Lesson Study

A ‘How to’ Guide for Teachers

Lesson Study is a form of professional development for teachers.

It is a collaborative approach teachers engage in to examine student learning.

Contents

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What is Lesson Study?

Lesson Study is a form of professional development for teachers. It is a collaborative approach teachers engage in to examine student learning. The focus of Lesson Study is not to simply produce a lesson, but to study a topic and student thinking in depth.

Though it can take many different forms, we will look at how a small group of teachers in a school can come together to take part in a cycle of Lesson Study. In doing so, we hope that participant teachers will be able to learn and grow together as practitioners. We also hope that their students will benefit from the process through improved instruction, which has been collaboratively designed with their learning in mind.

A central aspect of Lesson Study is that everyone takes part in the process equally. This maximises the learning that can be made across the cycle. There are many ways to participate in Lesson Study, we have outlined one such way below.

A Pathway Toward Engaging in Lesson Study

Figure 1: A Pathway for Engaging in Lesson Study

Across a cycle of Lesson Study, you and your team members plan a lesson collaboratively. One of you will teach it, while the other members of the team observe the lesson. After the lesson you will come back together to discuss what you have learned and suggest ways in which the lesson could be improved for the next time it is taught.

All teachers and mathematics departments have their own ways of planning lessons and working together, which we do not want to interfere with. However, we want to emphasise some things which have been shown to be effective for teachers who engage in Lesson Study. We will describe these below including: how a Lesson Study group can be structured, how to organise meetings, how to make the most of your planning, and (most importantly) the Research Lesson so that you maximise you and your students' collective learnings.

Lesson Study Group

As you can imagine, the vast majority of the work in Lesson Study takes place before the lesson is taught. You will meet with your group multiple times across a cycle of Lesson Study (outlined below), so it is important to understand the roles and responsibilities of each group member. The first step is to give each group member a role in each meeting. You can decide what your group will need, but some useful roles include:

Facilitator: Prepares agendas, leads meetings, ensures all members are involved and fairly represented, keeps conversation moving.

Note taker: Records and summarises discussions. Notes important decisions.

Recorder: Writes on board, documents brainstorming, maintains a shared drive etc.

Time keeper: Reminds the group of meetings, sets date and time for meetings, books room etc.

Note: if there are only three group members in the Lesson Study group you may wish to combine two of the non-facilitator roles.

Meetings

Once roles have been assigned, you can shift your focus to how to conduct your meetings. The most important things to consider here are **structure** and **behaviour**. We have provided a template at the end of the booklet to help with structure and encourage you to develop your group norms, which describe appropriate behaviour among your group members. You might like to reference the following advice when developing this.

- It is important that the group operates in a professional manner, where equal opportunities are given to each member to contribute.
- It is the responsibility of each member to listen to others and take responsibility for their role in the group.
- If there are moments of disagreement among members, it is important for these differences to be discussed in a constructive manner. Disagreements will happen – handling them in a respectful manner is the most important thing to consider.
- The group must always be student focused. Remember, you are all working together for the same reason – improving your students' learning.

Returning to structure, our advice would be to prepare an agenda in advance and to stay on task at meetings. This is something the group facilitator could create and share with the group at least one day before the meeting is scheduled to take place. Sharing in advance will allow others to suggest edits to the agenda. Having an agenda ensures that time together is best used and that attendees know what is to be discussed ahead of time so they can be prepared to discuss the topic – again preventing any time loss.

No matter how well organised you are and how well your meetings are structured, all groups will work at their own pace. For this reason, we have provided an overview below which gives a

rough guideline of what each meeting may contain. This is only intended to be a guide. It is simply to illustrate how the meetings may unfold. We explain each of the content areas below and each group should adapt their meeting schedule to best suit their situation. This may mean that more or less time is devoted to different facets of the content. However, we do believe that each content area requires attention and that this sequencing is the most useful. So, feel free to tweak the time allocations, but try to address everything suggested within the potential meeting structures.

Meeting length is dependent on the particular circumstances of your team members and your school. Although Japanese teachers meet in two-hour blocks, we recommend 55-minute meetings. We have found that this is more appropriate to the Irish setting and believe that it will still provide enough time to progress through the material in a timely manner.

Table 1

Overview of potential meeting structures		
Stage	**Meeting Number**	**Content**
1	1	Discuss and develop a Shared Vision for mathematics education in your school and a Research Theme to underpin this cycle of Lesson Study.
	2	Define and agree upon your Shared Vision and Research Theme.
2	3	Consider a strand within the curriculum.
	4	Choose a topic to focus on (consider topics that are of interest, cause difficulty for students, are challenging to teach etc.)
	5	Research the chosen topic through various materials (e.g. textbooks, online resources, research literature, curricula etc.) Meet (on Zoom or in-person) with a Lesson Study support team member, and potentially with your Research Mathematician, to ask questions, review progress to date, consider next steps etc.
3	6	Begin to plan the Unit of Learning and Research Lesson.
	7	Discuss findings from previous meetings and develop a 'run sheet' for the Research Lesson. Continue to develop the plan for the Research Lesson.
	8	Finalise the plan for the Research Lesson. Describe the roles and responsibilities for each team member in the Research Lesson. Prepare an agenda for the Post-lesson Discussion.
	9	Conduct and observe the Research Lesson and hold an immediate Post-lesson Discussion.
	10	Follow-up review session with Lesson Study support team member, potentially including your Research Mathematician, on Zoom or in person.

Meeting 1: Developing a Shared Vision and choosing your Research Theme

The focus of this meeting is on long-term goals. We want your team to get a sense for what you want students to be like in the long-term (Shared Vision). Then we will focus on a smaller aspect of this vision, which we will call our Research Theme. These will give you direction during the planning phase and offer a chance to be aspirational in your professional development. We give examples of each below, but strongly recommend you develop your own. It will underpin all of your Lesson Study cycle and can really empower you during the process.

Here is a task which can be useful when the team is trying to develop a Shared Vision for students in your school.

1. Begin by having team members individually jot down qualities in response to the following prompt:

   Ideally, what qualities do we hope students will have when they graduate from our school? (If we bumped into our students in 5-10 years, what qualities do we hope they would have?)

   After a few minutes of individual thinking time, share your lists and write all the qualities on a board or poster paper titled "Ideal".

2. Next, again working individually, spend a few minutes jotting down a list of qualities in response to a second prompt:

   What are the current qualities of our students? (For example, what qualities of our students inspire us? What are the things that concerns us?)

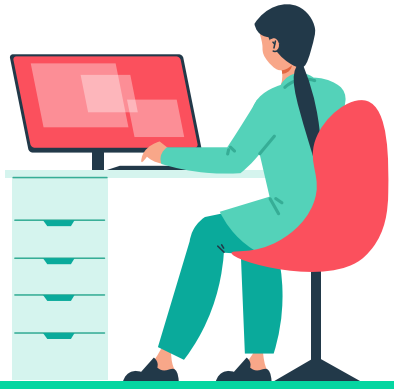
   Again, share your individual lists and write all the qualities on a second list labelled "Current".

3. Compare the two lists – ideal and current – and notice the gaps between both lists. Find one or two gaps where you would like to invest your time and energy. Your Shared Vision should state the qualities you will work toward.

Here is an example of a Shared Vision:

> *"Develop students' ability to participate in social discourse on issues in STEM in a mathematically-informed manner."*

Your Research Theme will be something smaller than your Shared Vision that you can embed within the Research Lesson. It is still an aspirational goal that you hope to develop within your students, but it should be visible across a shorter time period. In other words, it might be something that you can start to think about and develop in your students across as little as one cycle of Lesson Study, but certainly within a school year.



Taking the Shared Vision of "Develop students' ability to participate in social discourse on issues in STEM in a mathematically informed manner" as an example, Research Themes we have seen used include:

> ***"Devise instructional strategies to develop students' mathematical thinking, judgment skills, and expressive abilities. "***

> ***"Emphasise multiple means of representing information and deciding in what context each are advantageous."***

Both of these focus on the communication aspect of the Shared Vision. The teachers who wrote the first Research Theme then made an effort to include opportunities for students to explain, justify, and critique various mathematical points of view during the planning of their lesson. Similarly, the second group of teachers emphasized a series of graphical and analytical solution techniques to highlight the multiple ways in which information can be presented. In this way, they were working toward their desire for students to be comfortable communicators and mathematically literate within the course of their mathematics class.

Meeting 2: Continuing with the development of your Shared Vision and defining your Research Theme

The purpose of this meeting is to build on the progress from Meeting 1. Oftentimes team members continue to think about the first meeting in their own time and their thoughts develop and advance as a result of this reflection. By the end of Meeting 2, we would hope that the team agrees upon a Shared Vision and Research Theme to carry forward through this cycle of Lesson Study. If you happen to outline and phrase your Shared Vision and Research Theme relatively quickly, you can begin the processes for Meeting 3 in Meeting 2.

Meeting 3: Choosing your Mathematical Focus within the Curriculum

The purpose of this meeting is to decide what area of the curriculum your team wants to focus on. This can often be somewhat restricted by your in-school circumstances, but it is important to take time to decide on an area before you begin to explore a topic in finer detail.

It can be useful for teachers to share their prior experiences on the strands under discussion here. Openness and candour at this stage can lead to excellent Research Lessons and learnings, so please remember the intentions of Lesson Study before this discussion. In addition to your own experiences, teachers often consider the student cohorts who may experience the lesson – their learning will be a key factor during planning. Beyond this, textbooks and online resources are frequently examined during these phases as part of your research and discussions about how these sources approach the concept can be of benefit.

Note: What we suggest as content for Meeting 4 may be relevant to include in Meeting 3, depending on your conversations.

Meeting 4: Researching your Topic

This meeting focuses on deciding on a particular topic within the strand that the group has discussed. When choosing the particular topic that you want to focus on, it can be beneficial to consider the following questions:

- What topics are important and persistently challenging for students?
- What topics do we find difficult to teach?
- Are there new curricula, frameworks, or teaching approaches that we want to understand and try out as part of our Lesson Study cycle?
- Are there opportunities to incorporate our Research Theme within the topic?

We encourage you to choose a topic that you (as practitioners) want to get better at teaching. If you choose something you like or are good at, you will learn very little. This requires bravery on the part of the team – especially the teacher who will deliver the lesson – but if the group norms create a safe space for like-minded individuals to grow, you will learn the most this way.

The meeting notes from this meeting are of particular importance in describing your process. Make sure to be as meticulous as possible and describe why your team chose this focus. Your note-taker should record this in your chosen shared group format. The documenting of your decisions here are a key part of your learning.

Some Cautions

Even though one lesson is planned and observed, Lesson Study is not just about a single lesson. At this point in your Lesson Study work, you should be thinking about a content area and topic, not just a single lesson. As you study the topic, your ideas about a specific lesson may change radically. Consider the individual needs of your students, the challenges you face in your classroom, and the topics that are fundamental to students' future learning.

Note:

In this meeting it may be relevant to look towards articles in teacher magazines or research journals. You can contact your Lesson Study support team member to assist with this in advance of Meeting 5. In addition, you may wish to liaise with your Research Mathematician for their perspectives on key areas to address in your chosen topic of content in advance of the next meeting.

The following figure is a timely reminder of the larger picture, and how the initial decisions your team makes influence the subsequent stages of the Lesson Study process.

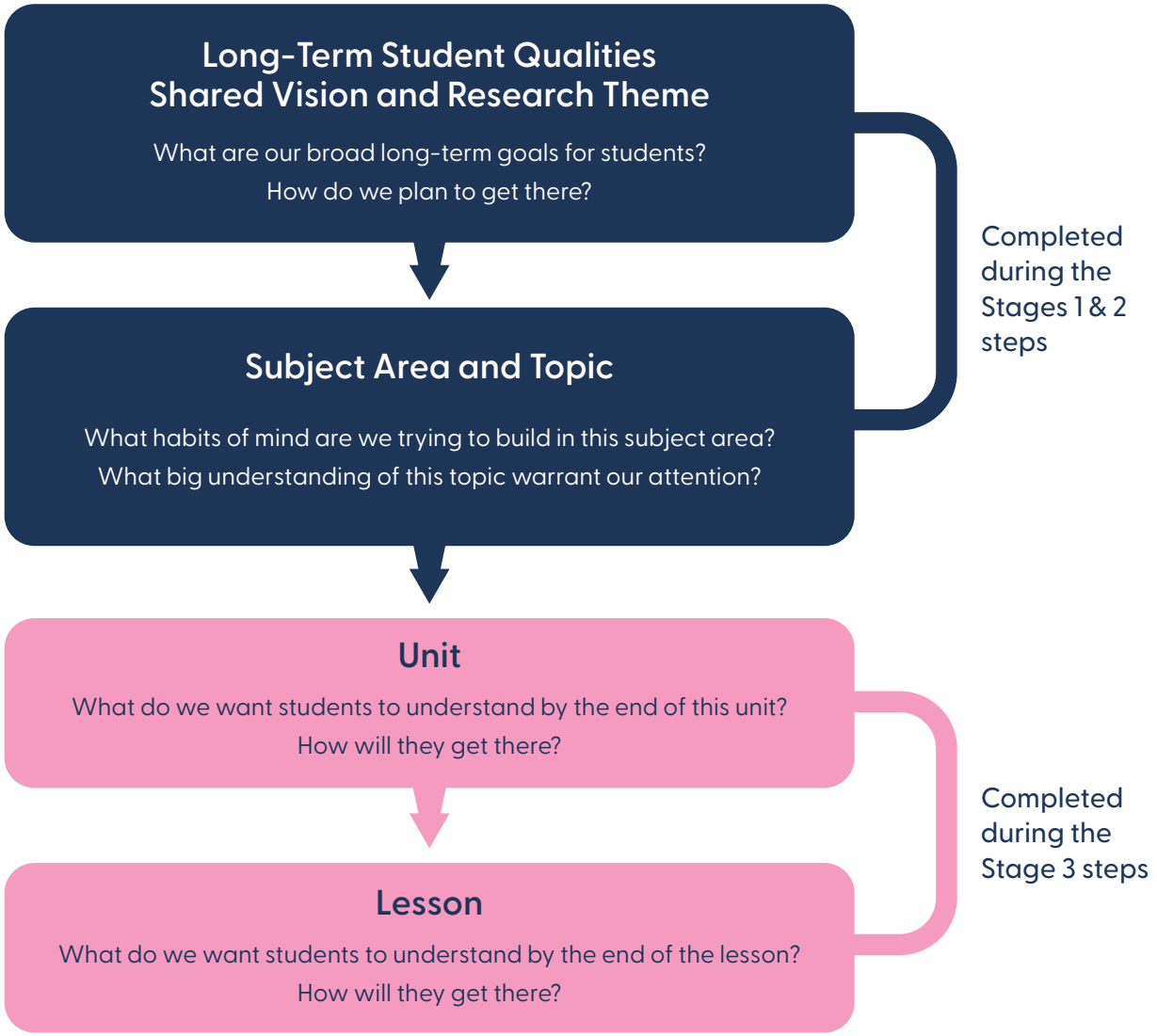


Figure 2: Stages 1, 2, 3

Meeting 5: Checking in with Lesson Study support team

In this meeting, we can provide you with appropriate materials to research or things to consider relating to your topic. The meeting with the Research Mathematician can happen at any time during Stage 2. Try to make sure that all group members can be in attendance (depending on availability etc.) at this meeting. While we are suggesting this meeting take place as Meeting 5, you can decide if meeting with your Lesson Study support team sooner might be more beneficial. The role of the Research Mathematician is intended to provide guidance on content, if desired, and provide insight on mathematical practices within a particular topic. The Research Mathematician may situate the mathematical content beyond post-primary level, but will not have ideas to contribute to the delivery of the lesson as this is your area of expertise as mathematics teachers.

Meeting 6/7/8: Lesson Planning

As experienced teachers you will have your own ways of planning your day-to-day teaching which work for you. We do not wish to infringe on your professional expertise and autonomy, and therefore provide a suggested approach to planning a topic within Lesson Study. Our intention here is to give you an insight into the level of work which will yield the maximum benefit for you and your students, but you can approach the planning and documenting of your lesson as you see fit.

In Lesson Study, the planning process begins with an in-depth exploration of your topic. Your investigation of existing research, curriculum materials, and discussions with your Research Mathematician will build lasting knowledge about the subject, your teaching methods, and how students learn this content. Knowing your topic in detail (and considering your students' knowledge and anticipated responses) is the key to the lesson plan.

When examining your topic consider the following questions:

- What are the key understandings students need to develop about this topic?
- How does student learning of this topic develop over their school experience?
- What does research tell us about student understanding and how it develops?
- How do different curricula treat this topic, and what are the advantages and disadvantages of each?
- What might be the impact of the varying models, examples, or approaches used by different curricula?

It is important to remember that Lesson Study is not focused on one single lesson. The idea is that lessons are not isolated periods of time where students learn but are part of longer sequences which flow together as a topic is developed. The first part of the planning process should therefore focus on the Unit of Learning. We provide a guideline overleaf for groups who are interested in outlining a Unit of Learning.

Unit of Learning

A unit plan shows the progression of learning experiences that will enable students to reach the unit goals. Outline your unit of learning by identifying your unit goals and recording them in your plan. In thinking about designing the unit you may want to discuss and map out the following with your team:

- What do you want your students to understand at the end of this unit? (These are your unit goals.)
- What sequence of experiences will allow students to reach the unit goals?
- What task(s) will students do in each lesson of the unit, and what will they learn from each lesson?

Revisit the unit plan with respect to the curriculum and consider it in light of what you learned from your reading and research. In a perfect world, the unit plan in your curriculum will take students from where they are now to the new understandings expected in the syllabus, bringing to life what is known about student learning of the topic. Since we are not in that perfect world, try to figure out how to modify your unit plan so it will best enable students to reach the unit goals you have outlined.

The Research Lesson Plan

Once your team has a good sense for where the Research Lesson fits into the Unit of Learning you can begin to develop the lesson plan. We have provided several templates which may prove useful and encourage you to develop your own if that works best. Similarly, sample lesson plans are available to view.

Rather than dictate to you what should and should not be included, we have provided headings which may direct your conversations.

It is a universal truth in Lesson Study that the more time a group spends thinking about their students, the better the outcomes will be for everyone.

One piece of advice we will offer is that reading the lesson plan should make it clear to an outsider that student learning has been considered above all else

Observation Schedule

There are many reasons why it may not be possible to agree when the Research Lesson will **exactly** occur until close to the proposed date, but the question of which group member is teaching the Research Lesson (and **approximately** when it occurs) should be discussed as early in the process as possible. Prior to the Research Lesson, it is recommended that reflection questions are decided by the group specifically (see Post-lesson Discussion - Table 3).

Meeting 9: Conducting Research Lesson and Holding Post-Lesson Discussion

In some sense, observing the Research Lesson can be as difficult as teaching it because you are performing less-familiar tasks. We have included some guidelines for non-teaching team members below.

Table 2

Guidelines for Observing the Research Lesson	
1	**Respect the classroom atmosphere.** You know your school best, but general rules which are aimed at minimising distraction are always good to follow. If at all possible, try to document your observations with discretion and avoid any conversations or other sources of distraction.
2	**Do not help students or otherwise interfere with the Research Lesson.** Be mindful to sit at the back of the lesson or as far out of the way as possible if you are not directly observing students' work. Refrain from interacting with students, no matter what your intentions are, as this will interfere with the lesson you are trying to study. Try to embody a scientist collecting data rather than an additional teacher in a classroom.
3	**Collect data requested by the lesson planning team (points to notice from the lesson plan).** Prepare by reading the lesson plan. Anticipate what may transpire and prepare yourself to gather evidence of this. If you have a specific aim in your data collection (outlined in a previous meeting) spend time thinking about it: when may it occur, where may it occur, and how you will gather evidence of it.
4	**Focus on the same student (or group of students).** This is subject to what you are looking for, but it is often useful for people who are new to observing a Research Lesson to focus on a student or group of students over the entire lesson in order to gain the best picture as to whether or how students' understanding develops.

Much of this will occur naturally to you as a teacher, but we want to emphasise Point 2 and 3 above: It will go against your every instinct, but **do not interact with students** when you are observing the lesson. Remember, you are a researcher in the classroom. Your role is to observe the Research Lesson (ideally with a predetermined focus) and to gather data to inform your work.

Post-lesson Discussion

It is crucial that you schedule your Research Lesson so that all of the team can meet immediately afterwards for the Post-lesson Discussion. The timeliness of this meeting is among the most important aspects across a cycle of Lesson Study.

Note:
Please use your supervision and substitution funding or other time allowed for collaborative professional development meetings here.

Before beginning the discussion, each observer should take five to 10 minutes to reflect on the lesson, think about what they had experienced and what they are going to share. Useful prompts for this time can include comparing the anticipated prior learning to how students presented, noting the prevalence of solution strategies, or how opportunities for students to move toward your Research Theme occurred and were seized upon. It is a good idea to agree upon these in the final meeting before the observation.

Each team member may want to focus on different things, our advice is to consistently remind yourself that the focus is on student learning. It is natural for teachers to pay attention to teacher actions when observing the lesson, but the focus should be on gathering data related to student learning. These questions can be decided in advance by the group specific to your Research Theme and roles of the group members. Sample reflection question possibilities include:

- What data showed students' misconception in relation to...?
- Was there evidence of student thinking in relation to...?
- What questions did students ask which showed understanding or misconceptions?
- Did the activity elicit our anticipated responses?

When your group begins the Post-lesson Discussion consider using the following structure:

Table 3

Post-lesson Discussion		1 hour
1	**Instructors Reflections:** Post-lesson Discussions typically begin with the reflections of the teacher who delivered the Research Lesson. It is generally quite short and describes the aims for the lesson, comments on how the lesson unfolded (any surprises, challenges, etc.), and reflects on what was learned in planning and conducting the lesson.	**5 mins**
2	**Presentation and Discussion of Data from the Research Lesson:** The majority of time should be spent on this. The teachers who observed the lesson should present the data they gathered and discuss this within the group. The outcomes of this portion of the Post-lesson Discussion are often the most significant takeaways, which is why time spent preparing for the observation and thinking about what data to gather can be important.	**40 mins**
3	**General Discussion:** An open discussion period which focuses on students' learning and development. The focus should be on how specific elements of the Research Lesson design promoted these (or not). It may be beneficial for a facilitator to designate key issues for discussion to allow for a more organised constructive discussion.	**15 mins**
4	**Positive Reflection:** Take time to congratulate yourselves and each other on the work undertaken and new learning and understandings gained through this collaborative process. In Japan, teachers often take this opportunity to arrange an evening out to celebrate!	

One group member should take notes throughout the Post-lesson Discussion. It is important to remember that the Research Lesson belongs to the whole group, so this should be reflected in the language used in the discussion of your (collective) lesson.

The focus should be on the data collected, such as highlighting specific examples of student work and conversations. In the Post-lesson Discussion, there is no need to address every comment that is made. The image below provides guidelines for the Post-lesson Discussion.

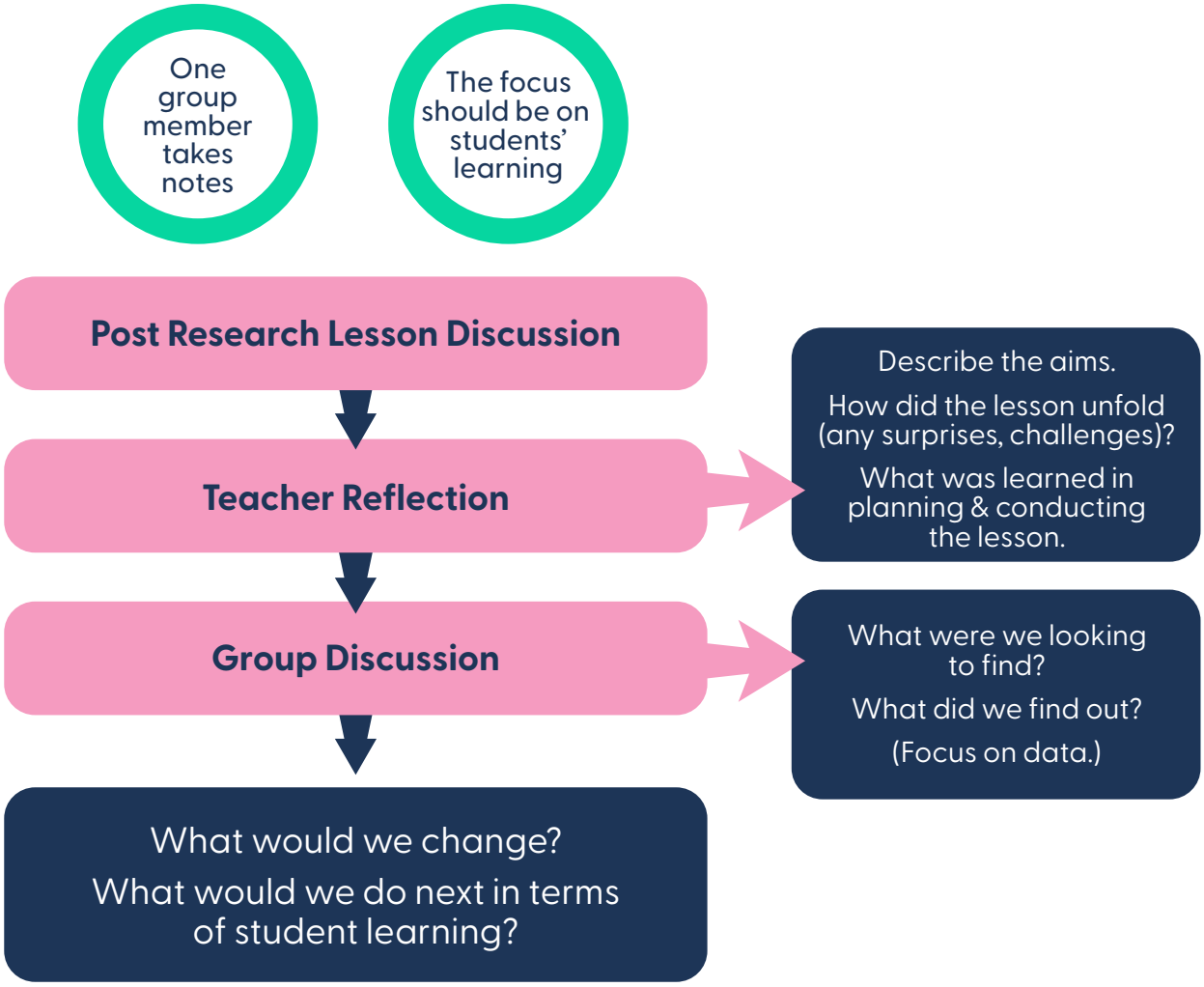


Figure 3: Stage4

Meeting 10: Connecting with Lesson Study support team member

After the dust has settled and group members have had a chance to reflect individually, it would be great to check back in with a Lesson Study support team member to discuss your process and what takeaways you have formed from your first cycle of Lesson Study.

Notes

Lesson Study Templates

Templates for Agenda and Meeting

Agenda for Meeting		
Item	**Description**	**Group Member**
1		
2		
3		
4		
5		
6		

Meeting _____	
Time:	**Date:**
In Attendance:	
Minutes of Last Meeting	
1	
2	
3	
4	
5	
6	
Agenda Items	
1	
2	
3	
4	
5	
6	

Action Statements		**Group Member**
1		
2		
3		
4		

Next Meeting	
Time:	**Date:**

Lesson Plan Template 1

Shared Vision for Lesson Study:	
Research Theme:	
Title of Lesson:	
Brief description of lesson:	
Students' prior learning:	**Learning outcomes for this lesson:**
Other Classroom Goals:	

Section of Class	Student Activities	Anticipated Student Responses	Teacher Activites
Introduction	In this column you describe; The type of work students will be engaged with; group/ individual/pair. Resources used Discussion/individual work		Planned questions to probe students' understanding can be detailed here. Instructions and explanations can be outlined.
Activity 1			
Summing Up			

Lesson Plan Template 2

VISION OF LESSON STUDY

Research Theme

Brief Description of Lesson

Learning Outcomes of this Lesson

Students’ Prior Learning

TEACHER ACTIVITIES

STUDENT ACTIVITIES

ANTICIPATED STUDENT RESPONSES

Unit of Learning Template 1

Unit of Learning
Topic:
Goals of the Unit:
Unit Plan (brief overview of lessons in the unit): **1.** **2.** **3.** **etc**
Ideal situation of student:
Where you ideally want your student to be:
Actual situation of the student:
Where you think your students will actually be: **Common misconceptions/errors**

Unit of Learning Template 2

Give overall goals of the unit of learning

Give a brief overview of the lessons
1.
2.
3.

Give brief details of the **ideal** situation of the students during this unit of learning

Give brief details of the **actual** situation of the students during this unit of learning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