

TEACHING FOR MASTERY LESSON STUDY TOOLKIT SECTION 1:

LEARNING ABOUT LESSON STUDY

An introduction to lesson study – what it is, how it developed and what it can achieve



Teaching for Mastery Lesson Study Toolkit

Section 1: Learning about Lesson Study

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LEARNING ABOUT LESSON STUDY

Lesson Study originated in the Far East. It has been developed in the Confucian tradition and has been used in Japan for about 150 years. You can read about its historical development in Japan [here](#).

Lesson Study came to prominence in the West when researchers Stigler and Hiebert published a book, '[The Teaching Gap](#)' that told of their research in classrooms in Japan, Germany and the U.S.A. Based on video observations of many lessons they found that Japanese mathematics lessons were substantially different to others around the world and they attributed the high performance of Japanese students in international studies, such as the OECD's PISA studies, to the lesson structures that were used. In turn they attributed teachers' knowledge and behaviours that allowed them to teach in this way to Japanese Lesson Study.

Following publication of the Teaching Gap, many researchers and educators around the world have tried to adopt and adapt Japanese Lesson Study for use in their different countries. The growth in Lesson Study as a practice has been rapid and substantial.

It is perhaps not surprising that Japanese Lesson Study has attracted the attention of educators around the world – as a professional learning experience it connects directly with the core business of teachers, that of teaching in classrooms. It is not by chance that it meets all the key features of good quality professional development that research points us to. Research suggests that high quality professional learning activity is:

- **Experiential:** stimulating and drawing on teachers' experiences.
- **Sustained:** cycles of planning, predicting, enactment & reflection.
- **Grounded:** practical, well-resourced; related to context & culture.
- **Safe:** teachers able to speak their minds, permission to take risks.
- **Collaborative:** involving networks of teachers & administrators.
- **Informed:** by outside expertise and research.
- **Provocative:** involving both pressure and support.
- **Focused:** attentive to the development of the mathematics itself.

(See, for example, Guskey & Yoon (2009); Joubert and Sutherland (2009); Villegas-Reimers (2003)).



This toolkit is based on adapted Japanese Lesson Study practices that have been found to work effectively in England, primarily in work carried out by the [Centre for Research in Mathematics Education](#) at the University of Nottingham in a number of research projects. Notably two of these projects have used adapted versions of Lesson Study. These models were adapted from the standard or 'pure' model of Japanese Lesson Study - they did not involve teachers directly in the lesson planning process. Whilst this may seem contrary to the essential ingredients of Lesson Study as set out here, participants had opportunities to engage fully in

understanding the intentions of the lesson designs and even teach the lessons before attending the research lesson that was part of the Lesson Study cycle. In this way it was ensured that as many teachers as possible were able to benefit from the experience.

Significantly, the Lesson Study aspect of the planned intervention working alongside the carefully designed "teaching for Mastery" lessons and teacher PD sessions led to an impact in terms of student scores on GCSE resit examinations. In their study, the University of Nottingham research team found that it was the Lesson Study element of the professional learning programme had the most impact - especially for students from the most deprived backgrounds.

1.1 AN OVERVIEW OF LESSON STUDY

The term lesson study is used quite widely and increasingly by teachers the world over. Consequently, many practices have come to be thought of as lesson study, with some of these not being particularly close to the original models which originated in the Far East, particularly in Japan and China.

Fundamentally, teacher research into their teaching practice and their students' learning in classroom lessons is central to lesson study (LS). This research is collaborative with teachers working together to explore teaching and learning. For this reason, sometimes the term teacher research group, or collaborative lesson research might be used instead of lesson study.

Akihiko Takahashi, a Japanese educator, now living and working in the United States writes, "Lesson Study" is a translation of the Japanese phrase *jugyou kenkyuu*, which refers to a set of practices that have been used in Japan to improve teaching and learning for over 100 years. Lesson Study is credited with enabling profound changes in math and science instruction in Japan in recent decades, but Japanese teachers use Lesson Study to hone instruction in all content areas, including P.E. and foreign language".

He goes on to suggest that in its translation into other countries the cultural context and school structures don't necessarily support direct adoption of the Japanese model. It is probably best to take a pragmatic view of trying to get in place a model that "works for you". Clearly, teaching in an FE college provides a very particular context in which to work. Equally, teaching GCSE mathematics resits sets some very specific challenges. The CfEM lesson study model that became a part of the National Trials of approaches to Teaching for Mastery was indeed an adaptation of the more generally accepted model (see below for some details about this adaptation).

Fundamentally, Lesson Study involves teachers taking part in cycles of action research that explores student learning. However, to ensure that it is as effective as possible these cycles are carefully organised in a systematic way so that individual teachers and the group as a whole benefit in terms of their learning.

A typical or even idealised model is described below.

1. As a group we begin by identifying a **research focus**. This will be fundamental to our work as a group.
The focus, for example, may be problem solving, so the research questions for lessons in the cycle of lessons will relate to the teaching of problem solving processes, rather than content. So for example for one lesson the research question may be: How can we enable students to select and use mathematical representations when problem solving?
2. A **detailed lesson plan** is needed for each cycle of LS. This is effectively the 'research proposal' for the lesson.
This may be produced by a small planning team and may include input from an outside expert who has been asked to help the team. The intention of the plan is to seek to find some answers to the research question. At the heart of the plan is the careful anticipation of how students will respond to the task(s) of the lesson and how the teacher might respond in turn. The plan also anticipates what the teacher will do at vital moments in the lesson to progress learning and help students overcome their difficulties. More detailed advice is provided in **section 2.4**.
3. **The lesson is taught** by one of the planning team. **This lesson is observed** carefully by the teachers involved in the Lesson Study group (see **section 3.5**). This may include teachers from other colleges who are part of the group, an 'outside expert' and student teachers.
4. The research lesson is then **analysed** in the post-lesson discussion (see **section 3.7**) involving the teacher and all the observers. The outside expert may be expected to make a particularly significant contribution to the post-lesson discussion by providing insights informed by research and in-depth knowledge of the research issue.

This post-lesson discussion plays a crucial role in teacher learning - based on careful and detailed observation of the lesson it provides opportunities for detailed discussions that we do not often have space to engage in with colleagues.

5. This leads to the potential for a collaborative development of a **revised version of the lesson plan**.

The learning that we can take from the lesson and discussion is then taken account of when the cycle begins again, with a new research question (**see section 3.8**).

Using this process, learning gradually accumulates through collaboration with colleagues in a spirit of mutual professional development (see **section 2.9**).

The benefits of the Lesson Study approach include:

- Increased collegiality as a result of collaboration in planning, observing and reflecting on lessons.
- Enhanced personal skills and an increased capacity for critical analysis, for creative design, and for linking practice to goals.
- The opportunity to develop a better picture of what constitutes good teaching from close observation of teaching and learning as it takes place in the classroom.
- The teacher-led nature of the professional development, which keeps students at the centre in ways that have immediate practical value in teachers' classrooms.

In the adaptation of LS that was part of the National Trials of approaches to Teaching for Mastery in FE the participating teachers were not directly involved in the lesson planning process. Whilst this seems contrary to the essential ingredients set out above, it was ensured that all participants had opportunities to engage fully in understanding the intentions of the lesson designs and even teach the lesson to one or more of their own classes before attending the research lesson that was part of the LS cycle. This adaptation of the idealised model of LS allowed as many teachers as possible to benefit from the experience whilst also taking part in a randomised controlled trial that explored the efficacy of the Teaching for Mastery (TfM) in FE approach.

1.2 LEARNING COMMUNITIES

As teachers we spend a lot of our working life on our own working directly with students. Our own learning about teaching and learning is important and, whilst we may do some of that on our own, lesson study provides a means of making it much more effective by collaborating with other teachers and drawing on each other's knowledge and expertise. Lesson Study supports us in developing a learning community with practical issues relating to teaching and learning at the very heart of our activity.

As teachers deep and meaningful learning occurs when we productively interact with others, developing relationships that simultaneously grow and support. These empathetic relationships can expand one's vision of teaching and learning by offering different perspectives whilst respecting each other's intelligence, skill, intentions, and pressures. Working together can help alter practices through a deeper understanding of the complex work of teaching, and serve to keep teachers in the profession.

Core to the programme, is teachers establishing together a culture of collaborative learning in which all perspectives are valued. By drawing on teachers' shared classroom experiences, teachers solve the problems of teaching and learning that are important to them.

The characteristics of a successful collaborative community of professions can be summed up within five important dimensions.

Shared identity

Teachers establish a community of professionals with a shared vision

It is important that the lead teachers, as well as the teachers, position themselves as learners. This fosters a more equitable situation. Teachers are more likely to speak out if they can see their views are

being listened to and valued. Everyone, including the lead teacher, should teach each lesson. This will help cultivate a shared identity as both learners and teachers.

Shared experiences

Sharing concrete experiences that go beyond finding out about the theories of learning

Useful discussions are likely to emerge when the focus is on concrete, shared events rather than focusing on just theories. Within the programme, there are multiple opportunities for shared experiences – from planning, observing and reviewing a lesson, to watching videos of others teaching a lesson. Not all teachers will interpret the experience in the same way, which adds to the richness of the discussion, and can promote a deeper understanding.

Safe space

For teachers to adopt new ways of teaching requires a certain amount of risk taking. Developing safe spaces for them to do so is crucial to the success of the programme. A culture needs to be carefully fostered that allows teachers to speak their minds, without feeling judged. This requires a recognition by all members of the group that there is no 'one right way' to teach. One's knowledge, beliefs and practices are personal, and dependent on experiences, outside pressures, and training.

Many teachers find being observed by others stressful, this is understandable. They may be accustomed to being judged and graded in an observation. This experience can isolate teachers and undermines attempts to develop a collaborative community of professionals. Moreover, it encourages compliance rather than risk-taking.

Observations within the programme require sensitive consideration of a teacher's attitude and skills. Planning a lesson together helps foster a culture of shared responsibility, allows teachers to take risks and breaks engrained habits by adopting new strategies. Observers focusing on student thinking rather than teacher practice can also help.

When trialling the Teaching for Mastery approach, we found further education teachers particularly skilful at developing safe spaces.

Echo teaching strategies

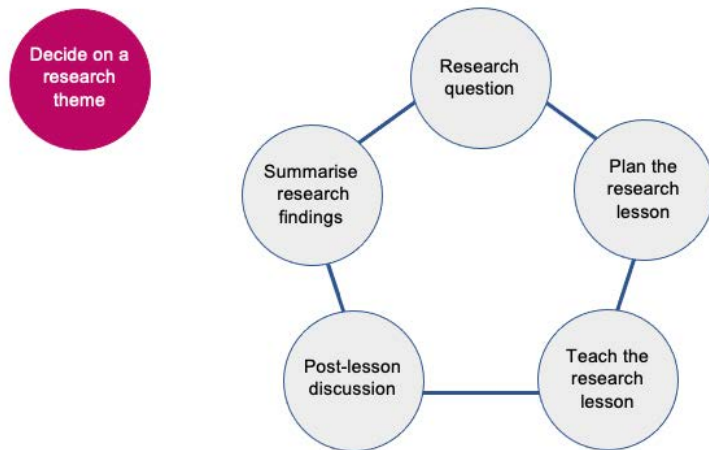
In professional development sessions, teachers practise what they enact in the classroom. Often there can be a disconnect between the teaching strategies learnt about in professional development sessions and the teaching strategies employed by the facilitator of those sessions. For example, facilitators may use a lecture-style approach to tell teachers about pedagogies that focus on not telling students about a maths method, but instead allowing them to figure it out for themselves. It is important that the lesson study leads 'practise what they preach'. The collaborative strategies used in professional development sessions and lesson study meetings should echo the strategies that we want teachers to use within the classrooms.

Sustained

New practices are likely to be maintained if professional development is not simply a one-off introduction to a new teaching strategy but sustained over several months. Developing new ways of working, is not easy, particularly when there is a need to by-pass engrained habits. It requires time for teachers and students to get used to a new culture in the classroom. Sharing setbacks and successes with colleagues during its establishment can help keep the process on track.

1.3 LESSON STUDY AS PROFESSIONAL DEVELOPMENT

Lesson Study involves a community of teachers working in a sustained way through cycles of inquiry that focus on how teaching practices can better support student learning. Each cycle involves five steps as shown in the diagram. Ideally there is some outside support from someone with "expert knowledge" of mathematics teaching and learning.



The Lesson Study process provides excellent professional development for groups of teachers. Because it looks in detail at student learning it does not provide a "quick fix", rather it requires long term commitment from both individuals and the group/team as they build their new knowledge and expertise over time.

Research suggests that high quality professional learning activity is:

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- Sustained: cycles of planning, predicting, enactment & reflection.
- Grounded: practical, well-resourced; related to context & culture.
- Safe: teachers able to speak their minds, permission to take risks.
- Collaborative: involving networks of teachers & administrators.
- Informed: by outside expertise and research.
- Provocative: involving both pressure and support.
- Focused: attentive to the development of the mathematics itself.

(See, for example, [Guskey & Yoon \(2009\)](#); [Joubert & Sutherland \(2009\)](#); [Villegas-Reimers \(2003\)](#)).

Even without knowing too much detail of how to make Lesson Study work for you, it meets all these criteria. Given this, it is perhaps not surprising that Lesson Study was found to be the key mechanism leading to improved outcomes for students in the randomised controlled trial that explored how best to assist student learning from a Teaching for Mastery approach.

Lesson study can be a very effective form of professional development for improving teaching in classrooms leading to improved learning outcomes for students.

In the CfEM randomised controlled trials of implementing Teaching for Mastery it was found that Lesson Study greatly enhanced teachers' understanding of the Mastery approach which in turn led to increases in students' GCSE scores (especially for students from the most disadvantaged backgrounds).

1.4 LESSON STUDY AS COLLABORATIVE LESSON RESEARCH

Around the world teachers are increasingly coming together to engage in Lesson Study. Central to this work is **collaborative lesson research**. That is, collaboration between teachers, and others involved in supporting teaching and learning, in which trying to improve learners' learning experiences is the aim.

Akihiko Takahashi and Tom McDougal who had been working to adopt a form of Lesson Study in the USA write... "we coined a new term: collaborative lesson research (CLR). As a form of lesson study, CLR is an investigation undertaken by a group of educators, usually teachers, using live lessons to answer shared questions about teaching and learning. We define collaborative lesson research (CLR) as having the following components:

1. A clear research purpose and theme
2. Kyouzai kenkyuu (This is a Japanese term for the study of curriculum materials)
3. A written research proposal
4. A live research lesson and discussion
5. Knowledgeable others
6. Sharing of results

In working in this way, teachers aim to change aspects of their classroom practice, both as individuals, and also as a collective.

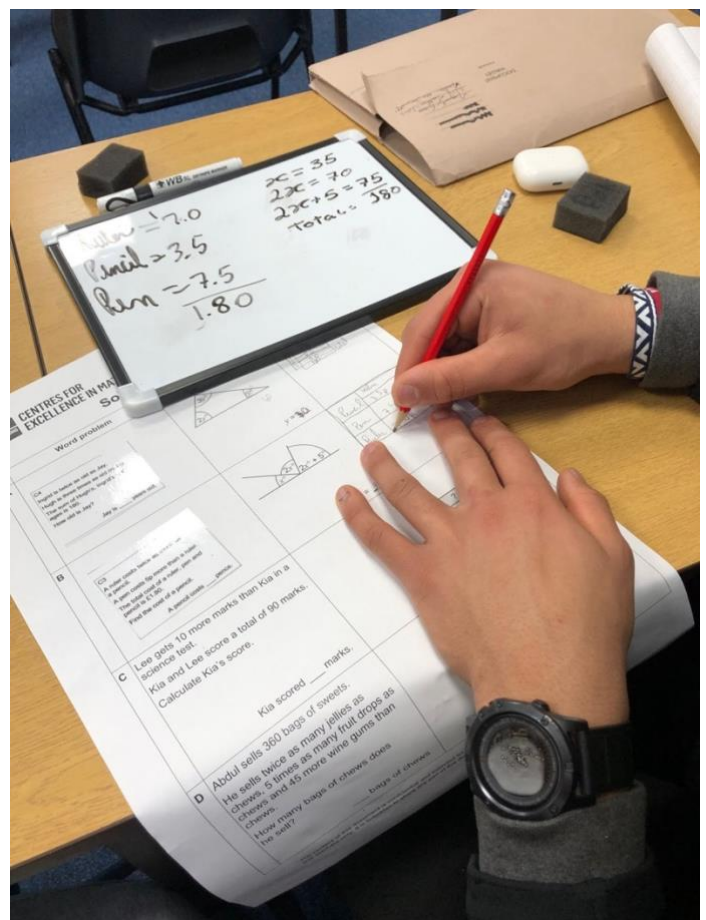
Below, we say a little more about research themes and questions as part of collaborative teacher research. The rest of this toolkit gives a lot of detailed insight into the important aspects of collaborative lesson research.

You can find out more about collaborative lesson research and connect with other working in this way at: <https://www.collaborative-lesson-research.uk/>

Research Theme

It is important that lesson study efforts are directed carefully within an overarching theme - such as Teaching for Mastery, which was the focus of the Research Trials within the CfEM programme.

This theme will set the direction of all lesson study activity over a substantial period. For this reason, it is important that the group agrees on the theme and has a shared understanding of what they mean by something like Teaching for Mastery. If Teaching for Mastery is considered as an example, the first thing to do is to explore exactly what might be meant by this. During the CfEM research trials the Centres collaboratively came to an agreement of key principles that applied to their thinking. These were carefully documented and exemplified. See the Teaching for Mastery Handbook that sets out the Key Principles. In this way all teacher participants in the research were able to make sure that they had a shared understanding of the issues that they would explore in the research lessons. These principles were important in developing the exemplar lessons and their accompanying research questions.



Research Questions

The research lesson in Lesson Study explores a 'professional' or research question that the group seeks to answer in the carefully explored research lesson. Consequently, the research question(s) relate very directly to important incidents that are planned for in the lesson. For example, if the group is exploring students' use of different representations in their solution to a problem, the lesson needs to be planned in ways that encourages such representation development. The lesson plan for the research lesson should be considerably more extensive than would be the case for a day-to-day lesson. It needs, for example, to signal to the class teacher (and observers) where this is planned for, and to indicate what the planning team expect to happen and how to deal with what they expect students to do in response to the task(s).

1.5 WORKING ONLINE AND IN HYBRID MODES

There are a number of reasons why you may consider carrying out lesson study or collaborative lesson research online. This might be either the whole process or just certain parts of it. Such modes of working became much more important during the covid-19 pandemic when around the world, education in all its many forms found that shifting to online working was at times the only way of operating. At that time the CfEM research trials were planned and during 2021-2 the large-scale randomised controlled trials took place. In the full intervention model, there was an element of lesson study and because covid was still prevalent and disrupting opportunities for collaborative lesson observations in colleagues' classrooms some of the lesson study was held online. At other times the lesson study was held in-person with teachers travelling to meet and take part in research lessons in each other's classrooms.

Importantly the online/hybrid mode of research lessons that were used were carefully considered as part of the overall sequence of Lesson Study cycles, were designed to the same principles as all other lessons, and were used by Lesson Study groups that were already established, personal relationships had been developed and everyone was committed to the professional learning of the group.

Some key points that you might like to consider if attempting to get Lesson Study to work using an online platform.

The lesson video

The group will need a video of a research lesson. Technically, this is less difficult to achieve than it used to be. Small video cameras provide surprisingly high quality images - and sound. Your college Media studies students may be a valuable resource to draw upon to help with this.

- It is important that you have permission from students for them to be videoed in the lesson where they are learning maths. Some of them may be a little hesitant about this.
- It may be helpful to get their signed permission for the video to be used with other teachers in pursuit of their professional learning.
- It is useful for the video to have shots of students work - and if possible, of them talking about their mathematics as they do it (this, of course, depends on the tasks that they are working with).
- The video should show the full length of the lesson so that when viewing the group can fully understand what happened over the entire time.

Viewing the lesson

There are a number of advantages of having a videoed research lesson. Most obviously everyone can watch the lesson at their convenience. A disadvantage is that everyone will see the same few sequences of students involved in learning. (Ideally capture photographs of their work that can be shared alongside the video). An important aspect of a joint in classroom lesson observation is that many different students' responses can be observed providing rich evidence on which to draw in the post-lesson discussion, so a mix of live and video lesson study cycles includes the advantages of both types.

Everyone needs to watch the video in advance of the post-lesson discussion - and may do so more than once. A particular advantage of the use of video is that you can look at what seem interesting moments more than once.

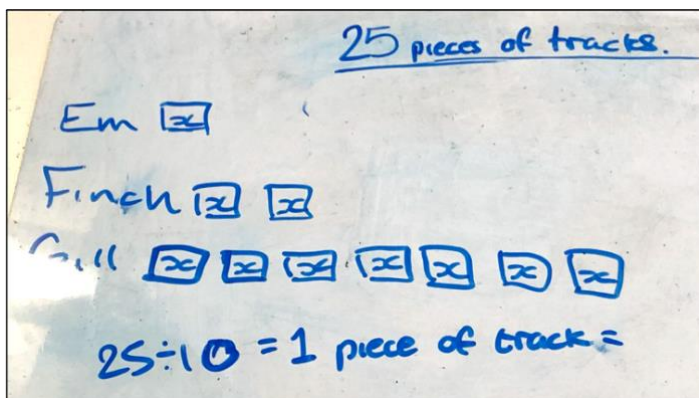
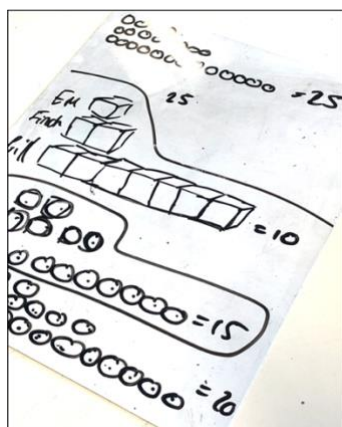
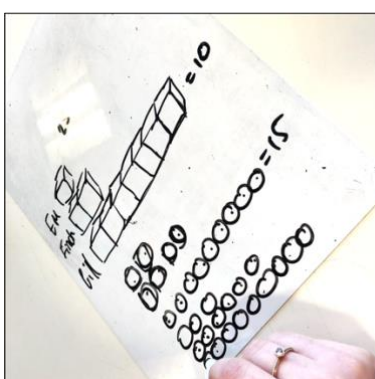
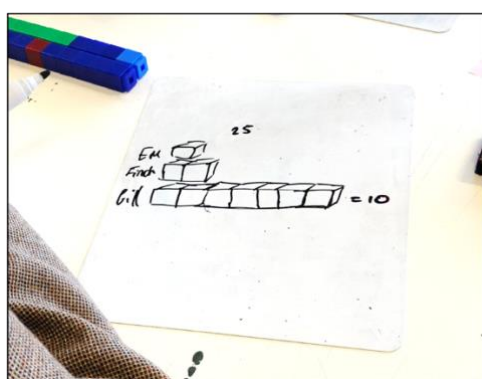
The post-lesson discussion

The post-lesson discussion can be held online at a time that is convenient to everyone - but of course it is important that everyone makes sure that this has protected space in their diaries and have prepared carefully for the discussion. As in the case of face-to-face, in college, discussions make sure that everyone knows their role. For some advice about post-lesson discussions ([see section 3.7](#)). It may well be easier to ensure that someone with expertise outside of the group can contribute.

Capturing students' work

Capturing how a students' work (and thinking) develops over time can be very helpful when working with a videoed research lesson.

Here, in the first three photographs, a pair of students were working in one of the CfEM Trial lessons. Their thinking was recorded on a mini whiteboard. This is compared to the work of another pair of students who had used a different representation that shows a shift towards using more standard algebraic notation, but it is still a pictorial representation.



Further reading: Researchers around the world have reported their research of online/hybrid lesson study in a special themed issue of the [International Journal for Learning and Lesson Studies](#).

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