Development tool

NCSL National College for School Leadership

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What are we
learning about...?

'Making mathematics count' in school networks

Two routes to an improvement solution...

Planning and working together in mathematics

A development tool designed to support collaborative planning and working in networks through the use of the processes of appreciative inquiry and action research.

Networked Learning Communities

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

Two routes to an improvement solution...

" It is teachers who in the end will change the world of the school by understanding it. "

Lawrence Stenhouse

This development tool is designed to support collaborative planning and working in school networks and amongst networks of teachers of mathematics. It explores the use of appreciative inquiry and action research as two potentially powerful routes to finding practical and actionable solutions to the questions and issues which affect the everyday lives of teachers and students, as they work to improve teaching and learning in mathematics.

Although these two approaches to joint planning and working have different starting points and encourage the use of different processes and methods, they are bound together around a common core. What they share in common is collaborative engagement in a process of action-oriented, evidence-informed improvement, and the building of change management capacity within schools and networks.

Both approaches involve a commitment to working with others (eg with inquiry partners, in inquiry teams, with pupils as researchers) and to improving the quality of action in any given situation (eg a classroom, a school, a network), so building the individual, collective and organisational capacity for change.

Equally, both approaches seek out the potential usefulness of this form of joint inquiry in relation to improved policy or practice in shared areas of appreciation, interest or concern. What is distinctive about this way of joint working is that it is designed to ensure that the search for improved understanding is carried out *through* practice (eg through joint problem-solving; collaborative, appreciative and reflective practices; organisational re-design processes).

This development tool provides an overview of each of these two potential routes to improvement. It gives practical illustrations of the research and inquiry processes in action with a focus on teaching and learning issues in mathematics. Whichever way forward you decide to take, we hope you will find this development tool helpful in planning a route to improvement in your classroom, school or network. For this reason, planning templates detailing the key stages of each of these approaches have been included, for use in supporting the processes of planning and undertaking your collaborative work. □

Appreciative inquiry

Appreciative inquiry has evolved from work in the field of organisational change which acknowledged the powerful effects of an appreciative mindset and the effectiveness of appreciative managers and leaders in organisations (Srivastva & Cooperrider, 1990). It is described by its co-creator, Dr David Cooperrider of Case Western Reserve University, as the "*study and exploration of what gives life to human systems when they are at their best*". It is a method for improving an organisation by inquiring into strengths, successes and values.

Although acknowledged as providing a viable complement to conventional forms of action research, appreciative inquiry is distinctive in that, rather than taking a problem identification or problem-solving focus as its starting point, alternatively the inquiry process begins by recognising the best in people and their current practice. It is based on the guiding principles that research into the social and innovation potential of organisational life should begin with appreciation and be applicable, proactive and collaborative.

> ***"Appreciative inquiry involves the art and practice of asking questions that strengthen a system's capacity to heighten positive potential. In appreciative inquiry, intervention gives way to imagination and innovation; instead of negation, criticism and spiralling diagnosis, there is discovery, dream and design. It assumes that every living system has untapped, rich and inspiring accounts of the positive."***
>
> Cooperrider & Whitney, 2000

Appreciative inquiry offers the opportunity for colleagues to define what the future in their organisation ought to be in relation to the values and purposes they have identified as important to them. In a network context, this process could be part of a re-examination or refinement of an identified learning focus, or a way to build strategically on that focus by maximising the talents and imagination of a particular group of learners.

The process develops leadership and change management capacity because it helps participants to move beyond talking about what hasn't worked in the past to a focus on the best of 'what is' in the present, and ultimately to a positive a view of 'what might be' in the future. It encourages participants to focus on what gives life to teaching and learning when they are at their best, and requires them to act upon this knowledge. This process involves four key stages of activity.

Four key stages of appreciative inquiry

1. **Discovering** the best of 'what is' – participants make sense of their past and current achievements.
2. **Dreaming** of 'what might be' and envisioning an ideal future – participants create future scenarios for themselves and their organisation.
3. **Designing** 'what should be' in an ideal future – participants construct a strategic vision.
4. **Delivering**, underpinning and sustaining the changes undertaken – participants realise and implement their dream.

During this process, new relationships are formed between colleagues, and bridges are created where traditionally there have been boundaries. Moreover, the process enables the experience of individuals to articulate a strategy for personal development as well as an agenda for organisational change. This provides the conditions and the knowledge-base for collective learning, innovation and the implementation of action for improved practice.

Action research

Action research in education in the United Kingdom has grown largely out of a tradition of work in the school sector associated with curriculum development (Stenhouse, 1975) and more recently it has been associated with work in the field of school improvement. It has been described by Kurt Lewin, one of the originators of action research, as consisting of a *"spiral of circles"* of *"analysis, fact-finding, conceptualisation, planning, execution, more fact-finding or evaluation, and then repetition"*. To the present day, this combination of action and research in classrooms and schools has continued to have powerful appeal to teachers.

> ***"Put simply, action research is the way groups of people can organise the conditions under which they can learn from their own experience."***
>
> Kemmis & McTaggart, 1982

When undertaken collaboratively, the action research process provides the opportunity for colleagues to identify and clarify key issues of shared concern in their situation, whether that be a classroom, school or a network of schools. It then provides the basis for researching what is actually happening in that situation regarding the area of concern identified, including different people's understanding of it. Following this, research participants introduce and implement a change in practice on the basis of acknowledging the contradiction which exists between what is happening, and what they would like to see happening. Finally, research is undertaken into the impact of the change which has been introduced (Bassey, 1998).

The action research spiral depends initially upon the identification of a 'general idea' that an improvement or change in the teacher's work is desirable. The succeeding spirals are based on four recurring steps. As a result of the fourth step, the original plan is revised and the cycle of 'plan, act, do, review' is repeated until the question is answered and the issue resolved (Elliott, 1991).

Four key steps in the action research cycle

1. **Identifying the 'general idea' and finding out the facts** – the 'general idea' is a statement which links an idea to action, it is followed by a fact-finding exercise to provide the basis for classifying what is relevant to the subject of the inquiry.
2. **Constructing a plan for an intervention** – this involves constructing a plan which will address the concern located in the 'general idea'.
3. **Carrying out and observing the plan in action** – this involves implementing changes in practice and collecting data about the impact and effects of the changes introduced, including teaching and learning outcomes.
4. **Revising the plan based on a reflection and review of outcomes** – the plan is then revised on the basis of reflection, analysis and review of the structured observations and outcomes.

As with the appreciative inquiry process, when action research is undertaken as a collaborative activity, new relationships are formed between colleagues, and bridges are created where traditionally there have been boundaries. As Marion Dadds describes, adopting such a partnership approach to joint planning and working has important benefits for both teachers and students as the beneficiaries of the collaborative action research process.

> ***"There are good reasons for fostering our partnerships with other practitioners…our efforts to do those good jobs of work through research can be enhanced if we join forces wherever there is a common will for change. Together, we ought to be able to achieve more than we can as separate professional groups. Together we bring a variety of experiences and expertise which can be drawn upon collectively for the greater good of the beneficiaries."***
>
> Dadds, 1996

□

What difference do these approaches make?

Appreciative inquiry and action research help to build learning communities by providing two contrasting routes to improving teaching and learning.

Whereas action research links theory and action to find ways to resolve an identified problem, appreciative inquiry concentrates more strongly on thinking through the final ideal picture to drive necessary actions. Both, however, lead the practitioner through the decisions that change classroom practice.

The two approaches are based on a structure and discipline that provides practitioners with the security that frees them to be innovative. Hence teachers are able to consider their intentions and develop qualitatively different ways of managing the learning process, but can take different routes to achieve their common objective.

Appreciative inquiry allows an alignment of strategies for improved pupil learning with those for improving adult learning. In addition, teachers are prompted to think about what they hope their legacy will be and the difference that they hope to make as a result of their joint planning and working.

Action research involves reflective practitioners in critical collaborative enquiry. It requires them to be accountable to themselves, each other and their pupils. Involvement in the processes of self-evaluation of practice and participative problem-solving also provides a powerful networked context for teachers' continuing professional development.

The examples on pages 6-7 are designed to assist you in considering which if these approaches you might like to take as a route to improving teaching and learning in your context. Whichever route you choose, the planning templates which follow can then be used to support the processes of joint planning and working in your situation. □

References and further information

Appreciative inquiry

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Elliott, J, 1991, *Action Research for Educational Change,* Milton Keynes, Open University Press

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The routes:

The following diagram demonstrates how the processes of appreciative inquiry and action research can be used for joint planning and working by teams of mathematics teachers to address shared areas of appreciation or interest, or to solve particular problems, issues or areas of concern which affect them all.

Appreciative inquiry

1 Defining the topic for the inquiry Discovering – the best of what is and has been

Identify your issue eg What does effective teaching of mathematics look like?

This stage involves gathering data (through interviews with a cross-section of individuals) and the sharing of best practice stories about the positive past. Interviewees are asked to describe the times when they felt most excited, enthused and most effective as teachers and to consider the features and factors which contributed to those experiences.

Maths teachers from across a network of 10 schools (8 primaries, 2 secondaries) work in pairs, telling each other the best examples from their experience about when they feel most effective as teachers, with a particular focus on making a difference to pupils. As a result of their reflections, a more wide-ranging discussion emerges around progression in mathematics being sequential, highlighting the importance of a sound foundation.

Dialogue focusing on their own key learning moments (pedagogical and strategic) leads to a series of themes that represent the collective strengths of the group. Many teachers feel they have been most effective when they have "*helped pupils achieve beyond their own expectations",* others report feeling most effective when "*supporting the learning of colleagues and therefore leading the direction of a maths department*."

2 Dreaming – what might be

Think big and out of the box. What are your hopes and dreams for yourself, your own work and your network?

In this stage, teachers work in cross-school groups to turn real examples of excellence into positive, shared visions for the future. Some draw pictures, or storyboards, others capture their conversations in written form. Their propositions demonstrate a shared focus that can be expressed in a statement that forms the basis of their inquiry.

Discovery Statement: As a network, we can transform the way pupils learn maths by creating a seamless transition.

In cross-school groups of four to six, they work to build on the common themes to create their image of an ideal future. This is a highly creative stage in the process. Everyone feels they have a stake in influencing the future direction of teaching and learning in their network. The future scenarios are felt to be both innovative and exciting, but achievable because they are based on real examples of what has already worked in the classroom.

In addition, discussions around leadership of the project ensure that their visions are strategic, making sure that they address the demands of the networked context in which the teachers are now situated.

Action research

1 Identifying the 'general idea' and finding out the facts

The 'general idea' is a statement which links an idea to action.

The fact-finding element involves collecting information to classify the relevant facts.

During a mathematics pyramid meeting of six primary co-ordinators and two secondary heads of department the issue of transition is raised as an area for improvement. Progression in mental calculations as well as shape and space are highlighted as problem areas by various members of the group, but problem-solving is highlighted by everyone. They decide to undertake a collaborative action research project into writing a problem-solving transition unit for shape and space.

All mathematics teachers conduct an audit of their own approaches to problem-solving. A common questionnaire about attitudes towards problem solving in mathematics is drawn up and administered to all Year 6 and Year 7 students in the network schools. Each teacher interviews a sample of students (three each) to establish their views in more detail. These data are analysed at a shared CPD day with the help of the HEI link.

2 Constructing a plan for an intervention

Following the data gathering and analysis, the teachers brainstorm the reasons for the students' perceptions and reactions. Using the data, they decide which classroom strategies to use.

They construct a shared plan of how to implement the chosen strategies and monitor the impact on students. They devise observation tools that will enable them to collect the necessary data. They agree a timeframe.

A timeframe of one term is agreed and network funding is supplied to give people time to work together.

They decide to ask three students with varying levels of mathematical confidence in each class to keep a video diary and they design an action research journal to be kept by each teacher. They also agree on a common format for lesson planning sheets as well as an observation schedule.

HEI partner agrees to carry out focus group discussions with random samples of students in each school to investigate perceptions of each strategy.

3 Designing – what should be

Translate your dreams into projects and actions.

Teachers outline together an improvement strategy which links the positive past (schools' individual attempts to improve) and the ideal future vision (where teachers across the schools are working together). Then they create a consultation paper outlining the strategy (knowledge-base and rationale, objectives, actions, intended outcomes) which is shared with all teachers and pupils in their network.

Focusing on turning the dream scenario into reality, groups of maths teachers consider how they have made effective changes to their working practices. During their conversations, they are asked to draw on their experiences of success and failure when managing change in school environments. Teachers develop faith in their ability to achieve their collective vision for improving the teaching and learning of maths at transition.

When designing and making real improvements to teaching and learning, teacher confidence is critically important. Knowledge about the processes of communication, collaborative enquiry, knowledge-transfer and self-evaluation needs to be pooled so that a genuinely collective decision can be made.

4 Delivering – what will be

Volunteer to help make the vision a reality.

At this final stage, teachers are asked to think about what it would mean to implement the specific proposals made in their 'appreciative design'. This involves making judgements about resource allocation, school-wide and school-school capacities, and the precise implications of pupil involvement at all stages of the implementation of the improvement strategy.

From the outset the teachers know that their project needs to include a continual learning and feedback loop. They group themselves according to expertise and interest around the elements of the project that have already been proposed. They make personal commitments to take the work forward together on behalf of the pupils whose experience of maths (and learning in a wider sense) is affected by transition. As a result, they become jointly accountable for implementing and reviewing the changes they have jointly pursued.

A strategic experiment is designed, including the development of a shared transition unit that will be taught by cross-phase teams. The content of the unit is planned collaboratively by a cross-phase working party including Year 6 and 7 pupils.

3 Carrying out and observing the plan in action

The plan is implemented in the classroom.

Careful observations are made of each element, recording effects on the teacher and students. Instruments used usually include varieties of diaries, journals and learning logs, as well as quantitative data as appropriate.

Detailed records of observations are compiled.

Several of the teachers visit each other's schools. Using the agreed lesson observation tool, they record their impressions of the learning occurring in one of the transition lessons. Three pupils in each observed lesson keep a learning log of what they feel they are learning. Three other pupils, in the plenary session, record a video diary of their reactions to the lesson. The teacher running the lesson writes up a journal entry after the lesson.

Teachers who are unable to host an observer make a video recording of the lesson for discussion in the reflection stage. Focus group discussions are held by the HEI partner in each school.

4 Revising the plan based on a reflection and review of outcomes

Review all of the evidence. Analyse the outcomes and implications.

What effect has the action had on the students and the teacher?

Is the 'general idea' still valid? Does it need to be modified? Are there other aspects to explore?

What needs to be done next?

During a shared CPD day, the teachers work together to identify the common threads in perceptions from the multiple sources of evidence. They seek to find what works most effectively in improving problem-solving skills and enhancing transition. The HEI partner facilitates their discussions.

Pupils have been involved in the analysis of the survey of Years 6 and 7 perceptions of problem-solving and in drawing out common themes from their video diaries and learning logs.

The teachers then discuss whether their dual focus on problem-solving and transition is still valid as their priority. Once they agree their refined 'general idea' for the next cycle – transition only – they set about planning cycle two of their action research project. □

Appreciative inquiry planning template

Photocopy these pages

Appreciative inquiry stages	**Planning for action...** *Pause for thought...?* Record your thoughts, plans and proposed actions here
1 Discovering – the best of what is and has been Identify your issue eg What does effective teaching of mathematics look like?	
2 Dreaming – what might be Think big and out of the box. What are your hopes and dreams for yourself, your own work and your network?	

Appreciative inquiry stages

Planning for action… *Pause for thought…?*

Record your thoughts, plans and proposed actions here

3 Designing – what should be

Translate your dreams into projects and actions.

Outline together an improvement strategy which links the positive past (schools' individual attempts to improve) and the ideal future vision.

4 Delivering – what will be

Volunteer to help make the vision a reality.

Give details of what it would mean to implement the specific proposals made in your 'appreciative design' and plan out what this implementation would look like in practice.

Action research planning template

Photocopy these pages

Action research steps

Planning for action...

Pause for thought...?

Record your thoughts, plans and proposed actions here

1 Identifying the 'general idea' and finding out the facts

Focus upon and identify a 'general idea' and formulate this as a statement which links an idea to action.

Plan out the fact-finding element of your inquiry to involve collecting information from others on your chosen area of focus.

Plan to ensure that your fact-finding data provides a basis for classifying the relevant facts of the situation, your interpretation of it and that of others

2 Constructing a plan for an intervention

Using the data from step 1 decide which changes you will introduce and which strategies you will use.

Construct a shared plan of how to implement the chosen changes in practice and the strategies to be used.

Agree a timeframe for action.

Action research steps	Planning for action… *Pause for thought…?*
	Record your thoughts, plans and proposed actions here
3 Carrying out and observing the plan in action Devise observation tools that will enable you to observe and collect data about the implementation of your planned intervention. Plan out and schedule how observations will be made of each element of your action and how you will record the impact and effects on teacher and students.	
4 Revising the plan based on a reflection and review of outcomes Plan out how you intend to review all of the evidence and analyse the outcomes and implications. What effect has the action had on the students and the teacher? Is the 'general idea' still valid? Does it need to be modified? Are there other aspects to explore? What needs to be done next?	

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**

National College for School Leadership
Networked Learning Group
Derwent House
Cranfield University Technology Park
University Way, Cranfield
Bedfordshire
MK43 0AZ

T: 08707 870 370
F: 0115 872 2401
E: nlc@ncsl.org.uk
W: www.ncsl.org.uk/nlc

NCSL National College for School Leadership