

Equals

for ages 3 to 18+

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Realising
potential in mathematics
for all

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**The children count and record
the numbers of worms,
snails and flowers
that were found.**

MATHEMATICAL ASSOCIATION



supporting mathematics in education



Realising potential in mathematics for all

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Politicians' influence on the education system is still skewing the system in favour of learners in the top half of the achievement range and in damaging the system in other even more serious ways. Peter Newsam, past education officer, ILEA, and director of London Institute of Education, very recently wrote that "a statutorily enforceable national curriculum, controlled by an opinionated individual, has no place in a democratic society. It is the road to serfdom" (letter to the Observer 24.02.13) and he reminds readers that the 1904 Board of Education's *Handbook for Teachers* suggested "that each teacher shall think for himself and work out for himself such methods of teaching as may use his powers to the best advantage and be best suited to the particular needs and conditions of the school." This is still relevant advice for today's teachers

but there are also great advantages in discussion between professionals. Just as group work is to be encouraged in the classroom so it is between teachers. Professional development courses where teachers can come together from several schools to discuss "methods of teaching" and to write and share classroom materials are of great value to both the teachers taking part in them and to their pupils and are certainly worth fighting for. The excitement of working in a group of teachers from nearby schools to design activities more suited to your own pupils is an experience to be savoured and will certainly use - and develop - your expertise and understanding to the best advantage. This will ensure that Michael Gove's insistence on rigour will not turn out to be an outbreak of what Morpurgo calls rigor - rigor mortis.

Notes for a talk

John Hibbs has given permission for his notes for an ATM (Association of Teachers of Mathematics) talk to be published in *Equals*.

I could go on about how happy I am to close an ATM conference in the "land of my fathers" and tell the story of my great grandfather who is listed on my mother's marriage certificate as Job Lot Williams, builder. To my anglicised eyes it always reads as job lot the builder. I will however start with an email from Geoff Faux to the general council of

ATM saying, and here I quote, " We also need to make space for young members to be giving the closing address to conference. I was completely taken aback to see next year's closing speaker - this invitation is 30 years too late." I must say that I agree with Geoff. If asked I would have done so but it may have been a mistake for it seems to me that

an outrageous old man is more acceptable than a young one. 30 years ago I was enjoying my last year as a proper teacher of mathematics – a head of department in an 11-16 comprehensive school in Cambridge. It was here that I got one of the only two compliments I ever

got from a pupil. “You are a f**king thespian” said the school’s most notorious thug after I had

pushed him into an embarrassing position in front of his peers. This led me to wonder about why SMTs do not seem to know what is going on in the classrooms of their own schools. The gap between their rhetoric and the reality of the classroom experiences of many of their pupils is wide, believe me. From Cambridge I soon ran back to the warmth of the ILEA (Inner London Education Authority) to work in the Ladbrooke Mathematics Centre where only once did some bloke ‘phone up to ask how to place a bet on a horse.

But I must be careful not to get ahead of myself for I wish to tell some stories

in the hope that I may get towards some truth. I wish to do this because all my professional life I have been concerned with one problem; “What can we do to make for a better life for our pupils in our mathematics classrooms?”

We all know the answer lies within ATM, MA, SMP, MEP, SMILE, Nuffield and DIME to name a few where small groups of keen mathematics teachers changed the assessment regime to suit the style of teaching and learning they wished for their kids. It does not lie within the NC, SATS or NCETM or any number of centrally controlled government

initiatives - although I must say on balance some have done more good than harm. I will leave you to form your own opinion. I can illustrate all this by telling the story of my own experience of being a chief examiner.

What can we do to make for a better life for our pupils in our mathematics classrooms?

The problem with the old is that their future is shorter than their past and often with time the

past gets distorted into some golden view of things as they were. My 90-year-old mother-in-law has a golden view of a Christian Britain that she believes is now under threat from an Islamic take over. Her memory of the past is selective choosing to forget the tolerant culture Islam brought to many parts of the world, Spain and Portugal for example, while so called Christians did the opposite by driving out Muslims in the name of Christ.

It is the distorted view of the past that leads to fanaticism that should be avoided. The only thing that I am fanatical about

is school mathematics and I suppose therefore that I may have a distorted view about that. The question, however, remains for me:

“Are our kids in maths classrooms getting a better deal than those taught by us all those years ago?” And by us I mean those ex-teachers of my age and above.

In some ways I think that they are; pupils are working harder and getting better results than ever before but the classrooms that I still visit seem to lack the edge, the wonder and the surprise that the one or more charismatic teachers found in almost

all departments in the days gone by seemed to engender. Where are the teachers of mathematics turning kids on to the mathematics as I would like to think they did in the past?

Mathematics teachers today seem to work under more constraints than I did and mathematics courses seem to me to be driven increasingly to the well known solution to the well know problem than ever before.

How then are we to break through the current straitjackets to enrich the mathematical lives of the pupils in our classrooms today? Now being old I think that I know some of the answers to this question for I know that it does not lie within centralised government initiatives like the National Curriculum, the National Strategies and the NCETM, although I will accept that, on balance, these may have done more good than harm - although it sticks in my throat to say so.

No. Major changes happen when teachers get involved in comparatively small-scale projects which they choose and their schools support them. We know them as SMILE, Nuffield, SMP, MEP, DIME to name a few. And my I add ATM and MA to that pot.

All of us in this room know how to change the mathematical experience of pupils in mathematics classrooms overnight. You change the assessment, sad but oh so true. Just look at David Fielker's open-ended examinations, my mathematics and art mod 3s including making mathematics film loops, ATM's O level and SMP and SMILE examinations. There are of course many others which all have one thing in common, they came from the grass roots and they were all developed to fulfil a perceived classroom need. So: change the assessment – change the classroom experience.

John Hibbs is an OU tutor and retired HMI

Raising the profile of SEN learners in mathematics

Becky Keen wanted a chance to learn and share ideas.

It began in the summer term of 2009 for Joe Murray when he was able to attend the North West SEN Mathematics conference in Wigan. He found the range of workshops on offer for teachers in my position was amazing and Les Staves' anecdotes, advice and enthusiasm left him fully charged up to continue this in his own classroom and see the

children in his school progressing in all areas of mathematics, despite the barriers to learning that many had.

I wanted more. I wanted teachers in Yorkshire, and especially in Sheffield where I work, to have a similar conference. The chance to meet, learn and share

ideas must be something which we could set up locally. My school, Sheffield Springs Academy, had recently moved to new buildings and the sixth form suite was an ideal location for our first Yorkshire SEN Mathematics conference.

In November 2009, 46 teachers from schools in the Yorkshire region attended. The keynote address from our Strategy SEN Adviser offered lots of guidance on the deployment of teaching assistants and the idea of training “specialist” TAs to work in mathematics lessons. With so many of these working in the SEN settings this had to be a very positive outcome. Four other workshops included

Rich tasks to engage learners,
Approaches to functional maths and
KS3 maths in a special school,

all of which were offered by teachers and consultants from across the region.

We did prompt another similar conference during 2010 for teachers in the North East which took place at Spennymoor but sadly, attempts to repeat the project in Yorkshire during 2011 were foiled by the low take-up of places and the difficulty of teacher release for CPD in the present climate.

Nevertheless, I did have a few things to try in class.

The **grabs game** had children “grabbing” a handful of small sweets from a bowl and then sorting them in to sets of 2, or 3...or other numbers. Each time they sorted in sets with none left over earned a point. Discussions took place about the number of sweets that won most points. Before we knew it we

were learning about factors...and enjoying eating sweets!!

Sorting factors, multiples as well as odds and evens on a **Carroll diagram** generated lots of talk and thinking, especially with inter-changeable attribute cards on the diagram. The challenge was to find a number for every cell or to explain why no number was possible for some cells. Pupils’ reasoning and use of language was enhanced and since this did not involve copious writing, some thought they had done no work!!

I used my own “tailor-made” **Target boards** with a range of numbers accompanied by strategic questioning allowed yet more opportunity to visit these objectives and offered some assessment-rich material.

My recent development work has been using the idea of **topic themes** and **mystery games** to address real mathematical problems. The football club project has several facets. We used the idea of a small local club with a small ground. Many of the learning objectives would fit alongside literacy work as well.

Building a team against a budget constraint for transfer fees and then scoring the team’s performance on fantasy football model has been a challenge for many. Investigating ticket pricing, discounts, projected attendances, etc is another area where more development is needed.

Another problem idea was the question of mobile phone tariffs. Children are well aware of the

Before we knew it we were learning about factors...and enjoying eating sweets!!

issues here (probably more than we adults!!) and if we simplify the numbers this will create some fascinating problems, discussion and decision making.

can identify and engage with and finding the right level of access and challenge is most certainly a worthwhile area for development.

Becky Keen

This kind of work is something that our children

Mathematics teacher & SENCO

Great Teachers 2: “Egeria”

Edmond Holmes was chief inspector of elementary schools for many years in the first half of the twentieth century. In his obituary in the *Teachers’ World* he is praised for freeing teaching from the “strait jacket” methods in which they had for so long been confined. In his book *What is and what might be* he describes ‘a school in Utopia’.

It is a real school in a real village in Sussex and his description of it makes it clear that its head teacher (named by him Egeria) is a great teacher.

There are many elementary schools in England in which bold and successful departures have been made from the beaten track and in each of these cases what is at present a mere possibility for most schools has been actually realised.. And there is one elementary school at least in which the beaten track has been entirely abandoned.

The head teacher whose genius has revolutionised the life, not of the school only, but of the whole village, is a woman. I will call her Egeria. She has certainly been my Egeria, in the sense that whatever modicum of wisdom I may happen to possess, I owe in large measure to her. I have paid her school many visits, and it has taken me many months of thought to get to what I believe to be the bed-rock of her philosophy of education.

Two things will strike the stranger who pays his first visit to this school. One is the ceaseless activity of the children. The other is the bright and happy look on every face. In too many elementary schools the children are engaged either in laboriously doing nothing, - in listening, for example, with ill-concealed yawns, to *lectures* on history, geography, nature study and the rest; or in doing what is only one degree removed from nothing - working mechanical sums, transcribing lists of spellings or pieces of composition, drawing diagrams which have no meaning for them, and so forth. But in this school every child is, as a rule, actively employed. And bearing in mind that “energy” is a recognised source of happiness, the visitor will probably conjecture that there is a close connection between the activity of the children and the brightness of their faces.

Mathematical opportunities

No matter where I am or who I speak to, I hear the words, ‘You’re a maths teacher? I was rubbish at maths.’ I hated it, writes Nick Blunt.

Why such a common response? What have we done to the people of my generation to make them feel this way? And sadly what are we doing to the next generation? The following outlines my goals, ideals and philosophies about mathematics. A teacher of mathematics has a great opportunity. If he fills his allotted time with drilling his students in routine operations, he kills their interest, hampers their intellectual development, and misuses his opportunity. But if he challenges the curiosity of his students by setting them problems proportionate to their knowledge and helps them to solve their problems with stimulating questions, he may give them a taste for, and some independent means of, independent thinking. Polya, G (1945)

Mathematics. It has the power to elevate, enthuse and excite the curious mind. It is a language that makes sense of the world around us. It can be used as a tool in decision making, a tool to solve problems that enhance and change lives. But it also has the power to demean, discourage and demoralise individuals.

In order for me to change these negative perceptions of mathematics, I need to identify where these attitudes stem from. Predominately, these negative feelings come from pupil experiences of mathematics at school and the experiences of

parents and grandparents at home. I must question what went wrong in the past and what is continuing to go wrong in the teaching of mathematics.

‘Sir I’m rubbish at maths, I just don’t get it.’ If I had a pound for every time I heard this from my lower ability Year 8 students I could start planning for early retirement. Contrast this view with my higher ability Year 7s and I can’t count it on one hand. Here in lies the problem with the subject I love. Whether intentionally or not, we pigeon-hole students into those who ‘can’ and those who ‘cannot’ do maths. We put a barrier up between them, like a maths Berlin Wall. And

once you’ve been assigned into one of these piles your fate is sealed. The result, confidence in a pupil’s own mathematical ability is shot and they come to the conclusion that they “can’t do maths”.

But what actually is ‘doing’ maths? Maths isn’t something we do, it is something we learn. Like a new language. ‘Learning maths is about constructing ideas from first principles and applying this knowledge when a situation or a solution to a problem requires it. Understanding how to reconstruct a subject is of far greater value than trying to remember all kinds of formulae.’ Ollerton, M (2012, p23)

My personal belief is that maths is about patient

problem solving. It's about picking a problem apart, developing your own ideas on how to solve it and being creative with these ideas. It's about collaborating with peers, challenging your own and others concepts, developing logical reasoning, critically evaluating and analysing your ideas and then developing them further. I firmly believe that all pupils can do this, in fact pupils do this all the time in their lives. So why do we have a population who insist and in some cases are proud, that they cannot do maths? For me the answer is simple. We as educators are teaching the subject incorrectly.

'In Maths you have to remember, in other subjects you can think about it' Boaler, J (2009, p35). This quote sums up why we

have a nation that fears, **we have a nation that fears, despises and feels that they can't do maths.** For

too long we have used a traditional didactic style to teach and I believe it hasn't worked. Traditional methods of teaching rely on pupils remembering, but what we need to do is teach for understanding.

The Cockcroft Report 'Mathematics Counts' (1982) identified the traditional method was inadequate and a more 'investigative and problem solving approach' should be used to teach pupils. It highlighted that effective mathematics teaching was 'where pupils are encouraged to pose questions, to express their opinions and to engage actively in developing strategies for solving problems'.

As I look back on my education and the education of the next generation, I question whether the investigative problem solving approach has ever been implemented and the harm this is doing to my students and looking wider, the country.

Personally I feel the constraints of the curriculum are the cause for these negative feelings. 'We have a curriculum and qualification framework that fails to meet the mathematical requirements of learners, the needs and expectations of higher education and employers and fails to motivate and engage young people to continue with the study of maths post 16.' Smith, A (2004).

The curriculum has no allowance for understanding. Teachers feel compelled to reach the end of the textbook. We get judged by the government, managers and fellow teachers by the results in tests. We are backed into a corner whereby we have no choice but to teach to the test. It's

impractical for us to teach for understanding and deepen the learning. The impact, many students fail. They develop negative views of mathematics, lose confidence in their ability and worse, they become disengaged.

As a student I was fortunate. I was capable of remembering facts, rules, methods and regurgitating them in exams. I have always been somebody placed in the 'can do' category. The teaching to test method worked for me, not because I 'can' do maths, not because I understand how it works, but because I have the ability to retain information. Could I apply these skills in a real life situation? I doubt it. What of those who are not as fortunate as me? Those who are not capable of reciting facts in an exam situation? Those who 'cannot do' maths? The curriculum and the standardized tests we force students to do is creating a nation that is anxious and fearful of mathematics.

This is my major dilemma as I embark on my new adventure as an educator. Do I abandon my philosophy on how the subject should be taught? Do I teach so that those higher than me can judge me on the amount of A-C grades I get? Or do I teach for understanding? Do I deliver lessons which test my pupils abilities to problem solve and reason? Only now as I begin to plan my lessons do I realise that I don't have a true understanding of maths. I was just another number that passed through the exam factory and boosted school results. The mathematics education system failed me and it continues to fail others.

The 'Made to Measure Report' (2012) from Ofsted didn't surprise me when it showed that

the rates of pupil under achievement increased from 10% of pupils at the age of seven to a figure of 40% by the age of sixteen. From my primary school experience I noted the stark contrast between the teaching techniques of primary and secondary pupils. Primary schools actively involve pupils in their learning. They allow pupils to learn through undertaking problems appropriate to their level, allowing them to discuss their ideas. Pupils can collaborate and construct their own ideas, challenge misunderstandings and learn through fun interactive methods. Typical secondary classrooms don't. Secondary teachers are transfixed on the smaller picture, the exam. We don't allow our pupils to learn in a natural intuitive way. We don't allow pupils to develop conceptual understanding. 'Made to Measure' is a damning condemnation of secondary mathematics education. The figures are frightening and highlight the need for me to use active and collaborative teaching methods which

We don't allow our pupils to learn in a natural intuitive way. We don't allow pupils to develop conceptual understanding.

develop learning and give students understanding.

My rationale is not just about changing attitudes or the curriculum. It's more important than that. It's about changing lives. It is my goal is to ensure all my pupils progress and fulfil their potential. I am part of a process that develops individual's personalities, moral values and instils a work ethic. I want the pupils I teach to make a positive impact on society. I must prepare them to use the skills they learn within in the classroom to life outside it. To problem solve in the real world. 'Mathematics

is essential for everyday life and understanding our world. It is essential to science, technology and engineering, and the advances in these

fields on which our economic future depends. It is therefore fundamentally important to ensure that all pupils have the best possible mathematics education. They need to understand the mathematics they learn so that they can be creative in solving problems, as well as being confident and fluent in developing and using the mathematical skills so valued by the world of industry and higher education. Ofsted, (2012)' I am in the enviable position of teaching our future leaders, creators, designers and innovators. The privileged position of nurturing young enquiring minds, minds that may solve the problems of the future.

But how can I do this, when society judges students on whether they have a grade 'C' at GCSE? I have seen the effects of not getting that grade. Many doors are closed to pupils who don't have it. University, schools, offices, any professional organisation will reject your application if the

mathematics grade is lower than a 'C'. Student's life choices are dependent on that grade. As such, teachers are not taking the risks of active learning. We are sticking to what we know, sucking the fun out of the subject and disengaging pupils.

Unfortunately I will always be judged by the achievements of my pupils in assessments. I need to ensure that pupils are well prepared for the exams that decide their futures. I need to follow the curriculum. But this doesn't mean I should abandon my philosophy on what effective mathematics teaching looks like. I shouldn't be focussing on getting to the end of the textbook, but actually 'decelerating the learning and deepening the understanding'. Ollerton, M (2012, p28) I need to be creative and use the curriculum to guide me to make investigative and interesting lessons that engage and enthuse my students. I need to enable pupils to learn so they have an understanding of the subject, so that they can use and apply their skills to problem solving in the future.

Since beginning my placement, my views on teaching mathematics have changed. I continually question why am I teaching the subject? Am I just teaching mathematics or am I giving my pupils the education and skills necessary to improve their lives and make a difference in society.

I could be a successful teacher, teaching in the traditional didactic style. I could write methods and instructions on the board for students to memorize and the brightest will achieve. But can they apply these skills in the real world? If they cannot then

clearly I have failed in providing them with the skills and knowledge needed to problem solve.

I now see myself as a facilitator, someone who guides pupils through their learning. When planning lessons I am striving to build in open ended problem solving tasks and investigative work, which require the learners to construct new meanings and think about the skills they are using. We learn through discovery and this is how I wish to conduct my lessons. I feel an effective mathematics

practitioner enables all their pupils to develop a deeper conceptual understanding of the mathematics they learn.

They plan lessons around investigation and problem solving, reflecting real life problems, enabling students to apply their skills and knowledge. Good mathematics teaching encourages pupils to question, express opinions, explore, refine, discuss, reason and most importantly actively engage in developing strategies for solving problems. It allows pupils to develop self-confidence, feel empowered and take ownership of their learning. We must stop spoon feeding and make pupils think. Allow them to be creative and draw their own conclusions on problem solving. The teacher must be enthusiastic, knowledgeable and focus on developing learning and understanding.

My rationale for teaching mathematics? I want to change the attitudes of the next generation of pupil's I have the privilege of teaching. I want children to have a love for mathematics and embrace the subject. I don't want them to come to my lessons for an hour three times a week with anxious, stressed

Am I just teaching maths or am I giving my pupils the education and skills necessary to improve their lives and make a difference in society.

faces. I don't want them to enter the room with negative emotions only to feel worse after another energy sapping and confidence debilitating lesson. I want them to become curious about mathematics and be creative in problem solving. I want my students to enjoy being in the classroom. After all 'Mathematics is not only taught because it is useful. It should also be a delight of wonder, offering pupils intellectual excitement and an appreciation of its essential creativity'. National Curriculum Council (1989). By offering an interesting, investigative approach to the curriculum, I feel I can install an enjoyment for mathematics and enthuse my pupils.

Nick Blunt s a trainee teacher at Arthur Terry School, SCITT

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WHO GOES TO SCHOOL?

Girls' right to education in South and West Asia

'Everyone has the right to education'

Article 26, Universal Declaration of Human Rights

Around the world, more than 60 million children of primary school age are denied the right to go to school. The majority of those children are girls. And more than 7 million of those girls live in West and South Asia.

But the picture is not entirely a gloomy one. Virtually all states in the region have made some progress towards gender parity in education in the past decade. In Bangladesh, India and Sri Lanka in particular, enrolment rates for girls have risen. Regionwide, the number of primary school age children out of school has dropped from more than 40 million to 13.26 million, while the proportion of girls among them has fallen from 64 per cent to 55.

The map shows the proportions of girls and boys enrolled in primary and secondary schools in countries across the region. There may be many reasons why girls in Bangladesh, for example, are as likely to go to school as boys are while those in Pakistan are not. But the difference cannot be explained away by poverty and religion: both countries are Muslim, and Pakistan's Gross National Income per head is higher. At least part of the reason lies in the relative willingness of governments to tackle discrimination against girls.

The figures cannot reveal regional disparities within countries. In the Swat region of Pakistan, for example, where Malala Yousufzai was shot by the Taliban, only one in three girls goes to school. Nor can the figures tell us much about the quality of education available – but getting to school in the first place is at least a start.

■ **Source:** Education for All Global Monitoring Report 2012, UNESCO. Figures are the latest available, and refer in all cases to either 2010 or 2011.

CHILDREN ENROLLED IN SCHOOL, BY GENDER

IRAN

PRIMARY



49% female, 51% male

SECONDARY



45% female, 55% male

PAKISTAN

PRIMARY



44% female, 56% male

SECONDARY



42% female, 58% male

MALDIVES

PRIMARY



48% female, 52% male

SECONDARY



na% female, na% male

AFGHANISTAN

PRIMARY



39% female, 61% male

SECONDARY



32% female, 68% male

NEPAL

PRIMARY



50% female, 50% male

SECONDARY



47% female, 53% male

BHUTAN

PRIMARY



50% female, 50% male

SECONDARY



50% female, 50% male

BANGLADESH

PRIMARY



51% female, 49% male

SECONDARY



52% female, 48% male

INDIA

PRIMARY



48% female, 52% male

SECONDARY



46% female, 54% male

SRI LANKA

PRIMARY

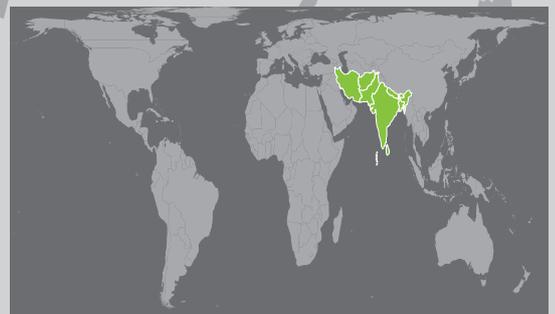


49% female, 51% male

SECONDARY



na% female, na% male



Resources and Opportunities

Looking back over some 60 years of experience in the field of mathematics education Rachel Gibbons deplores the narrowing of opportunities in classrooms today, largely due to the dabbling of politicians in areas where they have no expertise. On the other hand Catherine Dawes rejoices in the development of second chances.

The obsession with SATs and league tables and other such crude assessment measures over recent years has severely warped our education system. It is useful to go back to basics and remind ourselves of the meaning of the words to educate – not a Gradgrindian stuffing in of facts but a leading out of ideas. What goes on in classrooms should be exciting. The children in those desks in front of you did not ask to be there. Indeed, it may be the last place many of them would choose to be and it is your first duty to persuade them how exciting learning can be. Perhaps the greatest learning difficulty we can encounter is the lack of a desire to know. Catherine Dawes, for example, describes how she found her schooldays entirely uninspiring:

and longed for a second chance but thought that with my poor grades, lack of financial stability and family commitments higher education would never be an option for me. I never imagined for a minute that twelve years down the line I would be given a second chance.

After meeting my husband and having 2 more children I focussed on family life and bringing up my children. I felt discontented and even a little embarrassed when people asked me what my profession was and I didn't have one. Even though I loved being there for my children I still felt I was capable of much more and I wanted to set an example for my daughters and make them proud.

Education for me as a child was uninspiring. Although I enjoyed my school life I was never really made to understand – by teachers or by my parents just how important all education is. I received poor grades in my GCSEs and worked in a string of dead end jobs. I found myself a single mother to my daughter regretting wasting the education I had been offered in school. Wishing I was in university making something of myself like all my friends but never knowing what it was I wanted to do exactly. I was stuck in a rut

there is no excuse today for lessons in mathematics to be boring

Once my youngest had reached school age, desperate to work, I

took a job in a secondary school. Not having worked outside the home for 12 years I was a little apprehensive but I loved it. I particularly loved being in a school environment with children. I felt inspired by the teachers – their approach to pupils and teaching was so different from when I was in school. I was impressed with the rapport they had with one another and how the pupils respected and even liked their mentors, something that I had

never felt towards my teachers. It was then that the penny dropped and I realised what it was I wanted to do – I wanted to teach, to make a difference in children’s lives. I wanted to inspire and to make education for someone what it had never been for me – inspirational, motivating and exciting. However, although I now knew what I wanted to do, I feared that my grades would perhaps prove a hurdle that was too high to get over. With a family income that didn’t allow for course fees, I didn’t see re-sitting GCSEs and A Levels as a feasible option. That was before I spotted an advertisement in a newspaper for a fast track course into teaching and one of the subjects mentioned was design and technology, a subject I had studied and indeed been passionate about. Furthermore, neither A Levels nor even GCSEs were compulsory. I jumped at the chance and applied immediately.

I have been on the fast track for thirty weeks now and enjoyed every minute of it. I have already surpassed my expectations by passing the mathematics equivalency exam with much better results than I had expected, made lots of new friends and am excited and eager for the next three years ahead of me. I feel more than lucky to have been given this second chance and I am determined to make a success of myself and become the kind of teacher I wish I had had in my own school days.

With the creation of the National STEM Centre at the University of York there is no excuse today for lessons in mathematics to be boring, nor indeed in science, technology or engineering. Collected at the Centre are all the best classroom materials for the teaching of science, technology, engineering and mathematics from the last 40 or 50 years. And they are open to all. Only last week I recommended

the mother of an 11 year old, who wanted some extra mathematical activities for her daughter to do at home, to visit the STEM Centre.

“Try ‘SMILE at STEM’,” I said. She did so and found just what she wanted.

Of course, it was because my own involvement in the creation of SMILE that I suggested those activities rather than any other collections stored at STEM. If you try ‘SMILE at STEM’ you should find, as well as all the individual tasks, the SMILE network: the map of all the SMILE activities, showing the level of difficulty of each task and the mathematical topics covered. Most of the tasks were originally written with a particular pupil or group of pupils in mind. After being used with the pupils for which it had been written, an activity would then be shared with other teachers (with a report of how it had gone down in the classroom), tried in other classrooms and finally, if judged effective, given to a designer who would prepare a version for printing.

I recommend a visit to SMILE at STEM – why not go there today?

Rachel Gibbons is a retired ILEA inspector and Catherine Dawes is a teacher in training.

Britain built fewer than 10,000 homes last year, far below the 240,000 a year benchmark necessary to house our citizens...

BBC TV The Observer 24.02.13

The hare is capable of clocking 60 km per hour

BBC TV

Tales from The ARC: 2

Part 2 of a regular feature 'Tales from the ARC'. These stories will relate the true mathematical adventures of 'Ken' our new columnist who works at The Academy, somewhere in the North of England.

This winter the snow has brought delight into the lives of my own children but those first, wonderful, flurries heralded a reign of chaos within the Academy. As the noise outside rose and the corridors became littered with the telltale damp patches that signified snowballs secretly brought into the building I sought refuge in the ARC.

That chance encounter with Kathy has proved to be the best decision I have made this year. My respect for the pupils within the ARC rises after each lesson I share with them and my interest in understanding children's learning has been fired into life once again. Each week I have been trying a different activity to gauge for myself how suitable my personal bank of KS 1 and 2 resources could be for pupils such as these. After each success I began to consider the possibility of developing a whole mathematics curriculum based around a core of 'reasoning' challenges that provide the starting point for two weeks worth of instructional lessons.

During this time what has become more and more interesting to me is how the acquisition of language goes hand in hand with the development of mathematical thinking and I will use the lesson I taught this week to illustrate this. After two sessions on co-ordinates I decided to shift to data handling

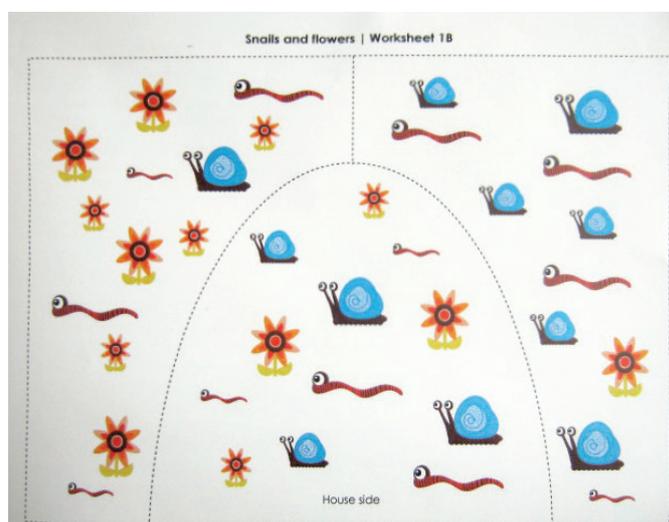
and chose to start with an activity from the Year 2 'Let's Think through Maths' pack called Snails and Flowers. There are two main episodes of thinking within this particular lesson:

Episode 1

The lesson opens with a story about children looking for animals/plants within a garden before they count and record the numbers of worms, snails and flowers that were found.

The resulting chart, see below, provides a rich time of quantification where the pupils discuss the varying relationships and ultimately the possible causes for such striking patterns. The numbers show that the worms are the same in all three areas but the snails are more common in the shadows side whereas the flowers are more abundant in the sunny part of the garden.

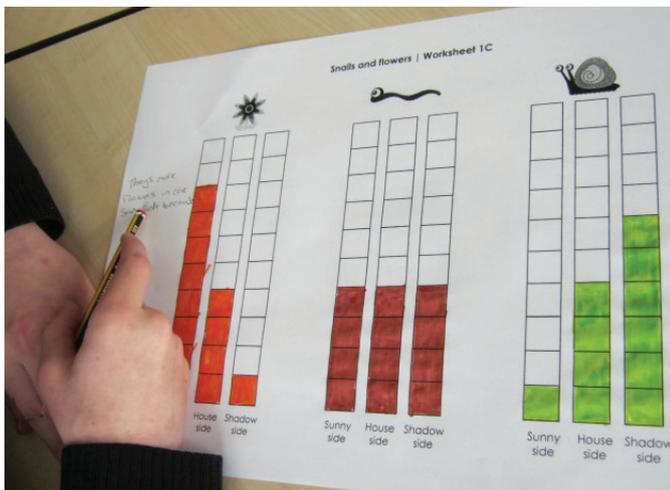
the acquisition of language goes hand in hand with the development of mathematical thinking



Episode 2

Here the lesson shifts up a gear and the children now consider the patterns that exist along a path. The activity encourages them to quantify relations between two objects along a path and also to predict a missing value.

The important part of this episode is the challenge that comes from describing two contrasting patterns that occur simultaneously. Here I chose to focus upon the fact that as the number of stones increases the number of plants decreases.



On this particular day the Year 11's came first and from the moment the lesson started the language began to flow in response to their high levels of engagement. As the words emerged, initially from the more able, they effectively scaffolded the thinking of their weaker peers thus providing them with a route into the exploration of the patterns within the garden.

As each word or phrase was written on the board they all began to join in and soon the room became filled with the language of patterns:

“The worms are the same.”

“They are less while they are more!”

“The snails are more but the flowers are less.”

The more they fed off each other the higher they were able to progress and the idea of cause and

effect began to bring this episode to an end:

“I know the flowers don't like the shade but the snails are more in there

because they are out of the sun.”

“But the worms they are the same all over because they live under the grass.”

In Episode two the Level 1 pupils now began to take the lead and to talk about what they could see:

“The yellows are going down but the greens are going up.”



At this point Paul, who had been rather quiet and thoughtful, came out with:

“I know what's happening, as you go along the path it's getting more stony and the plants don't like that so they are getting less.”

What a lovely way to describe the underlying causality I thought as I realised that our time would soon be over.

By now I had run out of space to note down their ideas, so the pupils decided to pick their favourite sentences and write them down so they could read them to Mrs. Jones, their Teaching Assistant who was missing due to the need for her to invigilate

a mathematics exam. As the lesson drew to a close and the noise outside began to rise I glanced around the ARC to see pupils deep in thought, talking to each other and writing with real intent as they sought to summarise their learning. With a heavy heart I sighed knowing how rare such an atmosphere of calm study was beyond the doors of the ARC.

'Ken' teaches at an academy

Behaviour Management Strategies in Mathematics Part 2

Behaviour management strategies, Jennifer Pendlebury's research leads her to conclude, have a positive effect on decreasing problematic behaviour in the classroom.

Pupils in the treatment classrooms showed less disruptive, inappropriate and aggressive behaviour in the classroom. Through analysing the scoring system for the Key Stage 3 class and Key Stage 4 class we can form a conclusion of how often the behaviour policy was used and how the severity of the policy has changed over the nine week period. However, we cannot form any conclusions to suggest that the improvement in behaviour was due to the behaviour policy since there are many other factors that contribute to the behaviour of a class. Therefore the question being addressed "do schools' behaviour management strategies reduce problem behaviour in mathematics classrooms?" can only be answered

Do schools behaviour management strategies reduce problematic behaviour in mathematics classrooms?

inconclusively from the research carried out in this study. Through analysing the lesson plans during the study, the observations carried out by the class teacher and the self-evaluation carried out by the researcher, it is clear that there are three important components illustrated from this research which form an effective and efficient behaviour management programme for reducing disruptions during mathematics lessons. The three components are effective and personalised lesson planning, forming a good relationship with the pupils and obtaining and maintaining a relaxed and friendly atmosphere during each lesson.

By the end of the research study pupils in the Key Stage 3 class showed a more significant improvement with regard to their behaviour during mathematics lessons than the Key Stage 4 class therefore the findings from the research tends to favour the researcher's hypothesis that strategies of behaviour management used to improve disruptive behaviour was more effective in lower Key Stage levels – more effective in Key Stage 3 than in Key Sage 4. However the results of this research are inconclusive with regard to behaviour management strategies are more effective in lower Key Stage levels than higher as a large sample of classes would be required over a longer period of time for the research to have a reliable result and for a conclusion to be formed.

For two weeks the researcher observed and analysed the type of disruption in mathematics lessons, how often the disruptions occurring and analysing the different disruptions d and whether there were any procedures to help the school and the teachers to manage. After observing and analysing the different disruptions in mathematics lessons, the researcher started to implement different strategies to improve the pupils' behaviour and eradicate the common disruptions within a Key Stage 3 class and a Key Stage 4 class, thus allowing the research questions to be addressed: do schools behaviour management strategies reduce problematic behaviour in mathematics classrooms? What components make the most effective and efficient management programmes for reducing disruptions in mathematics lessons? Are

behaviour management strategies more effective in loser Key Stages than higher?

During each lesson the researcher made use of the school's behaviour policy in order to analyse whether it reduced problematic behaviour in classrooms. The policy consisted of first giving a pupil a verbal warning that the current behaviour is not acceptable. If the pupil continues to be disruptive

During each lesson the researcher made use of the school's behaviour policy in order to analyse whether it reduced problematic behaviour in classrooms.

he is given his first number then his second number. Being given a third number results in a thirty minute detention. The researcher created a scoring system from zero

to five. Zero was scored when a pupil was well behaved and the behaviour policy was not used throughout the week. If the policy was used but the pupil only received warnings in any of the three lessons during the week.

Jennifer Pendlebury is doing research at Edge Hill University

Britain has trouble with boys. In our schools, they are slipping behind girls as early as the age of five, with 53 % reaching the expected level of writing compared with 72% of girls. Boys are three and a half times more likely to be permanently excluded from school while men account for 95% of the prison population. Boys and young men are struggling to find their place in society. We must start asking ourselves why.

David Lammy, *Out of the Ashes*, Guardian Books, 2012

Reviews - Rachel Gibbons

***Out of the Ashes: Britain after the Riots* David Lammy**

Rachel Gibbons considers that David Lammy's book should be required reading for all secondary teachers, especially those who work in inner city areas.

David Lammy, the MP for Tottenham, shows in his study of the riots that he knows what makes teenagers tick. He writes from his own experience. He himself grew up in Tottenham in a working class family which virtually became a one parent family when his father left for the United States in search of better prospects. Where his teenage experience differed from that of the rest of his Tottenham peers was in gaining a choral scholarship to Peterborough. Many of the boys and young men he meets in the course of his work as an MP lead surprisingly parochial lives not being able to remember when they last left Haringey and fearing what lies beyond their own confined horizons. Lammy's own early experiences of Peterborough are of course quite different. Nevertheless, growing up as a member of a working class family in Tottenham has given him a unique insight into the devices and desires of London's teenagers. He recognises the need for appropriate role models for inner city youngsters. He also recognises the failure of the justice system as it affects young people and is keen to reform it:

“Our prisons are one of the most unreformed public services. People lack faith in them, they are expensive and they largely fail even

on their own terms. The riots are a wake up call not just for a rehabilitation revolution but for a proper public conversation about what prison is for and how we fund it.”

He has too a message for teachers about the vital importance of a sense of achievement of the sort he got from his singing:

“I was given the opportunity to sing some of the greatest music ever produced, standing in surroundings I could once not have dreamed of, with my voice being broadcast throughout the UK. I was overwhelmed with pride. It was not for a prize, a record contract or a financial reward, but simply for what I was doing. This was what I understood aspiration to mean: the urge to learn a craft, to do something brilliantly, to fulfil a talent through hard work.”

This surely is the kind of motivation we want to be planted in the minds of our pupils; not the kind of desire for fame that they find in the celebrity culture presented to them by the media. If we manage give them the self esteem needed to discover and develop their own particular talents then we can begin to feel as teachers something of the same sense of fulfilment ourselves.

Rachel Gibbons is a retired ILEA inspector