Pat Bailey shares her experiences of studying mathematics education courses, using them with learners and tutoring them. Read about how the Open University can help you to make mathematics interesting and exciting for all of your pupils.

Mathematics teaching is changing! I have recently received the multi-media resource ‘Improving Learning in Mathematics’ as part of my teaching materials for my new post as an Open University Initial Teacher Training tutor. From the NCTEM February update: “This multi-media resource has been developed with teachers, trainers and managers across secondary mathematics education. It has proved genuinely successful in transforming the way teachers and learners approach mathematics.”

And, from the ‘Improving Learning in Mathematics’ article: “Improving Learning in Mathematics builds on existing successful practice and explores approaches that encourage a more active way of learning through the use of group work, discussion and open questioning. Learners are encouraged to ‘have a go’, become more independent and reflective about their mathematics, to learn to think mathematically rather than simply learning rules and most importantly, to enjoy their mathematics.”

Many experienced mathematics’ teachers may also benefit from the OU courses on developing mathematical thinking. These courses will revolutionise your teaching, as it did mine! In particular, before you ask learners to follow their own ideas and reflect on their own learning, you need practice on this yourself, and these courses will enable you to become an experienced practitioner in this technique.

The courses provide professional development for anyone who is interested in the learning and teaching of mathematics (experienced and prospective teachers, learning assistants, parents and people of all ages who just want to revisit the mathematics they were taught in the past); they enable students and their learners to learn by doing, in interesting and attractive ways. The courses both contribute to your own mathematical development and enrich your learners' learning and confidence. Whatever your background and experience in learning and teaching mathematics, you will find new ideas, new mathematics (see the picture below), new ways of teaching, as I did.
The first time I worked through this book, I discovered a result about the triangles in Vecten’s diagram that I hadn’t seen before – another ‘eureka’ moment, after thirty six years of studying mathematics!

There are four undergraduate courses (at level 3), which, together with a one week residential school (MEXR624, Developing mathematical thinking at Key Stage 3) qualify the student for a Graduate Diploma in Mathematical Education. The courses are:

**ME624: Teaching mathematical thinking at Key Stage 3**  
**ME625: Developing algebraic thinking**  
**ME626: Developing statistical thinking**  
**ME627: Developing geometric thinking**

Although the mathematics in the last three courses is focussed on Key Stages 2 – 4, the educational issues discussed in all of the courses are relevant for all stages; all of the courses are accessible to anyone with a grade B in GCSE mathematics (or the equivalent). As well as the mathematics, students learn how to introduce their learners to up-to-date techniques of teaching mathematics and are required to try out activities with one or more learners, in a school or home setting. Assessment is carried out through written assignments (there is no examination).

The first Open University course I tutored, the level 1 mathematics course M101, and the PGCE in 1985, both promoted mathematics’ investigations as a means of interesting learners in the subject; the new GCSE qualification I taught from 1986 had coursework which included an investigation. In those days, pupils were still taught in rows, facing the teacher, with no talking allowed.

I have studied the occasional OU course since 1979; the new course ME624 in 2003 looked interesting, and I signed up. It was a revelation! The mathematics investigations (some old, some I hadn’t seen before) were an inspiration – but so were the learning and teaching techniques, which were new to me. I used the ideas regularly with my year 8 and 9 classes – they were fascinated, not just by the mathematics, but by the idea of working on interesting problems in small groups, being able to talk and to bounce ideas off their peers and me, being able to discover methods and results for themselves, instead of being given a formula and exercises to do with the formula.

My experience with ME624 encouraged me to apply to tutor the other three courses as they came on stream, in 2005 (algebra and geometry).
and in 2006 (statistics). Each of these three courses are based on a book which are full of activities for students and their learners, with many tasks offering methods for both learning and teaching the subject. The books are not intended to be worked through entirely during the six months each course takes place -- they are resources which a teacher can dip into time and time again.

The courses will give you an understanding of the different ways in which people learn mathematics and the theory behind these. Learning is usually more effective when learners have some control of it in terms of choice of topics, approaches, depth of study, and ways of working and presenting their work. You will come to understand that, just because teaching has occurred, the desired learning might not have occurred. You will learn about current issues in mathematical education, using the course materials, the course website and the internet. Reflections on your own practice as both a learner and teacher will enable you to analyse the ways in which your strengths have developed in teaching and learning mathematics. Each of the courses develop your knowledge of, and experience with, ICT in the learning and teaching of mathematics including spreadsheets and graphics calculators, Geometer's Sketchpad and Cabri Geometre, and other software. The geometry course includes interactive ICT files which bring theorems and results in geometry to life in a way that drawing diagrams by hand cannot do.

So, take the plunge and register for one of the courses (you don’t need to already be an Open University student). You will be learning from the superb teaching materials that the OU is renowned for, with a personal tutor (like me!) who will help and guide you, and mark your assignments. You will learn how to motivate learners and make mathematics interesting for the most disaffected pupils, and be on the way to a qualification at the same time. Developing algebraic thinking and Developing statistical thinking start in April each year, and Developing mathematical thinking at Key Stage 3 and Developing geometric thinking have October starts. The residential school MEXR624 takes place in July at the University of Bath.

**About the author:** Pat Bailey was one of the first intake of Open University students, studying mathematics, physics and chemistry in 1971 – 1978 whilst bringing up her family (born 1973, 1976 and 1979); she had left school at aged 16 with five ‘O’ levels. She started a PhD in mathematics in 1980 at her local university, Keele, the SRC grant being awarded because she was an OU graduate. After completing the PhD in 1984, she followed this with a PGCE at Keele. She has been a tutor with the Open University since 1979, on mathematics and mathematics education courses. She retired from her ‘day’ job in December 2006 after over twenty years as a mathematics teacher and examination officer at a selective, independent 11 – 18 school, to spend more time with her first grandchild and on her expanding Open University work.

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