Over the last five years, most British universities have introduced training for their new teaching staff. Completing it is, increasingly, a condition for ending probation and having one’s appointment made permanent. In most cases the training is provided, across all subjects, by a Centre for Staff Development, or a Centre for Academic Practice. This article begins with some very brief comments on central or generic staff training, and goes on to describe an experiment, still in its first year, in which the Mathematics Department at Warwick has taken over the training of its own staff. More details can be found at http://www.maths.warwick.ac.uk/~mond/wtc.html (henceforth referred to as ‘the website’).

1. Participants’ criticisms of generic institutional teacher development

By and large, the response of new mathematics lecturers at Warwick to generic training has been critical. Participants feel that many of the issues central to their teaching are peculiar to mathematics and cannot be addressed in a generic programme aimed at practitioners of all subjects. The ‘reflective essays’ that form the mainstay of assessment are foreign to the practice of mathematicians, and leave them perplexed and frustrated. Only the part of the generic provision directly connected with their teaching, namely having their lectures observed and videoed, and observing others’ lectures, was felt to offer any significant benefit.

2. Departmental apprenticeship

In the academic year 2004-2005, the Mathematics Institute at Warwick opted out of the staff training (the Warwick Teaching Certificate, WTC) provided by the Centre for Academic Practice (CAP) in order to implement its own training programme, the MWTC, designed primarily by Trevor Hawkes, with input from David Mond and with support and advice from Paul Blackmore, Director of CAP.

The MWTC aims to provide a more satisfactory training by:

1. Building the training around an in-service apprenticeship.
2. Replacing generic taught modules by mentoring, by experienced members of staff, supplemented with talks and workshops delivered by recognised specialists on topics of obvious relevance.
3. Building a programme which seeks the consent of existing members of staff, and responds to the needs and interests of the new staff undergoing the training.
4. Encouraging new staff to engage critically with the teaching programmes they find in Warwick, in the light of their previous experience.

1. In the Warwick Mathematics Department this was made more acute by two additional factors:
   i. Most of our recent hirings come from abroad, and as a department working hard to strengthen an international reputation, we compete with universities in other countries to attract some of the best young mathematicians in the world. It was feared that the prospect of unpopular obligatory training would make this more difficult.
   ii. While new staff are being trained, their teaching duties are covered by temporary lecturers who are naturally not obliged to do the training, and who often work extremely hard teaching demanding courses, only to move on when their contract ends. The experience that they have gained teaching our courses is lost to us, and the continual turnover in staff detracts from continuity.
The following principles guided the design of the MWTC: it should be

1. **Embedded**: as far as possible the activities should be closely linked to the normal run of activities undertaken by any new lecturer.
2. **Transparent**: the process of training and the evaluation of participants’ progress should be clearly visible to CAP or, for example, to the Higher Education Academy (HEA).
3. **Self-sustaining**: once in place, the MWTC must run itself, with a robust administrative system that is not a heavy burden to any academic in the department.

### 3. Embedded training: learning on the job

The MWTC begins with the two-day induction course organised by the Higher Education Academy Mathematics, Statistics and Operational Research Subject Centre at Birmingham University, in September. After that, it is built around the first two courses that participants teach. These should be:

1. A new course, at a high level, in the area of the participant’s research speciality, with a small audience.
2. An existing course aimed at a wider audience, at a lower level.

Ideally they should be given in this order because poor teaching in the first, where the students are fewer and more self-reliant, would be less of a disaster for the department than in the second.

For each of these first two courses, the participant and the MWTC coordinator choose a “course mentor”, an established member of the department with relevant experience and subject-knowledge. The course mentor will interact with the participant in several ways:

1. By discussing his or her plans for the course
2. By observing and commenting on one or more lectures
3. By checking the final exam, both for appropriateness and for correctness
4. By debriefing after the final exam
5. By second-marking the relevant part of the participant’s portfolio

Participants also have a CAP adviser who observes two of their lectures.

### 4. Transparency: preparing material for assessment

The Warwick Teaching Certificate is divided into four modules, and for the purpose of transparency the Mathematics variant, the MWTC, has retained this structure, at least in its first year. The four modules are:

1. Preparing to teach;
2. Assessment and Evaluation;
3. Designing a Curriculum;
4. Lecturing in practice.

For each module participants assemble a portfolio, which is submitted for marking to the CAP. Since the division of the MWTC into modules is somewhat artificial, the list of portfolio material that follows is not divided up by modules.

For each of the participant’s first two courses, the portfolio should contain:

1. A statement of aims and objectives
2. Handouts, lecture notes and exercises
3. Assignments, tests, etc., together with the final exam and a record of its checking by the course mentor, with a list of suggestions and comments.
4. Staff-Student Liaison Committee summaries of student course evaluations, and the participant’s response
5. Records of observations of lectures by the course mentor and the CAP adviser, with the participant’s response, where appropriate
6. A post mortem review of the course, to be written after marking the final exam. This should include suggestions for improvements both to their own teaching and, if they wish, in the syllabus, and in the preparation of the students.

Participants must also:

1. Read and comment on at least one of a list of books on university-level mathematics teaching.
2. Observe two lectures by established members of the department, and submit a record of the observation.
3. Sit in on a tutorial given by an experienced teacher.

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2. Having the exam checked is already a requirement for all courses taught at Warwick.
3. This is requested from all members of staff, as a matter of course, when student evaluations are passed on to lecturers.
4. Available from the website.
5. Every module taught in the department is supposed to receive such a peer-observation, so this requirement should give rise to no extra work. If the module to be observed is well-chosen, the MWTC participant can gain considerable benefit – for example by gaining some idea of the content and level of a course immediately preceding, or following on from, one that they themselves teach.
member of staff, and design two tutorial sessions of their own.
4. Answer all the questions on one of the most recent A-level Maths papers.
5. Have a lecture videoed, and document their response.
6. Prepare a short project on any aspect of university maths teaching.

5. MWTC Events

The nature and number of these events will evolve as we gain experience. So far this year we have had three:

1. An evening discussion, over wine and a light buffet, between MWTC participants and a group of about twenty undergraduates from all four years.
2. A workshop on Computer-Aided Assessment and drilling in basic skills, run by Dr. Chris Sangwin, an expert on the AiM software.
3. A workshop entitled “How undergraduates understand proof”, run by Professor David Tall, from Warwick University’s Institute of Education.

Two more are planned:

4. A visit by a representative of one of the examination boards, to discuss the present status and future of Mathematics A-level.
5. A discussion on MMath projects, to be held in early June, in time to harvest the interest and frustrations that supervising and marking this year’s crop of projects generates.

MWTC participants are expected to attend all of the events, but all are also open to other staff. The interest and participation of other members of staff in events of this kind is one of the strengths of a departmental provision, and may be of benefit to both trainees and other members of the department. We believe that by raising issues of teaching and mentoring, it has increased interest in teaching, and can help to kindle a sense of a teaching community.

6. Marking, passing and failing

Participants’ portfolios are first-marked by the CAP. In fact CAP brings in subject specialists to do its marking, so that this year’s participants will have their portfolios marked by two mathematicians: a colleague recently retired from the Mathematics Institute, and a member of the University’s Institute of Education. Portfolio material assembled from the participant’s first two courses will be second-marked by the course mentors. This gives rise to a possible source of friction: it is harder to receive poor marks from one’s colleagues than from CAP. So far, no member of the mathematics department has failed any version of the training. I suspect that if CAP were to fail a member of staff whom the department wished to retain, it would create enormous political problems. So bringing the issue of passing and failing at least partially back into the department is not a significant change.

7. The experience with mentoring

So far, mentoring the MWTC participants has turned out to be fairly routine. Their teaching has been good, and the mentors’ comments have been limited to minor good advice. Let us imagine, however, what would happen if a new lecturer had serious problems with their teaching. As currently envisaged, the system would work like this:

1. The first course mentor observes a lecture. He/She realises that some serious changes to the style or content are needed, and makes recommendations to the participant accordingly, both in person and in writing. At this point a lot depends on the two individuals involved. A serious participant will make efforts to improve their teaching in the light of the recommendations or, possibly, will consult with the coordinator if he/she feels that they are inappropriate or mistaken. A concerned mentor will decide to visit the lecture again, to see if their recommendations have had any effect on the participant’s teaching. Let us give both the benefit of the doubt and assume that they take this course of action.

2. Aware of the difficulties, the participant alerts their second course mentor, and arranges to have his/her second course’s lectures visited early in the term, in order to catch the problems early on.

3. The course mentor attends an early lecture, makes suggestions, and attends further lectures. If the problems are sufficiently serious, and the participant’s teaching does not improve to an acceptable level in response to the mentor’s
suggestions, the mentor will alert the coordinator.

4. The department now has to decide how to confront these problems. Because they concern students as well as the MWTC participant, they transcend the framework of the training. Different departments will respond to such situations in different ways. It may well be that it is possible to devise further training within the department, or to buy in specialised services, from CAP, from the MSOR subject centre, or from further afield.

In any case, the system of mentoring provides a means of detecting problems with teaching at an early stage, and at least some of the means to tackle them. As part of an evaluation of the first year of the MWTC, planned for the coming (summer) term, we intend to survey the view of the mentors and find out what kind of training and support, if any, they feel their rôle requires, beyond the documentation currently provided.

8. Conclusions

The MWTC has generally been well-received by its participants. As coordinator, I have been aware of the opportunity that it provides to develop teaching and increase communication between different groups inside the department. I thought the Discussion Evening with undergraduates (5.1) was particularly enjoyable, and valuable not only to MWTC participants but to the undergraduate participants too. In the same vein, I have high hopes for the planned discussion on MMath projects (5.5).

How successful is this new programme? It is without a doubt more popular than the programme it replaces. It is too early to say for certain whether it is more effective, although all the evidence I have seen suggests that the structures we have put in place are functioning well. One of the mentors who was actively involved in the programme remarked “I think what you are doing with the MWTC is great”. In the coming term we will carry out a serious evaluation.

I am confident that it will be able to evolve in response to participants’ needs. There is little doubt that there are some gaps in our provision, and there is a need for a certain amount of well-targeted overt training, for example on tutorials and surrounding issues. This should not be hard to arrange, perhaps through CAP. Our small scale makes responsive evolution possible.

On the negative side, running the MWTC has taken a lot more of my time than I had budgeted for. Occasionally I find myself recalling the dire prediction of the person most critical of the old training (but who had, nevertheless, completed it), that by taking on the battle to replace it, I would end up being co-opted into it. In the remainder of the academic year it is essential that we implement the third of our founding principles, and put in place the administrative arrangements that will ensure that, as far as possible, next year the MWTC runs itself. This means delineating precise secretarial responsibilities for arranging enrolment, fixing portfolio submission dates, making sure everyone involved gets the necessary documentation, etc. Much of what keeps me awake at night worrying could certainly be done more efficiently by a secretary.

Another negative is the awareness that I have not found the time to read and respond to the participants’ portfolio submissions with the alacrity they probably wished for. Although the coordinator does not have any marking responsibility, I am certainly a first port of call for a participant wanting to get an idea if he or she is on the right track. My neglect of this aspect of my rôle reflects two things, I think: one is that I am simply too busy, and have to prioritise. The second, more serious, is that at some level I am still sceptical of the value of some of the written work, even though it contains far fewer of the reflective essays that participants in the old WTC complained of. I suspect that some of what we ask participants to do is still hoop-jumping, and that we are not really interested enough in what they have to say. This must necessarily be disappointing to people who have been out of school for some time now, and expect what they say, and write, to be taken seriously. It is difficult to reconcile the two guiding principles of embeddedness and transparency.

But this may just be gloomy cavilling. We have not yet carried out a serious evaluation of the participants’ response, and perhaps when we do we will find out that they found assembling their portfolios instructive and enjoyable.

Finally, transferring the training from CAP to the Mathematics Department has not just involved extra work for me and for Trevor Hawkes. The rôle of course mentor (Section 3 above) can, on occasions, involve a serious commitment of time. In the end, departments themselves have to decide whether this is time they and their members are prepared to invest.

9. Can it work elsewhere?

The backbone of the MWTC is mentoring and learning

12. See the website for a collection of undergraduate views on teaching, collected from participants in the discussion.
on the job, and this can surely take place anywhere, or at least, in any department that feels it has some strength in teaching. Other aspects of the training may be more difficult in a department with fewer new staff. Workshops like Chris Sangwin’s (5.2) or David Tall’s (5.3) could not be run to an audience of one. But Mathematics departments could run such events in coordination with departments from neighbouring universities, or from neighbouring subject areas. They can also count on the expertise and resources of the MSOR subject centre, which is well placed to play a key rôle in coordinating and sharing departmental expertise and experience. Moreover, once a demarcation between subject-specific training and generic training is understood and appreciated, departments will be able to bring in appropriate generic training where needed. Overall, I am very optimistic.