# Teacher Views of Parent Roles in Continued Mathematics Home Learning

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This paper emerges from a broader study that investigated the strategies employed by teachers to continue mathematics teaching and learning during South Africa's COVID-19 lockdowns and through subsequent phased and partial re-opening of schools. In this paper, we focus on teacher views of the role of parents in these efforts gathered through two questionnaires administered from 2020 to 2021. Twenty-five Grade 4–7 mathematics teachers from schools in the Eastern Cape province took part in the study. We address the question: What were teacher perspectives on the role of parents in the continuation of mathematics teaching and learning during COVID-19 and the gradual reopening of schools? We explore the teacher responses and show how the pandemic context provided a stimulus to forge stronger teacher-parent relationships and opened opportunities for productive ways of extending mathematics learning almost exclusively undertaken in the classroom into homes.

## Introduction and Context

The COVID-19 pandemic necessitated a rapid re-imagining of how to continue mathematics teaching and learning through a period of initial total lockdown and school closures and then through the extended gradual reopening of schools. In South Africa schools were closed from 27 March 2020. For five weeks citizens were strictly confined to their homes and for a further five weeks schools remained closed (Vale & Graven, 2021). There was a gradual reopening of schools for certain grades from 8 June 2020, but another school shutdown was implemented from 23 July 2020. In total, Grades 5 and 8 and Grades 4 and 9 lost 42% and 39% of their school days, respectively (Hoadley, 2020). A rotational model of attendance in which learners attended school on alternating days was introduced and only officially ended early in 2022. Many school days were lost, and the home became a critical site of learning. This was not unique to South Africa, and thus the research presented here has relevance beyond South Africa. We draw on literature from the South African and the Australasian context to make this relevance explicit.

This paper emerges from a broader study that investigated the strategies employed by teachers to continue mathematics teaching and learning during South Africa's COVID-19 lockdowns and through subsequent phased and partial reopening of schools. In this paper we focus on teacher views of the role of parents in these efforts from two questionnaires gathered from 2020 to 2021. The goal was to understand the school-home relationship in the continuation of mathematics teaching and learning during COVID-19 lockdowns.

## Literature Review

Muir (2011) writes that there is relatively little that is published about the role of parents in the mathematics education of their children. This is despite the acknowledgment that parents are influential in the success or otherwise of their children in mathematics (Muir, 2011). Of the literature that is available, there is "widespread agreement … that students' learning is maximised when strong educational partnerships between home and school exist" (p. 1). Weerasinghe (2019) writes that "it is the involvement of parents with their children's education at home that is most likely to result in a positive difference to academic outcomes" (p. 755). Muir (2012) notes while parents have been previously viewed as impeding reform in

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mathematics education, parents also bring expertise and a knowledge of their children to contribute to their mathematical development.

Wadham et al. (2020) argued that achieving effective mathematics partnerships between the school and the home was difficult. Their study focused on teacher perspectives of parental involvement in mathematics as well as parent reports of their involvement in their children's mathematics work. The study revealed tensions between parent and teacher perspectives showing that "teacher assumptions that parents would not be confident with mathematics were not supported by the data" (p. 18). They concluded that it was important for schools to pursue gaining parent input and better communicate with parents about their children's mathematics learning to improve the flow of information between school and home.

A primary way in which mathematics learning extends into the home is through homework. Graven (2018) found that, in the area where this research is based, very few teachers set homework. At a national level Spaull (2013) found that about half of South African Grade 6 learners were not given regular homework thus limiting extension of learning and independent activity beyond the classroom. Graven (2018) reported that some of the reasons given by teachers for not giving homework included "problems with parents ranging from parents being unable to support homework or parents doing the homework for learners" (p. 41). However, after implementing a homework-drive intervention, Graven (2018) noted that participating teachers shifted towards more positive comments about parental involvement. In this study we seek to explore teachers' views about parental involvement through the pandemic.

Darragh and Franke (2021) report that pre-pandemic research revealed that "mathematics homework is often unsuccessful or stressful for both parents and children and that tension exists between home and school in the learning of mathematics" (p. 1). It is important to realise these challenges when considering the shift to the home becoming an essential site of learning during the COVID-19 school closures. Their findings included that there was a range of parent experiences during lockdown home learning from those who felt very little support from schools and teachers to those who felt supported and had the resources and motivation to help their children (Darragh & Franke, 2021). They suggested that "teacher support is essential for home-learning success" (p. 20). It is therefore of interest to explore teacher perspectives on the role of parents in their children's mathematics education during the pandemic.

## Theoretical Perspective

The theoretical perspective taken in this study is that of Cultural Historical Activity Theory (CHAT) (Engeström, 2001). The origins of CHAT lie in Vygotsky's theorising of the mediation of behaviour (Vygotsky, 2012) as a triangular model linking the subject, object and mediating artefact. As Engeström points out, however, this model fails to "fully explicate the societal and collaborative nature of actions" (Engeström, 1999, p. 30). In his model of activity, Engeström (2014) de-centres activity as being focused on individuals but positions it as involving joint activity by people working in interaction with one another. There are six elements to Engeström's model of an activity system: subject, object, mediating artefacts, community, division of labour, and rules. A classroom could be considered an activity system, in which the subject (the teacher) makes use of mediating artefacts in pursuit of the object of the activity system, which would be the learner doing mathematics and thereby the teaching and learning of mathematics. That classroom would comprise of "multiple individuals … who share the same general object" (Engeström, 1993, p. 67), which forms the community. Within that classroom there would be a particular division of labour in the sharing of tasks between the teacher and the learners; rules would guide this activity. These would be the "explicit and implicit regulations, norms and conventions that constrain actions and interactions" (Engeström, 1993, p. 67). This is what is known to be second-generation activity theory.

During COVID-19, however, the classroom activity system was severely disrupted with teachers and learners no longer able to access the classroom. The home became an additional site of learning and teachers needed to reach out to the home activity system to ensure continued mathematics teaching and learning. This implies the need to consider the home to be a second, interacting, activity system. Third generation activity system theorises the interaction of activity systems. Figure 2 provides a visual representation of the interaction of the home and school activity system:

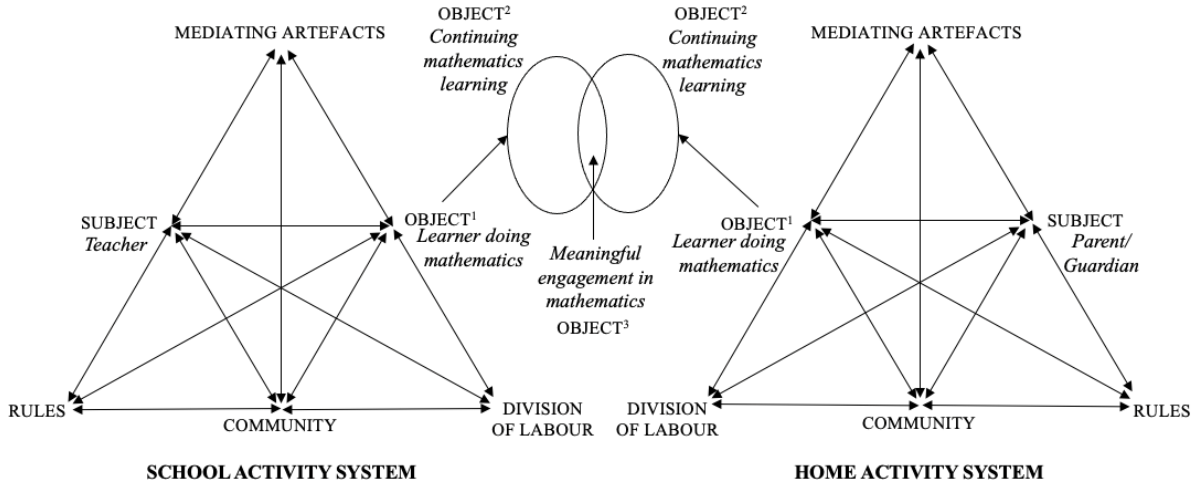


*Figure 1:* School and home activity systems (Based on Engeström, 2014).

For the periods when learners were learning exclusively from home, and later when learners were only attending school on alternate days, the home activity system was crucial to consider. Both the home and school activity systems needed to become oriented to the shared object of the learner doing mathematics, continuing mathematics learning, and ultimately the goal of meaningful engagement in mathematics. Wadham et al. (2020) reported that "the school and the home are both influential contexts in which a child learns mathematics and therefore schools and families should work collaboratively to achieve shared goals for children's mathematics learning" (p. 1). This involved teacher innovation and resourcefulness and required them to reach out to the parents and caregivers in the home to enable this. Here we explore how teachers referred to parents when reporting on the strategies they employed to continue mathematics education. It is important to note that there were various stages of lockdown, and thus the strategies for connecting with home activity systems shifted as the lockdown regulations shifted.

## Methodology

This research is a qualitative, interpretive case study in which we adopt a sociocultural perspective aligned to Vygotsky's (1978) notion of knowledge as being socially constructed. In the broader research project, we focused on seeking teachers' experiences and strategies of continuing mathematics teaching and learning through the pandemic. Through the thematic analysis of those responses, we noted emerging themes in relation to the role of parents in applying these strategies. For this study, we have revisited that data with the research question: What were teacher perspectives on the role of parents in the continuation of mathematics teaching and learning during COVID-19 school closures and the phased and partial reopening of schools?

The first questionnaire was conducted in November 2020, with the aim of eliciting the strategies teachers employed to continue mathematics learning through the shifting phases of lockdown and gradual school re-opening during 2020. The second questionnaire was conducted in September 2021 and included items asking teachers what strategies they were continuing to use in their efforts to ensure mathematics teaching and learning was happening. While the hard lockdowns of 2020 did not occur in 2021, many schools continued to use a rotational model of attendance throughout 2021, and thus it was still relevant to be examining what these strategies might be. It was only in early 2022 that schools returned to full attendance.

There were 25 Grade 4–7 mathematics teacher participants from eight schools. The teachers were all participants in the South African Numeracy Chair's teacher professional development Mathematics Inquiry Community of Leader Educators (MICLE) and were recruited from that group. Schools represented a range of socioeconomic circumstances, from those that were severely resource-constrained (5 schools) to those serving less resource-constrained communities (3 schools). Ethical clearance was granted by the Rhodes University Education Faculty Research Ethics Committee (ref. 2020-2732-4713). Alpha-numeric codes were assigned to participants for reporting purposes to maintain anonymity.

We undertook a thematic analysis to analyse the data. There were 53 responses from 19 teachers that directly referenced parents as members of the home activity system. The first author coded all 53 responses according to these categories. The second author reviewed these codes with strong agreement across all except two of the coded responses. These were discussed and consensus reached about the category of the responses. Questionnaires 1 and 2 (Q1 and Q2) were coded separately to allow for the noticing of any shifts or differences in the type of response at these two distinct time periods.

The questionnaires had a range of questions that looked to establish what strategies the teachers had employed during the COVID-19 school closures and the gradual re-opening of schools. The questions that generated the most responses with reference to parents were:

> What strategies, if any, did your school implement during the school shutdown periods (Questionnaire 1, 8 responses)
>
> Did you use technology to support you I managing the challenge of continuing education during the pandemic? How did you use this technology? (Questionnaire 1, 8 responses)
>
> At the start of learner rotation (in 2020) what strategies, if any, did you use to manage teaching and learning in the classroom and at home? (Questionnaire 2, 5 responses)
>
> Are there strategies that you have developed as a result of COVID disruptions that you might continue using even after schooling returns to 'normal'? (Questionnaire 2, 5 responses)

## Results

Overall, there were 53 responses in the data that directly referred to parents as a key member of the home activity system. These responses came from 14 of the teachers in Questionnaire 1 and 9 of the teachers in Questionnaire 2. Five of the teachers wrote about parents in both questionnaires. There were broadly three categories of responses that included the mention of parents. The first was mention of parents, or the circumstances of the home activity system, as a source of hinderance to the continuation of teaching and learning. The second was an instrumental view of the parent as the collector of resources from school and the conveyor of messages between the teacher and the learner, without any reference to any additional role with respect to teaching and learning. The third category comprised those responses that reflected a view of the parent as a partner in the continuation of mathematics teaching and learning, and thus responsible in part for the progress that their children were able to make during that time. Included in this category are those responses that mention sending extra materials aimed at clarifying the content to the parent. The parent was in those cases not

merely viewed as the conveyor of messages, but as needing to explain the work to their children. For example, "I used videos and voice records to parents on WhatsApp … involving parents more in the lessons" (GD2). Table 1 below summarises the number of responses per questionnaire and category.

Table 1
*Frequency of Responses Per Category Across the Two Questionnaires*

| | Questionnaire 1 | Questionnaire 2 |
|---|---|---|
| Category 1: Parent/home challenges | 8 from 4 teachers | 1 from 1 teacher |
| Category 2: Parents as message/ resource conveyers | 18 from 8 teachers | 3 from 3 teachers |
| Category 3: Parents as partners | 10 from 7 teachers | 13 from 6 teachers |

Although there was a drop in the total number of comments about parents from Q1 to Q2 there was a pleasing shift from Q1 to Q2 away from foregrounding challenges of parents and home situations to productive communication (8 in Q1 to only 1 in Q2) matched by a shift towards more comments about parents as partners in the teaching and learning process (from 10 in Q1 to 13 in Q2) along with less mention of parents as message conveyors. This reduction could be linked to the easing of lockdown restrictions which meant that learners were attending school on a rotational basis, and thus there was less need for parents to pass information on to their children. However, even with that shift it was encouraging to see the increase in mention of parents as partners over this time.

Only nine responses from four teachers were made of the first category (with 9 of these being from Q1. Illustrative examples are listed below:

> "Some parents decided to keep their children home…without contacting the school and without reason" (SM1)
>
> "Most parents don't have cellphones so it was impossible to keep learners busy." (BH3)
>
> "It was difficult to keep learners, teachers and parents motivated." (BH3)
>
> "Learners who are [usually] struggling with no support from home are struggling more." (BH3)
>
> "Parents that lost their job due to COVID couldn't keep up with WhatsApp lessons on a daily basis." (OL2)
>
> "Syllabus/curriculum and the maths concepts taught are a lot different compared to parents' education. This could create a challenge where some children live with grannies and they can't be helped." (OL2)

These responses reveal teacher perceptions that the home activity system for some lacked the resources for effective continuation of learning (e.g., "Most parents don't have cellphones"), or that the parents as the subjects of the home activity system were prolonging the isolation of the learner from the school activity system. In these cases, it appeared there was not productive interaction between the school and home activity systems and the object of continued learning was frustrating.

The second category of responses viewed the role of the parent quite instrumentally as a conveyor of information to the learners and as the person to collect work from the school for the children to complete. For example, "The educators were asked to prepare work for the students to do at home. The parents had to pick it up from school on certain days for certain grades" (SM1). There was a clear indication of the division of labour in this response: the teacher designed the materials, and the parents collected the work and in turn gave it to their children. Other teachers mentioned, "via WhatsApp parents were given the work to be done"

(AP4), "We asked parents to collect the homework packs during certain dates and times" (SM2), and "Parents could fetch booklets/work done and the learners could do it at home" (OL2). Overall, there were 21 responses of this instrumental nature.

There were a further 23 responses in which teachers mentioned a more substantial role of the parent, that of a co-educator, and occupying a position in the home activity system of actively working towards the continuing learning of their child. Some of these responses were similar to the "message conveyor" responses but included mention by the teachers of extra material designed to assist the parents to understand the content. For example, "[I] sent links to relevant lessons to help parents understand what/how they can help teach their kids, and [I] did videos of myself teaching lessons and sent to the parents' WhatsApp group" (PA1). One teacher reported that he "gave out homework in packs so that learners could get help from their parents [and] I used videos and voice records to parents on WhatsApp" (GD2). Another teacher also noted that "parents contacted me privately with queries or questions" (OL1). One school encouraged parents by sharing "on the school's Facebook page what they can do to keep their children busy … [and] parents were also encouraged to look for maths activities in the newspapers" (SM3). A teacher noted that "parents were in charge calling and asking about the problem and how to do it" (SN3). Another teacher also noted that "parental support played a big role in making sure homework was done" (OL2). Similarly, it was reported that "the parents were involved and explained to their learners the work and check[ed] their books" (SN3) and "parents are very helpful and concerned about the education of their kids" (GD2). From these quotes we see that the home and school activity system were, in certain cases, productively engaged together in the object of continuing meaningful mathematical learning.

Only one teacher made exclusively Category 1 responses (4 responses) regarding parents in both the questionnaires. Eight teachers made exclusively Category 3 responses in describing the role of the parents (2 in Q1 only, 5 in Q2 only, 1 in both). Across the other teachers there was a mixture of responses across the categories. One teacher who made three Category 1 responses in the first questionnaire went on to comment in the second questionnaire that "parental support played a big part in making sure booklet 'homework' was done" (OL2). For the whole group (Table 1) we saw that the responses were predominantly Category 2 for the first questionnaire, and this shifted to being predominantly Category 3 in the second questionnaire. This indicated a potential shift in the teachers' perspectives of the role of parents in the mathematics education of their children from 2020 to 2021.

Furthermore, it is interesting to note that in response to the question, "Are there strategies that you have developed as a result of COVID disruptions that you might continue using even after schooling returns to 'normal'?" teachers mentioned the relationship with parents as being one they hoped to continue. Three such responses included:

> "I will continue using WhatsApp and involving parents and use videos and voice records" (GD2)
>
> "Will be more interactive with parents, reminding parents of the importance of homework and self-study. Keep contact with parents to see how they and their children and doing/coping" (PA1)
>
> "Teacher-parent interaction got more important, hoping to keep it like that" (PA2)

## Discussion and Conclusion

It is important to note the source of the tensions evident in the Category 1 responses. Many centred on parental decisions to keep children away from school due to anxiety about COVID-19, a factor only mentioned in Questionnaire 1. They also focused on the limited resources in the home activity system, for example, no cellphone or data. This featured in both questionnaires and is likely to continue to be a challenge. It was also mentioned that the parents themselves were educated under a different curriculum and that this caused challenges.

Wadham et al. (2020) similarly found that there were tensions evident "between the contrasting mathematical pedagogies that parents use and those that teachers are directed to teach" (p. 15).

The increased interaction between teachers and parents, which is evident throughout the data, could mitigate this source of tension. Teachers reported creating "notes to explain concepts in detail [and] videos of explanations" (OL1) and "sending worksheets, instructions, pictures, messages and short videos to parents" (OL2). All of these measures would have functioned to support the parents in aligning their assistance of their children with the approach that the teacher would have taken and thus resulting in an effective interaction between the home and school activity systems to produce meaningful mathematical activity.

As with Darragh and Franke's (2021) finding that there was a range of parent experiences during lockdown home learning: from those who felt supported to those who felt unsupported, we note in this data a range of levels of support that teachers reported giving to parents. Some parents received extensive notes and explanations to support their efforts in the home activity system, whereas others were presented with instructions to collect work and requests to convey messages to the learners as evident in the Category 2 responses. These responses indicated that the home activity system was recognised as an important site of learning during COVID-19, but the support of the parents in that activity system was not always evident.

It is encouraging to note that just over half of the responses (23 of the 53) reference parents in a way that recognised them as partners in the continuation of mathematics learning of their children. This points to a possible shift away from earlier research findings (discussed above) that pointed to deficit views of parent support for learning. While there were instances in this data that reveal some of Wadham et al.'s (2020) noted tensions between teachers and parents, these were outnumbered by responses indicating partnering with parents. The stated teacher intentions to continue to engage closely with parents beyond the pandemic were also encouraging. There was recognition by some of the importance of connecting productively with the home activity system through engaging with the parents and a commitment expressed to continuing that practice (e.g., "teacher-parent interaction got more important, hoping to keep it like that [PA2]"). The teacher who made three Category 1 responses in Q1 commented in Q2 that "parental support played a big part in making sure booklet 'homework' was done" (OL2). We also see this in the shift in the balance of comments from eight Category 1 responses in the first questionnaire down to just one in the second, and an increase in Category 3 responses from 10 in Q1 to 13 in Q2. It seems likely that the pandemic had been the stimulus for this shift in perspectives on the role of parents. Parents were increasingly recognised as partners in their child's mathematics education and teachers were reporting on the measures they were taking to support the parents in orienting the home activity system to the object of continued mathematics education.

Despite our acknowledgement of the limitations of our small scale and localised study findings, our data presents a positive opportunity for moving forward. The pandemic has stimulated increased parental involvement in their children's education. As Muir (2012) noted, "students' learning is maximised when strong educational partnerships between home and school exist" (p. 1). We see in the data a shift to teachers viewing the parents as partners in the mathematical learning of their children and have a commitment expressed to continuing pandemic necessitated parent engagement moving forward. This points to the possibility of sustained productive interaction between the school and home activity system that could operate to strengthen the teaching and learning of mathematics.

## Practical Implications

The responses of the teachers about what was effective in terms of engaging parents in the home activity system have implications for school communities and education departments who support these schools. Teachers presented practical ideas on how they effectively

interacted with parents in a situation of distance, as COVID-19 presented. WhatsApp presented a cheap and effective means of quickly contacting parents, mentioned by 21 of the 25 participating teachers. This platform enabled teachers to share notes, instructions, videos, and voice explanations of work. While this was not possible for all families, as noted in the responses indicating parents had no cell phones or data, it was a simple technology that was within reach for the majority. Furthermore, given that this is a relatively cheap and effective form of communication, departments of education in South Africa could consider providing family data bundles to enable communication or a national policy could look to free internet connectivity, particularly in poorer areas. Teachers' effective use of booklets for 'home'-work also points to opportunities for schools and education departments to supply such workbooks for home use in future. Our data shared in this paper, along with the literature reviewed highlights that partnering with parents is *essential* for continued learning in contexts where learner access to schools is restricted and presents a powerful opportunity for strengthening mathematics learning beyond the classroom and beyond the pandemic.

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## References

Darragh, L., & Franke, N. (2021). Lessons from lockdown: Parent perspectives on home-learning mathematics during COVID-19 lockdown. *International Journal of Science and Mathematics Education*. https://doi.org/10.1007/s10763-021-10222-w

Engeström, Y. (1993). Developmental studies of work as a testbench of activity theory. In S. Chaiklin & J. Lave (Eds), *Understanding practice: Perspectives on activity and context* (pp. 64–103). Cambridge University Press.

Engeström, Y. (1999). Activity theory and individual and social transformation. In Y. Engeström, R. Miettinen & R. Punamäki (Eds), *Perspectives on activity theory* (pp. 19-38). Cambridge University Press.

Engeström, Y. (2001). Expansive learning at work: Toward an activity theoretical reconceptualization. *Journal of Education and Work, 14*(1), 133–156.

Engeström, Y. (2014). *Learning by Expanding: An activity-theoretical approach to developmental research* (2nd ed). Cambridge University Press.

Graven, M. (2018). Teacher perceptions of the successes and challenges of a mathematics homework drive for primary learners. In P. Webb & N. Roberts (Eds), *The pedagogy of mathematics: Is there a unifying logic?* (pp. 161–175). Real African Publishers.

Hoadley, U. (2020). Schools in the time of COVID-19: Impacts of the pandemic on curriculum. RESEP Non-Economic Working Paper. Research on Socio-Economic Policy.

Muir, T. (2011). Join the club: Engaging parents in mathematics education. In J. Clark, B. Kissane, J. Mousley, T. Spencer & S. Thornton (Eds.), *Mathematics: Traditions and [new] practices* (Proceedings of the 34th annual conference of the Mathematics Education Research Group of Australasia and the Australian Association of Mathematics Teachers) pp. 531–539. Alice Springs: AAMT and MERGA.

Muir, T. (2012). Numeracy at home: Involving parents in mathematics education. *International Journal for Mathematics Teaching and Learning, 2012.* https://www.cimt.org.uk/journal/muir.pdf

Spaull, N. (2013). Poverty & privilege: Primary school inequality in South Africa. *International Journal of Educational Development, 33*(5), 436–447.

Vale, P., & Graven, M. (2021). Reflecting on dilemmas in digital resource design as a response to COVID-19 for learners in under-resourced contexts. *Pythagoras, 42*(1), 1–17.

Vygotsky, L. (1978). *Mind in society: The development of higher psychological functions.* Harvard University Press.

Vygotsky, L. (2012). *Thought and language* (A. Kozulin, trans.). The MIT Press.

Wadham, B., Darragh, L., & Ell, F. (2020). Mathematics home-school partnerships in diverse contexts. *Mathematics Education Research Journal, 2020*, 1–21. https://doi.org/10.1007/s13394-020-00357-4

Weerasinghe, D. (2019). Striking a balance between children's need of support and parental roles in mathematics homework. In G. Hine, S. Blackley & A. Cooke (Eds), *Mathematics education research: Impacting practice* (Proceedings of the 42nd annual conference of the Mathematics Education Research Group of Australasia) pp. 755–762. Perth: MERGA.