Reflective essay on experience in schools

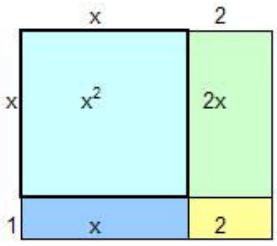
Introduction to Secondary School Teaching Final Task – Teaching experience reflection

I spent three weeks in a secondary school, observing, planning and teaching lessons, marking work, talking with teachers and working with small groups of pupils. This has given me a valuable insight into a number of important issues related to teaching. For instance, the question of an appropriate curriculum for 11 to 16 year olds. I feel that what we teach in mathematics should be of some use to all pupils. Einstein said "Teaching should be such that what is offered is perceived as a valuable gift and not as a hard duty". A maths lesson should be equipping the pupils with useful skills they can take into later life, not putting them off with topics only of interest to the mathematically minded. I spent some time with a pupil who wanted to become a plasterer, and claimed he had no need of maths for his job. Maths lessons for him placed too much emphasis on topics such as algebra and trigonometry which were of no interest, and this meant that even when they were learning relevant topics such as surface area and volume he was still unwilling to work.

Having said that, there is a place for more advanced mathematical learning. Pupils with an aptitude for maths should not be held back merely because others have no interest in it, and a whole new field of application opens up for more advanced concepts.

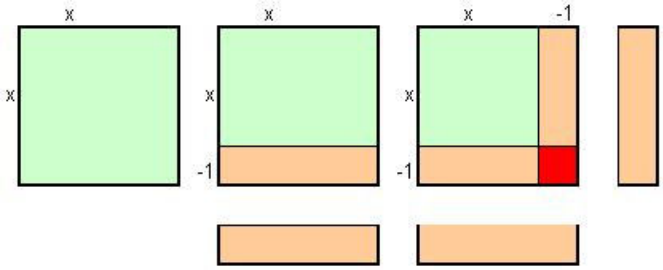
One of the principle qualities of a good teacher is an ability to explain a topic in a number of different ways. Each pupil has a particular preferred method for learning, even if they are not aware of it. Learning theory points to different types of understanding – relational and instrumental *(1)*. Instrumental understanding is more algorithmic; the pupil will learn a sequence of steps for solving a particular problem, and will simply apply this to any similar problem, ending up with the right answer, but with little or no understanding of how or why the method works. Relational understanding, on the other hand, refers to a much wider level of comprehension; the pupil can see why a method works, has some grasp of the mechanics behind the steps and can apply their wider knowledge to related problems which a purely instrumental knowledge would be inadequate for. At GCSE level and below, there is little advantage to the pupil in gaining a relational understanding rather than an instrumental one in terms of exam results, and so a teacher should be aware of these two approaches and make sure that the way they teach allows for both instrumental learning and relational understanding. In practice this usually manifests itself as solving a series of example problems by a given sequence of steps, but also explaining the reasoning behind each at each stage.

I am going to consider a lesson I planned and taught to a top set year 9 group on multiplying out brackets. I decided to use the geometrical approach, and introduced the topic by considering a garden with an unknown length of side. This was gradually extended to eventually incorporate double brackets, with the working as below:



This method of teaching the topic has a number of advantages in my opinion. Most importantly it appeals to both the instrumental and relational learner. Most pupils will have been taught to multiply out brackets by the smiley face method or similar – a series of lines indicating that each term in the first bracket must be multiplied by every term in the second. While this, once learnt, will give the correct answer, it is by no means helpful for a pupil trying to understand why and how it works. Using the analogy between multiplication and area I can bring in the idea of the square – why a number multiplied by itself is referred to as a square, and also explain the mixed terms.

Most of the students found this method very useful, and although it took them longer to work out the first few problems, having initially introduced the topic in this way will hopefully mean that it will be remembered and understood better in the future. It is also helpful, when extended, to give an illustration of why a negative multiplied by a negative gives a positive. When a strip is removed from the edge of the garden instead of added, it is easy to see that we end up taking away to achieve our final area. Attempting to remove a strip from both sides gives us this outcome:



The pupils can see, with a little thought, that by removing a whole strip from each side has resulted in the removal of the final section twice, and so it needs to be added back on once. This kind of illustration should serve to improve the pupil's understanding of the concept of multiplication of brackets while at the same time appealing to their geometric sense and ideas of number.

I am becoming increasingly aware that what is taught in schools is being taught with a different aim in mind to the improvement of the pupil's understanding of mathematics. With pupils being subjected to an alarming number of national exams throughout their school years, the focus of lessons appears to have shifted from exploring and understanding mathematics to fulfilling criteria and exam preparation. In the short term, this is no doubt helpful for pupils, who are indeed doing better in exams than their predecessors *(2)*, but I would suggest that the improvement in exam technique has come about to the detriment of

a thorough and applicable mathematical understanding of core topics. Teachers feel compelled to teach to a particular syllabus which doesn't allow time to fully develop ideas they may see as important, and rather requires pupils to learn what appear to be more or less disconnected mathematical facts for a specific exam.

It may be that teachers are feeling unduly restrained in their methods, possibly due to pressure from heads of department or school governors, when the Department for Education and Skills have the opposite idea in mind:

"We want all schools to ... take ownership of the curriculum, shaping it and making it their own. Teachers have much more freedom than they often realise to design the timetable and decide what and how they teach" (3)

I found one of the hardest things about teaching mathematics was not, as may be the case with other subjects, trouble with remembering or understanding the subject matter, but rather the ability to clearly articulate it. As a mathematician myself, I learnt quickly at secondary school, and since then I have used the concepts and ideas introduced then to such an extent that they have become second nature. To be required to then present this knowledge to pupils who have never come across it before and who may usually struggle to understand maths in general, is a tall order. Being very familiar with the material being taught is helpful in some ways, since it enables the teacher to teach with the strength of knowledge of applications and wider context, derivations and its relationship to other branches of maths. However, in other ways it can actually be a handicap, as it makes it a lot harder to put yourself in the shoes of the pupil and explain a concept for the first time.

This is where the Bell-Lancaster method becomes useful. The fundamental idea of this method, developed independently by Andrew Bell and Joseph Lancaster, is to work with pupils in teaching, so they are not only the recipients but also co-teachers. Research has shown that communicating a concept to a third person is actually a very effective method of learning it yourself, so this method is helpful for the bright pupils who do the tutoring. On the side of the pupils learning, this method has a number of advantages. Firstly, and most importantly, they are being taught by someone who comes from a similar intellectual background. By this I mean that the pupil doing the tutoring has only recently come to an understanding of the topic themselves, and this means that they have probably succeeded in overcoming the same issues and questions as their peers, and so will be in a much better position to explain it than the teacher. Another advantage is that pupils will find it easier to discuss relevant issues and problems with a fellow pupil than with a teacher. Of course, it is crucial for a teacher with a good grasp of the topic themselves to be on hand at all times, if not for anything else then to correct misconceptions and steer pupils in the right direction.

In conclusion, mathematics education ought to concentrate on building up in pupils the confidence to apply themselves to problems with a well-grounded understanding of the fundamental, and most important, aspects of compulsory school age mathematics.

Bibliography

(1) Richard R Skemp. Department of Education, University of Warwick. *Relational Understanding and Instrumental Understanding* from Mathematics Teaching, 77, 20-26.

(2) BBC news report on the upward trend of results from the website http://news.bbc.co.uk/1/hi/education/4359840.stm

(3) Department For Education and Skills – *Excellence and Enjoyment* from the website http://standards.dfes.gov.uk