What part does homework have in teaching mathematics? During my PGCE school experience, I felt that I was somewhat neglecting homework in comparison to work covered in class. This manifested itself through a lack of time given to explaining and giving feedback on homework and the setting of tasks that were a continuation or “finishing off” of work done in class. I also felt that I was paying less attention to issues such as differentiation and providing a variety of learning tasks, styles and situations in homework activities compared to those done in class (where I was aware of explicitly taking account of ‘Cockcroft’ paragraph 243[1] about different styles of teaching). The tasks that I was setting and those that I had seen other teachers give had been almost exclusively focused on getting pupils to consolidate and practice skills and techniques that had been taught in class.

I wanted to ask myself if this was the most appropriate use of the time that pupils were spending on mathematics outside the classroom. What role does homework have in advancing pupils’ mathematical achievement, and how can I, as a teacher, set homework tasks that complement the work done in class and contribute to pupils’ mathematical advancement?

Studies on homework [2], [3], [4] have found, in general, that it can have a positive benefit on pupils’ learning, but that for maximum benefit, certain factors must be taken into consideration. In the view of OFSTED [3],

*Homework has the potential to raise standards, extend coverage of the curriculum, allow more effective use of lesson time and improve pupils’ study skills and attitudes to learning.*
How does homework achieve these benefits? According to the report, it is seen by many teachers as additional study time, thus making it possible for more material to be covered. In addition, it also allows tasks that can be completed independently to be done at home, thereby allowing lesson time to be focused on activities that require direct teaching. Homework is also believed to develop pupils’ independent study skills.

I wanted to investigate how I could use a greater variety of homework tasks beyond ’standard’ consolidation. As Weston [4] writes: ’A way of making homework integral to the learning programme was to ensure that the tasks complemented as well as supported what was done in class, rather than just expecting “more of the same”’. Thus I prepared a series of homework tasks that tried to take into account the factors I have written about above, as well as other considerations that I shall endeavour to highlight. In each case, I tried to make the purpose of the homework explicit, so that pupils knew why they were being asked to do it and how it related to the work they had been doing, or were about to do. I also tried to emphasise the importance I was attaching to the homework by taking longer than I had previously to set it and explain what I was expecting and how I would be marking it. Additionally, I hoped that by doing this and through the nature of the tasks I was setting, pupils would find them more motivating and, perhaps, more enjoyable than a consolidation / practice exercise.

However, this raises an important issue. How can one judge if pupils have enjoyed a set task or found it more motivating? Over a long-term period, one may expect higher completion rates, possibly higher marks, and therefore higher quality of work (although, again, there is the problem of defining what is meant by this term) but it is extremely difficult to separate that from other factors. My what is meant by this term) but it is extremely difficult to separate that from other factors. My

The request for different scales threw up a number of interesting examples, which provided a very good starting point for the next lesson. Thus two purposes had been served, namely, pupils had been introduced to the next topic, and they had also found a collection of real-life examples, helping me to provide a motivation for the study of scales.

Example two:
A second homework for Y7 was an introductory worksheet for LOGO, which asked pupils to draw the paths of a turtle when given a set of instructions and also to list the commands that would be required to make diagrams they had been given. The purpose of this activity (and the revision that pupils were asked to do on their previous angle work) was to prepare pupils for LOGO. This is an example of a ’distributed’ task – covering material not yet come across in class or covered in previous lessons. According to Cooper [2], ’studies revealed positive effects of distributed homework over same-day-content homework’. 

For me, this raises the question of what I expect from homework, both in terms of the pupils and in terms of myself. For myself, I might want to set a task that explores pupils’ pre-existing knowledge of a topic, or one that indicates how well pupils have...
grasped a concept that has been covered in class (ie, using homework for diagnostic purposes). The success of such homework could be judged by how much information I accrue through doing it and this might then feed back into my planning for the future. On the other hand, if my objectives are more concerned with taking pupils’ learning forward then I need some way of checking that these aims have been met. The only way to be sure that certain aims have been fulfilled is to devise activities that allow pupils to demonstrate that this is the case. It seems to me that here is a crucial point. One advantage of setting homework tasks that go beyond routine consolidation is that they may (not necessarily will) allow one to have different objectives in mind than simply ‘pupils will demonstrate that they can perform what was learned in class’.

**Example three**

With my Y10 group, we had been covering the areas of triangles, rectangles, parallelograms and trapeziums, including compound shapes. For most of the pupils in the class, I felt that it was appropriate to give them a task that required them to do some ‘backwards’ thinking, by starting with an area and using this to create an appropriate-shape. Hence the task I gave them was to cut out three compound shapes from a piece of card, with areas of 40cm², 60cm² and 100cm². However, there were some pupils for whom I felt that this would be problematic because their basic grasp of the areas of these shapes was not yet secure enough. This led me to set a differentiated homework, which for this latter group meant a consolidation exercise to make sure that they were happy finding the areas of different shapes.

I was pleased that the pupils all accepted my guidance as to which task they should attempt (might it be possible to cultivate a classroom environment in which pupils can be given the responsibility to choose what they believe to be most appropriate to them?). The work that was done enabled me to be sure that everyone in the group could find areas, whilst it challenged most pupils to think hard about what determines the area of a shape.

**And finally some conclusions:**

Overall I was extremely happy with the results of this investigation, but it did raise one important point. What made this, in my opinion, a useful homework, were the same features that would have made it a good classroom activity also. This brought me to the conclusion that in setting homework one should be seeking to address the same things as with work done in class. There is a place for pupils to consolidate and practice their mathematical skills both inside and outside the classroom, but that is just one part of the learning of mathematics. There are just two caveats that I would make about this. Firstly, one has to remember that the environment outside the classroom is quite different to that inside: Help may not be as readily available, nor the required resources, and it is important that homework is capable of being completed. On a more positive note, being outside the classroom brings opportunities as well as limitations. Pupils can find real examples and contexts of the mathematics they have been doing in class, they can carry out practical work and they can make use of their environment.

My investigation into the setting of different homework tasks has illuminated a number of important issues for me. I am convinced that homework does have a role to play in the teaching and learning of mathematics. There are many different purposes that homework can serve and I feel that it’s important to identify the objectives behind the tasks that one sets. This allows pupils and teachers to know that the work is being set for a greater reason than simply because of the allotted time. Homework need not relate to the lesson it is set in, but it should be designed to form part of the overall learning programme: The tasks that one asks pupils to complete for homework can and should vary according to the purposes it is designed to fulfil. The work given to pupils outside the classroom should be varied, challenging and able to promote a high level of pupil interest.

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**A thousand years are as a day . . .**

On the Christian calendar

- How many days were there in the first millennium?
- How many days were there in the second millennium?
- How many days do you expect there to be in the third millennium?
- Which of these questions has the greatest number of alternative correct answers?

The answer to the last question is not the last question. Now extend to other calendars.

Jon MacKernan
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