

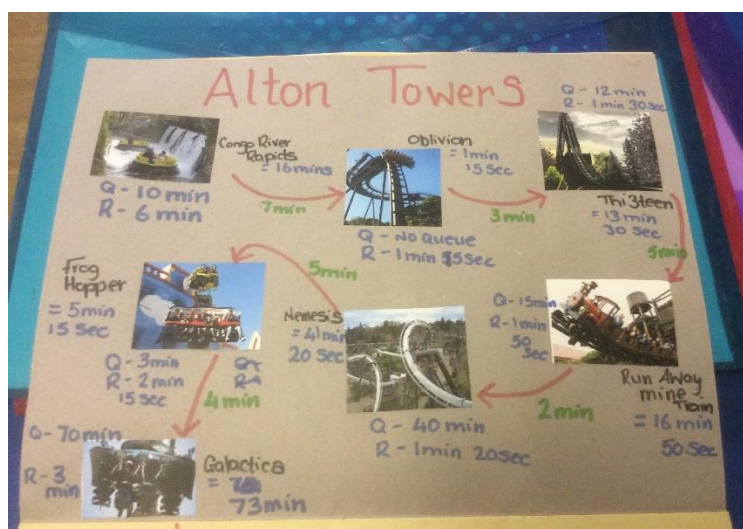
Parental engagement with mathematics homework

by Keith Williams and Hefin Williams

How can a homework programme be designed to increase parental involvement? We conducted a pilot study

Mathematics homework is a routine aspect of school life that many of us will have memories of as children or parents and, it should be said, not always fond ones. We set out to deliver a different experience to the typical “common sense” conception of homework as time to practice and complete by offering teachers a model that enables parents and teachers to show children that mathematics problems are real and being able to solve them is useful, and, that their efforts are valued both at home and in school.

Homework was piloted with nine primary schools that utilised mathematical problems set in ‘everyday’ contexts to generate specific forms of parental involvement in children’s learning to make homework interesting and enjoyable for parents and children. The outcomes of [this pilot study](#) are evaluated here.



Why parental involvement? Why homework? Why Mathematics?

Parents choose to become involved in their children’s learning because they believe they should be and that their involvement will make a difference. Research on parental involvement has identified a range of benefits: improved parent–teacher relationships; improved school attendance, attitudes, behaviour and mental health of children; and, increased parental confidence, satisfaction and interest in their own child’s education.

Homework, which is defined as any task assigned by teachers for pupils to be carried out during non-instructional time, is a natural conduit for encouraging parental involvement in learning. Evidence about the relationship between homework and attainment has proved inconclusive for the primary age phase but other benefits are possible.

For example, it can facilitate practice, preparation and development as an independent learner; it can provide opportunities for parents and children to work together and it can help parents to gain an understanding of what children are learning in school. Four achievement outcomes are susceptible to parental involvement: academic self-efficacy – if a person believes they are more likely to be successful they will be more likely to continue to behave in a way consistent with that belief; intrinsic motivation to learn; self-regulatory strategy use – metacognitions, and behaviours likely to promote learning success; social self-efficacy for relating to teachers.

Homework can be an emotionally charged event. Parents need to be aware of the dangers of falling into a potentially vicious circle of negative emotion during completion of homework. Unfortunately, parental recollections of school mathematics are not always positive. Parents communicate their beliefs and attitudes to their children and feelings of inadequacy, alienation and anxiety towards mathematics are not uncommon. When children become anxious, it takes up some of their working memory and reduces confidence.

By designing homework that was contextualised in the everyday use of mathematics we felt that the social and cultural make up of participants need not exclude families who had negative histories of education. Drawing attention to the way that using mathematics skills is an everyday occurrence may convince parents that they can discuss mathematical decision making with their child.

If homework tasks are situated in everyday applications of mathematics and if teachers can convince parents that they can help regardless of their own perceived degree of mathematical competence parent – child interaction is more likely. If teachers find time in their week to discuss homework the children will recognise that their efforts are valued both at home and at school. The child is then more likely to commit to learning, recognise the usefulness of maths as a life skill, and the value of sharing ideas and accepting feedback.

What we did: the homework programme

The participants were 14 full classes of primary school pupils, from nine mainstream primary schools, aged from six to eleven, their parents and/or carers and teachers. The schools involved had responded to an email invitation to take

part and as such were a self-selecting sample. The research design was qualitative and non-experimental. No attempt to control for specific school features was made. The focus of the research was the stimulation of parental involvement and it was assumed that all parents, regardless of background, want their children to be successful. The schools were motivated by the potential of increasing parental involvement and by improving the effectiveness of their mathematics homework. Homework packs were sent home every week over a period of twenty weeks and four sets of data were collected: parent feedback sheets, pupil questionnaires, teacher interviews and focus groups with pupils and parents.

The two distinctive features of the design were a 30-minute classroom homework changeover and information sessions used to introduce the homework to parents. The homework changeover was a designated time each week for the discussion and changeover of homework. It took the form of a 30-minute session structured around the four principles of informal assessment for learning: questioning; giving/understanding feedback; peer assessment; self-assessment. It was split into three distinct parts each lasting approximately ten minutes.

First, children were encouraged to share with peers their responses to the homework problem and explain how they approached it, questioning each other. *Second*, the teacher selected examples of work to discuss and provided feedback on elements of the response that were particularly effective. *Third*, new homework was introduced, and children given the opportunity to discuss how they might approach the new task. Parents were invited to take part in these sessions on three occasions allowing the teacher to promote and model involvement strategies.

At the information sessions parents were advised on behaviours to model, encourage and reinforce. For example, ability to adapt their approach; investment and involvement in the homework; willingness to try new and novel approaches; taking ownership of their homework; balancing turns with the child; responding quickly in a warm and positive manner at child's eye level; seeking clarification when child meanings are not understood; interpreting and expanding on ideas, and providing positive feedback. The role of the parent feedback sheet was explained. This consisted of a checklist of 15 statements that captured the behaviours and interactions taking place and a comment box for additional information.

Each homework task was distributed to the whole class and contained an introductory message to parents reminding them of the purpose of the homework, a mathematics objective, a list of any materials required, and a parental feedback sheet. The tasks addressed a range of mathematical concepts including money, co-ordinates, time and ratio. For example, one of the money-related tasks was called 'After School Club' and involved working out the cost of purchasing different

combinations of Lego sets for children to play with; one of the tasks focusing on time was based on a scenario of making different amounts of toast.

What we analysed

The researchers opted to evaluate using inductive analysis of participant responses. Participant responses were examined as social and public relationships, as perceptions of, and actual, practices. Data were transcribed and shared between the researchers then coded by actions, opinions, interactions, behaviours, practices, strategies and issues arising. Codes were categorised and sub-categorised by frequency and intensity to understand what participants were experiencing in relation to their roles, responsibilities, values and attitude towards the homework. Further searching and reviewing refined themes prior to final reporting.

Parents were asked to contact school if they did not wish to participate. The homework would still be distributed because it was part of school practice. The risk to pupils from participation was assessed to be negligible because parental involvement was taken to be an intrinsic 'good'. The homework tasks did not introduce additional burden to the children or teachers, since they were not additional to the normal homework routine and all materials were prepared by the researchers.



Homework engagement: some findings

The homework generated interactions between parents and children, children and their peers, children and teachers, and, more untypically, from home to school with children as the conduit. This included justification of choices; use of skills; modelling of recording and calculation strategies; identification of key information; adaptation of the task and common errors and misconceptions. The homework was contributing to the generation of a closer fit between parental actions and school expectations. This acts as a precursor to greater pupil motivation and enjoyment. Parents' actions provided a scaffold which enabled children to use the mathematical concepts they need to master in an enjoyable way.

The homework changeover session raised the profile of homework through the sharing of different responses to tasks recorded in the children's homework scrapbooks. The structure of the changeover generated bi-directional maths talk. The children were acting as go-between's disseminating knowledge and skills from their parents into the classroom. This is knowledge transfer from the home into the school which remains unusual.

Children developed their ability to provide reasoned explanations and understood that many methods could be used to solve one problem. Over time children moved from using closed questions and lower level open questions to higher level open questions that focused on the mathematics involved as well as commenting on choice of method and recording. Where a child had not attempted or returned their homework, a common problem in schools, the assessment for learning strategies become less effective. However, the teachers' pedagogical expertise allowed them to include pupils without their homework by focusing on peer review.

The design of the tasks appealed to parents by highlighting the mathematics knowledge parents often use unthinkingly in everyday situations and how natural it is to talk about mathematical problems. They recognised the logic in using scenarios that were authentic and relatable.

Conclusions and recommendations

The homework brought together elements of existing approaches to parental involvement, problem solving, and homework to offer a more meaningful experience. One that enables parents and teachers to show children that mathematics problems are real and being able to solve them is useful, and, thanks to the commitment made to peer review and self-assessment, that their efforts are valued at home and in school.

The use of open-ended problems provided parents and children with opportunities to reason and apply their knowledge and skills and may have increased their

willingness to “have a go”. Children more readily accepted feedback from parents and peers on how to improve their approaches. There are potential benefits to implementing a designated time in the school day to focus on homework and to apply formative assessment practices.

Attending a classroom changeover session helps to convince parents that the assessment for learning approach has pedagogic value and that it is not a shortcut for *proper* marking; that peer assessment generates useful feedback and leads children towards more effective learning strategies. It exposed children to a wider range of methods than would otherwise be experienced due to parental ideas flowing back into class.

Conveying a clear message regarding the anticipated parental role was crucial though not entirely successful. For example, it had been anticipated that parents would take on board that it was acceptable for them to adapt the tasks. There was evidence that this took place but there was more evidence that it did not, and this occasionally caused the type of tension that the pilot sought to avoid. The solution is to be dogged in the pursuit of face-to-face contact with parents and to ensure that ultra-clear instructions are provided.

Participating teachers identified several organisational improvements. Launch at the start of the school year in an informal way to capture the energy and optimism of children and parents and maximise face-to-face contact with parents. Give the homework prominence on the school website and consider different models of delivery, depending on school context and priorities. Plan time to develop authentic homework tasks that are realistic. Once a bank of activities has been developed little additional work is required.

The model evaluated here engages parents in an effective form of involvement which has little cost. Homework is widely accepted as a ‘normal’ school activity, so it is a logical strategy to use.

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