Using the Concept of Mathematical Resilience to Encourage Positive Parental Interactions Around Mathematics

A Case Study by Katie Baker from research conducted at Coventry University

Introduction

- A child who has mathematical resilience (MR) is one who **values** maths, has a **growth** mind set towards maths, knows you have to **struggle** in order to learn maths and knows how to access **resources** to help them with maths. (Johnston-Wilder and Lee 2010) [1] Students possessing MR are thought to perform better in mathematics.
- Parents have a strong influence on how children's attitudes to maths develop but not all parents know how to help their children with maths. Some parental interactions with children around mathematics seem to cause negative effects on children's achievement in the subject (Maloney et al 2015). [2]
- An intervention was devised to support parents of 5 and 6 year olds in interacting more positively around mathematics including sessions on the mathematics children would be doing at school and on MR.
- One particular mother reported significant changes in interactions around mathematics and in her son's approach to mathematics after the sessions. The data from this participant was used to construct a theory about how this effect might have been achieved.

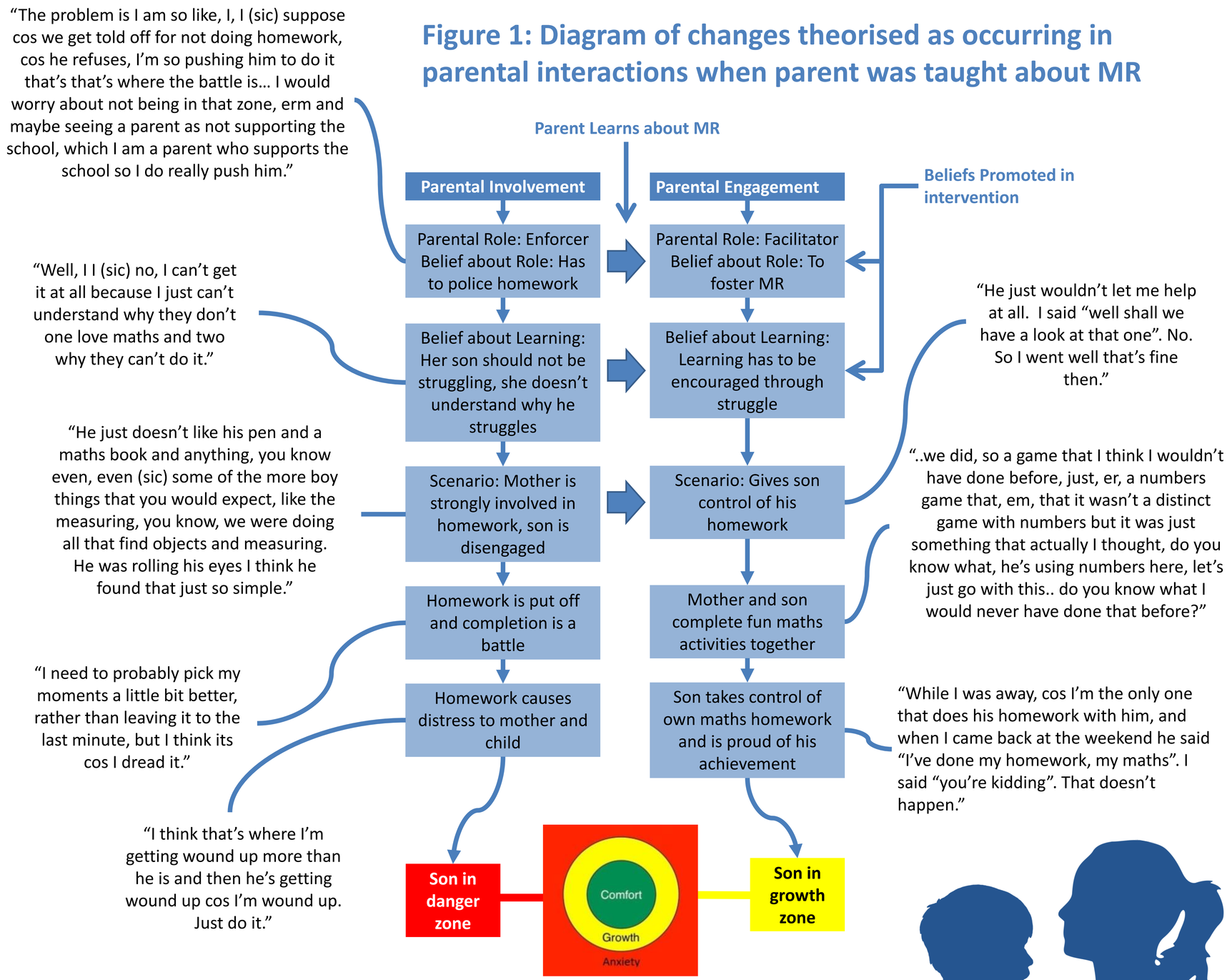
Definitions (developed from Goodall & Montgomery 2014) [3]

- **Parental Involvement**: a parent is demonstrating parental involvement with mathematics learning if they are taking part in a mathematical activity with their child.
- **Parental Engagement:** activities that parents engage in with or for the benefit of their child which originate with the parent and are a response to their knowledge of their child and that child's mathematical learning needs. Said to be the most beneficial type of parental interaction.

Methodology

- Intervention developed.
- Parents recruited through schools for trial of intervention.
- Qualitative (pre- and post- intervention questionnaires, reflexive diagries, video transcripts of sessions) and Quantitative (pre and post-intervention MR and Mathematical Anxiety Scale Scores) data collected from parents.

Figure 1: Diagram of changes theorised as occurring in parental interactions when parent was taught about MR



Growth Zone Model [4]

Approach for Statistical Analysis

- Theoretical sampling led to examination of this case which reported a large behavioural change in child.
- Data from all sources used to assess changes in mother after intervention and construct a theory about the possible cause of the changes.

Results

- Intervention led to change in how mother viewed her role in homework and thus what she did with her son (see Figure 1)
- Mother now trying to foster MR not just please the school.
- Son showed changes in behaviour towards taking control of his own maths homework.

Conclusions

- Parents may not have the same purpose as teachers in completing homework (i.e. here to keep out of trouble not to improve child's mathematics). This can create conflict.
- Teaching about MR was a powerful tool for helping this mother understand what was expected of her.
- Teaching about the development of MR should be considered as a tool to help parents work better with their children on mathematics.

References: [1] Johnston-Wilder, S., & Lee, C. (2010). Developing mathematical resilience. Paper presented at the *BERA Conference,* University of Warwick. Retrieved from http://www.beraconference.co.uk/2010, [2] Maloney, E., Ramirez, G., Gunderson, E. A., Levine, S. C., & Beilock, S. L. (2015). Intergenerational effects of parents' math anxiety on children's math achievement and anxiety. *Psychological Science, 26*(9), 1480-1488. [3] Goodall, J., & Montgomery, C. (2014). Parental involvement to parental engagement: A continuum. *Educational Review, 66*(4), 399-410 [4] Lee, C. & Johnston-Wilder, S. (2013) 'Learning Mathematics - Letting the Pupils have their Say'. *Educational Studies in Mathematics* 83 (2), 163-180.