

# Combating Shortages of Mathematics Teachers

Yun Zhang

*The International School and Community College (ISCCB), Birmingham, UK*  
[zhang@totalise.co.uk](mailto:zhang@totalise.co.uk)

This paper outlines the ISCCB's practice of combating the shortage of Mathematics teachers since September 2002. Every effort was made to accommodate pupils' learning even though there were not enough qualified Mathematics teachers to teach the pupils. A number of schemes were created so that the pupils had the opportunity to make the best possible progress in their learning of Mathematics.

The International School and Community College (ISCCB) opened in September 2002 as a result of a merger between two 11-18 comprehensive schools which were situated on the same campus. There were over 1,700 students in the school, but with only 3 qualified teachers of Mathematics. The shortage of Mathematics teachers was and still is a nationwide problem in many schools in England; the difficulties the school had in recruiting Mathematics teachers were unprecedented. As a result, there were no qualified Mathematics Teachers to teach pupils at Key Stage 3 (Years 7, 8 and 9), totalling 32 teaching groups. A Consultant Teacher of Mathematics was recruited to help combat the shortage of Maths teachers in the school in a creative and innovative way. The school's approach in overcoming the shortage can be categorised into the following areas.

## Recruitment of Mathematics Teachers

Between March and May 2002, the school placed adverts for Teachers of Mathematics vacancies in the TES (Times Educational Supplement, the main newspaper for teachers and teacher recruitment in the UK), along with approximately 500 similar adverts for Mathematics Teachers vacancies in any issue during that time. The adverts attracted enquiries, but no serious applicants for the posts. The school then placed an advert at the beginning of last year for a Key Stage 3 Subject Leader – Mathematics. The post bears an extra 3 responsibility points (worth over £5,000) on top of the teachers' main pay scale. This time the advert attracted several informal enquiries and visits to the school by would-be applicants, but none of them were offered the post.

The following measures taken by the school reaped reasonable success:

1. Employing experienced teachers originally trained for primary schools to teach Year 7 Maths lessons and providing them with in-service training in Mathematics
2. Assigning qualified teachers of other subjects at the school to teach some Maths lessons and providing them with in-service training in Mathematics
3. Recruiting graduates of subjects with considerable Maths content. They teach a proportion of Mathematics lessons at the school whilst being trained towards qualified Maths teacher status, a Government Graduate Trainee Program.

4. Using local teaching agencies to buy supply teachers to come to the school to cover Maths lessons, either temporarily or long term, lasting from one week to one year.
5. Following the government's Fast Track teaching programme. It encourages talented and well-qualified individuals to enter teaching, stay in teaching and contribute to the maximum of their potential as quickly as possible. It identifies high potential teachers, new graduates and career changers and gives the support and opportunities they need to progress rapidly to become leaders in the profession — both in the classroom as Advanced Skills Teachers and as Deputy Heads, Assistant Heads or Head teachers.
6. The school successfully used the UK Work Permit Scheme to recruit qualified Mathematics teachers from abroad. Careful consideration had been given to the status of teacher shortage/surplus of the country where the recruitment is to take place, along with other factors. After detailed investigation and consultation by the Senior Management Team with Senior Educationalists from the countries concerned, the school decided to recruit two Mathematics Teachers from Malta, where there was a surplus of teachers and teaching of Mathematics had been conducted in English.

### **UK Work Permit Scheme**

**Skills shortage occupations lists** in UK Work Permit Scheme in the **Business and Commercial** categories are as follows:

- [Engineering sector](#)
- [Healthcare sector](#)
- [Other occupations](#)

Under the category “Other occupations” are “**Teachers - All posts in England covering compulsory schooling**”.

This indicates that teaching posts in all the school subjects in primary schools and secondary schools covering pupils between 11 and 16 years olds are ‘shortage occupations’ and that employers may fill their teaching posts according to the UK Work Permit Scheme.

The UK Work Permit Scheme also states that Decisions on Business and Commercial Work Permit applications are made against the following criteria:

- whether there is a UK-based employer;
- whether the individual is going to be an employee of the UK employer;
- whether there is a genuine vacancy for an employee in this country;
- whether the employer is responsible for the post and is providing a service and not just personnel where the individual will be working at a client's address;
- whether the pay and conditions of employment are equal to those normally given to a resident worker doing similar work;

- whether the employment complies with UK legislation and any requirements for registration or licensing necessary for the employment;
- whether the potential employee has a significant shareholding or beneficial interest in the UK-based company or connected business;
- whether the skills, qualifications and experience needed to do the job meet specific requirements;
- whether the person is suitably qualified or experienced to do the job on offer and whether there is a need for them to do the job on offer; and
- whether there are suitably qualified or experienced 'resident workers' available.

With the help of the Vice Principal in a Maltese Secondary School, we advertised in “Sunday Times” in Malta for Teachers of Mathematics to teach in our school in England. We had a good response to the adverts from Mathematics Teachers in Malta and were able to interview 8 very suitable candidates who were all qualified teachers in the country. In addition to Mr Nardeep Sharma (the Vice Principal of our school) and myself, we were fortunate enough to have two Senior Maltese Educationalists in our interview panel: the Vice Principal of a secondary school in Malta and a Senior Teacher Trainer from the University of Malta who was also a Chartered Educational Psychologist (U.K.).

Before finalising the contracts with the successful applicants, we invited them to visit our school in early July 2002. During their weeklong stay in the school they each followed a teacher in the school to get a full taste of teaching in England. The school was also able to provide them with accommodation for the duration of their teaching contract, which in the first instance was made for one year with their formal teaching starting from 1 September 2002.

The teachers from Malta were initially assigned a slightly lighter workload than the mainstream teachers in the school and regular help has been provided to them to deal with any problems they may encounter. In February 2004, both teachers were offered permanent contracts from the school.

### **Out Of Hours Learning (OOHL)**

Pupils were offered opportunities to continue their classroom style learning of Mathematics with a Mathematics teacher through a range of sessions taking place in the school, but after normal school teaching hours, e.g., during lunch breaks, immediately after school, on Saturdays and during Easter holidays. I was fortunate enough to be able to acquire funding from Eastern Birmingham Education Action Zone (EAZ) to fund the OOHL.

Another important form of OOHL takes place at home. To encourage this I once set homework on behalf of other teachers for **all** Year 8 and Year 9 teaching groups according to pupils’ mathematical attainment and the teaching content at the time in individual groups. Pupils are encouraged to discuss more and more of their learning of Mathematics at home with their parents and relatives. A number of motivational measures have been taken to help pupils and their parents realise a direct relationship between pupils’ learning of Mathematics during their school years and the quality of their future career. These have included classroom discussions, Mathematics

Assemblies, discussions with parents at Parents' Evenings, and articles on the relevance of Mathematics in the school's "Half-termly Newsletters". An article from a Half-termly Newsletter is attached in the Appendix. These methods motivated pupils to learn Mathematics at home with help from their families and relatives.

Also in the "Half-termly Newsletters" were Maths Challenge questions. Many parents, teachers and supporting staff as well as pupils responded enthusiastically to these interesting Maths Challenge puzzles. Some parents sent their answers to me by post and email. The names of the winners in Maths Challenges were mentioned in the next issue of the "Half-termly Newsletter" and every winner received a prize.

Form teachers were encouraged to do mental arithmetic with their pupils during form registration times if they had a few minutes to spare. Mental Maths questions were carefully selected for ease of execution. Ms Joy Stedmon carried out this creatively and both her pupils and herself enjoyed the quick and sharp numeracy exercises.

There is more about OOHL in the "Personalised Learning Program" section.

### **Study Centres**

The school has successfully established "Study Centres" within the school for cover lessons when teaching staff is absent from school. In each of the Study Centres, there are two "Study Centre Managers" who may or may not be qualified teachers, plus an additional qualified teacher if needed. The Study Centres cover lessons of absent staff in all subjects. There are physical capacities in each of the Study Centres to accommodate up to 3 teaching groups at the same time. The teaching of pupils whose teacher is absent for that lesson takes place in the Study Centre.

For planned absence, the members of staff concerned provide cover lesson plans and worksheets for the Study Centre Managers to deliver. Subject Leaders of all school subjects are also encouraged to provide lesson plans for individual teaching groups in case of unplanned absence of staff. I provided covering lesson plans and worksheets for the Study Centres, which match the mathematical ability for each of the 32 Mathematics teaching groups.

Pupils clearly sensed that the Study Centre Managers had the physical ownership and authority of the Study Centre classrooms. Their working behaviour and the learning atmosphere were much better than when a temporary cover teacher took the lesson for absent staff in the normal timetabled classrooms.

### **Personalised Learning Program**

In September 2002, I devised a "Personalised Learning Program" to accommodate learning of Mathematics for Year 9 pupils under the school's circumstances at that time. This was publicised in the school's "Half-termly Newsletter", October 2002 issue.

Due to the shortage of Mathematics teachers, it was difficult to set pupils according to their attainment across the year group. As a result, some teaching groups included a range of pupils whose attainments in Mathematics were across 3 or more "National

Curriculum Levels”, e.g., levels 3, 4 and 5. Personalised Learning Program was originally designed to promote effective teaching and learning of Mathematics in these situations.

Effective assessment was carried out to collect accurate information on pupils’ attainment levels. We produced booklets that accommodated pupils’ learning and differentiated between their abilities: Each small “chunk” of the booklet focused on one teaching point, in just a few pages. It starts from a short, sharp mathematical definition and explanation, followed by example questions with detailed solutions, then exercises with answers, and finally exercises without answers. There are 3 booklets for each of the National Curriculum Levels. Pupils may choose to work on booklets that match their attainment levels during “the main lesson activity” section of the three-part lesson, when they finish their class work.

The booklets which pupils worked on indicated the pupils’ attainment at that time. High quality discussions between teachers and small groups of pupils took place more frequently and were more interactive, timely marking of pupils’ work was recorded as the main basis to decide whether they were ready to proceed to the next levels. Pupils were very clear on what they had to do to reach a higher attainment and move forward to the next level. Pupils were encouraged to take the booklets home and homework was set, marked and judged on the quality of work and progress made. Teachers were often surprised by the amount of work pupils did during a short time interval.

The Personalised Learning Program was also about knowing and understanding pupils and therefore knowing how to help them in their learning. Pupils are encouraged to work together after school at home. Let’s take the example of two pupils, pupil G and pupil C. They both participated enthusiastically in the OOHl sessions, i.e., after school, Saturday and Easter revision classes. Pupil G wanted to work with pupil C at home during the school holidays, but did not feel confident enough to ask as pupil G’s father smoked and pupil C did not feel comfortable in a smoking environment. As a result of my discussions with them, pupil G’s Dad stopped smoking and the pupils were able to work together and help each other learn. Both pupils improved their attainment by two National Curriculum Levels in Key Stage 3 SATs compared with their Key Stage 2 results.

Parents, the school’s Senior Leadership Team, Mathematics teachers as well as pupils enthusiastically supported the Personalised Learning Program. Kitts Green/Shard End Education Action Zone provided support for the program and financial help for the production of the booklets. The learning partnership was also extended beyond the school environment: Community Section of Cadbury Schweppes generously provided financial support for the program, EHC Publishing in Bradford-on-Avon kindly allowed us to photocopy their Mathematics booklets free of charge for pupils’ extra reading.

### **Concluding Remarks**

It has appeared that the pupils’ learning of Mathematics at Key Stage 3 has not been adversely affected to a great extent by the acute shortage of Maths teachers in the 2002/2003 school year. In the National Maths SATs Test for year 9 the number of the

pupils achieving levels 5 and above increased by 16% compared to the previous year's results of the two schools.

The school is now fully incorporated into the "Ninestiles Federation", which comprises of Ninestiles School, Waverly School and ISCCB (all in Birmingham), under the overall leadership of the Head of Ninestiles Federation, Sir Dexter Hutt. Even though the shortage of Mathematics teachers is still a nationwide dilemma, this school will no longer suffer from this problem. As a matter of fact, all the Mathematics lessons will be timetabled and taught by qualified Mathematics Teachers in the school from September 2004.

### **Acknowledgement**

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**Appendix:** One of the articles appeared in the school's "Half-termly Newsletter" (ISCCB, April 2003 issue)

### **Money, Maths and More II – Chloe & Rob's Story**

Written by Dr Yun Zhang, Mathematics Consultant

"How many centimetres are there in one hundred metres?

A: 1,000

B: 10,000

C: 100,000

D: 1,000,000"

Chloe, a lovely girl in her early 20s, sitting on the famous contestant "Hot Chair" in the popular TV quiz show "Who Wants To Be A Millionaire?" broadcast on a weekend in March 2003, faced this question, which is at **level 5** in Mathematics.

**Level 5** is the government's benchmark level in Mathematics, marking the important academic attainments of the pupils at year 9.

Chloe was on £4,000 and this question was for £8,000 - the amount that she really needed in order to clear her remaining student loan, as she told the veteran presenter Chris Tarrant earlier in the program.

"It's 100 times 100. I can't work it out," said Chloe, who looked slightly amused by the question. Later she guessed, "it's 10,000", which is the right answer but she was not sure. The unpredictable Tarrant, who is very good at talking to the contestant about the questions and revealing no clues at all, read the question once more. Tarrant would make a lousy Mathematics teacher even though a very successful TV presenter.

Sitting in the especially reserved relative's seat is a neat, handsome young man, Rob, Chloe's boyfriend.

“It’s either 10,000 or 100,000... .. I want to play”, said Chloe, who desperately wanted to clear her debts. Nobody can blame her for that. It was almost impossible for Chloe to concentrate facing Tarrant and the camera, in the presence of Rob and the studio audience.

Chloe felt that it was time for her to choose an answer: “It’s 100,000”. “Fiiinal answer?” ascertained Tarrant in his usual cunning way. Chloe was uncertain but nevertheless she nodded reluctantly as if she had lost.

In the meantime, Rob shook his head miserably and covered his eyes with both his hands.

Tarrant later apologised in a professional way: “It’s a wrong answer! I am so sorry. You’ve just lost £3,000. But you still go away with £1,000”.

Some people would say that Chloe’s actual loss was £7,000, and potentially more ...

Will this episode cast a small shadow in Rob’s mind, as he has always known Chloe as a lovely, clever girl?

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1 metre (m) = 100 centimetres (cm)    **100 m = 100 \* 100 cm = 10,000 cm**

1 cm = 10 millimetres (mm)            1 m = 1,000 mm

1 kilometre = 1,000 m