

# [Mathematics is one of the most difficult subjects](https://assignbuster.com/mathematics-is-one-of-the-most-difficult-subjects/)

I have noticed that throughout my previous and current experience, mathematics is commonly identified as one of the most difficult subjects encountered by pupils in schools and adults alike. Several studies have investigated the prevalence of learning difficulties in mathematics (Dowker, 2004). This has been verified by the Basic Skills Agency that conducted their research and found a large proportion of adults whom did not possess basic numeracy skills (Bynner and Parsons, 1997)).

I have witnessed the frustration of individuals whom struggle with these simple calculations in the school environment. Individuals become disenchanted with mathematics and often question the relevance of the amount of time spent in teaching the subject. Pollard (2004) has also identified in recent studies, that although teachers are very good at telling individuals what to do, they very rarely tell them why they are doing it. In order to prevent individuals from becoming disconcerted, it is paramount in teaching to encourage good teaching practice that will develop pupil’s own logical thinking skills and higher order skills. This in turn will have a positive impact and shape pupil’s future lives. It is therefore important to look at good teaching principles and practice that will enhance all pupil’s learning processes so that they can develop the skills for their optimum wellbeing.

The contents aim to identify what is effective teaching of mathematics and to give specific examples drawn from my reflective journal, personal experiences and observations, which were thought to be particularly effective and characteristic of high quality and exemplary mathematical teaching.

The contents of the assignment focus on the discussion of

The purpose of mathematics in the curriculum,

Mathematics and its application to real life situations.

Mathematics and the application of ICT

and how I considered these points for discussion because of their entwining properties.

The usefulness of mathematics is perceived in different ways and is paramount within the curriculum as supported by Chambers (2008). This is because it is seen as very useful for everyday functioning and can be used as a powerful means of communication to represent, to explain and to predict situations and events in real life contexts. The underpinnings of everyday life are increasingly mathematical and technological, which is why mathematics is indispensible. For instance, making purchasing decisions, banking, following timetables for travelling, the natural world around us, DNA structure, symmetry, shapes, locomotion, reproduction of the animal kingdom and many more aspects within our universe involve simple to complex applications of mathematics are a few discussed by Stewart (1995).

Research also highlights the importance of mathematics on a long term basis, which is why pupils need to know its importance in the cirriculum. This is evident in the works carried out by Bynner and Parsons (1997) whereby, the lack of numeracy was related to unemployment and low income amongst adults. Likewise, adults with a higher secondary mathematics qualification such as A level mathematics had an average earning of 10 percent higher than the population without this qualification Bynner and Parsons (1997). Hence, mathematics is a prime vehicle for developing pupil’s logical thinking and higher order skills and also playing a major role in a number of other subject and professional field. These include physics, statistics and engineering just to name a few.

Exemplary teaching practice incorporated The National Strategy (DCSF, 2001) which is well evident in my observation and my own practice. This is a framework that identifies a balanced mathematical programme and includes conceptual learning, developing and maintaining skills, and learning to tackle applications. These should be taught in such a way that pupils develop the ability to think mathematically. I have observed experiences where pupils have found Mathematics so much easier when they could relate to it as supported by Little and Jones (2007). This effective practice encourages students to explore several solutions and challenge deeper thinking about real problems which is the type of teaching I would like to aspire to in an efficient and confident manner.

In my observations, it is good practice that I have seen only a few mathematical teachers focus on the “ how” and tend to forget about the “ why”. This is an area that I have become to build upon exponentially. I have seen where pupils not only get confused but tend not to retain the new skill they have learnt. Thus, pupils are unable to apply the skill to new contexts. In comparison, where I have observed exemplary practice using effective questioning, pupils show more independent learning and motivation and enjoyment in the subject. It is important to address this in the teaching so that pupils can make sense of the mathematics they are doing (Little and Jones, 2007).

One reason why students cannot appreciate mathematics is the fact that many view the subject as having no real use for them in the real world. There have been occasions where I have heard pupils say “ What possible benefit can I get from understanding the principles of simultaneous equations?” This is an example of where pupils need to be more receptive of what you teach them in that they need to have a better understanding of the practical applications of mathematics. For example, you can share with them how the search engines generate and select the search made through the use of simultaneous equations. Thus, by knowing why they have to study mathematics and how its principles can be applied in everyday life, then they might not moan as much the next time you start your class.

Muijs and Reynolds (2005, p218) also supports that pupils do often struggle with conceptualising mathematics learnt in the classroom to real life situations. I agree with their statement in my example of an observation whereby, a class of Year 9 pupils of foundation level struggled to link and discuss their findings from the group averages they had gathered from area of hand spans. To follow was an excellent example of good practice in teaching whereby an opportunity had been created to rectify the situation by encouraging pupils to learn most effectively through applying concepts and skills in interesting and realistic contexts which were personally meaningful to them. They were given an open ended task as a new company ready to design and make gloves for Year 9 pupils. They could then understand what strategies they required to take all options into consideration because the task had become personal to them. Thus, mathematics is best taught by helping pupils to solve problems drawn from their own individual experiences. NCETM(2009) This identifies and stresses the importance of real-life problems are not always closed, nor do they necessarily have only one solution. Determining the best approximation to a solution is on the ownness of mathematics teachers and their ability to choose worthwhile mathematical tasks to introduce important ideas. Such well planned tasks pique student interest and provide motivation for learning the concept.

Exemplary teaching during my practice helped to create opportunities for pupils in developing skills necessary for mathematics. They were encouraged to practise and learn such simple strategies as guessing and checking, drawing a diagram, making lists, looking for patterns, classifying, substituting, re-arranging, putting observations into words, making predictions. The Cockcroft report (1982, Paragraph 4) also addressed these points. Thus, the curriculum must focus on important mathematics that is worth the time and attention of pupils and that will prepare them for continued study and for solving problems in a variety of school, home, and work settings.

In addition, the innovation of Personal, Learning and thinking skills and Functional Skills incorporated into the curriculum will also aid its development. From the Year 9 open ended tasks observed it is quite clear that there has been a positive impact of PLTS-based teaching. Pupils enjoyed the freedom to experiment, feel empowered by taking responsibility for their own learning and having self-confidence (QCA, 2009). I have also seen a clear improvement in behaviour and attitudes to learning: as one pupil said, ‘ It is not just fun; you learn as well’. These functional skills provide individuals with the skills and abilities they need to operate confidently, effectively and independently in life, their communities and work.

This example of modelled teaching identifies the following points addressed by Cockcroft (1982, Paragraph 243) – who identifies mathematics teaching at all levels should include opportunities for

appropriate practical work;

consolidation and practice of fundamental skills and routines;

problem solving, including the application of mathematics to everyday situations;

investigational work.

Thus the good practice encourages a more secure understanding and provides pupils with a more cohesive approach to their learning. It also reduces the amount pupils feel they need to learn in order to prepare for an examination (National Centre for Excellence in teaching No date).

Using ICT prepares pupils to participate in a rapidly changing world, whereby they can use tools to find, explore, analyse, exchange and present information responsibly and creatively. It also promotes initiative and independent learning with pupils being able to make informed judgements and decision as supported by DFEE (1999 p. 14). I found that I made effective utilisation of the interactive smartboard in particular for starters and plenaries. The school subscribed to Mymaths package to be used for Years7 to 9. During my teaching experience pupils were frequently invited to the board to answer questions. This generated engagement giving all pupils and an opportunity to utilise their skills with Information and Communication Technology (ICT) in mathematics and took into consideration aspects of the Every Child Matters Agenda (DCSF, 2003).

This style of teaching did not appear to be difficult as I had anticipated but I did avoid the use of laptops for the main lesson. My reasons were more on a personal basis in that I lacked confidence with ICT, at that particular time. To overcome this weakness, I planned to make this a target and incorporated the use of laptops with the last two lessons I taught. A group of Year 9 pupils were given a task to create a presentation or poster on a choice of several themes to cover the topic of arithmetic for revision. The themes included designing an activity room, a bedroom, organising a party for fifteen people and Christmas shopping for 15 people. The task was a rich mathematical activity which Ahmed (1987) identified as

must be accessible to everyone at the start

needs to allow further challenges and be extendable

should invite learners to make decisions

should involve learners in speculating, hypothesis making and testing, proving or explaining, reflecting and interpreting

should not restrict learners from searching in other directions

should promote discussion and communication

should encourage originality and invention

should encourage “ what if?” and “ what if not?” questions

should have an element of surprise should be enjoyable. NCETM(2009)

A great deal of research strongly suggests that mathematical tasks that we refer to as “ rich”, are those that are most likely to engage learners positively and effectively with their mathematical learning (NCETM no date)

My teaching practice identified how the use of ICT in mathematics covered a broad spectrum of effective teaching and learning strategies. The result was an extremely pleasant one, not at all what I had anticipated. Pupil’s behaviour was well controlled, they were focused and engaged on their task and found it very enjoyable. I had created an effective learning environment, secured motivation and concentration of pupils. Thus as supported by DFEE (1999, P. 27) I had also provided equality of opportunities for all pupils, enabling them to share their ideas with their partners. However, in a few instances I need to take into consideration for future practice those pupils that do not have the ability for searching skills with ICT and will tend not to engage in the activity (Petty, 2009, P. 401).

The curriculum identifies calculators, graphics calculators, and computers are learning tools which students can use to discover and reinforce new ideas. Calculators are powerful tools for helping students to discover numerical facts and patterns, and helping them to make generalisations about, for example, repeated operations. Graphical calculators, and computer software such as graphing packages and spreadsheets, are tools which enable students to concentrate on mathematical ideas rather than on routine mechanical manipulation, which often intrudes on the real point of particular learning situations. ICT tasks provide excellent environments for mathematical experimentation and open-ended problem solving as discussed below.

Not only did the ICT allow students to raise original questions about math for which there are no right answers “ in the book,” they also initiated discussion of these questions, realising that it may be other students who will find reasonable answers. Thus, the task required pupils to reason mathematically and to communicate and justify their thinking to the application of everyday life.

As a teacher I found on giving guidance to pupils during the task that I would draw on the pupil’s discovery and creativity to keep them interested. This enhanced pupil’s opportunities to develop independent thinking and collaborative learning skills and simultaneously, encouraged pupils to seek connections to previous and developing knowledge move around the room to keep everyone engaged and on track. Pupils would be encouraged to go on with the next challenge, once a step is learned. However, good practice shows that not all pupils learn at the same pace. By using ICT in maths with rich tasks naturally incorporates differentiation within the class.

## CONCLUSION

We live in a time of extraordinary and accelerating change. New knowledge, tools, and ways of doing and communicating mathematics continue to emerge and evolve. The need to understand and be able to use mathematics in everyday life and in the workplace has never been greater and will continue to increase.

Nevertheless, I believe that there are certain elements which need to be present in successful mathematical teaching to pupils of all ages. I believe it is paramount to observe exemplary practice in not only in mathematics but across the whole school, so that we can take on and aspire to that modelled behaviour that creates optimum learning for our pupils.