foundation Phase Numeracy (DBE, 2011)
2. Numeracy Handbook for Foundation Phase Teachers Grades R-3: CAPS Edition (DBE, 2012)

The presences of certain promoted dispositions are compared with international literature and frameworks and certain absences or under represented dispositions are noted. The paper points to implications for creating a more coherent language of description and transition between the Grade

R and the Grade 1 classrooms - strengthening and supporting the newly introduced Curriculum and Assessment Policy Statements followed by these schools. The impetus for this study came from the increasing acknowledgement of learning dispositions as a central aspect of learning in general and of mathematics learning in particular, both nationally (e.g. Graven, 2012; Graven, Hewana & Stott, 2013) and internationally (Gresalfi, 2009; Gresalfi, Boaler & Cobb, 2004; Gresalfi & Cobb, 2006). Yet this is largely underexplored in local studies relating to crisis in numeracy learning.

In response to the South African Government's 2009 'Green Paper' concerned with "improving strategic planning in the country" (DBE, 2012, p. 2), of which the first of twelve national priorities, or outcomes, is "Improved quality of basic education" (DBE, 2012, p. 2) Priority Goal 11, regarding improving access to ECD, was implemented, and was envisioned to be completed by 2014 – this entailed a national campaign to establish, in the year before Grade 1 (i.e. for learners aged 5 turning 6), a year of compulsory schooling called 'Grade R'. This recent local 'roll out' of Grade R pointed to the need for research into the crucial transitional phase between Grade R (the year before formal schooling) and Grade 1 both in terms of the content and assessment standards specified and the learning dispositions promoted.

Analytical framework used for the documentary analysis

In order to obtain Mathematical Proficiency throughout a child's schooling, 'how' children engage with mathematics is important. Of specific relevance to this article is the notion of "productive disposition" - the fifth strand of Mathematical Proficiency, following 'Procedural Fluency', 'Conceptual Understanding', 'Strategic Competence', and 'Adaptive Reasoning' - as developed by Kilpatrick, Swafford and Findell in their 2001 work: *Adding it up: Helping Children Learn Mathematics.*

This fifth strand, or productive 'disposition', is seen as equally important to the development of mathematics proficiency because if students "believe that mathematics is understandable, not arbitrary; that, with diligent effort it can be learned and used; and that they are capable of figuring it out," (p. 131) then the other four strands will develop, and vice versa. This strand is highlighted as being equally important in the early years, where this study is situated, especially in regards to good mathematics teaching because children:

> "enter school eager to learn and with positive attitudes towards mathematics. It is critical that they encounter good mathematical teaching in the early grades. Otherwise, those positive attitudes may turn sour as they come to see themselves as poor learners and mathematics as nonsensical, arbitrary, and impossible to learn except by rote memorisation. Such views, once adopted, can be extremely difficult to change." (Kilpatrick, Swafford, & Findell, 2001, p. 132)

Productive disposition refers to the tendency to see sense in mathematics, to perceive it as both useful and worthwhile, to believe that steady effort in learning mathematics pays off, and to see oneself as an effective learner and doer of mathematics (2001, p. 131).

Carr and Claxton (2010) identify the following three key dispositions relevant to what they term 'learning power':

Resilience: "the inclination to take on learning challenges where the outcome is uncertain, to persist with learning despite temporary confusion or frustration, and to recover from setbacks or failures and rededicate oneself to the learning task" (p. 14). Playfulness: Being playful, as described by Carr & Claxton (2010) does not necessarily point to 'silliness' or a lack of serious and meaningful intent. Rather it refers to a child who is "ready, willing and able" (p. 14) to understand, interpret or create

various strategies with which to approach learning situations. The result is a child who is able to use creativity of thought when tackling new problems and concepts.

Reciprocity: Carr & Claxton (2010) in their discussion of reciprocity identify that one of the most valuable learning and teaching resources available to young children in particular is that of 'other people'. The exchange of ideas and understanding, and the ability to articulate thinking processes are vital in developing a capable learner. For the authors, reciprocity is "both expressive and receptive and verbal and non-verbal" (2010, p. 15). Three key contributors to the development of reciprocity include "a willingness and ability for joint attention, participation, and taking account of the opinions and needs of others" (2010, p. 15).

Drawing on the above mentioned literature, and in particular the definitions of a productive learning disposition by Kilpatrick et al. (2001) and the key learning dispositions noted by Carr & Claxton (2010) the following indicators emerged as critical and comprehensive for use in analysing the presence or absence of the promotion of learning dispositions in current government policies: Reciprocity; Playfulness / resourcefulness; Resilience; Confidence / self-efficacy; and Connections to learner's world / see mathematics as worthwhile.

Government documents provide useful research data as they are authoritative, objective and factual (Denscombe, 2007). They are easy to access, as they are freely available online, are cost effective, offer permanence of data and also offer "authenticity, credibility and representativeness" (Denscombe, 2007, p. 232). Developing an analytical tool derived from relevant literature and using this to conduct content analysis of the documents is important as it "has the potential to disclose many 'hidden' aspects of what is being communicated through the written text" and "reveals 1. What the text establishes as relevant; 2. The priorities portrayed through the text; 3. The values conveyed in the text; 4. How ideas are related" (Denscombe, 2007, pp. 237-238).

Findings of the documentary analysis

Curriculum and Assessment Policy Statements (CAPS) for Foundation Phase: Numeracy

Section 1: National Curriculum and Assessment Policy Statement for Mathematics Foundation Phase (preamble) (DBE, Curriculum Assessment Policy Statements, 2012, pp. 3-8)

For the documentary analysis all statements that referred to or related to learning dispositions were extracted, and connected to the categories of indicators of the analytic framework described above. The table below provides an overview of the frequency of dispositional statements found in Section 1 of the CAPS document, and is laid out according to *dispositional category; examples of statements related to the category;* and *frequency of statement*. Emphasis has been added to specific words or terms within statements related to the categories.

Table 1. Frequency of dispositional statements by category – CAPS Section 1.

Dispositional Category	Examples of statements related to the category	Frequency of statements
Reciprocity	The National Curriculum Statement Grades R-12 aims to produce learners that are able to:	2

	"work effectively *with others* and as individuals" and "*communicate effectively"* (p. 5).	
Playfulness / Resourcefulness	The National Curriculum Statement Grades R-12 is based on "active and *critical* learning" (p. 5).	2
Resilience	-	0
Confidence / Self-Efficacy	-	0
Connections to learner's world / see mathematics as worthwhile	This curriculum aims to ensure that "children acquire and apply knowledge and skills in ways that are *meaningful to their own lives*" (p. 4).	1

It is evident from this brief section / preamble to the CAPS that *'reciprocity'*, which includes being willing and able to communicate, is included. This means that throughout schooling, throughout the different grades, and amongst the different subjects and learning areas, the ability to communicate ideas fluently and effectively is paramount. *'Playfulness/resourcefulness'*, or the ability to think and apply concepts creatively, is also included across the wide spectrum of school learning in this section. *'Connections to learner's world/see mathematics as worthwhile'* is also mentioned here, in relation to making all learning "meaningful" to the children and their lives.

Noticeably absent are statements relating to developing *'resilience'* and *'confidence/self-efficacy'*. However, a conclusion about the importance or relevance of these particular dispositions cannot be made from such a small sample of policy, and these indicators do appear in later aspects.

Section 2: Mathematics: Aims, Skills and Content (DBE, 2012, pp. 9-18)

The same method of analysis is used in this section. For this section, however, Grade R is discussed as a separate sub-section (DBE, 2012, p. 15) in terms of the classroom environment and appropriate programme for this grade, to be developed by teachers. An important distinction is made here in the emphasis that Grade R: "should promote the holistic development of the child" (p.15). It can therefore be expected that attributes associated with productive learning dispositions are encouraged and enhanced – through opportunities to communicate, socialise, and modelling of positive habits of mind (inquiry). Although specific dispositions are not explicitly discussed or listed herein, the environment and practices described would fit the criteria of a classroom ready to incorporate and accommodate the promotion of aspects of productive learning dispositions. The table below is similar to the one above and contains the *dispositional category; examples of statements related to the category;* and *frequency of statements.* It also distinguishes between statements intended for consideration across the Foundation Phase (Grades R-3), as well as those which are Grade R specific (i.e. statements were specific to the Grade R subsection).

Table 2. Frequency of dispositional statements by category – CAPS Section 2

Dispositional Category	Statements related to the category	Frequency of statements
Reciprocity	Grade R-3 "do, *talk* and record mathematical thinking" (p. 12).	2
Playfulness / Resourcefulness	Grade R-3 "spirit of *curiosity* and love for mathematics" (p. 9).	3
Resilience	-	0
Confidence / Self-Efficacy	Grade R-3 develop in learner: "*confidence* and competence" (p. 9).	1
Connections to learner's world / see mathematics as worthwhile	Grade R-3 "forges *link between child's preschool life and life outside school*" (p. 12).	2

In this section, *'playfulness/resourcefulness'* has the highest frequency of statements, with three statements.*'Reciprocity and 'connections to learner's world/see mathematics as worthwhile'* are also included with two statements each in this section.

Again, there is a noticeable absence in statements referring to *'resilience'*, and only one statement related to *'confidence/self-efficacy'.* This one statement is somewhat vague, in that it simply states that teachers should develop "confidence and competence" in the learner (p. 9).

Section 3: Content Areas Overview – Grades R-3 (DBE, 2012, pp. 15-285)

This section of the CAPS document outlines the specific content areas within Mathematics (i.e. Space and Shape), which are further broken down into different topis (i.e. two-dimensional shapes). Concepts and skills to be taught and learnt are specified within each topic, and clarifies what needs to be covered throughout the year. This section also aims to show progression across content areas throughout the Foundation Phase (Grade R-3) (DBE, 2012). The following table was developed using the same approach as above.

Table 3. Frequency of dispositional statements by category – CAPS Section 3.

Dispositional Category	Example of statement	Frequency of statements
Reciprocity	Grade R & 1: "*Describe* the position of one object in relation to another…" (p. 29)	Grade R: 14 Grade 1: 27
Playfulness /Resourcefulness	Grade R & 1: "*Compare* and order the length, height or width of two or more objects by placing them next to each other" (p. 27)	Grade R: 9 Grade 1: 16

Resilience	Grade R: "Teachers should...*not simply assume that their learners cannot cope with bigger numbers*" (p. 49)	Grade R: 1
Confidence / Self-Efficacy	-	0
Connections to learner's world / see mathematics as worthwhile	Grade R & 1: "Order regular events from their *own lives*" (p. 32)	Grade R: 8 Grade 1: 14

Reciprocity:

'Reciprocity' can also be thought of as the ability to communicate effectively and efficiently, as well as the ability to understand another person's articulation of their ideas. This communication can be verbal or non-verbal, expressive or receptive. In light of this, the following key words were identified as relating to *'reciprocity'*: *discuss; describe; explain; report; use language; write.* The frequency of these words was then counted across the content areas for the Grade R and Grade 1 respectively.

In the Grade R phase overview, these words (or variations thereof) occurred fourteen times across the numerous content areas and topics. In Grade 1, these words appeared twenty-seven times. This high frequency in both grades points to a prioritisation of communication (*'reciprocity'),* which coheres with the emphasis in the general as well as specific aims of the CAPS document. The phase overview is in line with the underlying principles of the document, and teachers are expected, through the implementation of this curriculum, to invest time and energy into achieving effective and efficient communication amongst learners.

Progression by the children in this particular disposition is also present in the jump from 14 instances to 27 instances from Grade R to Grade 1 respectively. This relates to children being increasingly able to communicate more frequently and with more alacrity. The progression can thus be noted through the increased demands on the children to use their communication skills; from reading, to reading and writing number symbols; from drawing patterns, to discussing the qualities of a pattern.

Playfulness/resourcefulness:

As discussed earlier, *'playfulness/resourcefulness'* in terms of a productive disposition relates not only to the physical 'playing with' or manipulation of concrete objects (although important in the Early Years' setting), but also to the ability to use known concepts in a variety of contexts. A certain 'flexibility' of thought is implied here, as well as what is often referred to as 'critical and creative thinking'. In light of this, the following terms can be used to describe *'playfulness/resourcefulness'*: *estimate; compare; extend; create own; interpret.*

In Grade R, these terms are mentioned nine times, and in Grade 1, we again see a significant jump in occurrences to sixteen frequencies. As with *'reciprocity'*, it can be determined from the analysis that this particular disposition is both prioritised, in line with the general and specific aims, as well as

designed to encourage progression form one grade to the next. This progression is once again about the sophistication with which the children can utilise and express this particular 'habit'.

As well as the above terms relating to *'playfulness/resourcefulness'*, this document also makes reference to other elements which can be considered characteristics of this disposition. Under the content area 'Space and Shape', relating to the topic '3D Shapes', Grade R learners are expected to "use 3D objects to construct composite objects" (p. 30). The ability to use objects in the construction of an individual composite or whole object is an expression of a child's creativity of thought – this often manifests in the Art section of a pre-school as children use cardboard boxes glued together in a systematic way to represent a 'machine' of some sort of their own interpretation (i.e. explicit reference to *'playfulness/resourcefulness'*). The progression for this particular instance in Grade 1 is described as "observe and build given 3D objects using concrete materials" (p. 30). It is not clear in this particular instance just how much the ability to 'play' with a concept is allowed or indeed encouraged. Often, depending on the specific activity and materials selected by the teacher for the children to use in order to reach this milestone will determine the establishment or encouragement of *'playfulness/resourcefulness'*, or dismissal and restriction thereof. To elaborate: A teacher who allows children to select a box/prism/example of a 3D objects from a wide selection, and provides a host of collected objects which can be used in non-specified, varied ways to construct a chosen final shape, may find that the children all come up with different ideas and ways of achieving the same desired outcome (*'playfulness/resourcefulness'* of thinking, and creativity encouraged). Conversely, if all the children are given the same object to recreate, using a specified type of material, and guided in a step-by-step way to achieve the same final result, creativity is secondary to a procedural 'right or wrong' approach. Since this particular objective is ambiguous in its intended execution, it could not definitively be included as the promotion of *'playfulness/resourcefulness'*.

Resilience:

From page 39 onwards in Section 3, the document contains a section on "Content Clarification". This section deals with the Grade R-3 overview once more, but this time it provides suggested sequencing of topics, suggested pacing, and clarification notes and teaching guidelines (p.39). Although a systematic analysis of this whole section is not in fact pertinent to this discussion, certain areas are selected where dispositions in Grade R in particular are mentioned. Corresponding mention in the Grade 1-3 areas is highlighted if at all present.

On page 49, "Problem types for Grade R" are discussed. Within this section reference is made to *'resilience'*, *'playfulness/resourcefulness'* and *'connections to learner's world/see mathematics as worthwhile'*, but not *'reciprocity'*. The exclusion of this disposition in this particular section, though, has been addressed in the general or specific aims, or in the content overview itself. *'Resilience'* makes a rare appearance in this section. On page 49, in relation to Grade R, teachers are encouraged to "not simply assume that their learners cannot cope with bigger numbers". Teachers here are not directly encouraged to motivate children to 'keep trying' but there is some implication to push them beyond their comfort zone (i.e. extend them). So far, little reference has been made to what should be considered an important attribute within the mathematics learning environment. With the development of *'resilience'* amongst children comes the empowerment necessary to change the education system in South Africa from the inside-out: children feeling empowered and confident

within themselves and with their abilities, not only in mathematics, but in life in general, will be better prepared to take on the challenges of poverty, injustice and social tension (Atweh et al., 2014). This said, however, the instruction to challenge children to explore mathematical thinking beyond what is the minimum curriculum requirement, or beyond what the learners have demonstrated they can do, is important as it indirectly encourages the development of *'resilience'* and in turn, *'confidence / self-efficacy'* in themselves – a positive regardless of the scope or extent to which it is done.

Confidence/self-efficacy

The development of *'confidence/self-efficacy'* as a specific indicator is not observable in section 3 of the CAPS document as a direct intended outcome of learning and teaching. However, because of its close reciprocal relationship with the development of *'resilience'* amongst children, it cannot be claimed that this indicator, in its absence, is overlooked in this particular policy document. Rather, it could be argued that it is present as a secondary intended outcome which arises through the development of other dispositional focused outcomes and activities.

Connections to learner's world/see mathematics as worthwhile:

For this indicator, statements within this section of the document that foreground explicitly the connections to the world of the learner and/or those that relate to the emphasis of the usefulness of Mathematics beyond the classroom were considered. *'Connections to learner's world/see mathematics as worthwhile'* refers to children being encouraged to approach mathematical concepts, which get more and more abstract as they reach higher grades, in everyday contexts to emphasise practical, experienced and real-world representations of concepts as well as the usefulness and validity of the concept. An assumption here is that a child will be less inclined to utilise and fully assimilate an abstract concept if they are not explicitly shown the relevance of that concept to their lives.

This disposition is referred to a total of eight times in Grade R and fourteen times in Grade 1. Specific mention is made in the topic 'addition and subtraction' (p.22) of "solving problems in context", both in Grade R and Grade 1. This refers to word problems, and represents the need to embed these 'story sums' in the everyday knowledge and experiences of the children, so that children may not only relate to the story itself, but also so that the mathematical concepts are less threatening. Dispositional statements related to this particular indicator also appear under the topics 'Pattern' and 'Measurement'.

Although progression is not immediately evident, it can be assumed that the sophistication of thought in the children will develop as they grow older and develop their mathematical as well as literacy skills. Encouraging children to continuously rely on and make reference to their own personal lives contributes to establishing connections to their world, and provides a way of approaching mathematics that enables children to establish 'ownership' of this activity, making it personal, and so enabling easier retention of the concept.

The second document relates to practical teaching elements. This document is important in that it supports the implementation of the foundational CAPS document, and, although it is not possible to

achieve the same desired outcome in every classroom, in every school throughout our diverse nation, this handbook serves to supplement the guidelines and practical implications laid out in the CAPS document. It also speaks to the practical manifestations of how and when productive learning dispositions can or should be promoted.

Documentary analysis of the Numeracy Handbook for Foundation Phase Teachers: Grade R-3

The overall aim of this document is to "enhance the pedagogic and didactic capacity of Foundation Phase teachers, to teach Mathematics more effectively" (DBE, 2012, p. i). The document is divided into two parts; the first part consists of different units which describe "what it means to be numerate and do mathematics in the modern world" (DBE, 2012, p. 1). This section deals with the foundational principles of all mathematical learning, across the five content areas, and across the grades. It also deals with "the discussion of critical factors that contribute to the development of numeracy" (DBE, 2012, p. 1). It is this section that will be analysed here. The following table gives examples of the statements relating to the promotion of productive dispositions which can be observed within Part 1:

Table 4. Frequency of dispositional statements by category in the Numeracy Handbook (Part 1).

Dispositional Category	Example of statements	Frequency
Reciprocity	"giving children the opportunity to *explain their thinking* to their peers and teacher" "need to encourage *reflection through discussion*" (p. 12).	11
Playfulness/Resourcefulness	"apply what you know to solve *unfamiliar or non-routine problems*" (p. 2). "need to understand the mathematics they learn in *flexible* and meaningful ways…"(p. 4).	7
Resilience	use understanding to solve problems knowing that " they *may have to struggle* and try a few different approaches" (p. 14). "believe that with *some effort* they can solve the problem" (p. 14).	4
Confidence / Self-Efficacy	"need to understand the mathematics they learn in flexible and meaningful ways so that they can apply it *with confidence* to make sense of the world" (p. 4).	2

Connections to learner's world / see mathematics as worthwhile	"start *with real problems* that present children with mathematics processes that are *embedded in meaningful contexts*"	8

Reciprocity

As in the CAPS document, *'reciprocity'* is a priority in context of teacher *practices*, extending the implications beyond a singular curriculum outline, and into the realm of the physical classroom environment. The implication of this prioritisation is that teachers are expected to encourage this particular disposition – the enacted curriculum is intended to align to the intended curriculum. Significant examples of the promotion of *'reciprocity'* appear on page 5 and 19, as the document discusses 'crucial factors' of teaching numeracy in the Foundation Phase, and 'guidelines for practice', both of which contain 'discussion'. This discussion mentioned can be observed in the children's ability to:

> (From Part 1): "demonstrate mental images", "explain their thinking", "present their mathematical understanding" and "reflect on their mathematical thinking" (p.i); to "reason about" what they have done (p.2); active encouragement by the teacher to "reflect on what they are doing and thinking" and "help children verbalize observations" which they can "explain to others and learn to interpret explanations of others" (p. 8); be given the opportunity to "make sense of and reflect on procedures and practices" (p. 11); they should "reflect on and think about" (p. 12) how they have solved a problem; develop understanding "through reasoning" (p 12); and finally, reflection should be encouraged through discussion (p. 12).

These many manifestations of 'discussion' as advocated in the 'crucial factors' and 'guidelines for practice' can be articulated by the children in a number of ways: "with concrete objects or use of drawings and sketches", "to their peers and to their teacher", "verbally and graphically" and through "a variety of dialogues" (p.i).

Playfulness/resourcefulness:

As with *'reciprocity'*, *'playfulness/resourcefulness'* is again prioritised in this document, appearing in multiple instances throughout Part 1. Similar to the descriptions present in the CAPS document, *'playfulness/resourcefulness'* here is described as the ability of the children to:

> Apply what they know to "solve unfamiliar or non-routine problems" (p. 2); "understand the mathematics they learn in flexible...ways" (p. 4); make sense of, use and relate basic mathematical ideas in a range of situations, and when solving problems (p. 11); and finally "use understanding of learnt mathematics to solve meaningful problems" (p. 14).

Teachers are encouraged to do the following in order to support and encourage these abilities, and so promote the production of *'playfulness/resourcefulness:* "create activities that reveal underlying

structures of numbers, operations and mathematical relationships" (p. 8), and expose the children to "non-routine problems in which they have to apply the knowledge and skills that they have developed" (p. 12).

Resilience:

Although only four instances were observed where this particular disposition is mentioned throughout the nineteen pages of this section, it is significant that it is mentioned. Again, as with CAPS document, *'resilience'* as a term is not directly referred to, but rather variations thereof or attributes which support the development of *'resilience'* are instead referred to as using their understanding while acknowledging that "they may have to struggle *and try a few different approaches*" and "believe with *some effort* they can solve the problem" (p. 14) (emphasis added). Finally, the document describes the ability of being able to 'engage' as seeing mathematics as "sensible, useful and doable – if you *work at it* – and are *willing to do the work*" (p.14) (emphasis added). This notion of 'doing the work', or putting in the effort is at the heart of *'resilience'* – the end result, the success or failure of the child, is irrelevant here, but rather the ability to 'engage' and sustain that engagement regardless of the complexity of the activity. No mention is made here of practical ways in which teachers can encourage the development of this habit amongst learners.

Confidence/self-efficacy:

Notably fewer frequencies of this particular dispositional category are observable within this document. *'Confidence/self-efficacy'* is directly related to or referred to only twice, onpage 4 as: children "need to understand the mathematics they learn in meaningful ways *so that they can apply it with confidence*"; and on page 14 as: "believe that with some effort *they can solve the problem*" (emphasis added).

Connections to learner's world/see mathematics as worthwhile:

The promotion of connections to the learner's world, or the importance of seeing mathematics as worthwhile, is also prioritised in this document. This is shown on the first page, where the practice of 'embedding' mathematical processes in meaningful contexts is mentioned, as well as in the section regarding 'crucial factors' – where the use of "meaningful problems" is advocated (p. 5). Finally, in the 'guidelines for practice' section, this indicator is again brought to the fore as the document calls on teachers to make mathematics "meaningful and relevant" (p.19). This is reiterated throughout the nineteen pages of Part 1, and is highlighted through stating children should:

> "experience Numeracy as a purposeful, *meaningful* and *sensible* activity" (p. 2); and experience it as "meaningful, interesting and worthwhile" (p. 3); the desire to encourage children to use mathematics to "*make sense* of their world" (p. 4); and to use their understanding of learnt mathematics to "solve *meaningful* problems" (p.14) (emphasis added).

It can be argued from the above analysis of Part 1 of this teacher's guide that the five productive learning dispositions are not only encouraged, but seen as fundamental in the effective teaching and doing of mathematics across the content areas and topics. This is in line with the intended CAPS curriculum, and many instances of teacher practice guidelines are mentioned herein – although not

detailed, a general idea is conveyed to the teachers around how to create an environment, and what sort of activities to conduct, in order to foster the development of these learning dispositions.

Concluding Remarks

Across the documents analysed, as well as across the various sections within these documents, the key indicators of dispositional categories most prevalent are: *'reciprocity'; 'playfulness/resourcefulness'* and *'connections to learner's world/see mathematics as worthwhile'. 'Reciprocity'* was consistently high in frequency, and the lowest instances of frequency were for the key indicators *'resilience'* and *'confidence/self-efficacy'.* This speaks to the inclusion of all key characteristics of disposition in international Mathematics Education (Kilpatrick et al., 2001) and general key learning dispositions in Early Childhood Development and Education (Carr & Claxton, 2010).

Across Grade R and Grade 1, there was no observable dissonance in respect of the prioritisation and promotion of key productive learning dispositions as outlined by the indicator categories. In instances where one particular indicator had a high frequency of statements in Grade R specific documentation, the same occurred in Grade 1, and the same for those indicators with lower frequencies. Notable as well, in terms of the two different grades, is the presence (especially in Section 3 of the CAPS document) of progression from Grade R to Grade 1 in terms of the expected level of sophistication of key productive learning disposition development.

References

DBE. (2012, January). *Action Plan to 2014.* Retrieved May 27, 2014, from http://www.education.gov.za: http://www.education.gov.za/Curriculum/ActionPlanto2014/tabid/418/Default.aspx

DBE. (2012). *Curriculum Assessment Policy Statements*. Retrieved October 5, 2012, from Department of Basic Education South Africa: http://www.education.gov.za/Curriculum/CurriculumAssessmentPolicyStatements/tabid/419/Default.aspx

DBE. (2012, November). *Numeracy Handbook for Foundation Phase Teachers Grade R-3: CAPS Edition.* Retrieved August 14, 2014, from www.thutong.co.za: http://www.thutong.doe.gov.za/Default.aspx?alias=www.thutong.doe.gov.za/foundationphase

Denscombe, M. (2007). *The Good Research Guide for small-scale social research projects* (3rd ed.). Berkshire: Open University Press.

Kilpatrick, J., Swafford, J., & Findell, B. (2001). *Adding it up: Helping children learn Mathematics.* Washington DC: National Academy Press.

Carr, M., & Claxton, G. (2010). Tracking the Development of Learning Dispositions. *Assessment in Education: Principles, Policy & Practice, 9*(1), 9-37.

Graven, M. (2012). Accessing and assessing young learner's mathematical dispositions. *South African Journal of Childhood Education*, 2(1), 49–62.

Graven, M. H. (2014). Poverty, inequality and mathematics performance: the case of South Africa's post-apartheid context. *ZDM*, *46*(7), 1039-1049.

Graven, M., & Heyd-Metzuyanim, E. (2014). Exploring the Limitations and Possibilities of Researching Mathematical Dispositions of Learners with Low Literacy Levels. *Scientia in educatione, 5*(1), 1-16.

Graven, M., Hewana, D., & Stott, D. (2013). The Evolution of an Instrument for Researching Young Mathematical Dispositions. *African Journal of Research in Mathematics, Science and Technology Education, 17*(1-2), 26-37.

Gresalfi, M. (2009). Taking up Opportunities to Learn: Constructing Dispositions in Mathematics Classrooms. *Journal of the Learning Sciences, 18*(3), 327-369.

Gresalfi, M. S., Boaler, J., & Cobb, P. (2004). Exploring an elusive link between knowledge and practice: Students' disciplinary orientations. In *Proceedings of the twenty-sixth annual meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education. Toronto: OISE/UT*.

Gresalfi, M., & Cobb, P. (2006). Cultivating student's discipline-specific dispositions as a critical goal for pedagogy and equity. *Pedagogies: An International journal, 1*(1), 49-57.

Lave, J., & Wenger, E. (1991). *Situated Learning: Legitimate peripheral participation.* Cambridge: Cambridge University Press.

Wenger, E. (1998). *Communities of Practice: Learning, meaning and identity.* New York: Cambridge University Press.

Acknowledgement: This research was supported by funding from the DHET/EU, the FirstRand Foundation (with the RMB), Anglo American Chairman's fund, the DST and the NRF.