Post-16 Networking in England to Share Active Learning Approaches to Mathematics/Numeracy

Viv Brown
National Centre for Excellence in the Teaching of Mathematics
viv.brown@ncetm.org.uk

In England, The National Centre for Excellence in the Teaching of Mathematics (NCETM) is a government initiative to provide effective strategic leadership for mathematics-specific continuous professional development. It aims to raise the professional status of all those engaged in the teaching of mathematics so that the mathematics potential of learners will be fully realised.

This paper provides a brief overview of some of the work of this organisation from the perspective of post-16 education. This will touch particularly on subject learning coaches and networking as part of the Post-16 National Teaching and Learning Change Programme http://www.subjectlearningcoach.net/, the organisation of mathematics in colleges and developing a ‘numeracy for employability’ strategy. http://www.ncetm.org.uk/Default.aspx?page=13&module=res&mode=100&resid=6225 It covers the content of the workshop given at ALM 15 on 3rd July 2008.

Background

Recent developments in further education, mathematics and professional development in England have been directed by several reports including Success for All (2002) which stated that the government strategy would include

Putting teaching, training and learning at the heart of what we do by establishing a new Standards Unit to identify and disseminate best practice, which will guide learning and training programmes. (Success for All: Reforming Further Education and Training, 2002, p. 7)

In its report on 'Continuing Professional Development for Teachers of Mathematics' published in December 2002, The Advisory Committee on Mathematics Education (ACME) recommended the establishment of a National Academy for Teachers of Mathematics, to have a strategic overview of CPD at a national level and to co-ordinate its operation locally.

On 9 December 2004 Charles Clarke MP, then Secretary of State for Education and Skills, announced £15m funding over 3 years for the new National Centre for Excellence in the Teaching of Mathematics (NCETM).

The National Centre for Excellence in the Teaching of Mathematics

The National Centre for Excellence in the Teaching of Mathematics (NCETM) is a UK government initiative in England. The National Centre works collaboratively to enhance mathematics teaching across all sectors, primary, secondary and further education (post 16
education). It aims to raise the professional status of all those engaged in the teaching of mathematics so that the mathematical potential of learners will be fully realised.

The NCETM is a virtual centre, (www.ncetm.org.uk), supported in the 9 Learning and Skills Council (LSC) regions in England by Regional Coordinators. Most regions have one regional coordinator with a focus on primary and secondary schools/teachers and one with a focus on Further Education adults/teachers. It was established in 2006 by the Department for Education and Skills (DfES). In England there are now two government bodies looking after education—the Department for Children, Schools and Families (DCSF) and the Department for Innovation, Universities and Skills (DIUS).

The NCETM is a growing community. The web portal supports mathematics and numeracy teachers with news, resources, research and communities and blogs where teachers can discuss issues, ask questions etc. There is also a mathemapedia (similar to a wikipedia but for maths teaching) which is building up. There is also a self evaluation tool which is linked to national teaching standards and levels, where teachers can look at a particular level and see what topics that will involve and examples of the knowledge this requires. The latest addition to the NCETM web portal is a personal learning space, where teachers can collect their favourite items from the portal, make notes, keep their continuing professional development (CPD) record and share items with others. In Further Education in England there is now a requirement to maintain ‘Qualified to teach in the Learning and Skills sector’ (QTLS) by evidencing a minimum of 30 hours of CPD per year.

**The National Teaching and Learning Change Programme**

Since its establishment in 2006 part of the work of the NCETM has been to carry forward the National Teaching and Learning Change Programme in relation to mathematics. This is part of the government’s programme of reform for the Learning and Skills sector, ‘Success for All (2202), which is working to support Subject Learning Coaches as champions of change within organisations by bringing together three ‘enablers’

- Subject specific teaching and learning resources
- Subject coaching networks
- Professional training for Subject Learning Coaches

The subject specific teaching and learning resources entitled ‘Improving learning in mathematics’ were produced by the Standards Unit in 2005 and are now available in hard copy to both further education organisations and secondary schools within England. These resources and professional development sessions are also available to all for free download from the internet via the QIA Excellence Gateway at http://excellence.qia.org.uk/

‘Improving learning in mathematics’ is a substantial, well researched set of resources which is now being widely used. Before publication the resources were trialled with over 120 teachers working in 60 different organisations. To understand the approaches, principles and underlying research, the best starting point is the short book included within the pack by Malcolm Swan, ‘Improving learning in mathematics: challenges and strategies’. This is based on the work of Malcolm Swan published first in 2002 under the title ‘Learning mathematics through discussion and reflection’ and later in 2006 ‘Collaborative Learning in Mathematics: a challenge to our beliefs and practices’.

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The pack also includes

- 6 professional development sessions
- 51 teaching and learning sessions with resources under the headings of mostly number, mostly algebra, mostly shape and space, mostly statistics and other
- Software
- Activity templates

The approaches are based on moving from ‘passive’ to ‘active’ learning and from ‘transmission’ to ‘challenging’ teaching. The teacher’s role in this model is to assess learners and make constructive use of prior knowledge; to choose appropriate challenges for learners; to make the purposes of activities clear; to help learners to see how they should work together in profitable ways; to encourage learners to explore and exchange ideas in an unhurried, reflective atmosphere; to remove the ‘fear of failure’ by welcoming mistakes as learning opportunities rather than problems to avoid; to challenge learners through effective, probing questions; to manage small group and whole group discussions; to draw out the important ideas in each session and to help learners to make connections between their ideas.

The resources are designed to encourage best practice through the use of some underlying principles which

- Build on the knowledge learners bring to sessions
- Expose and discuss common misconceptions
- Develop effective questioning
- Use cooperative small group work
- Emphasises methods rather than answers
- Use rich collaborative tasks
- Create connections between mathematical topics
- Use technology in appropriate ways.

There are five types of activity which are used extensively. The first is classifying mathematical objects where learners are encouraged to devise their own classifications and apply those devised by others. The second activity use is the interpretation of multiple representations. So for example learners may be asked to work in small groups to match fractions, decimals and shaded diagrams. The third strategy is evaluation mathematical statements where learners may have to decide whether given statements are always, sometimes or never true and to present explanations and arguments to justify their decisions. A fourth type of activity is where learners devise their own problems for other learners to solve so that learners have the opportunity to take on the role of teacher and explainer. The fifty activity type is described as analysing reasoning and solutions where learners might compare different methods for doing a problem, organise solutions or diagnose the errors in solutions.

The professional development sessions provide structured guidance to take a group of teachers working together through the opportunity to explore and reflect on the various approaches and activity types and how they can be used effectively with learners while the other sessions provide well thought out and supportive guidance for sessions to use with learners and the resources all ready to use. The sessions encourage discussion both between teacher and learners but also between learners. They provide opportunities for small group work and resources where there is scope for learners at a variety of levels of understanding to work on the same task through differentiated activity.
Many of the sessions use posters as a way of sharing, discussing and recording learning. Mini whiteboards are used for working and for responding to questions such as ‘show me a shape that has a right angle’ or ‘show me a fraction between $\frac{1}{4}$ and $\frac{1}{2}$’ or ‘show me an equation of a line with a positive gradient’ to help with assessment for learning and sharing a variety of responses to open questions.

‘Improving learning in mathematics’ is a substantial resource which, as well as professional development sessions where colleagues are invited to work together to become familiar with the approaches and resources, contains a huge variety of sessions to use with learners with all the activities ready to use across several levels and many topics. They are being used in England for ages 14 years upwards to support qualifications such as GCSE and A Level. But they are not tied to particular courses, levels or qualifications. There is some indication of level of challenge—from A up to D—which in England relates to A (Level 1 Adult Numeracy and low levels of GCSE) up to D (Advanced Level, Level 3).

The sessions have been grouped into categories such as ‘Mostly number’ or ‘Mostly algebra’ for guidance, but many of the sessions contain rich activities that explore a range of mathematical topics.

The 3 enablers, the resources, the networks and the Subject Learning Coaches programme are having a very positive effect. Learners and teachers are enjoying the active approaches and assessment/results are improving and in some cases quite dramatically. Feedback from teachers and learners is very positive. Kelly Hughes, a mathematics subject learning coach at Darlington college, says

I was flying high after the GCSE results. Since I started using the ‘Improving learning in mathematics’ approaches, and taking over GCSE maths in September 2006, our success rate has increased from 56% to 73%.

Subject Learning Coaches like Kelly and other teachers and trainers attend the subject network meetings. These meetings are held at least three times per year in each of the nine Learning and Skills (LSC) regions in England and are organised and managed by the NCETM Regional Coordinators. The events provide the opportunity for teachers to work on the activities and approaches together and to share their experience and reflections. The hope and expectation is that teachers will take forward these approaches and create and share more. This is already happening at network meetings where we usually have a ‘show and tell’ session. More resources for teaching and learning are being produced and shared in the communities on the NCETM web portal as well as the QIA excellence gateway.

The Subject Learning Coaches Professional Training Programme is a course which helps teachers to become coaches within their organisations so that they can share their ideas and support and influence colleagues to use more active approaches to teaching and learning and to improve their practice.

However there are challenges to be faced. Experience is showing how important it is for Subject Learning Coaches to have the support of the managers in their organisation if the programme is to reach across the whole organisation. This can be a problem in some colleges where there may be little or no opportunity for all the staff teaching mathematics and numeracy across different levels and vocational courses to meet or spend time on subject pedagogy. These matters are thoroughly discussed in the recent NCETM report ‘The Organisation of Mathematics in Colleges’ available for download from the web site.
A recent development in 2008 has been some additional funding for practitioner action research projects and we have also just had a 2 day residential Summer School in York for over 80 teachers with teachers from all the regions and from a variety of organisations including colleges, prisons, adult and community and work based learning. Updates of these and other related activities will be made available via the NCETM web portal.

**Challenges for the Future**

Can we make the networks self sustaining?

How will we persuade more providers to take a ‘whole organisation approach’ to the National Teaching and Learning Programme and the effective use of Subject Learning Coaches?

The recent NCETM report on ‘The organisation of mathematics in colleges’ (2008) makes interesting observations and recommendations

The support of managers is critical in taking the work of the teaching and learning programme and the networks forward

The governments ambitions for ‘World Class Skills’ provides challenging targets to increase the number of mathematics and numeracy learners and the number of qualified staff to teach them.

Meanwhile networking also continues via the NCETM portal. All are free to join. When you join, which only takes a few clicks you can then view more of the communities, you can add your comments and you can make use of the self-evaluation tool and the personal learning space. Or you can access the ‘Subject Learning Coaches’ community or the ‘Thinking Through Mathematics’ community where more activities are being shared for all to use.

Have a browse. There is much to engage teachers of mathematics and numeracy. Make [www.ncetm.org.uk](http://www.ncetm.org.uk) one of your favourites!

**References**


WEB References

Accessed July 2008


National Teaching and Learning Change Programme  http://www.subjectlearningcoach.net/