

## Using a Lesson Study CPD approach in mathematics with a focus on number

### Teacher's initial assessment and observations

Some of my children:

- do not understand how the position of a digit in a number determines its value, particularly when decimals are involved, and they cannot interpret measures, numbers on different scales or those displayed on a calculator;
- have little grasp of the relative size of numbers and cannot order number accurately;
- have an insecure understanding of fractions and the relationship between whole and part numbers;
- are unable to manipulate numbers and partition them in different ways when carrying out informal methods of calculation.

Teacher's questions

- What can I do to secure my children's understanding of place value?
- What resources might I use to help children interpret scales?
- How can I help my children to understand the relative size of numbers?
- What practical approaches and images can I use to help them to read and interpret scales and to recognise the relationship between whole numbers and part numbers?
- Are there teaching approaches I have not tried that have worked for other teachers?

***Step 1: Analyse assessment and observation information to sharpen the focus***

I will look closely at data I have on my children's attainment. I will use the Primary Framework to track their progression in number and assess the progress my children are making in understanding key number concepts. I will identify:

- which children are struggling;
- if they can count in different step sizes and relate the count to numbers on a scale;
- if they can partition numbers in different ways;
- how secure their understanding is of place value and the relative size of numbers;
- how well they can read calculator displays and scales with different intervals;
- what they understand about the relationship between whole and part numbers;
- if they struggle with ordering particular sets of numbers;
- how their poor understanding of key number concepts might be affecting their ability to calculate;
- if they make use of the available practical materials, and how and when this helps.

***Senior leader's role***

Encourage the teacher to review and analyse their children's mathematics

***Subject leader's role***

Help the teacher to track progression in number within the Primary

<p>learning. Make any data you have on these children available to the teacher and discuss the analysis with the teacher and subject leader. Discuss the Lesson Study approach and the questions. Help to focus the proposal on improving learning, to relate it to the school's improvement planning and to set realistic and clear expectations and outcomes.</p>	<p>Framework and to analyse any data and to review the children's responses to work involving key number concepts. If appropriate, observe children in a lesson and interview a group of children with or for the teacher to discuss the mathematics the children can do and are struggling with. Discuss the Lesson Study approach and help to frame and agree the questions and identify when to provide any further support or help.</p>
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***Step 2: Decide who you can work with to carry out the Lesson Study***

I will discuss this with two of my colleagues, one who has said she is interested in finding out more about why her children are not all making progress in mathematics and the other who has a class with children in the same age group to agree who I will work with and to establish the Lesson Study Group. I will find out:

- if the headteacher is happy that we can work together this way;
- if we can have dedicated time to carry out the study;
- when we can plan together and when we can carry out joint observation;
- if everyone is willing to have a go and share ideas;
- if there are any concerns about being observed or observing;
- if they have any views on the question I have posed;

<ul style="list-style-type: none"><li>• if they can talk to some of my children about their understanding of number;</li><li>• if they think my assessments are correct.</li></ul>	
<p><b>Senior leader's role</b></p> <p>Encourage the collaboration and, where appropriate, provide the space and time for initial discussions to take place. Discuss the questions that will steer the collaborative activity, the resources that will be available to support the activity and the skills of observing and analysing learning.</p>	<p><b>Subject leader's role</b></p> <p>Promote and engage in the early collaboration and discussions. Emphasise that all the observations are confidential and are focused on the children's learning to inform further planning and the next steps in the collaborative activity. Offer to give any mathematics advice if and when requested.</p>

<p><b>Step 3: Agree on the focus, methods, roles and rules</b></p> <p>Our Lesson Study Group will draw up a timeline for the study and agree on:</p> <ul style="list-style-type: none"><li>• the questions we want to address through the collaborative enquiry;</li><li>• what we want to get out of the Lesson Study and how we will know we have achieved it;</li><li>• how and when we plan and work together;</li><li>• who will teach the study lessons and which classes will be involved;</li><li>• how we record and share our observations and develop a learning log that captures the evidence of impact on children's learning;</li><li>• if we keep other notes and records and who might have access to these;</li><li>• what we tell the children and how we engage them;</li></ul>
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- if any teaching assistants are involved;
- if something does not work this is as important as if it does work;
- how we identify our own learning as well as the children's learning.

***Senior leader's role***

Discuss the timeline for the study and confirm the resources that will be available to support the study.

Emphasise that the lesson observations have nothing to do with performance review and you expect the group to try out new and different approaches that may not always work, but that this will be part of the learning process. Ask to be kept informed about the activity and to learn about what has helped to strengthen the children's learning.

***Subject leader's role***

Check to see if the group has access to the resources it needs to use in the lessons. Discuss the questions the group is to focus on and offer any advice on how the observations of children's learning might be undertaken and how the evidence might be recorded. Determine whether there is any subject specific support the group needs or if they need access to the ICT suite or other locations. Offer to engage in the planning process and to arrange any cover for children with the headteacher. Encourage the group to use the study lessons as an opportunity to take risks.

**Step 4: Find out what has worked for other children and teachers**

Our Lesson Study Group will look for ideas and methods of teaching that have worked. We will:

- discuss with colleagues how they plan, teach the key number concepts to their children and how they assess whether children have a secure understanding;
- talk to children about place value and the size and scale of numbers and find out the strategies they use to order numbers;
- research ideas in texts and other publications;
- search the Internet for evidence of effective practice;
- begin to identify approaches we might build into our study lessons.

**Senior leader's role**

Discuss what the Lesson Study Group's search for ideas and effective practice has identified and how the group plans to use this learning. Where appropriate, arrange visits to partner schools or provide access to extra teaching and learning resources that have been identified as being successful in securing children's learning in the area of study.

**Subject leader's role**

Help the group to search for evidence of the common problems children have in number and what has worked in overcoming these. Take responsibility for researching a particular area of difficulty or a particular teaching approach. Engage in discussions with the group about approaches they might try and discuss these with other staff to see if they have tried them or would be prepared to do so too.

**Step 5: Decide on the focus group of children**

I will look at the assessment and progress data I have and pick three children who represent the range of attainment in my class in terms of how secure they are in relation to the key number concepts we are going to address in the enquiry. I will:

- review with the Lesson Study Group the questions we plan to address through the enquiry to ensure the selection of the focus group is appropriate;
- invite colleagues from the Lesson Study Group to talk to the focus group of children about their understanding of the size and scale of numbers and identify strengths and gaps in understanding that limit their progress;
- adjust membership of the focus group in the light of these discussions;
- draw up assessment profiles on the children in the focus group with colleagues from the Lesson Study Group;
- agree a description of the security the children in the focus group have with the key number concepts that the study is to focus on;
- agree targets for this group of children to use when planning the study lesson and when observing their learning.

**Senior leader's role**

Discuss with the Lesson Study Group the importance of identifying children who represent the range of attainment in the class and how these children's learning is to be observed. Find out what targets are being set, when the Group's first

**Subject leader's role**

Offer to engage in the discussions with the children to help to identify the focus group. Review with the group how well the selection of the children in the focus group reflects the questions the group want to address through their

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study lesson is happening and confirm that they have the resources they need for the activity.	collaborative enquiry.
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***Step 6: Together plan a study lesson with the focus group in mind***

Our Lesson Study Group will use the assessment profiles we have on the three children to draw together what we want to learn or improve in the teaching and learning of number concepts and what the children need to learn to make progress. We will use this information to plan a study lesson that:

- addresses the questions we want to answer as part of our enquiry;
- draws on our previous discussions and assessment profiles and the Primary Framework to set the pitch of the work for the children in the lesson;
- introduces some of the researched ideas and practices;
- sets out what each child in the focus group is expected to learn in the lesson;
- identifies the new approaches, the expected outcomes from these innovation and associated risks;
- has clear guidance for the observer on what they are to look for and how they will record this for the post lesson discussion.

***Senior leader's role***

Make sure the Lesson Study Group has the time to plan the study lesson jointly and thoroughly and discuss with them how the lesson is to address the questions that inform the enquiry.

***Subject leader's role***

Discuss with the group the research ideas they are planning to draw on and use. Encourage any innovation or new approaches and assure the group that they can and should be taking some risks and be prepared for successes and failures that they will

	build on in future planning. If invited to, look at the lesson plan and discuss the intended learning outcomes with the group and how they plan to carry out the observations.
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***Step 7: Teach and together observe and assess the learning of the focus group***

One of us will teach the study lesson and others in our Lesson Study Group will observe the focus group to identify what learning is taking place. Together we will:

- contrast the involvement, response and progress of the focus group children to the content of the lesson with that of other children in the class;
- observe how they engage and interact with other children and with the mathematics and have a go at tackling the tasks and problems they are set;
- decide whether the pitch of the mathematics is right for all or some of the focus group and if they connect their learning with what they already know;
- see if the focus group understands what they are to learn and why;
- identify what the focus group children do and when;
- identify key steps in the lesson that engage and challenge the focus group;
- assess the progress of the focus group of children during the lesson;
- establish what the children have learned by the end of the lesson and compare progress made against the learning that was planned for them;
- decide whether the innovation led to good learning and, if so, why it worked or not;
- review the progress made against the anticipated risks.

***Senior leader's role***

Encourage the Lesson Study Group to meet and discuss the lesson

***Subject leader's role***

Provide encouragement before the lesson and engage in discussion with

<p>immediately after it ends and again as soon as they are able to carry out a more detailed review. If necessary, provide additional time for the post lesson discussion.</p>	<p>the group after it ends. Offer no opinion or criticism at this stage unless the focus has moved away from the identified areas of learning and questions. Ensure that the group is prepared to use the first lesson as a starting point and emphasise that they should reflect on the children's learning and their own learning following the lesson. Help to create the space and time the group needs to review the lesson.</p>
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### ***Step 8: Together review learning in the light of the planned learning outcome***

Our Lesson Study Group will meet after the lesson to swap any notes we have and to share observations on the children's learning. We will discuss the lesson with the children, in particular the focus group of children, to find out their views on their own learning. We will make sure there is plenty of time set aside to meet again, preferably within 24 hours of the lesson so we can review learning in more detail and record the progress we are making. We will review each element of the lesson with reference to the focus children and test each tentative conclusion or hypothesis against their behaviours and learning, which will form our touchstones. We will check out our assumptions against the external research and our personal observations. Together we will review:

- how the focus group responded to the mathematics in the lesson;
- the appropriateness of the pitch of the work and any gaps in learning we identified that limited progress and the pace of learning;
- the extent to which the focus group children were challenged by the work;
- how successful they were, what they struggled with and if there were any different or unexpected responses and strategies being used by children;
- whether the focus group children met the objectives that were planned and what progress they made towards the agreed targets;
- what worked in the lesson and what was less successful;
- what we have learned from what worked and did not work;
- how well the researched ideas informed the learning and where we might extend our research to find out more about an idea or teaching approach;
- the extent to which the risks led to changes in children's responses,

<p>learning approaches and behaviours, and their impact against the anticipated outcomes;</p> <ul style="list-style-type: none"><li>• the extent to which we have answers to the enquiry questions and whether we need to amend or revise the questions;</li><li>• our hypotheses about what worked and why and set new hypotheses to test out during the next study lesson;</li><li>• the assessment profiles of the focus group of children and update these in preparation for the next study lesson;</li><li>• our plans for the lesson and use all the information we have collected and analysed to plan the next study lesson.</li></ul>	
<p><b><i>Senior leader's role</i></b></p> <p>Discuss with the group what they learned from the study lesson and what they have identified as their next steps. Promote the keeping of the learning log for future dissemination across the school. Remind the Lesson Study Group that this CPD is still at an early stage and is new to the children. Confirm that they have the resources they need to continue to undertake the collaborative lesson study activity.</p>	<p><b><i>Subject leader's role</i></b></p> <p>Discuss the outcomes from the lesson and the response and learning of the children in the focus group. Check that in the review attention remains on those aspects of mathematics identified through the data analysis and the assessment activity. Encourage the group to draw on the evidence of what works and to continue to be innovative. Offer support and, if appropriate, any guidance on mathematical issues or the use of resources and maintaining the learning log to record progress.</p>

### ***Step 9: Together, plan, teach and observe further study lessons***

Our Lesson Study Group will use our collaborative observations, review meetings and analyses, discussions with children and shared learning to plan more lessons that extend the ideas and practice further, and think about how we might capture the children's learning more effectively. We will update our learning log. We will review the membership of the focus group and make any adjustments we think will help us to gather additional and more precise evidence. We will look at when, where, if and how we might:

- adjust our questions to inform the study lessons;
- refine and refocus our hypotheses about what makes a difference to children's learning in the context of securing number concepts;
- amend the learning expectations for the focus group;
- introduce less structure or greater scaffolding for the study lessons and the children in the focus group;
- strengthen the learning in areas that were less successful;
- check with the focus group children what they have gained from the study lessons;
- revise targets and outcomes to ensure that expectations and the challenge of the work are matched to the children's rate of progress;
- carry on taking risks and being innovative, continuing to draw on the research and what has worked in the lessons;
- be prepared for unexpected responses and look for and capture any innovative methods or strategies being used by children;
- capture evidence in future study lessons using audio, still or video recording to analyse after the lesson and use for wider dissemination.

<b><i>Senior leader's role</i></b>	<b><i>Subject leader's role</i></b>
<p>Continue to engage with the group and discuss the progress they are making in extending their own learning and practice and the learning of the children. Provide ongoing support for the Lesson Study activity. Remind the group that they should maintain the log to record the risks they took, what worked and what was less successful and why and the progress they and the children are making so they can share this with the whole school when they are ready. Invite the group to consider if they are ready to share any of their work with colleagues in the school, and to think how they might do this most effectively.</p>	<p>Maintain regular contact with the Lesson Study Group and monitor the ongoing activity against the proposed timeline. Discuss the learning log and the outcomes that are emerging and the impact it is having on the children's learning. Help the group to record the progress in their own learning and that of the children in preparation for wider dissemination. If appropriate, interview children from the focus group to collect evidence for the group. Provide any mathematical support and resources that relate to the group's revised questions or hypotheses. Keep encouraging the group and help them to sustain the activity and the focus on improving learning in mathematics.</p>

**Step 10: Decide how to share learning and disseminate approach to others**

Our Lesson Study Group will review our own learning and identify the key areas of learning for us and what is important about these. We will update and review our learning log and look at how we can share this learning with colleagues and how we can work with our colleagues to help them to extend their own practice in the classroom. We will tell the story of the focus groups' progress and our progress and explain to colleagues:

- what we wanted to improve and the questions we were setting out to answer;
- what worked well, why and how we improved on this over time;
- what did not work and how we recognised this and how it helped us to plan future activity and inform the study lessons;
- what we found from other sources and how we used this information;
- what risks we took and the outcomes of these risks and resulting innovations to practice;
- how the focus was on learning and how we engaged the focus group in the Lesson Study process at every stage to gather evidence of their learning;
- what the focus group children learned and how they responded to the lessons;
- where we have improved learning for all children and what next.

**Senior leader's role**

Discuss with the group members how

**Subject leader's role**

Rehearse with the group the journey

<p>they plan to disseminate their learning with colleagues in the school. Arrange and promote the dissemination meeting and agree a structure and agenda. If appropriate, run through the presentation with the Lesson Study Group members to help them to draw out key messages and to identify implications for the teaching and learning of mathematics in the school. Emphasise that, while the group's learning log should provide the evidence of impact, they should draw on any examples of children's learning through samples of their written work or audio, still or video recordings of their responses.</p>	<p>they have undertaken during the period they have been engaged in the Lesson Study activity. Help the group to identify the key steps and actions that will help others to engage in the process. Draw out the improvements in learning that have resulted from the activity and the progress the children have made in the selected areas of mathematics. Map out the presentation with the group, keeping it focused on the children's learning in mathematics. With the group, select examples of children's work and responses that highlight the learning and progress they have made. If appropriate, engage the children in the presentation and help to prepare them for this role.</p>
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***Next steps: future CPD activity***

Our Lesson Study Group will consider:

- the success of the presentation and the support we might provide for colleagues who wish to engage in the approach;
- whether there are further areas of teaching and learning we want to review and improve as a group and how we might use a Lesson Study approach to address these;
- our own CPD needs in the light of our learning and how this might inform the performance review process;
- the overall impact on children’s learning in mathematics and the implications for future teaching and learning in mathematics and across the curriculum.

***Senior leader’s role***

Discuss the benefits, constraints and implications of introducing a Lesson Study approach into the school. In the light of the Lesson Study whole-school dissemination and leadership team discussions, review the CPD programme against the outcomes in the school’s development plan. Share any key messages and changes to the plan with governors and with staff.

***Subject leader’s role***

After the presentation, discuss with the Lesson Study Group members what additional aspects of mathematics learning they might go on to review and develop using a Lesson Study approach. Using the Primary Framework, review the school’s mathematics planning in the light of the group’s learning and dissemination. Discuss with colleagues any plans they have for engaging in Lesson Study activity and

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	set this out as a proposal to present to the senior leadership team.
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