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Guide for professional development using Lesson Study
(based on problem solving with Bowland Maths materials)

Preface

This project was undertaken to explore how the Japanese approach to CPD using Lesson Study might be used to develop the skills for teaching problem solving, using the Bowland Maths materials. The approach was tested in more than 25 Lesson Study events over 9 volunteer schools in the Midlands and London. In this project, we have been very fortunate in having direct assistance from the Japanese maths team (IMPULS) set up by the Japanese Government to help export Lesson Study to other countries; the IMPLUS team paid several visits to our schools and some of our team members visited lessons in Japan.

This guide has been developed based on lessons learned from these events; it is presented as an Annex to a full report of the project. It is intended for schools and teachers who wish to develop a lesson study approach for the professional development of their maths teachers for problem solving.

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1. Background

Problem solving

- Problem solving has many interpretations. In this document, we take a problem to be an unstructured task that has no routine method of solution. Pupils may need to make assumptions and simplifications, select appropriate techniques to use, and interpret solutions in context. There are usually several possible methods and various solutions, without there necessarily being a single 'right' answer.
- The skills of problem solving will be ever more important in the world of the future – and maths is the school subject in which pupils can best be taught such skills; problem solving also now features more strongly in the revised National Curriculum - and is expected to form part of future GCSE examinations.
- International, and national, evidence suggests that pupils do not have any intrinsic difficulty in studying one problem in depth for a whole lesson, for which there is no need to have 'starters' and a 'variety' of small questions - as is often found in maths teaching in England. There is also good evidence to show that using a problem solving approach for maths teaching in general also helps pupils with more traditional maths – in fact the Japanese think it is essential for good maths teaching.
- All the Bowland case study problems are designed to help pupils develop process skills and most of them require a problem solving approach. They are designed to enable pupils to try to solve problems over several lessons, during which they see that maths can provide a way to help address the problem. In this way, pupils grow in confidence to tackle different kinds of problems in the future – and recognise that maths can help solve real problems.
- Some of the Bowland problems can be challenging even for more able pupils, but experience has shown that the nature (and variety) of the problems can also encourage less motivated pupils back into maths. However, we have found that the richness of Bowland materials (and that they can also be used as a lead to other maths content) is not always appreciated by teachers, with the result that teachers and pupils may get less from the materials than they could.

Professional development and Lesson Study

- There is international evidence to show that teacher quality makes the biggest difference to pupil achievement; the most effective school systems are those which invest in the development of their teachers (see, for example McKinsey's work for Singapore).
- Many teachers find it challenging to teach problem solving skills, which suggests there is a need for more CPD on problem solving. The original Bowland materials included extensive CPD materials – over 20 hours, but we now know that a more active approach is also needed.
- The 'Lesson Study' approach to CPD lends itself extremely well to developing the teaching of problem solving; the concept was developed in Japan – over 100 years ago, and is now being encouraged in other countries, for example in Singapore where two thirds of the schools are now using it, in the USA and now increasingly in the UK.
- Lesson Study provides teachers with opportunities to observe their colleagues and others in a spirit of mutual development and professional learning – it is not a tool for teacher evaluation. It helps reclaim classroom observation for CPD rather than being used to make judgements - as is often now done in the UK for the grading and accountability of teachers.
- In essence, Lesson Study is school based CPD, dealing directly with pupils in the classroom and valuing teachers as professionals – in contrast to some of what has been happening in recent years. The Lesson Study process focuses the mind of the teachers and the observers on pupil

understanding so that teachers learn about 'guiding pupils to understand' rather than to simply helping them to get to the right answers.

- The Lesson Study approach is built round a 'research question' about a pre-defined aspect of teaching and learning (eg how to improve the teaching of problem solving); at its heart is anticipating pupils' responses and planning what the teacher will do accordingly, to help pupils overcome their difficulties. This is the reason why, irrespective of the specific content of the research lesson, teachers learn something to guide their teaching in all classes.
- Some teachers are concerned that a lesson may be unduly affected by the presence of observers; but Lesson Study lessons are not supposed to be 'typical lessons', they are '*research* lessons' designed to enable the close study of a particular pedagogical issue. The focus is on finding how pupils learn, not on developing classroom management skills. As long as the observers do not interrupt pupils as they work, they provide a unique opportunity for the close observation of pupil learning. This results in a much richer picture of pupils' learning than, say, video footage.
- However, there are important differences between England and Japan which need to be taken into account when seeking to transfer Lesson Study ideas to English schools:
    - There is more of a 'surveillance culture' in England in which lessons are usually observed only when teachers are being 'inspected' and so teachers can naturally be reluctant to open their classrooms. In Japan there is more of a learning culture, where lessons are jointly planned, owned and discussed in a non-judgmental way. To help with this, our project focussed on a team role in planning the Research Lesson, making it explicitly a collective effort.
    - In Japan, schools and universities work more closely together: Lesson Study groups are supported by 'knowledgeable others', often from the local universities; we arranged this for our events.
    - There seems to be a greater shortage of teacher time in England – and Lesson Study takes time to plan; in contrast, there is a professional expectation in Japan that teachers design 'beautiful lessons' and are expected to find time to do so. In England, teachers are seen less as designers of lessons, more as consumers of materials, monitors of pupils and 'fixers' who put pupils right when they go wrong: teaching has become more about routine and survival and less of a creative art.
    - Classes in Japan are often larger, less multicultural, and pupils more compliant. Teachers can focus attention more easily on teaching rather than on social issues.
- Further, according to Ofsted, many maths teachers in England tend to focus on 'how to perform techniques', rather than on developing an understanding of the 'why?' and of the problem solving processes – in contrast to Japan. To date, this practice tends to be reinforced by external examinations that mostly consist of routine tasks. In addition, senior managers in schools, especially non-maths specialists, often tend to encourage this 'technical' approach as it is easier to show 'tick box' progress on defined tasks; this can be reinforced by a misconception that this is what OFSTED expects - because Ofsted requirements for maths are often (mis)interpreted by the same 'lay' SMT. In fact, the Ofsted maths experts support the building of 'understanding' and not simply performing techniques; teachers need to explain to their SMT that this is the best way to teach maths – and that it is what Ofsted truly expects:

> "While the best teaching developed pupils' conceptual understanding alongside their fluent recall of knowledge and confidence in problem solving, too much teaching concentrated on the acquisition of disparate skills that enabled pupils to pass tests and examinations but did not equip them for the next stage of education, work and life.
> Schools were more aware than at the time of the previous survey of the need to improve

> pupils' problem-solving and investigative skills, but such activities were rarely integral to learning except in the best schools where they were at the heart of learning mathematics. Many teachers continued to struggle to develop skills of using and applying mathematics systematically. (Mathematics: Made to Measure, Ofsted, 2012, p 9)

- The benefits of the Lesson Study approach are already clear in England – both from our work and from that of others; they include:
  - increased collegiality between teachers as a result of collaboration with fellow teachers in planning, observing and reflecting on lessons
  - enhanced personal skills of the teachers and an increased capacity for critical analysis, for creative design, and for linking practice to goals
  - the opportunity for teachers to observe closely teaching and learning as it takes place in the classroom, to consider different pedagogical strategies and so to develop a better picture of what comprises good teaching
  - the teacher-led nature of the professional development, which keeps pupils at the centre in ways that make the CPD clearly valuable - rather than just another chore
- But it is critical to recognise that Lesson Study does require time to be set aside to allow for the group of teachers to meet to plan, observe and review the Lesson Study lessons, on a regular basis; this time allocation should be backed and protected by senior management.

Setting up LS in a school

- The main stages in a LS event are:
  - identify the pedagogical topic which is to be the subject of the 'Research Lesson'
  - select and invite an external advisor to help the team
  - determine the materials on which to base the Research Lesson and develop the Lesson
  - determine and invite observers and a Koshi – see below
  - deliver and observe the Research Lesson
  - discuss the lesson and the observations
  - document the findings – and revise the lesson if appropriate
- The starting point is to establish the Lesson Study group, which should comprise 3-4 teachers plus an expert advisor, who would usually be external to the school; one of the teachers would deliver the 'Research Lesson' on behalf of the team - as it would be jointly planned. The teaching teacher needs to be comfortable with teaching pupils in groups – as peer group learning can be very effective for problem solving.
- A Lesson Study event takes teacher time, which means it is best to build it into the school timetable and make use of supply cover and/or classroom assistants. Despite the time it takes, the SMT should be aware that it is less costly for the school than sending staff on CDP courses – and it is more effective.

2. Selection/tailoring of problem solving materials

- It is preferable for the Research Lesson (RL) not to be an isolated lesson, but form part of a wider strategy for the development of problem solving skills in pupils.
- The topic for the RL should be chosen to be challenging - either for the pupils to learn and/or for the teacher to teach. It is important for the teacher group to start by defining the research problem that the LS is to help the teacher(s) address, followed by an articulation of the pupil learning.

- To help develop pupils' process skills, materials should be selected which foster pupils' understanding of such skills and their use to tackle unstructured problems; they should also require pupils to collaborate with others, as this is an effective way to learn about problem solving. In selecting materials, too much pupil choice about what they can investigate may risk losing the chance for the teacher to compare different problem solving approaches in the class. Of course, the materials should also enhance pupils' enjoyment of maths.
- Many of the Bowland cases studies (although not all) have been designed to satisfy these conditions; they also usually require pupils to go through 'open' processes of thinking to structure problems and so encourage exploration beyond the immediate tasks. Our project work for this guide suggests that the materials can work with a wide ability range, although this clearly depends on the research question to be addressed.
- However, not all the Bowland cases work equally well as a RL; for example, some of them may be too rich for a LS lesson, given its aim of developing the teacher. One simpler approach is to extract one of the lessons from a full Bowland case and use that as the Research Lesson. Alternatively, the material can be reduced to focus on specific problem solving issues for pupils so that teachers can observe their learning; this focus might well be on the initial problem that is built into the narrative and which requires pupils to structure the problem and use a problem solving approach. The openness/fuzziness of the narrative is important for making the problem real and for developing real problem solving skills.
- Another option is to use one of the Bowland Assessment tasks, which usually require less preparation time, are easily covered in a single lesson and are easier to run in the classroom. They also contain detailed guidance on 'progression steps' which can identify the process tasks being targeted and so help show progression in problem solving strategies. On the other hand, the assessment tasks are less exploratory and more limited in scope.
- Whatever the material chosen (and Bowland is hoping to do some more work to identify the more suitable materials), the teaching team should seek to produce its own grid as part of the lesson preparation. In the most effective lesson studies in our project, we found that reducing the focus to a few processes is helpful, with the progression grid then being limited to these.
- Unless the purpose is to develop content skills (which some teachers have found useful), any mathematical content should, as far as possible, be well within pupils' current skill levels so that the lesson can focus on developing process skills.
- Any adaptation of the tasks or of the numbers should be done with care as the original design was carefully set to ensure the problem lead to conflicts that are useful for teaching problem solving; any adaptation should be checked to ensure that it retains the conflicts. Numbers chosen should also be realistic and manageable so that any arithmetic is simple enough to ensure that process learning points arise clearly, without pupils getting bogged down in numbers.

3. Preparation of the lesson plan

The research question

- It is important for the research question to be clarified, together with the learning objective for the pupils. The 'research question' should be a clear statement of what the teacher(s) are hoping to learn from the lesson about ways to enhance pupil learning (for a defined aspect of problem solving).
- The research question and the approach to it should be discussed and agreed between the teacher team in the pre-lesson preparation; the question is then addressed by planning and

delivering the lesson in ways that deliver insights into it. It is **not** a conventional lesson plan. Possible research questions might be:

- How might we scaffold questioning to help pupils reflect on their assumptions?
- How can we enable pupils to critique sample approaches produced by others?
- How can we develop and refine pupils' own representations for the problem?
- How can we help pupils to adapt their strategies when the problem constraints are changed?

- Lesson objectives should be expressed with reference to the materials to be used, not just in general terms, and with specific reference to any problems the pupils might have with the processes being taught. For example, one assessment problem is to estimate the number of descendants a cat might have in 18 months. Suitable lesson objectives might be:
    - To enable pupils to recognise that they need to make simplifying assumptions (e.g. that the cats do not die during the 18 months; that a cat becomes pregnant as soon as it can, etc.
    - To enable pupils to represent the problem structure in different ways (e.g. using tables or time lines) and compare the advantages and disadvantages of different forms of representation (clarity, revealing the structure).

Planning the lesson

- Research Lesson planning should start about a month before the lesson is to take place, with the teaching team, including the external consultant, spending a good half day working collaboratively to prepare a draft lesson plan, starting from the 'research question'.
- A common mistake is to include too much in the lesson plan for fear of running out of material during the lesson. It is important for the team to focus on the research question and on the key 'learning points' that pupils must get from the lesson, and then plan interventions to promote that learning. Planned coverage should be adjusted to the expected pace of pupils' progress: depth is better than width – albeit with some flexibility in case some pupils move faster than expected.
- The chosen problem may require previously taught mathematical content or technique. It is tempting to plan a 'brush up' on this technique immediately before the research lesson but this is unhelpful as may lead pupils to think that the problem is intended merely as an exercise on that technique and so transform a problem-solving lesson into an exercise in using it. An important purpose of a problem solving lesson is that pupils should select the methods to use and apply their own approaches. A rich problem will allow many approaches, some more sophisticated than others.
- On the other hand, it can be motivating to pupils to use the lesson as a 'jumping off point' for teaching specific areas of mathematical content that arise from the problem. Pupils will benefit from seeing an alternative, perhaps more elegant and efficient approach to the problem they had previously addressed, but this should only be *after* they have tackled the problem for themselves.
- Problem solving requires time. Pupils must have opportunities to explore alternative ideas and approaches; they need 'space' not 'pace'. The team needs to plan for pupils to have thinking time and space for problem solving, not 'count downs' every few minutes. The current tendency to hurry pupils along is mostly counter-productive in teaching problem solving.
- It can be helpful to ask pupils to tackle the problem alone for 20-30 minutes in a lesson *before* the research lesson. The teacher can then analyse the work to see pupils' initial ideas and responses. For the research lesson itself, the team can then prepare responses for the teacher to make to such pupil responses and also develop questions that may be used to move pupils'

thinking forward. This 'pre-assessment' is not for marking or grades, rather it is to help understand pupils' thinking.

- This preliminary experience can also help to set the context and narrative drive for pupils beforehand, so that they get into the spirit of the problem. This saves valuable time in the research lesson itself where the emphasis need not then be on familiarisation, but rather on reasoning and refining ideas and approaches.
- An essential part of lesson planning is for each member of the teaching team to work through the problem for themselves from a pupil's perspective, asking questions such as: 'how will pupils actually think about this?'; 'what ideas are pupils likely to have?'; 'what questions will they ask?'; 'what obstacles will pupils see?'; 'what misunderstandings and mistakes are pupils likely to make?' Anticipated pupil responses should be recorded during the team discussion.
- A central aspect of good Lesson Study planning is the anticipation of pupils' responses at points during the lesson and thinking about what to do with them. Experience outside Japan, and not just in our project, shows that this aspect of LS is done least well and with insufficient thought – it is at the heart of Lesson Study in Japan. It is, of course, more difficult to do for 'process' problems than for content, although the teachers' guidance and the progression grids in (some of) the Bowland materials can provide clues and so can help with the preparation of the lesson plans.
- Some (anticipated) pupil responses can be used to flag key ideas to be shared with the class to help the development of the whole class – either good ideas or ideas that demonstrate a common misunderstanding. Other pupil responses may need a prompt or a question from the teacher to move the learning on. The teacher response planned for each anticipated pupil response is a central part of a lesson plan.
- The anticipated pupil responses and the planned responses to them by the teacher are important not only for the teacher, but also for the observers. In summary, the **final lesson plan** should include:
    i. A statement of the research question on which the lesson is designed to throw light (the learning objectives for the teaching team).
    ii. The materials to be used, any prior maths content (or indeed other knowledge) that pupils might need and the maths underneath the materials - with the possibilities for how it could be used during, or after, the lesson.
    iii. The detailed structure of the lesson itself (eg presenting the problem, individual, group and class work for its solution, reporting and comparing approaches, summary), including the key questions to be posed by the teacher at points in pupils' progress.
    iv. A picture of what pupils might achieve in the lesson (the learning objectives for pupils), what aspects might they find difficult and the likely pupil learning problems to be addressed during the lesson.
    v. The anticipated responses that the pupils are likely to make during the lesson, and the planned teacher responses to the pupil responses.
    vi. Examples of points to be observed about pupil learning during the lesson, based on the research question.
    vii. How the teacher (and the team) will assess what pupils truly learned (a common mistake is to be too concerned with quantitative measures). Simply asking pupils what they have learned often only results in them describing what they have done.
- The planning meeting should discuss these seven points, with the resulting lesson plan including the team's conclusions about them.
- Key role of the external advisor during this planning stage is to help the team think about each of these essential points and to bring his/her wider experience to bear on each of them.

- The teacher who will deliver the Research Lesson (preferably, but not necessarily, a teacher familiar with the class) should then write up the agreed lesson plan and circulate it to the team to check that each would be happy to teach it; the final lesson plan is a shared responsibility.

Annex: Summary points for the delivery of the Research Lesson

- Pupils should be made aware of the purpose of the research lesson, and especially the role of observers.
- Up-front time spent on contextualisation and providing the narrative drive is important in teaching problem solving.
- For learning about problem solving, the lesson should not look 'mathematical' at the outset – the point is for pupils to see later for themselves the benefit of using maths.
- For 'process' topics, pupils need time to discuss points with each other or they may jump without thinking; it is the discussion of conflicts and of alternative approaches that develops pupils' mathematical thinking.
- Helpful prompts include: 'Think about your overall approach and what you are trying to achieve?' so that pupils make their own responses.
- There is no absolute need to stick to the lesson plan, but the teacher should have a good reason for deviation from it – and explain this in the post-lesson discussion.
- In general, pupils should not be praised for producing a poor response, but provided with an argued critique - from the teacher or, if it can be done without loss of face, by the class.
- Mistakes should be kept on the board for later discussion.
- In general, the lesson should try to reach agreed full class solutions, not simply different ones from different groups.

4. The role of the observers

- In the UK, observation is usually associated with grading teachers for accountability purposes. It is important that Lesson study is **not** be used in this way. Lesson Study is an opportunity for a teacher to take risks and try something new, from which everyone will learn. This point must be made clear to all observers, especially to any senior managers who may be present.
- This observer focus on the pupils learning, not on the teacher teaching, is unusual in English schools, but it is essential for LS to work.
- Observers should keep the research question(s) in mind and observe pupils during the lesson so as to understand their thinking and learning processes and any points related to the research question. They should record their observations as data to back their contributions to the post-lesson discussion (eg points such as: pupils' approaches to solving the problem, their responses to teacher questions, common misunderstandings and how and why pupils' understanding changed).
- To achieve this, the observers should focus on pupil learning and not on the activities of the teacher. When a prompt by the teacher makes the pupils stop and think, the observers should try to see the *effect* of these prompts on pupils' thinking. The pupils are the 'lens' for observing the effectiveness of the learning experience.
- Pre-lesson briefing for the observers is useful and should include:
    - The schedule and organisation for the day (e.g. arrangements for visitors; any filming).
    - An introduction to the school and the class, including what the pupils should already know in terms of related content and any prior work done on the topic.

- The lesson plan itself, with the seven points listed in Section 3 above; this is as valuable for the observers as it is for the teachers.
- The 'rules of the game' for the observers:
  - they are there to observe the pupil learning that is taking place and not to make judgements about the teaching of the teacher
  - there must be no talking to the pupils or interfering with group discussions
  - they should make notes for the later discussion (eg on their copies of the lesson plan or using "LessonNote" – an iPad observation software tool available on the web)
  - they must put their day jobs behind them – they are there as *observers* and not as, for example, professors
  - different roles may be expected for differently experienced observers, for example, less experienced observers might focus on only one group of pupils (a luxury not often available to teachers!)

- If the lesson plan has been circulated in advance, the observers should have read it before the briefing session; if not, there needs to be time in the pre-lesson briefing for them to read it – rather than just being 'walked through' it. Observers should also solve the problem for themselves so that they are better able to think about different approaches and possible pupil responses.
- A pre-lesson briefing is rarely held in Japan as the observers tend do their homework before the lesson, including answering the problem and thinking about possible pupil responses; a briefing session is likely to be needed in the UK due to the differences between LS and our conventional ways of observing lessons.
- During the research lesson, the following are examples of learning points that observers might look for – depending on the research question:
  i. How did pupils respond to the materials and approaches used? Were they adequately (or excessively) challenged by them? Were the materials well used by the pupils and was their potential fully realised?
  ii. How did pupils respond mathematically and how did the mathematical processes flow and develop during the lesson?
  iii. How well did the prompts and questions promote learning and what were pupils' responses to them?
  iv. To what extent were the pupils' various responses the ones that were anticipated: their ideas and questions, the obstacles they encountered, their misunderstandings and mistakes? What reasons did pupils have for what they said and what learning points did they show? What use was made of their responses – and what more might have been done with them?
  v. Did pupils recognise when their approach was less than adequate – and what scope was there for making use of that?
  vi. Was there feedback from the teacher(s) to push pupils to think more deeply or to learn more about process skills?
  vii. Were opportunities for additional content implications pointed out – or developed?
  viii. Was the board used to show pupils' views at the start of the lesson compared with what they thought towards the end - and why this changed?
  ix. How did the pupil-pupil discussions go and how did they reason? Did pupils seem to learn from this?

x. How did the teacher select and develop pupils' own ideas and blend the best of them together to create a collective solution? (referred to as *Neriage* in Japanese).
xi. Did the pupils understand the issues and did they learn what was intended?
xii. Were the lesson objectives achieved for the teacher(s)?

- Though questioning pupils after the lesson as some form of feedback is not a formal part of LS in Japan, and is not easy to 'orchestrate', some schools here have experimented with it, not only in our project, but in others too. The main purpose is to test pupil learning and thinking to the extent that points were not obvious during the class (which may well be the case for problem solving classes), asking selected pupils why they did X and did not do Y.

5. Post lesson discussion

Logistics of the meeting

- The post-lesson discussion should, if at all possible, take place on the same day as the research lesson (perhaps with snacks provided to add a touch of professionalism!) and preferably in the same classroom so that pupil work is more easily available for reference.
- It is helpful if the post lesson discussion is recorded so that the important points are not missed.
- The discussion group should comprise:
  - a 'chair' or facilitator
  - the teacher team, including the external advisor
  - (some of) the observers
  - an experienced 'final' commentator (called *'Koshi'* in Japan), well respected for their expertise in maths teaching and the learning relevant to the research lesson; usually an outsider, for example a regional/curriculum advisor or an HEI expert
- The Chair needs to exercise discipline on the discussion to ensure that it sticks to the purpose of the Research Lesson, which is to focus on learning rather than on teacher performance. The Chair must also ensure that the observers stay in their *observer* role and do not revert to their day jobs. He/she must move the discussion forward and ensure that the time planned for the meeting is adhered to – not a skill noted in academics! As a rule of thumb, the meeting might be planned to be 10 x the number of participants in minutes, with a maximum of 1.5 hours.
- It is important that all the teacher team responsible for the research lesson are present and feel a joint responsibility for the delivery and outcomes of the lesson.
- If there had been a large number of observers at the lesson, the invitation to take an active part in the discussion should be limited, as too many people can result in an unfocussed discussion. One possibility would be for a selected group of observers to be actively involved in the discussion (say 4), with the less experienced ones continuing to observe – or limited to asking questions.
- The external advisor should add comments to help the teacher team with their learning, making important points that no-one else has made - but should retain the attitude that he/she is also a learner.
- The role of Koshi is crucial; his/her task falls at the end of the discussion and is to:
  - highlight key learning points – not so much a summary, but more points that had not hitherto been adequately made; he/she should cover the lesson plan as well as the delivered lesson, with reference to what more could have been achieved if the plan had been different (eg 'it would have been even better if….')

- bring his/her wider expertise to the conclusions to lift the level of thinking to a higher plane, pushing participants to further future contemplation
- talk about how to produce better learning in future lessons in the light of what was learned from this lesson

The content of the discussion

- The main objective of the post lesson discussion is to enable all participants to gain maximum advantage from the learning experiences provided by the Research Lesson. The discussion must be limited (by the Chair) to the lesson and to the learning.
- A key point of the post-lesson discussion is to explore the difference between the lesson development/scenario that the teacher team had in mind when planning, and the way the lesson actually went. This will need the meeting to reflect on the lesson plan, explore the research question and examine the predictive element of the outcomes.
- Such discussions with teachers in England can be 'awkward' and can lose focus (they can also be expensive if a large number of people are involved). The Chair should ensure that the discussion keeps its focus on what has been learned about pupils' learning for the benefit of future teaching; there will always be a risk of the discussion sliding one way into issues of teacher performance or the other way into the engagement and motivation of pupils. To avoid this Scylla and Charybdis requires considerable skill and determination from the Chair.
- There is also a risk that the discussion can lead the teaching team to become 'defensive' and so not discuss points openly; this easily happens if comments are directed at the teacher rather than at the learning. Again the skill of the Chair is needed to prevent this.
- The discussion would normally fall into four main parts:
  i. The teaching team describe the lesson plan and its delivery, the reasons behind their decisions and for any departures from the plan, and the issues they would like the group to discuss; this helps set a direction for discussion, so the team needs to think in advance about the points it will make.
  ii. The observers describe what they saw on the learning related to the research question, illustrated by their observational data; this should not simply be a description of their observations. In order to ensure that the discussion progresses and that points are not laboured or repeated, the chair should ensure that contrasting evidence and views are presented, if they exist, rather than allowing the repetition of similar points.
  iii. A wider, more open discussion addressing other issues such as some of those listed above at the end of Section 4, but keeping the research question in mind. The discussion should include reasons for any deviation from the original lesson plan, and should make suggestions for further refinement to the lesson and/or implications for future lessons.
  iv. For about 20 minutes at the end, the 'Koshi' should highlight what he/she considers to be key points, whether they were made in the discussion or not, raising more general, deeper issues and suggesting how participants might address these in future lessons.
- Mistakes sometimes made in post-lesson discussions include:
  - Reflections are based on recall without reference to data or observation notes
  - Judgmental remarks or opinions are given that are baseless and with no evidence
  - Inadequate use is made of pupils' work
  - Comments are made on the teacher delivery 'he should have…'
  - The video and/or photos are not used as a source of evidence
  - The materials produced during the process are not documented

6. After the LS event

- After the discussion, the teachers (and the observers) should reflect on what they have learned from the experience and think about how they might use it in classes of their own.
- Within a few days of the event, there would be an advantage in the teaching team meeting to reflect on the experience and what they learned from it; it can also be helpful to write a summary of the points raised in the post lesson discussion.
- After further reflection, perhaps a month or so later, there are also advantages in the team revising the lesson plan, including noting why changes were made; if the changes are extensive, it may be worthwhile teaching the lesson again as a further test of it.
- The Lesson Plan by itself, even revised, is not useful for the CPD of others unless it includes the reflections of the team, samples of pupils' work and what the teachers learned. Even then, the document can only form the starting point for planning research lessons by other teams for their classes.

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