National College for School Leadership

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Account of practice

What are we
learning about...?

'Making mathematics count' in school networks

A virtual design for networked learning in mathematics

Learning to Learn NLC

An illustrative example of what effective network practice for improving teaching, learning and leadership in mathematics looks like in action.

Networked Learning Communities

learning from each other | learning with each other | learning on behalf of each other

A virtual design for networked learning in mathematics

The accounts of practice presented within this series are generated from the work of practitioners involved in school networks. They aim to reflect the best of what is known from networked learning in action in order to provide concrete examples of networked learning practice. In particular, they provide a practical illustration of the significant elements we have found to be evident in school learning networks when developing network practice for effective teaching and learning in mathematics.

> ***"Across the country, teachers of mathematics have been teaching, enquiring and learning together. By creating subject-specific learning networks, they are finding ways to solve some of the problems currently facing the profession. More importantly, they are improving the learning experiences of children in classrooms and schools, and in a diverse range of contexts nationwide"***

There are now many schools, both in the UK and internationally, that are benefiting from working together as a network. By drawing upon their experience, and from the range of research that has been undertaken in school networks, it is possible to identify how networks of teachers are helping to address three key issues associated with effective teaching and learning in mathematics.

Three characteristics of network practice for effective teaching and learning in mathematics

1. ***Doing mathematics together in networks to enhance specialist subject knowledge and increase the supply of confident teachers of mathematics.***
2. ***Planning and working together in networks to ensure that the current and developing mathematics curriculum, assessment and qualifications framework meets the needs of all learners.***
3. ***Problem-solving and learning together in networks to provide the infrastructure required to support mathematics teachers effectively, particularly in terms of their continuing professional development.***

The four accounts in this series explore in different ways and with differing emphases the characteristics of effective network practice for improving and developing effective teaching and learning in mathematics. Consideration of these factors when developing learning networks of mathematics teachers and other mathematics practitioners will help ensure that future development is built from the best current thinking and practice. We hope that these accounts of practice will, therefore, be of practical use to you – if you are considering setting up a network, are part of a newly formed or established network, or if you are simply interested in finding out more about making mathematics count in school networks for the benefit of both teachers and children. □

Acknowledgements

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Nick Martin & Non Worrall
Lead Developers

Developing networked practices in mathematics

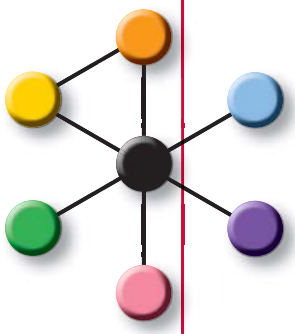
How do the practices of this network promote and develop mathematics?

- by creating and using electronically shared resources within and across schools
- by helping teachers to solve each other's problems
- by building greater confidence in their own teaching and understanding of pupils' learning through collaboration and shared planning
- by extending their knowledge and understanding of mathematics by 'doing mathematics together'

In 2003, 11 Hampshire schools – Wildern School with 3 secondary and 7 primary schools – decided to become the Learning to Learn Networked Learning Community. Building on previous co-operative cluster arrangements between primary and secondary schools, as well as informal collaborative activity amongst the secondary schools, they agreed a common learning focus:

"to engender a learning culture whereby teachers acknowledge themselves as life-long learners and young people recognise and understand the role they play in facilitating their own learning"

Network Co-leaders



Learning to Learn exemplifies the network configuration defined by David Hargreaves as *'centralised'*. The development of this particular structure has proved to facilitate cross-school subject collaboration. The steering group consists of four co-leaders and representatives from the local university and the Local Authority, who act as critical friends. Together, they oversee the current work of the network and plan strategically for the future. There are also two co-ordinators who liaise with the groups of teacher researchers.

Additionally, and most importantly for mathematics, the heads of department and Advanced Skills Teachers (ASTs) work across the network on subject and cross-curricular approaches to teaching and learning. Because of this structure, the head of the mathematics department at Wildern School can promote and create collaborative CPD for primary and secondary teachers of maths while at the same time effecting exciting changes in the ways that many pupils perceive mathematics.

Focusing on a Year 6 to 8 curriculum, which has at its core the development of independent learning, gives the network ways of addressing both pupils' anxieties about their transfer to large secondary schools and the academic 'dip' in pupil progress in Years 7 and 8. As part of the DfES initiative, the secondary schools in the network are developing a two-year, Key Stage 3 programme for the approximately 80 per cent of pupils who are deemed to be 'average or more able'.

Year 6 master classes

The development of the Year 6 master classes in mathematics arose from a problem first highlighted two years ago by a secondary school governor. Her son, who was a talented mathematician, was finding maths unchallenging at primary school. The head of mathematics at a local secondary school agreed to set the pupil work, but he soon found the one-to-one tutoring from a distance less than satisfactory. He proposed using a non-contact session to teach the pupil for an hour a week and invited the primary head to choose three other pupils to join them. This proved much more rewarding to all concerned and was rapidly expanded to a master class for eight pupils when he invited four pupils from another primary school within walking distance.

Once there was a formal network it was decided that all six of the primary schools should have equality of access. Using two school minibuses, the head of maths and a colleague pick up small groups of students from each primary school, bring 24 Year 6 pupils to the secondary school and pose an intriguing mathematical problem that they have to solve. Some of the topics they have dealt with so far include: trigonometry, negative numbers, simultaneous equations, ratio and quadratics.

The master classes had significant impact on the 24 pupils involved last year. Following their move to secondary school, they were noticeably more comfortable with the new school environment and delighted in their teachers' high expectations in mathematics. Their attitudes also affected several of their peers and proved a source of real satisfaction to teachers. The schools have been so pleased with the outcomes of this particular project that this year it has been extended to include 48 primary students (in two groups of 24).

"Our children who've been in the master classes have had the opportunity to do things they wouldn't normally because they've been doing extended work – and now we're looking to the future to broaden out the range of opportunities for all pupils within the 6 - 8 curriculum."

Network primary headteacher □

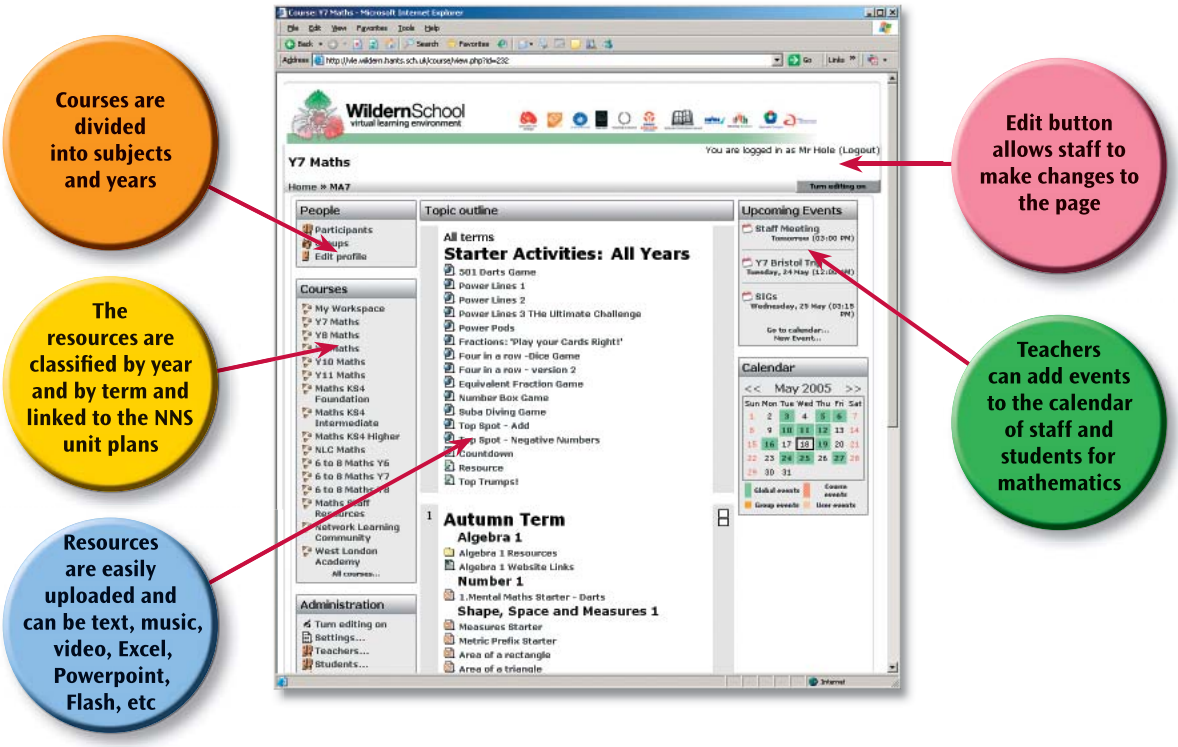
How does the Virtual Learning Environment work?

Wildern School decided to link together work within the Leading Edge Partnerships and Networked Learning Communities initiatives to buy high-quality technical help to develop a Virtual Learning Environment (VLE) that could be accessed by all teachers and students across the network. During the first year, the network has allocated time to enable subject leaders to develop curriculum materials to be posted on the VLE. Mathematics is proving the most proactive in this field, encouraging the growth of a genuine community of practitioners who meet face-to-face for decision-making and resource sharing, but can also access those shared resources in their classrooms on the VLE.

The VLE, built, adapted and designed using freeware, is open to all staff. The common page format is based on the feedback from teachers gathered by heads of department. Each teacher is allocated a curriculum page on the VLE on which to log subject resources.

The VLE design means that all teachers can add to the store of resources and have access to those posted by their colleagues. Consequently, collaboration becomes the norm, not an exception. In this way the network is breaking down barriers between teachers. It is establishing the expectation of working together to solve issues by creating a wealth of resources accessible to all teachers.

As staff become comfortable with the VLE and confident in using resources developed by their peers, the number of resources available to every teacher will increase and will consequently reduce time spent on planning. For example, since all of the teachers in the secondary schools in the network have laptops, even if they are teaching in a room without an interactive whiteboard, they can still log on to the VLE and have access to whichever resource they need. The VLE can also be accessed by supply or cover teachers, easing the burden on teachers but also enabling pupils to continue with their work in hand. □

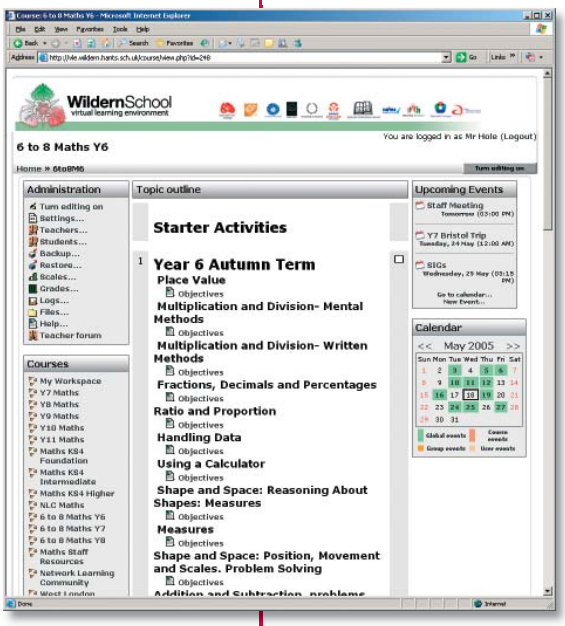


Transition and the 6 to 8 curriculum

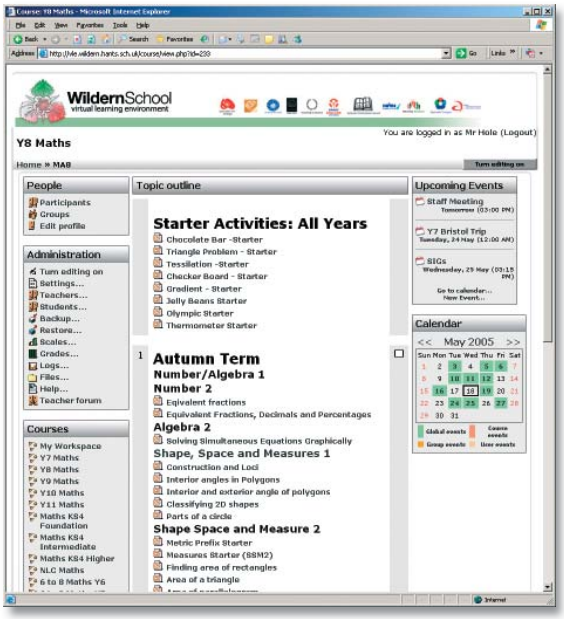
The Year 6 to 8 curriculum has increased the need for primary and secondary schools to work together and ensure that transition is as seamless as possible. The VLE will play a major role in this endeavour, as all the resources will eventually be visible to everyone. Teachers, pupils and parents from both the secondary and the primary schools will be able to see clearly what is intended for each year group.

One area that was discussed in detail was which resources should be allocated to which year group. In face-to-face discussion, the primary and secondary teachers agreed where a particular resource should be located. At the same time they are becoming ever more mindful of the impact on children if they need to work on resources that are labelled, for example Year 4, when the child may actually be in Year 6 or even Year 11. Therefore, debate is now centring on how to allocate some 'off-the-shelf' resources as 'all year starters' since so many topics recur or need revision in the mathematics curriculum. There is a facility within the VLE for teachers to conceal items from pupils unless they wish them to have access, ensuring that resources can only be used appropriately.

A further issue which the VLE is being used to address is that of *transition.* Particularly because of the reduction of KS3 to Years 7 and 8, it becomes even more important to ensure that the two months between KS2 SATs and the end of the summer term are used effectively.



The numeracy co-ordinators and the secondary heads of maths are working together to agree exactly which topics will be covered in all of the feeder schools. Their decisions will ensure all students have a solid foundation in those areas, giving them a common starting ground in September at the network's secondary schools.

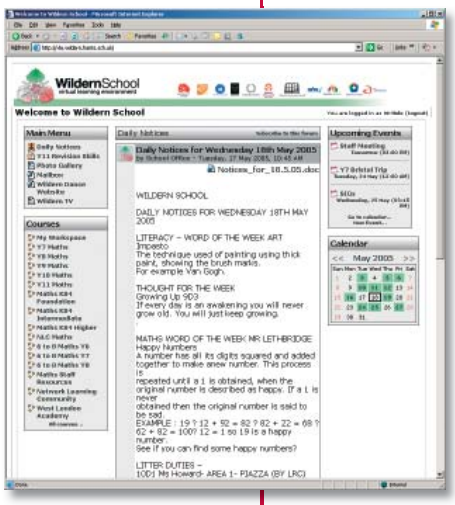


The transition topics are agreed upon during some of the regular monthly meetings, where discussions have become quicker and more efficient as the teachers have built trust and understanding through their growing collaboration. The DfES Transition Unit has been adapted to fit the local context and remains a powerful lever for maximising the use of time available for learning. The new unit is a context-specific programme which teachers are confident they can all deliver successfully to the advantage of their whole community of learners.

As well as electronic resources, there have been examples of the more traditional secondary teacher visits to primary schools. A benefit of such shared teaching (the degree of team teaching depending entirely on the decision of the primary teacher) has been that the secondary teachers, used to teaching classes in 'sets', have had to face the primary teacher's challenge of a class with the widest spread of mathematical attainment. This has led to a deeper realisation of the differences between teaching mathematics in such contrasting contexts. □

The future for teachers, pupils and parents

By giving pupils and parents individual access to the VLE, the network schools are beginning to tackle some of the problems associated with a mathematics curriculum that, as acknowledged by the DfES, does not necessarily meet the needs or interests of many pupils.

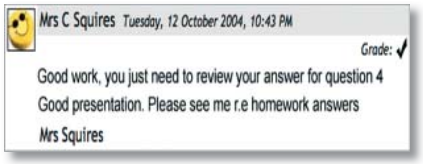


Pupils in Years 6 to 8 can access the resources they need to develop the activities in groups, individually or as whole classes. The learning activities can, if necessary, be individually tailored as required by the personalised curriculum – but without the teacher having to spend additional hours devising special activities for each student. For the secondary pupils, access can be achieved from home, enabling them to go over work that has been done in class that might still be causing some anxiety.

Martin Hole, the Head of Maths at Wildern explains how he saw this happening:

❝ Nowadays, if a pupils goes home and says 'Oh, Mr Hole went through this but I'm not sure about it' they can open up the VLE and there's my lesson for them to see and so can the parents. We often hear parents say 'How can I help my child? Oh, I'll buy a textbook' but hopefully this will be a little bit better because I've already been through it in class

Teachers also have the ability to send personal notes to pupils about their work, which once again could also be seen by parents if the pupils so wished.



The VLE is also impacting on CPD. The network meetings for secondary and primary teachers are building a community of practitioners who are offered opportunities to:

- extend their knowledge and understanding of mathematics within and beyond their own phase of expertise.
- develop their self-confidence as life-long learners who no longer have to worry about not being the all-knowing expert. In an atmosphere of trust, being able to reveal concerns and misunderstandings about a range of mathematics topics becomes acceptable.
- work through examples of maths problems and resources together, helping to reduce some of the non-specialist primary teachers' concerns about some more complex mathematics problems. By working through resources together their subject expertise is broadened and deepened.

End note

The network's plans for the future to develop and extend use of the Virtual Learning Environment include further skills development, interactive learning opportunities, cross-curricular work and animated resource development – all of which can usefully be drawn upon and adapted by teachers and learners of mathematics.

- A full VLE training programme is now running. Skills are developed on training days and twilight sessions as well as through personal tutoring by teachers, technicians, and specialist tutors.
- Interactive learning will be developed by providing 'Flash' workshops for staff wanting to create animated resources.
- Because music can be broadcast across the VLE, students will be able to present shows via an online radio station. Webcasting will share live video and sound of Wildern events across the web on an international basis including links with Germany, France, Spain and the USA. □

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What are we **learning about...?**

The 'What are we learning about…?' series is designed to make public the learning that has emerged from NLCs in the last two years.

The first nine titles in the series will focus on:
What are we learning about…?

- LEA involvement in school networks
- Establishing a network of schools
- Community leadership in networks
- ***'Making mathematics count'* in school networks**
- The impact of school networks
- Sustaining a network of schools
- Facilitation within school networks
- Professional development in school networks
- Leadership of school networks

To order a copy of this publication and others in this series, please email **nlc@ncsl.org.uk** quoting the reference **WAWLA/Making mathematics count**

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