# Core Maths: the teacher's perspective

Nicola Smith is a Core Maths teacher based at Cardinal Newman College, a popular Catholic sixth form college in Preston, Lancashire. The college offers a full range of Level 3 courses and a selection of Level 2 Business and Technology Education Council (BTEC) courses. Currently the college has over 3,000 learners in attendance, the majority of which are 16-18 year olds on full-time advanced level courses.

Nicola Smith is the Assistant Head of Mathematics, and is not only responsible for the delivery of Core Maths within the college, she is also the Core Maths Lead for her local cluster. Nicola has been based at Cardinal Newman College since 2009 when she began her teacher training. She taught there while studying part-time for her PGCE at another local college. She has taught a variety of courses during her seven years at the college, including A level mathematics, A level statistics, GCSE resit mathematics (foundation), extended project qualification and now Core Maths. She has, like many teachers, found Core Maths to be a very different teaching experience compared to other mathematics courses. Overall the experience of teaching Core Maths has been a positive one, although there have been some challenges along the way. The following case study is intended to provide an insight into some of these challenges and ways in which they can be addressed.

## The student response

Exactly half the cohort of students taking Core Maths last year had achieved a B at GCSE while the other half had a C. This year the cohort mainly have Cs. All the students were encouraged to take Core Maths last year either as a complement to their main programme of study or as an alternative when they had not received the GCSE grade to study AS mathematics. As a result, students at first were a little wary of starting a course that was new, and about which they had little information. They

didn't know or understand the value of Core Maths and therefore it took a while for students to become committed to the course. Typically these were BTEC students studying either ICT or A level science, psychology or sociology.

One of the ways that Nicola addressed this was to actively promote the course to other teaching staff and departments. She sought to inform them about Core Maths and in particular the overlaps with other subject areas and the benefits it can bring to students studying these subjects.

Over the last year, Nicola has also worked in partnership with the ICT department, as well as staff from biology and chemistry, to develop some context specific resources for her lessons.

As a result these subject teachers are now referencing Core Maths in lessons on topics that straddle both courses. Nicola notes the importance of teachers telling students they will be covering something in Core Maths specifically rather than mathematics generally. She too has been very clear about sign-posting links and connections for students to other subjects in her Core Maths classes. Feedback from students suggests they are now very aware of the benefits of studying Core Maths and the positive impact it can have on their other subjects.

In contrast, the new Year 12 Core Maths students are more aware of the course, and have a greater understanding of the benefits associated with studying Core Maths. This is undoubtedly in part because they are able to talk to the current year 13 students about their experience of the course. Raising the profile of Core Maths with other departments has also meant that staff within them have been more likely to promote Core Maths as well as referring to it within their lessons.

Getting teachers and members of the SLT to actively encourage students to take Core Maths has also been something new that has happened this year. The course having a higher profile and being more widely accepted by staff and students, has Nicola notes, made the job of engaging the new intake with Core Maths much easier.

*"They are seeing it more in different contexts rather than it just being me standing at the front of the classroom saying Core Maths is great. I think it's been much easier this year, they are already on board 8 weeks in."*

## Relationship building

At Cardinal Newman College, as in some other schools and colleges, there are students on the course who may have wanted to take A level or AS level mathematics but for whom it was not deemed appropriate for one reason or another. So the first cohort of students taking the course, not only didn't know too much about Core Maths, but in some cases, had not chosen it voluntarily. This was different to other mathematics classes that Nicola teaches where students are typically there by choice.

As a result getting students to fully engage with the course, to discuss problems and solutions – activities which lie at the very heart of Core Maths – was particularly challenging. Although some teachers have found this to be the case even when students have all registered for the course voluntarily. Finding that students were initially resistant to the idea of open class discussions about the topics and problems being presented, Nicola quickly decided to adapt her teaching style.

At the start of the year she used a number of mathematics-based ice-breakers to help students get to know each other. Also, about a month into the course, as each student got to know members of their class better, they were encouraged to work in pairs with people they knew well. In turn this lead to working in mixed pairs with students they were less familiar with, then to working in groups of four and eventually to contributing to whole class discussion.

Nicola believes this investment of time in confidence and relationship building has led to students feeling more comfortable taking risks in problem solving. A year into the course, and students are now more relaxed during class discussions and more willing to share their answers as well as details of how they have approached a problem. They are also fine with getting things wrong without fear of judgment by their fellow students. The

message that students have gradually come to accept is that it is ok not to have the right answer as long as they have a clear rationale for their answer. Nicola has found that over time students have independently started to check back on the solutions they have come up with for a problem, with a view to making sure they can justify how they arrived at those solutions.

The need for students to establish the rapport necessary for productive/constructive discussions about problems and solutions is one of the reasons Cardinal Newman will continue to offer Core Maths as a two year course. While offering Core Maths as a one year option might be a solution to timetabling challenges, Nicola notes there is less time to build up rapport amongst the students, which she views as key to enabling learning throughout the rest of the course.

## Mathematical skills

In Core Maths lessons, the teacher is not there to teach a method and then have students practice it and develop their skills accordingly. The students at Cardinal Neman Collage, as at other centres, initially found it challenging to adjust to the fact that the teacher was not going to tell them what methods were required to solve a particular problem. However, gradually as their confidence has grown, they have become more able to drawn on their own knowledge and skill set without always looking for direction from the teacher. As the year has progressed, Nicola has had to point out less and less what mathematics students already know and what might be appropriate to use with any given problem. Although notably, at first, she found that it was not always obvious to students what mathematical skills they were using in a lesson.

For example, in an early lesson involving data analysis*, the students did lots of work involving percentages, ratios, comparisons and averages. Prompted by a student who had come to her at the end of the lesson and commented that she didn’t think the class had done much mathematics that lesson, Nicola began the next Core Maths class with a simple task. She

asked students to write down all the mathematics they had used in the previous session. It was obvious from their answers that students were unaware of the range of mathematics skills that they had used. For several subsequent lessons, Nicola actively highlighted to students the methods they were using in solving a problem. As a result, students are now better at not only applying but also identifying what mathematics skills they are using in their problem solving.

*"Eventually rather than it being me telling them what maths they'd done, at the beginning of the class I'd say right as you're going through write a little list and at the end I'd make sure that everybody knew what maths they had used themselves…… so it was about getting that from the students rather than me always telling them."*

*Bowland Maths Examples:

How Risky Is Life

How Risky Is Life Numbers 2010 – Factfile

Mortality England Wales

## Teaching Core Maths – lessons learned

Nicola acknowledges that teaching Core Maths has been very beneficial for her teaching other courses. In particular, student discussion has now become more of an integral part of her A level teaching. Time pressures to cover the syllabus and student drive to pass exams, haven't usually allowed for discussion and debate. However, as a result of teaching Core Maths, Nicola recognises that these can be important tools for learning.

*"I now will quite happily have a discussion with my A Level class and not worry that they've not written anything down because I know the more they get involved, the more involved they are in it and they are going to want to make sure they can do it."*

## Preparation and planning

Nicola notes that Core Maths is not only a very different experience for students but also for teachers to teach, compared to other mathematics courses. It requires a lot more thought and planning than teaching GCSE or A level mathematics where students can work very independently. Core Maths is much more participatory, there is lots more discussion with and between students.

*"Just initially getting used to the style being different [is a challenge] and convincing teachers that you're not going in and doing the same lesson that you might teach to your A level class or your GCSE class. If you do it probably isn't going to work……..Give it a go. It won't go wrong, it just probably won't go in the direction you think it is going to go in."*

Sometimes lessons do go in an unexpected direction, but Nicola advises that while this can be disconcerting at first, investing plenty of time in planning can make this outcome more easy to manage. Taking time to think through the different directions that a lesson might go in means that is less unsettling when a lesson does veer away from what's been planned. The role of the Core Maths teacher is not necessarily to steer the class back on track but to respond flexibly to the lesson going in the direction students take it. The more confident a teacher feels when this happens, the more likely it is that the class will trust them and engage with the course.

## Recommendations for other teachers

### Course Structure

Nicola found route map provided by the examination board was very useful the first time she taught Core Maths. The experience of having taught the course for a year has led to a decision to present the topics in a different order for the new Year 12 students. Echoing the experience of other centres, Nicola emphasises the importance of starting the course with something new that students haven't encountered before so that they do not think they are just doing GCSE resit mathematics.

**Student Toolkit**

One of the key recommendations that Nicola makes is for students to be encouraged to develop their own toolkit consisting of different mathematical approaches/skills that they can easily refer back to when making decisions about how to solve a problem.

Right from the start of the course, she encourages students to take an organized approach to storing resources. This is quite key given that Core Maths is not a linear journey through a list of set methods or topics. So for example, her students keep notes on averages, percentages, estimations separately so they can be revisited as the problems/topics encountered requires.

Students are encouraged to clearly signpost resources so they can store them in a way that is logical and easily accessible. This has the added benefit of enabling students to access their resources and notes more easily when they do start preparing for the end of year exam.

*"We dip in and out of things rather than say doing Fermi Estimation and then moving on. We'll do a bit of Fermi and then move on to something else, but we might go back to Fermi when it becomes more relevant. So it's a bit more here and there rather than being one direct route to the exams…… I would make sure that students are really organized from the outset so for example they know that what they're doing is part of the data analysis or its part of finance, so they know what goes where and they can always find it when they come back to it."*