A. Lesson Studies 2013-2016
**A.1. Summary of LS Cycles**

### LS1 – Diagrams for problem-solving

<table>
<thead>
<tr>
<th>Location</th>
<th>Midlands Secondary School</th>
<th>Date</th>
<th>October 2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teacher Participants</td>
<td>R. Joomun&lt;br&gt;Maths Teacher (MT0)&lt;br&gt;Head of Department (HOD)&lt;br&gt;Second in Department (SID)</td>
<td>Student Participants</td>
<td>Year 9</td>
</tr>
</tbody>
</table>

#### Research Question
How do diagrammatic representations support mathematical thinking?

#### Outcomes
Year 9 students were able to draw upon a framework or “checklist” in order to verify the logic of their arguments to an open mathematical problem with no apparent clear strategy for finding a solution. This gave students the confidence to evaluate the validity of their solutions (because there was no “correct answer”) and to communicate them effectively through pictorial or diagrammatic representations.

#### Personal notes
Inspired Masters’ dissertation research topic of LS

### LS2 – Maths-Geography scatter graphs

<table>
<thead>
<tr>
<th>Location</th>
<th>Midlands Secondary School</th>
<th>Date</th>
<th>March 2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teacher Participants</td>
<td>R. Joomun&lt;br&gt;Head of Department (HOD)&lt;br&gt;Second in Department (SID)&lt;br&gt;Geography Teacher 1 (GT1)&lt;br&gt;Geography Teacher 2 (GT2)</td>
<td>Student Participants</td>
<td>Year 9</td>
</tr>
</tbody>
</table>

#### Research Question
How can mathematical and statistical techniques be used to interpret and evaluate geographical data?

#### Outcomes
Students had to apply statistical instruments to geographical concepts in order to inform rich contextual mathematical analyses, ultimately to illuminate the two subjects’ interdependence.

#### Personal notes
Scatter graphs were used to analyse correlations between geographical factors but this lacked the depth of the first Study and was perhaps intended more as an entrée for the geography department into LS. This experience stood in contrast to my initial one: the purpose was not pursued with the same vigour and the outcomes were not analysed, discussed or acted upon in either department.
**LS3 – Algebra Learning Study**

<table>
<thead>
<tr>
<th>Location</th>
<th>Midlands Secondary School</th>
<th>Date</th>
<th>October 2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teacher Participants</td>
<td>R. Joomun (HOD)</td>
<td>Student Participants</td>
<td>Year 7</td>
</tr>
<tr>
<td></td>
<td>Head of Department (HOD)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Second in Department (SID)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Maths Teacher 1 (MT1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Maths Teacher 2 (MT2)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Research Question         | 1. How can we make the concept of a variable as a pro-numeral entity, explicit to students?  |
|                          | 2. How can we support students in making algebraic generalisations based on observable numerical patterns? |

| Outcomes                  | The idea of the algebraic variable as a pro-numeral entity, which enables the generalisation of numbers, was considered the “missing link” between number and algebra. Students were made to demonstrate the limitations of their generalisations and to consider the use of the symbols they used to represent numbers. |

| Personal notes            | This was an extremely detailed pilot Lesson Study for the EdD. This LS was without a doubt, the most in-depth and informed reflection I have ever conducted on my own teaching and has led to a transformation in the way I understand and convey the importance of algebra to my own students. |

---

**LS4 – Secret Lesson Study**

<table>
<thead>
<tr>
<th>Location</th>
<th>Midlands Secondary School</th>
<th>Date</th>
<th>November 2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teacher Participants</td>
<td>R. Joomun</td>
<td>Student Participants</td>
<td>Year 9</td>
</tr>
<tr>
<td></td>
<td>Maths Teacher 1 (MT1)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Research Question         | How should geometric knowledge be structured? |
|                          | How do students apply geometry to challenging questions? |

| Outcomes                  | Four activities were planned, during which students applied their geometric knowledge to increasingly open questions |

| Personal notes            | This was very informal LS, whereby two of us collaboratively planned the lesson and MT1 observed my teaching, in order to make amendments for their own public LS. |
LS5 – Y12 Graphs Learning Study

<table>
<thead>
<tr>
<th>Location</th>
<th>Midlands Secondary School</th>
<th>Date</th>
<th>April 2016</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teacher</td>
<td>R. Joomun</td>
<td>Student</td>
<td>Year 12</td>
</tr>
<tr>
<td>Participants</td>
<td>Maths Teacher 3 (MT3)</td>
<td>Participants</td>
<td></td>
</tr>
<tr>
<td>Research Question</td>
<td>How can we inter-connect the algebraic concepts fundamental to the graphical representations of functions?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| Outcomes         | 3-part lesson was collaboratively designed and trialled on Joomun’s (more academically able) Y12 class, before being adapted for MT3’s Y12 class:  
Part 1: Working between equations, sketching and transformations including the use of f(x) notation.  
Part 2: Taxonomy of Graphs (and transformations).  
Part 3: The visual links between the graphs of y=f(x), y=f'(x) and y=f''(x).  
Part 1 was explored in the Research Lesson.  
The Trial Lesson was modified to include scaffolding to allow accessibility to the initial tasks. The students were expected to struggle with the idea of transforming a graph and MT3’s initial thoughts were to explore linear graphs in terms of sketching and transforming. This was mooted due to time constraints in order to allow students to focus on non-linear graphs.  
Scaffolding focused on the skill of “completing the square” as the vehicle for transforming from $y = x^2$. In Task 1, the students were required to sketch and they automatically did this by factorising the quadratic using double-brackets to find the roots. In Task 2, there were not allowed calculators and the expressions could not be factorised using integers. This was intended to lead them to complete the square as the only means available to them to find the roots and consequently explore the idea of the minimum/maximum. |
| Personal notes   | Students were not comfortable completing the square and were thrown off by the introduction of surds as roots, indicating far deeper numerical and algebraic misconceptions.  
The intended outcome of transforming from $y = x^2$ was not achieved, nor were the students able to identify the equation of the curve, given its sketch. However, MT3 continued with the ideas and concepts through questions over a period of three to four lessons, by the end of which students could confidently work from an equation to a sketch and vice versa (including trigonometric graphs).  
This LS highlighted the importance of fluent GCSE algebraic skills (which were seriously lacking), underpinning the concepts of graphs and calculus at A-Level. |

274
A.2. Y7 Algebra LS Plan

Bridging the gap between number and algebra

Rationale – The Missing Link

What connects Number to Algebra? We conducted an unstructured interview with two students and one of them argued: there's no need for algebra. Although he can collect like terms, factorise expressions and carry out most procedural methods, this student believes we do not actually need algebra. So how do we make students truly understand and therefore value algebra?

Further to being misunderstood, children often become hugely disillusioned with mathematics when they are presented with the complete abstraction of algebra in secondary school. Although they can generalise in real-life, they find it difficult to generalise numbers using algebra. Indeed, arithmetically fluent individuals can become quite perplexed when faced with ‘\(x + 5\)’. Every expression prior to this one had an answer so the lack of closure can be difficult to deal with – it goes against one’s previous understanding of mathematics’ aim to “find the right answer”. However, as John Mason\(^{17}\) puts it: ‘*A lesson without the opportunity for learners to generalise is not a mathematics lesson*’.

Therefore, we propose three lessons (the second of which will constitute the main Public Research Lesson) during which we begin with a simple 10x10 grid superimposed with dominoes, as a source of patterns. Following students’ familiarisation with patterns within an nxn grid of consecutive numbers, we introduce the idea of a variable as something which can be mapped to anything on the grid, and from which we require expressions to be formed.

By the end of both lessons, we expect some students to have generalised with two variables, \(n\) (the dimension of the grid) and \(x\) (any number on the grid). This will be achieved through a series of “same but different” tasks – each one being a subtly more evolved version of its predecessor to gently introduce this Year 7 class to algebraic principles, without explicit mention of algebraic procedures and focusing instead entirely on the underlying concepts behind the algebra.

The third and final lesson would serve as a bridge between the first two radically different lessons to more “standard” algebra lessons, perhaps in terms of easing some common misconceptions or misunderstandings about the manipulation of algebraic expressions. Since students would have generalised with a variable by the end of lesson 2, they ought to be comfortable with the idea of a “symbol” being mapped to “any number” (without the mention of grids at all) and would thus be asked to explore the idea of “grouping the variables” (e.g. \(x + x + x = 3x\)).

### Research Questions

1. *How can we make the concept of a variable as a pro-numeral entity, explicit to students?*
2. *How can we support students in making algebraic generalisations based on observable numerical patterns?*

Lesson 1 – Analysing Number Grids

Lesson Summary

Students form generalisations based on a square grid. They begin by exploring the properties of the grid and then form their own conjectures to describe numbers. These statements are tested and students evaluate the validity of a range of conjectures, including their own.

Learning Objectives

1. To form and test conjectures about shapes in a square grid.
2. To differentiate amongst statements which are always true, sometimes true and never true.

Key Processes

- Pattern seeking: analysing different sets of numbers to form patterns.
- Analysing: Making a conjecture and then seeking to justify it; working logically towards a solution, recognising the impact of the constraints involved.
- Interpreting and evaluating: forming convincing arguments, and formulating proofs.

Note

This is not a public Research Lesson but would still contain elements of a Research Lesson. The lesson would have been delivered by the same teacher, to the same class, prior to the main Lesson Study Research Lesson (Lesson 2 in this case) and observed by the Planning Team. As well as introducing the topic, this lesson will also be acclimatising students to open tasks, sitting in their arranged pairs/groups and being observed by multiple individuals (although not quite to the same scale as the main Public Research Lesson).
Teaching Questions and Notes

Part 1. Two squares on a 10-by-10 grid (15 mins)

1.1. 10x10 grid on the board with a question: James puts two squares on the grid to make this shape:
As he moves the shape around the grid, he says: “No matter where I move my shape, there is always one odd and one even number!”

Question 1. What else do you notice about the numbers inside James’ shape?
Students to be asked to come up to the board and “move the shape around to test James’s statement”. Students then asked to “think-pair-share” their answer and a few example statements are written on the board without the teacher evaluating them (saying whether they are correct or not).
Students are asked to record their statement onto worksheets.
   a) Teacher to show students a fourth movement of the horizontal shape and a counter-example (off the grid or disjoint).
   b) Teacher to draw out more details without revealing answers: “Which number is bigger? Why is this?”
It is expected that students will need prompting to begin to understand what is expected of them. The example of James’s answer must be expanded upon, not copied.

1.2. Students are now going to be prompted to form their own shape.

Question 2. Can you form a different shape using two squares and come up with your own theory as you move your shape around the grid?
Teacher to explain that what James’s statement was an example of a theory comparing the two numbers, as were the statements they produced in answer to Question 1.
Students to record all their predictions down as “theories” on Worksheet 1.

An Observation Board to share solutions/ideas: a large version of Worksheet 1 will be produced on the board and students will be asked to come up to the board, pair by pair, to read the existing theories and place their own theory, if different to the

Anticipated Student Responses

<table>
<thead>
<tr>
<th>Shape 1</th>
<th>Shape 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>12</td>
</tr>
<tr>
<td>9</td>
<td>22</td>
</tr>
<tr>
<td>Shape 3</td>
<td>Shape 4</td>
</tr>
<tr>
<td>23</td>
<td>57</td>
</tr>
<tr>
<td>34</td>
<td>66</td>
</tr>
</tbody>
</table>

   a) Unable to follow instructions, placing the two square separately on the grid or squares going off the grid.
   b) Simply reading the numbers: “8 and 9” or saying “one is bigger, one is smaller”
   c) Shape 1, vague observations about the consecutiveness of numbers: “one is more than the other”, “one is less than the other”, “the right one is more”, “the left one is one less”, “they go after each other”, “they have the same number of tens”.

   The language of students to describe the relationship between their numbers will be expected to be accurate and broad, including ideas such as: difference between numbers, sum of numbers, minimising and maximising sums, odd/even numbers, difference amongst digits and columns being “1 more” and rows being “10 more”. For example:
   a) Shape 2, the bottom number being 10 more or the tens digits being one more.
   b) Shape 3, the bottom right-hand number being 11 more or variations in both digits: “the tens column and the units column are both 1 more”.
   c) Shape 4, the bottom left-hand number being 9 more.

It is expected that the first two shapes will have the most observations, the diagonal shapes being more extension shapes.
### Teaching Questions and Notes

ones already on there. Teacher will select students based on what she has read on their Worksheet.

### Anticipated Student Responses

Students who are “stuck” can ask for permission to visit the board for some inspiration (for students who have tried but are getting the wrong idea about the task, not students who want to copy an answer). It is essential that students be discouraged from “copying” each other’s answers unless they are perfectly convinced by another argument. In this case, they ought to try to phrase the statement using their own words.

### Part 2. The 7-by-7 grid and “any grid” (20 mins)

**2.1.** Having already explored the possibilities within each shape, students will now be expected to draw parallels between their observations on the 10x10 grid and this 7x7 grid.

**Question 3. What happens as we move the shapes around a 7x7 grid?**

Students will fill in the second column on **Worksheet 1** in response to this question. Students will also continue to bring post-it notes to the Observation Board.

**2.2. Question 4. How does this compare to the 10x10 grid and why does it happen?**

Teacher to select appropriate post-it notes from Column 1 (10x10 grid) and Column 2 (7x7 grid) on the board as hints for students (but without revealing any actual answers)

**2.3. Question 5. What happens as we move the shapes around any grid?**

This will become students’ third and final statement regarding grids to be recorded on the Worksheet. Teacher to project 5x5, 8x8 and 12x12 grids on the board for students to test their conjectures on – 8x8 grids are also available for students who wish to see another example of a grid before conjecturing.

As we try to write some statements in the third column of Worksheet 1 (and therefore also on the board version), the teacher will bring in a convenient abbreviation: “Why don’t we use the letter G for “grid-size”? Students will find this is easier to use when describing the relationship for any grid (e.g. it’s easier to say “the bottom number is G bigger” than to say “the bottom number is whatever-the-size-of-the-grid is bigger.”

Students might jump to the conclusion that the exact same thing will happen on this grid as the 10x10 grid - they must be encouraged to actually try moving their shapes around in order to convince themselves.

The fact that Shape 1’s patterns/expressions remain unaffected by the size of the grid might mislead students into assuming that this is the case for all the shapes. They must be particularly encouraged to “check their assumption” through Shape 1.

Again, the main focus is on Shapes 1 and 2, Shapes 3 and 4 serving as “extension" for the more confident students.
### Teaching Questions and Notes

The layout of the worksheet is such that students are being prompted by being visually shown the comparisons side-by-side. This will increase their chances of successfully generalising for the “any grid”.

“So will this work in a 100x100 grid or a 53x53 grid?”

### Anticipated Student Responses

If possible, and indeed ideally, students will be subtly prompted to come up with the abbreviation “G” to represent grid-size by themselves. This could then be referred to as "Person X's idea of using the G".

Students will have to be genuinely convinced and would have had to have properly understood the "any grid" generalisation in order to confidently answer the questions about 100x100 or a 53x53 grid. It would be particularly impressive to see some of them answer this question with regards to Shapes 3 (difference of $n-1$) and 4 (difference of $n+1$) on an nxn grid.

### Part 3. RAG statements and voting (15 mins)

This final plenary task is to draw the learning together and consolidate the generalisations made throughout the lesson. False generalisations will be explained through counter-examples or contradictions. Some questions are trick-questions to ensure students are paying attention to the exact phrasing of their generalisation. The ultimate purpose is for students to go back and amend their generalisations on Worksheet 1 using their red pens.

In order to be allowed thinking time, students will complete Worksheet 2 – this will then allow them to vote at the end of the task, by turning their planners to red, amber or green depending on whether they think the statements are never true, sometimes true or always true.

**4.1.** (Shape 1) You can add 1 to either of the numbers to get the other.

**4.2.** (Shape 1) The left number is odd, the right number is even.

**4.3.** (Shape 2) The bottom number is 8 more in an 8x8 grid.

**4.4.** (Shape 2) The difference between the two numbers is 8.

Students might simply assume that all the statements are true if they do not read them carefully. If one pair is found to be particularly inattentive to the crucial details (or lack of detail) in the statements, they will be encouraged to interact with/listen to another pair of students who has made the appropriate observations.
### Teaching Questions and Notes

<table>
<thead>
<tr>
<th><strong>4.5.</strong> (Shape 2) The bottom number is the top number plus G (the size of the grid).</th>
<th><strong>Anticipated Student Responses</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>The teacher will go around and spy interesting reasoning behind students’ decision about each statement and make a mental note of which students to select during the voting stage to explain their answers.</td>
<td>Students might underestimate Statement 4.4. They will be asked to see if they can “spot the difference” between that statement and the one before it.</td>
</tr>
</tbody>
</table>

### Part 4. Conclusion (10 mins)

| Teacher to allow students time to reflect on the RAG statements and amend their statements on Worksheet 1, if they wish, using their red pens. Teacher to select a few students who have decided to amend their statement and ask why they did so (similarly for a few students who decided to stick to their previous statement). | The purpose of the **Voting Exercise** is to demonstrate consensus and to give students a platform to voice their ideas as well as listening to the ideas of their peers and critique each other in a constructive manner. |
| Anyone who thinks their statements are perfect can check the Observation Board to see if any of the statements on there need improving. | Students are expected to modify statements such as “one is always bigger” to “add 1 to the left number to get the right number” or “the right one is always 1 more unless it’s going off the grid”. |

Students are expected to modify statements such as “one is always bigger” to “add 1 to the left number to get the right number” or “the right one is always 1 more unless it’s going off the grid”.

The lesson will conclude with the importance of testing one’s conjectures and ensuring they are as specific as possible. This idea of **pseudo-proof** will be useful later on in students’ academic careers, when they need to make use of more formal proofs.
(Research Lesson) Lesson 2 –

Using Symbols to Represent Numbers

Lesson Summary

Students have made generalisations based on a square grid and tested worded conjectures. They are now formally introducing a variable into their work and using it to form expressions. These can then be “tested” by informally substituting values.

Learning Objectives

1. To use symbols to represent numbers.
2. To construct expressions to model the relationship between numbers in a square grid.

Key Processes

- Analysing: Making a conjecture and then seeking to justify it; working logically towards a solution, recognising the impact of the constraints involved.
- Interpreting and evaluating: forming convincing arguments, and formulating proofs.
- Communicating and reflecting: communicating reasoning and findings effectively.
### Teaching Questions and Notes

#### Intro: Recall and Reflect (5 mins)

Extracts from previous lesson's *Worksheet 1* on the board as well as the same Observation Board where students had recorded their work. Students will be asked to recall and reflect upon their learning outcomes from last lesson (with the aid of their Worksheet 1, if necessary).

**0.1.** “Last lesson, I gave you a 10x10 grid – what was the first thing I asked you to do? Then what comparisons did we make with the second grid?”

**0.2.** Use these phrases to describe the learning outcomes of last lesson: 10x10 grid, horizontal, vertical, diagonal, 7x7 grid, any grid, the letter “G”, sometimes true.

**0.3.** The teacher will share some of the students’ statements from the previous lesson (or even ask some of them to volunteer to read theirs).

#### Part 1. Missing numbers on an unspecified grid (10 mins)

**1.1.** Students to be given their Worksheet 1 from last lesson, alongside their first task of finding the missing numbers in each shape, in the form of *Worksheet 3*.

**Task 1:** These shapes were all placed on the same grid. Can you find the missing numbers in each one?

---

### Anticipated Student Responses

Last lesson, the students responded slightly quicker than we expected them to – therefore plenty of extension tasks have been slotted in to ensure students are consistently engaged due to the mixture of ability in this class. This part is to get them to recall the learning from the last lesson with some verbal and visual prompts.

**What did we learn last lesson?**

![Missing Numbers Grid](attachment:Missing_Numbers_Grid.png)

Students might make vague statements about the grids and shapes (“we looked at a 10x10 grid then a 7x7 grid with a horizontal, vertical and diagonal shape”) – however we would like to guide them towards the processes they went through with that grid through questions like “what was so special about these shapes?” or “what links did we discover between the shapes and the grids?”.  

One of the main envisaged issues is that students won't be able to articulate their thoughts about the numbers as precisely as we would like them to. For example, we do not expect to hear a fully detailed statement along the lines of: "horizontal shapes always consist of consecutive numbers, whereby if one is even, the other is definitely odd - unless the shape is on the verge of going off the grid". However, we will be gently nudging students to consider all the aspects of this statement (and would have already planted the seeds for this in Lesson 1), throughout this Lesson.
### Teaching Questions and Notes

Note, two different sets of shapes have been produced – the shapes are in fact the same but the numbers are different. This will force students to discuss the relationship amongst the numbers rather than just “ticking their answers” in Part 1.2.

<table>
<thead>
<tr>
<th>First set of shapes:</th>
<th>Second set of shapes:</th>
</tr>
</thead>
<tbody>
<tr>
<td>41</td>
<td>29</td>
</tr>
<tr>
<td>21</td>
<td>41</td>
</tr>
<tr>
<td>29</td>
<td>47</td>
</tr>
</tbody>
</table>

1.2. Each pair to visit their neighbours and “check” their answers with as many reasons as possible.

1.3. Teacher to deliberately show “working out”: e.g. to write 21+8+8 to prompt students to point out that 21+16 would also give the bottom number in the second shape.

**Extension:**

Can you draw your own shape on this grid and write the numbers inside it too?

### Anticipated Student Responses

Students might assume the second shape is on a 10x10 grid (they will be prompted to check the difference between 21-29 and 47-55). If students have forgotten the patterns within these shapes, they can refer to Worksheet 1. Note that the third L-shape is new and students might point out that they had only worked with two squares the previous lesson. They must be reassured that the addition of a third square is a change they can deal with comfortably.

The shapes above will also be included in the Powerpoint for students to try if they are done and can’t come up with their own shapes.

### Part 2. Gridless and number-less (15 mins)

Students given the blank shapes and asked to form rules to find missing numbers in any of them in an 8x8 grid (still on Worksheet 3).

**Task 2:** Can you write some rules which would give us the missing numbers no matter where the shapes are on an 8x8 grid?

Students might describe the “term-to-term” rule of adding one each time and therefore misconstrue the third expression.

They can be asked whether their second expression and third expression are the same and therefore whether it’s possible to have two of the same number on any grid (see below).
Stars have been used in the first and third shape to encourage students to discuss them as variables. The middle shape has been purposefully left blank to allow students to use their own symbols. Indeed, students will be prompted to use their own variables as the teacher will empathise that stars are sometimes hard to draw, so students can use anything they want to represent the top cell.

**Extension:**

Can you adapt your rules to make them work in a 12x12 grid?

Teacher to foreshadow future learning points by asking students to “test” their expressions (i.e. substitute) and by deliberately showing “working out” and asking for equivalent expressions (i.e. collecting like terms). For example, when the vertical shape is displayed, students ought to recognise that the two eights in the third cell can be collected to make 16.

**Class Discussion**

Teacher to also choose two students who used an interesting (non-star) symbol. Does it matter which symbol we have used? (e.g. Anisah used a love-heart and Jameel used the letter J, are there statements the same?) A crucial question here is “what is the star?” (or indeed the love-heart, the rainbow or whatever the students decided to use as their symbols).

Also, “why would we use a letter rather than a drawn symbol?”

Note that the same two extension shapes have also been included on the Powerpoint but are unlikely to be considered or discussed in depth in the lesson.

The second shape which was left purposefully blank will probably see most students putting their own symbol in the top cell. Anyone who does something different can be selected to have their work compared to someone who chose the top cell as the variable. The equivalence between these shapes is not that “star + 8 + 8” is the same as “star + 8” but rather, that the cell originally defined with the variable affects the expressions produced. Whist “star + 8 + 8” and “star + 8” can be equated to the same numbers on the grid, they are different expressions as the stars represented different cells initially.
### Part 3. Generalising for any grid (15 mins)

#### 3.1. Task 4: Can you adapt your rules to make them work in any grid?
Students to work on the same shapes but in any size grid.

**Extension:**
Can you draw your own shape and write your own rules for any grid?

#### 3.2. Students asked to place all their worksheets in front of them (with Worksheet 1 on top). Having written their own solutions, students will now have a look at the work of another pair and find something which that pair did differently to them. They can write this on a post-it note and will be asked to share it in the class discussion. This will give students a chance to peer-assess someone else’s work and gain some perspective on their own proposed solutions.

**Class Discussion**
This time, students to be asked if they found the solution they were assessing different compared to their own and this will be exposed on the board for discussion (as previously, but with students leading on the chosen examples).

“*Person X, how did Person Y express their solution different to yours?*

“*Are these conflicting solutions or could they both be correct?*

If students are unsure, they would be given an additional grid to test their conjectures on, and reminded to use Worksheet 1 as an aid.

Students might need to be reminded of the different words and terminology used to describe the nxn grid (e.g. the width/length or G) or they might come up with something really convoluted such as “however big the grid is” and prompted to find a more concise way of describing the dimension of the grid.

Students might comment on the choice of variables or the accuracy of the other pair’s proposed expressions.

They will be prompted to evaluate whether these differences affect the correctness of the solutions ("*they used a different symbol, but could they still be correct?*").

Students to be encouraged to consider conflicting solutions rather than solutions which have used different symbols (as we have already established these can be equivalent if used properly).
### Part 4. Neriage (10 mins)

**4.1.** Students to complete **Worksheet 4**: “Reflect on what we have done in the last two lessons, by considering the range of shapes we have encountered. Use this sentence to help describe each shape below:

Teacher will demonstrate the gradual generalisation journey visually by writing the working out in each shape and asking students to complete their final worksheet.

**4.2.** Students to have a look at each other’s work by doing a **Gallery Walk**, to discuss their own work with each other. Teacher will also take this opportunity to assess students’ work and choose any interesting points to discuss with the class.

**4.3.** Teacher to select students to share/justify their answers and to ask probing questions if necessary (e.g. “how do you know that’s the size of the grid?”)

“*What do you understand the purpose of this (generalisation) to be?*”

Teacher to reveal that “the X” that students associate with algebra is no different to the star they have been using in the lesson. In fact, X and star are almost one and the same as both of them can be any number (except the star was being used exclusively on square grids and X can be mapped to any number – including negatives and decimals).

*Generalisation helps us discuss not just one but every possible scenario.*

**Anticipated Student Responses**

Questions are purposefully quite closed to guide students to see the purpose of the last two lessons.

*This works when the top number is ______ on _______ grid.*

*I know this because …*

Students might justify the “top number” section – they will be asked to instead perhaps focus on how they figured out the “grid” part of this sentence.

Students are simply expected to observe and discuss their opinion with each other. As the teacher goes around, she may ask some of the students “*what do you think about this student’s work?*” simply to ensure they are engaged with the task.

It might be worth explaining to students that algebraic expressions and variables are worthy in their own right and do not need to “have an answer” in order to have a meaning and/or purpose.

*You will be allowed 10 minutes at the end of the lesson to interact with and question students about their work.*
### Student work

<table>
<thead>
<tr>
<th>Shape</th>
<th>10x10 grid</th>
<th>7x7 grid</th>
<th>Any grid</th>
</tr>
</thead>
<tbody>
<tr>
<td>![Shape 1]</td>
<td>The units go up by 1 every time you go to the test right.</td>
<td>It increases by one.</td>
<td>It increases by one.</td>
</tr>
<tr>
<td>![Shape 2]</td>
<td>It always increases by 10.</td>
<td>It always increases by seven if you go down down down down. If you go up, it decreases by 7.</td>
<td>It always increases by 11.</td>
</tr>
<tr>
<td>![Shape 3]</td>
<td>Every time you go down using this pattern it increases by 6.</td>
<td>Every time you go down this way it increases by 6 but if you go backwards it would decrease by 1.</td>
<td>It increases the length plus 1.</td>
</tr>
<tr>
<td>![Shape 4]</td>
<td>If you go the opposite way then it increases by 11.</td>
<td>It would go up if you went this way.</td>
<td>It increases by the length and decreases by 1.</td>
</tr>
</tbody>
</table>

*Comparing Shapes on a Grid (Friday 9th October 2015)*
<table>
<thead>
<tr>
<th><strong>Statement</strong></th>
<th><strong>Always True</strong></th>
<th><strong>Sometimes True</strong></th>
<th><strong>Never True</strong></th>
<th><strong>How do you know?</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>You can add one to one of the numbers to get the other.</td>
<td>√</td>
<td></td>
<td></td>
<td>It will always be one because the next number will be one more than the other.</td>
</tr>
<tr>
<td>The left number is odd, the right number is even.</td>
<td></td>
<td>√</td>
<td></td>
<td>It is sometimes true because any even number could be in front (32-33)</td>
</tr>
<tr>
<td>The bottom number is 8 more in an 8x8 grid.</td>
<td></td>
<td></td>
<td></td>
<td>It goes up in eight because eight add eight is sixteen.</td>
</tr>
<tr>
<td>The difference between the two numbers is 8.</td>
<td></td>
<td>√</td>
<td></td>
<td>This is the same as the top one.</td>
</tr>
<tr>
<td>The bottom number is the top number plus G (the size of the grid).</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Evaluating statements (Friday 9th October 2015)*
A.3. Y12 Graphs LS Report

Context and Journey of Lesson Study

The main teacher-researchers in this project were MT3 and MT0, both of whom worked collaboratively throughout the 2015-2016 academic year at Midlands Secondary School in teaching Year 12 pure mathematics. MT0 taught the 12D group of 10 students who had opted for Physics as well as Mathematics at AS, and MT3 taught 8 students as part of 12C, the more challenging group. Both MT3 and MT0 were new to teaching this course. MT3 is undertaking a Teaching Advanced Mathematics (TAM) and a Masters run by MEI (a national exam-board specialising in maths) and Plymouth University. MT0 is also a doctoral student with Cambridge University, currently focusing on Lesson Study.

Reflection and Impact on Teaching and Learning

This Lesson Study transformed the way the teachers involved teach algebra. The importance of graphs in the teaching of algebra and trigonometry and how deeply the concept of graphs as functions, permeates mathematics, (all the way back from "y = mx + c” in Key Stage 3) became increasingly apparent as teaching in AS level progressed. All teachers, including observers, began changing their delivery based on the outcome of the Lesson Study process. For example, MT3 taught their Year 11 Target Set (aiming for Cs in the GCSE) to sketch quadratics when solving and/or factorising them in order to develop a visual understanding of the quadratic function as a parabola. They also taught Year 7 Set 3 to find the intercepts of straight line graphs to visualise a sketch of the line prior to plotting. MT0 taught 9 Set 1 to sketch non-linear graphs through transformations of the most basic form of quadratics, cubics, reciprocals and exponentials.

By the end of the academic year, during collaborative revision classes, students were clearly more confident and competent at handling Core 1 and Core 2 GCE exam questions involving the sketching and transformation of graphs. They were also making use of sketches to support their
thinking when solving coordinate geometry questions. The original intended outcomes of this Lesson Study were achieved, perhaps not in the format originally intended and certainly not in the same way by 12C and 12D students, but nonetheless, the process was conceptually deep and allowed students to form highly developed interconnections amongst mathematical ideas.

**The Preliminary Easter Study Skills Session**

During a mixed revision workshop during the Easter holidays, one particular task unveiled a lack of skills when approaching graph sketching in spite of a natural intellectual curiosity towards the idea - this was the transformations ‘spider diagram’.

The tasks used in the session are included to give the reader an insight into the context-specific source of this Lesson Study.

These questions took a while for students to work through. They were very reluctant to approach questions of such an open nature and then secondly to sketch. A few of them plotted rather than sketched and some never did sketches of their own. This is where the core sketching issues became apparent.
The focus here was intended to be on the transformations of the graphs. Many issues emerged including the glaring inability to sketch - students simply did not know how to sketch graphs. This is what inspired the entire Lesson Study.

**Rationale for Lesson Study**

Graphs are the consistent thread that runs through the AS mathematics course of learning. Students do not feel confident with sketching graphs and do not use them as a tool to support the resolution of multiple examination problems. Particular areas where graph sketching can support student progress and understanding are: coordinate geometry, circles, logarithms, calculus and transformations.

After some observation within the classroom and analysis of assessments, a series of topics were determined as important for review and further probing. With observation and support from Dr M.B. (MEI), a study skills and revision lesson was constructed to tackle, amongst other things, graph transformations. Students found this perhaps the most challenging section of the session and we additionally observed that other open questions that were asked such as “change one aspect of 
\[(x - 4)^2 + (y - 2)^2 = 9\] so that the circle passes through exactly three quadrants” were tackled exclusively without sketching – students had to be specifically directed to do this. Consequently, after review and evaluation of this session, incorporating views and ideas from students, it was decided that graph sketching and transformations as a whole be tackled as a crucial skillset to support students in their problem solving. Discussion with Dr E.G. (MEI/Plymouth University) followed.

After much deliberation and investigation, the subsequent research question was determined.

**Research Question**

How can we inter-connect the algebraic concepts fundamental to the graphical representations of functions?
It was decided that the above research question would best be tackled in the following parts:

**Part 1:** Working between equations, sketching and transformations including the use of $f(x)$ notation.

**Part 2:** Taxonomy of Graphs (and transformations).

**Part 3:** The visual links between the graphs of $y = f(x), y = f'(x)$ and $y = f''(x)$.

Part 1 was explored in the Research Lesson.

**The 12D Trial**

Lessons were trialled by MT0 with the 12D group to provide the basis for analysis and refinement in preparation for the main Research Lesson, to be taught by MT3 to their 12C group. This was the first time the students had experienced these previously disjoint topics as one area of learning. There was a clear appreciation of the use of transformations as a mode to sketch any and all quadratic functions, by the end of the lesson. The other two parts in this series of lessons were then explored in follow-up lessons.

**Starter Task**

Students had to realise this had to be a quadratic with a negative coefficient of $x^2$ and there was an attempt to get them to translate and reflect. By reflecting first however, the process of narrowing down the equation of the curve came about more naturally.
Task 1

This task got students to consider the efficacy of the $f(x)$ notation as it enabled them to think about whether the $x$ or the $y$ component of the original equation needed to be modified. They also had to algebraically simplify expressions. No graphical representations were possible for the students (due to the confines of their knowledge base at this stage) therefore, they had to focus on the transformations and the equations solely.

Task 2

The aim was to get students to realise that any quadratic could be sketched by completing the square and translating either $y = x^2$ or $y = -x^2$. More content was planned but the hour was spent on these three tasks only. The questions included decimals and surds on purpose to force students to consider non-integer numbers (what we frequently refer to as “not nice” or “awkward numbers”).
**The Research Lesson**

Students form a notion of the key elements required in a sketch, the various forms of algebraic manipulation that yield them and the nature and purpose of the use of transformations therein.

**Learning Objectives**

1. Explore the transformations of graphs through \( f(x) \) notation
2. Sketch functions using transformations

**Key Processes**

Algebraic manipulation: factorising, completing the square, simplifying expressions.

Interplay between "\( y = \)" and "\( f(x) \)"

**Summary of Findings**

The Trial Lesson was modified to include scaffolding to allow accessibility to the initial tasks. The students were expected to struggle with the idea of transforming a graph and MT3’s initial thoughts were to explore linear graphs in terms of sketching and transforming. This was mooted due to time constraints in order to allow students to focus on non-linear graphs.

Scaffolding focused on the skill of “completing the square” as the vehicle for transforming from \( y = x^2 \). In Task 1, the students were required to sketch and they automatically did this by factorising the quadratic using double-brackets to find the roots. In Task 2, there were not allowed calculators and the expressions could not be factorised using integers. This was intended to lead them to complete the square as the only means available to them to find the roots and consequently explore the idea of the minimum/maximum. Students were not comfortable completing the square and were thrown off by the introduction of surds as roots, indicating far deeper numerical and algebraic misconceptions.

The intended outcome of transforming from \( y = x^2 \) was not achieved, nor were the students able to identify the equation of the curve, given its sketch. However, MT3 continued with the ideas and concepts through questions over a period of three to four lessons, by the end of which students could confidently work from an equation to a sketch and vice versa (including trigonometric graphs).
Teaching questions and notes | Anticipated responses | student | Post-Lesson Notes
--- | --- | --- | ---
**Starter – Big Question (20 minutes)**<br>“Give me an example of a curve with a maximum point (-2,2)”<br>Teacher displays question for students to consider as they enter and settle. Teacher opens a discussion around the question to determine prior knowledge and ideas around topic. It is expected that students will identify a negative parabola as a possibility to form a solution, or perhaps a cubic graph.<br>- “What makes you say that?”<br>- “Can you explain your ideas?”<br>Worksheet 1 was introduced to support students in selecting the correct region of mathematics in which to work (having not been present in the preliminary group of more able students). Concerns were raised as to their ability to access tasks and garner a deeper understanding of the topic at hand. It was felt that a sense of direction and indication of the appropriate tools and how they may be used would allow students to better attain a conceptual rather than procedural understanding of graph sketching as a whole. Students to work in collaborative pairs.<br><br>Students directed towards worksheet 1, **Task 1** (using factorisation), to begin to set the tone for the skills required to tackle the big question.<br>- “What information are you including?”<br>- “Why?”<br>- “Shall we factorise into double brackets?”<br>- “What do we need to include in the sketch?”
- “How should we sketch without factorising or using ‘the formula’?<br>- “Can you remind us how to complete the square?”<br>“Do the numbers involved all have to be integers?”<br><br>Students asked to move onto **Task 2** (using completing the square) to<br>- “What is the difference between $f(x)$ and ‘the equation’?”

It is not anticipated that students will attempt to sketch what this may look like but that they will think algebraically about equations satisfying the criteria.<br>Potential misconception: students may assume the point (-2,2) is a point of intersection.<br>- “Parabola (unhappy), cubic, not a straight line”

Most students were baffled by this question, except one who did a rough sketch of a negative parabola whose maximum point was (-2,2). She was very unsure of the validity of her ideas.<br><br>It was encouraging to see this student correctly identify a potential shape for the curve. It was clear that the rest of the class could not visualise the scenario.
tackle an alternative method for sketching graphs.
- “Why did you choose this method for graph sketching now?”
- “Do you have enough information on your sketch/what is enough information?”
- “Is this method useful, why/why not?”
- “Is every transformation from \( y = x^2 \) or shall we base it on the previous question?”
Potential misconception: e.g. a move of 2 units to the right is \( f(x + 2) \)
- “What does a stretch in the y-direction mean?”

Students directed to Task 3, initially sketching \( y = x^2 \), and moving onto structured transformation, incorporating sketching, \( f(x) \), vectors and transformed equations.
Funnelling layers: 3.2 \( f(x - 2) \), 3.3 \( f(x - 2) - 4 \), 3.4 \( 2f(x - 2) - 4 \), 3.5 sketching based on transformed equations and 3.6 forming an equation based on a sketch.
- “What information is important in the sketch?”
- “How are you determining the important information”
- “What is the easiest format of transformation to interpret, why?”
- “What is the most useful format of transformation, why?”

It is anticipated that students will have a clearer idea of what this graph could look like, but not of the notion that they should begin with \( y = x^2 \) and take incremental transformation steps from there. They will probably need some probing.
It is beyond the remit of their current learning to be able to reflect their translated curve in the line \( y = 2 \), so, should this pathway arise, questions will be posed to ask them if there is an alternative transformation ‘pathway’ using all the tools currently available to them. It is anticipated that a student(s) will recognise the logical step of reflecting in the x-axis first, before undertaking the appropriate translation of the maximum point.

Students return to the big question and re-examine in light of work undertaken.
- “Now can you tell me anything in more detail about a potential equation that satisfies the criteria”
- “What does the information indicate”
- “What processes can we undertake to work towards a possible solution?”
- “What could be our graphical starting point?”
- “What transformations could be undertaken to the above?”
- “What do you think a potential solution could be”
- “Can you verify the validity of your suggested solution(s)”

Based on their work in Tasks 1, 2, and 3, it is anticipated that students will be able to use the completed square format to find the intersections of the graph with the axes.

Task 3 was only begun with student workings through sections bar the translation vector.

of confidence numerically manifesting and proving to be n impeding factor in working through the task.
B. Diary Entries
B.1. 22nd September 2019

We have students from a range of backgrounds and with a range of emotional needs.

We try to teach our lessons with a disjoint set of resources and confusing schema.

We are bombarded with administrative tasks.

We forget our number one priority – we are here to teach all of our students to the best of our ability.

Students walk into maths, sometimes with other things on the brain.

We ask them to sit down, take their books and start with a random bit of maths – this is intended to serve as warm-up for whatever is coming next. During longer lessons, we do a recall activity which will involve random topics previously covered.

We then start presenting a seemingly random set of facts to them, expect them to “learn” them and to apply them to various scenarios. After a while, we test them on these random things at various points during their academic career and depending on the type of test it is, there are various consequences attached to them.

We also expect students to adhere to a set of poorly constructed rules which are designed to help us maintain order within the organisation.

Sometimes, students will genuinely enjoy learning something new, most of the time, they won’t.

Our concerted efforts can be summed as a series of desperate actions to (i) maximise results for the purpose of climbing the league tables, (ii) to “get rid” of the most “troublesome” students and (iii) fall in line with the latest “edu-trends” for Ofsted or Twitter.

In the meantime, the modern child’s experience is completely neglected.
Theirs is a more complex social sphere – what used to just be playground talk now extends to their homes as they can be reached 24/7 through social media. The internet alone has created so many new dimensions to their lives and has been weaved into almost all of their interactions with each other, and with the rest of the world. They consume content in snappy 60-second TikTok videos and 10-second SnapChats and many of them are even more interlinked with their devices than we, the adults, are. Without access to resources and real hobbies, the internet can provide access into the lives of thousands of celebrities and millions of cool influencers. YouTube, Instagram, Fortnite, PornHub, 4chan - these are the ones I am aware of, amongst thousands I have no idea about.

With parents constantly working just to keep up with basic living costs in London, if they are lucky, their parents will forge a strong link with the school and still fall slightly short of giving them the attention they crave. The tough ones are looking after their parents or living in neglect and hiding their situations, trying to “learn and be good” in school. Economic migrants will not have any extended networks to fall back on – so their sons become easy prey for gangs.

Online predators have never been the biggest threat to the kids of London – around many street corners there is a guy offering you food and trainers if you want to join their crew. Kids are a useful, widely available, disposable resource for drug peddlers. They are the mule of choice for today’s gangsters in search of the fastest route to a champagne lifestyle.

Then, there are the modern labels. Autism, ADHD, Special Needs, dyslexic, anorexic and many more need to be added to the bully’s lexicon alongside the classics of fat, whore, black, poor, dumb, etc. They understand mental health issues, know their child protection rights and have access to a wealth of information but those on the fringes will continue to struggle with their issues, as we amplify them with labels and push them to their limits with exams and threats of exclusions.

Regardless of socio-economic status, we have increased the pace of our kids’ lives and are training them to do the same with theirs.

Until we are able to influence major reforms, we operate through compromise.
The organisation goals of grade maximisation are roughly in line with helping our students as they also need the best grades they can get. We provide support in lots of other ways, at our own expense – extra classes, detentions, parental meetings and conversations, are all in our own free time, outside of lessons but we are forever swimming against the tide and it is simply exhausting…
B.2. 2018-2019 reflection

The initial stage of this research (originally scheduled to be upgraded before December 2017 and to begin collecting data January 2018) found itself postponed on three unfortunate occasions. Having undershot the rigour of my Research Design for the Upgrade Viva, I needed to spend another term of the 2017-2018 academic year re-writing it. Secondly, due to university staff strike action, the Upgrade Viva was further delayed by a few months, taking place in April 2018 and followed directly by exam season (the busiest time of the academic year for me, whereby I often work weekends and during the holidays to deliver ‘cramming’ sessions to students). This meant I could not write my corrections until June 2018, by which point the staff turnover meant there was essentially no point in including that term’s LS in the official research; most of the staff present would not be there the following academic year. Finally, the first term of the 2018-2019 academic year, when my responsibilities were expanded beyond the Maths department into leading Maths, Business and IT faculty, turned out to be some of the most stressful months of my career: 5 out of 14 of my team were brand new to the academy, 3 were completely new to teaching in secondary schools, 4 were non-maths subject specialists and a few weeks into the term, 3 teachers were placed on “support plans” due to concerns over the quality of their teaching – the first official step in Capability Procedures. The Business department was also a mess, not retaining teachers for more than 2 years and had “misplaced” all Year 11 and Year 13 coursework the previous summer, leading to a mad scramble to bring students in to redo work, after their exams. Despite all of this, I did make an attempt to start the Lesson Study in November 2018, when a member of the department then went on long-term sick leave due to stress, and the supply teachers we brought in ended up creating more issues than they solved... With a new A-Level specification’s first exam scheduled for that summer, I worked during October half-term to ensure Year 13s were prepared, and taught morning and after-school classes to key Y11 students, in an attempt to off-set what was predicted to be our lowest set of GCSE results. My “free periods” were also taken up conducting patrols or dealing with behavioural issues as my staff did not have a general handle on behaviour and cover lessons often required the teaching support. This was a time when I don’t recall having lunch during lunch-time: I ate in lessons, whilst on duty or after school. Had I any
family responsibilities or children of my own during this time, I don’t know how I would have
maintained them. Perhaps that is why so many “young ambitious” teachers rise through the middle
leadership ranks of academies like the one I worked at – we’re the only ones with the energy and time
to be able to do so.
B.3. Everything, everywhere, all at once

Consider the structure of the school day at the Academy. It is chunked into discrete ‘periods’, whereby every teacher’s time is controlled by their teaching timetable, as well as the school calendar and various duty rotas. In any given day, a teacher could be teaching up to seven 50-minute periods, with only a 20-minute and 30-minute break, during which they may or may not be expected to be ‘on duty’ (supervising students, often involving standing or walking around a particular area of the school). These breaks are our sole opportunity to use the restroom, eat, sit down, interact with our colleagues, or check our phones. During the lessons themselves, time is further broken down into chunks (first 5 minutes – settling the class and taking the register, 10 minutes – doing a silent starter, 30 minutes – deliver content as per designated lists which must be covered within specific time periods, final 5 minutes – check student understanding and ensure all work is packed away ready for the next period).

Unlike many other professions, we cannot simply take our attention away from our classes. We are also expected to monitor the behaviour and activities of up to 30 students all at once, making mental/physical notes of any issues or rewards, sanctions or follow-ups required. This is all assuming that the lesson is actually going well, that is, the content is planned, the resources are all available (no IT issues), we feel relaxed and confident, and the students are generally well-behaved. To ensure the lessons are ‘well planned’, we are expected to find, collate and adapt resources, mark students’ work, keep abreast of and follow-up pastoral events (logging issues on a digital system and/or emailing/phoning parents and alerting relevant members of the pastoral team) ‘outside of lesson time’, meaning during breaks, after school, before school, in the evenings at home or during the weekend or school holidays. All of the above would be bearable if it weren’t for two soul-crushing extras: meetings and admin.

We face a deluge of additional administrative tasks/requests/information, a ridiculous amount of which is demanded at very short notice and with a sense of urgency, through emails which are sent without restriction, by more senior members of the school. Further to this, we regularly have to sit in weekly meetings or ‘CPD sessions’, which feel like a drain on our time/energy, particularly as they
frequently occur at the end of the school day. Trips, extra-curricular activities, one-to-ones and detentions with students, parent consultation evenings, exam preparation, assessment marking, report writing and constant last-minute requests to ‘help out’ all further exacerbate matters. And then there’s Ofsted… The inspectorate inspires dread in all teachers because we all know we are expected to do MORE if we are due an inspection and during the two-day inspection itself, we are expected to do EVERYTHING. Schools will open early and close late, everyone will push themselves beyond their very limits to ensure the school gets a ‘Good’ or ‘Outstanding’ grade.

Teaching is exhausting. I am a relatively young, healthy, and motivated teacher, without any major socioeconomic constraints/difficulties who has been in the profession for 12 years, yet like many of my counterparts, I question whether I will be able to keep this up for the next 32 years.
B.4. The secret life of a middle leader

I joined the Academy in June 2016 as a Mathematics Teacher, when the school was operating under a strange Academy Trust consisting of another similar secondary located 6 miles away in the same borough, and under the leadership of a successful Catholic selective school. The latter imposed plenty of restrictions and very little support on the Academy. Having only taught for 5 years, I was the most experienced teacher in the department (excluding the two Senior Leaders who taught one class each). Given the most difficult classes to teach (one of whom was an unforgettable Y8 class which had experienced 7 different maths teachers the previous year and a third of which did not ‘make it’ to Y11) and with no support structures, I struggled to establish my personal life (I had relocated from the Midlands to London) and my teaching in what felt like a completely different country operating by a whole different set of rules (or no rules at all!).

Slowly establishing myself and learning the norms of my new environment, I was informally given the reins of the Maths department in November 2016. This responsibility was not officially recognised until September 2017 with a title of Mathematics Coordinator, alongside the appropriate financial renumeration. That 2016-17 academic year I became a Y12-Y13 form tutor and as the main A-Level Maths teacher, I also learned about sixth form teaching and exam strategies and began investing considerable time in supporting my form tutees applying to university, providing career advice, researching courses and requirements and re-writing application forms. As an unofficial middle leader, I also established structures around assessment, data analysis and intervention in an attempt to create clearer grade monitoring and support systems for students.

As soon as I was officially promoted in September 2017, my teaching hours went down by a few hours, only to go up considerably due to weekly detention and lunch duties (an extra four hours every week). I was also required to officially observe members of staff, conduct whole-school assemblies and parse through endless CV’s and application forms to schedule interviews far too often. A team of 9 Maths teachers in January 2018 consisted of 2 non-subject specialists and 2 new teachers, 4 of whom had left by the following academic year (one of these teachers was someone whose contract we purposefully did not renew following poor quality of teaching and poor response to support). We were
inspected by Ofsted in June 2018 and received our second ‘Good’ judgement since the last inspection three years prior. This was the first time I also found myself spending many mornings planning cover work for absent teachers, instead of doing my own preparatory work. As I was already working from 7am to 6:30pm most days, there weren’t really any more hours I could put into the work, so I simply spent much of year exhausted.

In September 2018, the Academy Trust we were under was dissolved following a scandal the year before resulting in the Headteacher leaving their post. The new Academy Trust was under the leadership of a successful non-selective local comprehensive and included various local primary schools as well. This Trust proved to be a better, more supportive match, although despite a few administrative issues at the start. The Academy also ramped up its recruitment, and following two years of good exam results, the ‘Good’ Ofsted report and marketing support from the Trust, was fully subscribed in Year 7 for the first time (with double the number of students in Year 7 compared to Year 11 that academic year). I was also promoted again to Team Leader of Maths, Business and IT, and found myself managing various GCSE, BTEC Level 2, BTEC Level 3 and A-Level courses I had no experience of teaching.

2018-19 proved to be our most challenging year in terms of staffing due to someone suddenly resigning in August 2018 (not giving us enough time to recruit), and another member of staff going on ‘stress leave’ in October. I was now in charge of a team of 14, with 6 members of staff new to the Academy, 1 member of staff regularly absent, 1 still on ‘stress leave’, multiple supply/cover teachers filling in and 3 teachers under ‘support plans’ due to poor teaching. I had to spend considerable time dealing with cover and general behaviour issues so began to establish my own structures to deal with these issues (including delegating cover out to other teachers and creating the department’s own behaviour management system to attempt to monitor and rectify behavioural problems internally). Another 4 teachers left at the end of the year, one of whom was another case of contract non-renewal.

2019-20 was beginning to prove a much smoother academic year: having managed to establish a lot of clear structures and systems to deal with day-to-day running of the faculty (including facing up
to the challenges of behaviour management, covering absent teachers, recruitment and strong assessment-intervention cycles, especially in the upper exam year groups), I was also developing teachers to take on additional teaching or leadership responsibilities within the department. That is, until February 2020 when the COVID-19 pandemic unleashed havoc on the world. This disrupted the second year of my official doctoral research, and provided me the same challenge every other teacher was suddenly faced with: how do we teach without seeing students? I created new means of delivering content, pioneered the use of Google Classroom to assess students and trained my team on the use of digital resources and platforms. I also used this time to completely re-design the maths curriculum into a more substantial working document.

As we enter the 2020-21 academic year, I have no idea what the world of education will look like anymore. In the meantime, I have restructured the teaching timetable so that we have the capacity to support the many students who would have not engaged with any school work in the last 6 months, and who may be facing even more disruption in the months to come. The older students facing external exams are particularly anxious, and as a school which puts in considerable blood, sweat and tears into extracting the slightly above-average we have secured for the last few years, we are gearing up to somehow increase our efforts next year.

On a personal note, I have experienced major life event in the last four years: I got married, moved to a new city, bought a house and am now expecting a baby (with the end of my 5-year doctorate finally in sight). I am fulfilling my career ambitions of teaching in a leadership capacity in an inner-city London school and although I will be taking a break to build a family, I feel I have developed the skills, experience and knowledge to continue on my journey to Headship of such schools and look forward to the next phase of my career, which has been immeasurably enriched by this doctorate and the world it opened up to me.
B.5. My teaching style

My motivation for teaching is to support the development of young people: cognitive, intellectual, social, and personal. Within that, I have a personal preference for a student-centric perspective to teaching in terms of evaluating situations from the student’s perspective, factoring in the student’s history and social relationships (with peers/teachers/adults) and family context (parents disengaged, unable to cope with the student, overly strict, etc). This expresses as an informality in my teacher-student relationships in the sense that I often express certain aspects of my personality, beliefs or values (e.g., my love for maths, being an atheist, stories about my friends’ and family members’ professions). In homogenous cultures which breed misunderstanding and distrust, I feel that this is my own personal way to combat wider societal issues, and this is reflective of other practitioners in similar socio-economic circumstances and with a similarly empathetic approach (hooks, 1994). This also enables me to establish trust with students, particularly ‘difficult’ students (and ‘difficult’ parents), whom I have found often simply wish to be listened to. Having spent considerable amounts of time literally sitting and listening to students express their frustrations, I feel immense empathy towards these students. Students are also then much more likely to give me frank feedback (e.g., ‘I didn’t get anything you just said’, ‘why do you go so fast??’) which I always try to act upon. I believe that it is this approach which makes me successful at the Academy (admittedly by my own definitions of success): it has enabled me to make difficult decisions in complex situations. Some may feel this level of personal investment is unprofessional, I see it as my greatest asset and my main motivation for teaching.

I adopt a similar ‘zero-nonsense’ approach to my teaching practice. Often teaching older exam-age students, much of what I do constitutes exam preparation, as opposed to actual teaching. Having wasted many years in a futile fight against exams, I long ago admitted defeat and regret not better preparing my earlier classes for these events which no doubt went on to shape their futures. We have all had to use the same techniques to pass our theory driving tests and it would be a great disservice to my students if I did not secure them the best grades possible when they reach my classroom in the year of their GCSE or A-Level exams. This does not necessarily mean pressuring students to perform
or demanding complete focus at all times but demonstrating the feasibility of doing well in exams through hard work and preparation, and whenever possible, also pointing out the sophistication and beauty of mathematics and logic. I am sceptical about the ‘gamification’ of lessons: I do not feel a game of solving equations necessarily makes a student grasp the deeper mathematical concepts. A well-designed teaching activity is one which gets students to appreciate these without diluting them.
C. Professional Development Guides
C.1. Lesson Study Journal
LESSON STUDY JOURNAL
The Academy 2018-2019 (Autumn Term)

THE LESSON STUDY FORMAT

1. Form your group (does not have to be three people) and ensure at least one copy of this Journal is saved in the Shared Drive (could be typed up or hand-written and scanned).
2. Consider issues you are experiencing in your teaching. Discuss this with others in your group and reach a consensus, formulating the problem as a "Research Question".
3. Plan a lesson or part of a lesson or design a particular resource which could help you solve the issues you initially discussed. Write a lesson plan or annotate your resource to demonstrate your train of thought.
4. One member of the group now teaches the lesson and/or implements the resource. Others should observe the lesson in person or where not possible, video the lesson and watch as a group or collect students’ work.
5. In a follow-up meeting (this could be in your next Faculty Meeting), evaluate the impact of your lesson and discuss how this should and will change the way you teach particular skills or content in the future.
6. Save all your relevant documents in the Shared Drive and if you found anything to be particularly useful, please share with everyone in the Academy.

The Purpose of Lesson Study

… is definitely not to produce an “OFSTED Outstanding” lesson! It is an opportunity for you as a teacher to inform and develop your practice for the ultimate benefit of your students. You will develop a research-based critical approach to drive your own professional development, through meaningful collaboration and careful analysis of your classroom. We hope that taking part in Lesson Study will develop your self-efficacy: motivating you to improve by taking responsibility for your practice and reinforcing your beliefs in your ability to make a real difference to your students.
1. DEVELOPING THE LESSON STUDY RATIONALE

- Consider the long-term goals for students.
- Compare your idea of the ideal student skillset with the reality you are faced with.
- Consider which steps you can take to get closer to the ideal.
- Can you articulate your aim concisely as one **Research Question**?
- Plan the content and processes according to the aim.

<table>
<thead>
<tr>
<th>Guiding Questions</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>What issues are you experiencing with regards to your teaching right now?</td>
<td></td>
</tr>
<tr>
<td>What skill or knowledge do you wish to develop in students?</td>
<td></td>
</tr>
<tr>
<td>What should you focus on?</td>
<td></td>
</tr>
<tr>
<td>Why is this important and what would it change?</td>
<td></td>
</tr>
<tr>
<td>What practical steps can you start putting into place to solve the issue above?</td>
<td></td>
</tr>
</tbody>
</table>
# 1.1. Decisions about the Lesson

<table>
<thead>
<tr>
<th>Guiding Questions</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>The Research Lesson will be taught by one member of the Group and observed by</strong></td>
<td></td>
</tr>
<tr>
<td><strong>the others for the purpose of informing the Research Question.</strong></td>
<td></td>
</tr>
<tr>
<td>Do you need to teach a specific topic to address the Question? If so, consider which</td>
<td></td>
</tr>
<tr>
<td>topics are coming up in the Scheme Of Work in 3-5 weeks’ time or how this fits into</td>
<td></td>
</tr>
<tr>
<td>the Scheme Of Work in general.</td>
<td></td>
</tr>
<tr>
<td>Do you need a specific type of task? (group-work is normally easier to observe as you can</td>
<td></td>
</tr>
<tr>
<td>eavesdrop on students' conversations)</td>
<td></td>
</tr>
<tr>
<td>Can the Question/topic/lesson be distilled into some key Learning Objectives or Learning</td>
<td></td>
</tr>
<tr>
<td>Outcomes for students?</td>
<td></td>
</tr>
</tbody>
</table>

| Which teacher will deliver the lesson and why?                                    |       |
| Some Lesson Study Groups plan the lesson without deciding this and the teacher is |       |
| randomly selected before the Lesson is taught.                                   |       |
| Some Groups take turns in delivering lessons.                                     |       |

| Which class will be taught and why?                                              |       |
| Will the entire class be taught or just a selection of students?                  |       |
| Will there be particular students on whom observers should focus, if so, why them? |       |
2. PLANNING THE LESSON

2.1. Kick-starting the process

- Are there any particular teaching styles or pedagogies we will subscribe to? Why or why not?
- Consider making this lesson “non-traditional” and ambitious – it might be your only chance to teach like this!
- Group or paired work is often useful for observations because then observers can listen in on conversations amongst students.
- Search before you design: there are endless freely available teaching resources online, look them up before embarking on the lesson-planning process for inspiration and to potentially save lots of time.

Notes
2.2. **Lesson Plan Template**

It is useful to anticipate student responses when planning – so you may wish to consider the template below (see the Appendix for a detailed example).

<table>
<thead>
<tr>
<th>Teaching Questions and Notes</th>
<th>Anticipated Student Responses</th>
</tr>
</thead>
</table>
3. POST-LESSON REFLECTION

3.1. Personal Reflection

- What were your key observations and “take-aways” from the lesson?

<table>
<thead>
<tr>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>
3.2. **Post-Lesson Discussion**

- Focus on the learning aspects and the student experience as opposed to the teaching style.
- How did students respond to the tasks and why? What would you change in the future?
### 3.3. Lesson Study Report and Actions

<table>
<thead>
<tr>
<th>Findings</th>
<th>Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Looking back at the issues explored, your goals and aims, what have you found?</td>
<td>How will your findings change the way you teach (this topic, particular students or in general)?</td>
</tr>
</tbody>
</table>

Further actions:

- Share your Lesson Plan and resources – email to relevant subject teachers, put onto TES, etc.
- Feed back to your Faculty during the next meeting
- Tell the world about your experience of Lesson Study through Twitter @lessonstudyUK
APPENDICES

Lesson Study Resources

1) Lesson Study Handbook, developed by Pete Dudley (2014)

2) Book 1 (on the right)

3) Information on Lesson Study and videos and lesson resources by leading Lesson Study experts
   http://www.lessonresearch.net/index.html

4) Can be accompanied by the Book 2 (on the left)

5) Government Handbook on Developing Subject Pedagogy through

Quote on Lesson Study

Lesson study is not something you are taught. Through the process of examining classroom lessons, a teacher gains valuable insights as to how students learn best. Through conversations with others who have the same daily challenges you do, the world of educating children becomes a small team effort, and your group is there to help you in every way it can. The actual observations give you “eyes” to really see what your students are thinking, because you don’t sit in the back of the classroom, but among the students as they ponder the new concepts.

~Marilyn Carpenter, teacher

Page 17, from Book 1
Why do we need Lesson Study?

The purpose of Lesson Study is to innovate teaching practice through the collaborative planning and reflective discussion of Research Lessons. Teachers will also develop the ability to develop richer and more powerful tasks as they dig deep into the content of the curriculum to dissect it and analyze its components in great detail. This will also require a sharpening of their subject knowledge: teachers will be challenged to come up with innovative way of introducing knowledge to students. For many teachers involved, this will be the single largest collaborative project they have taken part in, with the widest range of people. There is a constructive approach to the evaluation to teaching: rather than judging lessons (as per Ofsted criteria), teachers will be looking at their own/each other’s practice with the intention of improving practice, not judging it. Thus, Lesson Study, conducted through effective teamwork, results in the construction of deep and multi-faceted knowledge, which in turn, transforms practice and beliefs.

The discussions help teachers to develop an inquiry-based approach to their own practice, leading to a shift in pedagogical stance. Specifically, teachers’ experiences during Lesson Study will hopefully translate into sustained change in their pedagogy, personal beliefs, and assumptions – Lesson Study does this by challenging teachers to ‘suspend’ disbelief and act in new ways, to ‘shift’ their pedagogy of memorization, repetition, and recitation of correct answers to developing their students’ reasoning and communication skills by actively engaging their students’

Within mathematics specifically

As a result of experiencing content developed or inspired by the Lesson Study, we expect students to become more independent and creative mathematicians:

- **Developing resilience:** students will be encouraged to step out of their comfort zone and challenge themselves. This will mean potentially getting answers wrong but then developing the efficacy to keep attempting a solution. Students will be open-minded when approaching a problem.

- **Becoming self-assessors:** students will add to their repertoire of problem-solving strategies and will assess the effectiveness of these in each situation.

- **Developing creative solutions:** students will be likely presented with unfamiliar problems or problems in unfamiliar contexts. They will therefore be challenged to form creative links between ideas, drawing upon their existing knowledge and skills and through the development of new knowledge and skills.

- **Enhance appreciation for mathematics:** by allowing students to express their ideas regarding a problem rather than condemning them for incorrect solutions, students will become more confident and less anxious about solving difficult or previously unseen problems.
Exemplar Lesson Plan

**ANALYSING NUMBER GRIDS**

This is a lesson which aims to develop “Algebraic Thinking” in Year 7 students, based on teamwork and open, problem-solving tasks.

Lesson Summary

Students form generalisations based on a square grid. They begin by exploring the properties of the grid and then form their own conjectures to describe numbers. These statements are tested and students evaluate the validity of a range of conjectures, including their own.

Learning Objectives

3. To form and test conjectures about shapes in a square grid.

4. To differentiate amongst statements which are always true, sometimes true and never true.

Key Processes

- Pattern seeking: analysing different sets of numbers to form patterns.
- Analysing: Making a conjecture and then seeking to justify it; working logically towards a solution, recognising the impact of the constraints involved.
- Interpreting and evaluating: forming convincing arguments, and formulating proofs.
### Part 1. Two squares on a 10-by-10 grid (15 mins)

#### 1.1. 10x10 grid on the board with a question: James puts two squares on the grid to make this shape: ![shape](image)

As he moves the shape around the grid, he says: “No matter where I move my shape, there is always one odd and one even number!”

**Question 1. What else do you notice about the numbers inside James’ shape?**

Students to be asked to come up to the board and “move the shape around to test James’s statement”. Students then asked to “think-pair-share” their answer and a few example statements are written on the board without the teacher evaluating them (saying whether they are correct or not).

Students are asked to record their statement onto Worksheet 1.

- **a)** Teacher to show students a fourth movement of the horizontal shape and a counter-example (off the grid or disjoint).
- **b)** Teacher to draw out more details without revealing answers: “Which number is bigger? Why is this?”

It is expected that students will need prompting to begin to understand what is expected of them. The example of James’s answer must be expanded upon, not copied.

<table>
<thead>
<tr>
<th>Shape 1</th>
<th>Shape 2</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="shape" /></td>
<td><img src="image" alt="shape" /></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Shape 3</th>
<th>Shape 4</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="shape" /></td>
<td><img src="image" alt="shape" /></td>
</tr>
</tbody>
</table>

- **a)** Unable to follow instructions, placing the two squares separately on the grid or squares going off the grid.
- **b)** Simply reading the numbers: “8 and 9” or saying “one is bigger, one is smaller”
- **c)** Shape 1, vague observations about the consecutiveness of numbers: “one is more than the other”, “one is less than the other”, “the right one is more”, “the left one is one less”, “they go after each other”, “they have the same number of tens”.
<table>
<thead>
<tr>
<th>Teaching Questions and Notes</th>
<th>Anticipated Student Responses</th>
</tr>
</thead>
</table>

1.2. Students are now going to be prompted to form their own shape.

**Question 2. Can you form a different shape using two squares and come up with your own theory as you move your shape around the grid?**

Teacher to explain that what James’s statement was an example of a theory comparing the two numbers, as were the statements they produced in answer to Question 1.

Students to record all their predictions down as “theories” on Worksheet 1.

An **Observation Board** to share solutions/ideas: a large version of Worksheet 1 will be produced on the board and students will be asked to come up to the board, pair by pair, to read the existing theories and place their own theory, if different to the ones already on there. Teacher will select students based on what she has read on their Worksheet.

The language of students to describe the relationship between their numbers will be expected to be accurate and broad, including ideas such as: difference between numbers, sum of numbers, minimising and maximising sums, odd/even numbers, difference amongst digits and columns being “1 more” and rows being “10 more”. For example:

- a) Shape 2, the bottom number being 10 more or the tens digits being one more.
- b) Shape 3, the bottom right-hand number being 11 more or variations in both digits: “the tens column and the units column are both 1 more”.
- c) Shape 4, the bottom left-hand number being 9 more.

It is expected that the first two shapes will have the most observations, the diagonal shapes being more extension shapes.

Students who are “stuck” can ask for permission to visit the board for some inspiration (for students who have tried but are getting the wrong idea about the task, not students who want to copy an answer). It is essential that students be discouraged from “copying” each other’s answers unless they are perfectly convinced by another argument. In this case, they ought to try to phrase the statement using their own words.
C.2. A Middle Leader’s Guide to Nurturing Excellence
**PROACTIVE PROFESSIONAL DEVELOPMENT**

*PROFESSIONAL DEVELOPMENT is the key to unlocking a team’s potential*

A Middle Leader’s Guide to Nurturing Excellence

This guide supports a three-pronged, proactive approach to Professional Development:

- **Developing self** – (Personal Development Plans) All teachers continuously seeking to further their own PD, by identifying areas for improvement and/or expansion, in specific relation to the challenges posed by their current classes, responsibilities and chosen career trajectory.

- **Developing teaching** – Using Lesson Study to develop and embed teaching practices through research, collaboration and observation of students.

- **Developing people** – Mentoring and coaching others (teachers and students) to share knowledge, skills and experiences.
TARGETS

1.
2.
3.

<table>
<thead>
<tr>
<th>Strengths</th>
<th>Weaknesses</th>
</tr>
</thead>
<tbody>
<tr>
<td>What do you do well?</td>
<td>What could you improve?</td>
</tr>
<tr>
<td>What unique resources can</td>
<td>Where do you have fewer</td>
</tr>
<tr>
<td>you draw on?</td>
<td>resources than others?</td>
</tr>
<tr>
<td>What do others perceive as</td>
<td>What are others likely to</td>
</tr>
<tr>
<td>your strengths?</td>
<td>see as weaknesses?</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Opportunities</th>
<th>Threats</th>
</tr>
</thead>
<tbody>
<tr>
<td>What opportunities are</td>
<td>What threats could harm you?</td>
</tr>
<tr>
<td>open to you?</td>
<td>What is your competition</td>
</tr>
<tr>
<td>What trends could you take</td>
<td>doing?</td>
</tr>
<tr>
<td>advantage of?</td>
<td>What threats do your</td>
</tr>
<tr>
<td></td>
<td>weaknesses expose you to?</td>
</tr>
<tr>
<td>How can you turn your</td>
<td></td>
</tr>
<tr>
<td>strengths into</td>
<td></td>
</tr>
<tr>
<td>opportunities?</td>
<td></td>
</tr>
</tbody>
</table>

SWOT ANALYSIS

https://www.mindtools.com/pages/article/newTMC_05.htm

TEAM OBJECTIVES

These should be Specific – Measurable – Attainable – Realistic – Timebound

1.
2.
3.

Design a strategy

- Begin by clarifying your targets with your line manager.
- Consider your (personally and as a team) strengths and weaknesses in relation to the (external) opportunities and threats coming your way.
- Now design the objectives for your team – Make the most of your strengths, circumvent your weaknesses, capitalise on your opportunities and manage your threats.
DEVELOPING SELF

1. Each member of the team completes a Personal Development Plan (separate document) – filtering the team objectives down into personal performance management targets and teaching action plans for each class, based on the students’ strengths and weaknesses.
2. Support the developmental needs of staff by setting developmental targets as well as performance ones.
3. Schedule regular meetings with teachers to review the PDPs as well as planning team meetings around the team’s objectives – considering the school calendar, deadlines, etc.

<table>
<thead>
<tr>
<th>Term</th>
<th>Team Meetings</th>
<th>One-to-Ones</th>
</tr>
</thead>
<tbody>
<tr>
<td>Autumn 1</td>
<td>Wk 1 – 6th Sep</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Wk 7 – 18th Oct</td>
<td></td>
</tr>
<tr>
<td>Autumn 2</td>
<td>Wk 1 – 8th Nov</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Wk 6 – 13th Dec</td>
<td></td>
</tr>
<tr>
<td>Spring 1</td>
<td>Wk 1 – 14th Jan</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Wk 6 – 7th Feb</td>
<td></td>
</tr>
<tr>
<td>Spring 2</td>
<td>Wk 1 – 21st Feb</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Wk 7 – 4th Apr</td>
<td></td>
</tr>
<tr>
<td>Summer 1</td>
<td>Wk 1 – 25th Apr</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Wk 5 – 23rd May</td>
<td></td>
</tr>
<tr>
<td>Summer 2</td>
<td>Wk 1 – 6th Jun</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Wk 7 – 18th Jul</td>
<td></td>
</tr>
</tbody>
</table>

Times when the whole team (or essential sub-teams) is free:

- Time 1
- Time 2
DEVELOPING PEOPLE

1. Consider the SWOT analyses of individuals, to determine the level of support and challenge required by each person, particular for new/inexperienced members of staff, or those teaching high-stakes exam classes.

<table>
<thead>
<tr>
<th>Team-member</th>
<th>Support</th>
<th>Challenge</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. If a particular area has been identified as a need for support for multiple teachers, consider a broader departmental consultation or strategy to address this.

3. Consider complementing one person’s strength with another’s weakness by creating pairs of mentors and mentees which could provide support or challenge.

4. Consider external sources of support or challenge such as courses, visits to other schools, virtual meetings with external colleagues, textbooks, etc.

Purposeful Mentoring

- Coaching vs mentoring vs training – decide which one is required (this could be a short-term or year-long arrangement)
  - Coaching aims to improve competencies and capabilities (performance or behaviour transformation)
  - Mentoring is more about long-term personal or leadership development
  - Training targets a specific skill or set of knowledge which needs improving
- Discuss issues but focus on priorities and draft a long-term plan (consider long-term goals as well as short-term concerns)
- Schedule regular time for meetings and stick to them, even if the meeting is sometimes just a short one
- A mentor can use a range of strategies to complement regular discussions:
  - “Think out loud” to demonstrate your thinking process when posed with a problem
  - Co-planning of lessons
  - Observation of lessons (mentor or mentee being observed)
  - Lesson swaps (mentor teaches the class to better grasp the issues)
DEVELOPING TEACHING

The Lesson Study Format

7. Consider issues we, as a team, are experiencing or we anticipate experiencing this year.
8. Are there any common themes?
   Can we work as sub-teams to resolve these and feedback to the broader team?
   Are there sub-teams by default, based on their responsibilities or particular classes being taught?
9. As a Lesson Study group of 2-4 people, consider how this issue (which can be phrased as a Research Question) could be addressed through the design of particular lessons or resources.
   a. What is the common issue?
   b. How could we design a solution?
   c. Which classes could we test this solution on?
   d. When can we meet to plan the solution?
   e. When can we meet to evaluate the solution?
10. Plan a lesson or part of a lesson or design a particular resource which could help you solve the issues you initially discussed. Write a lesson plan or annotate your resource to demonstrate your train of thought.
11. One member of the group now teaches the lesson and/or implements the resource. Others should observe the lesson in person or where not possible, video the lesson and watch as a group or collect students’ work.
12. In a follow-up meeting (this could be in your next Faculty Meeting), evaluate the impact of your lesson and discuss how this should and will change the way you teach particular skills or content in the future.
13. Share these findings with the whole department or school.

The Purpose of Lesson Study

… is definitely not to produce an “OFSTED Outstanding” lesson! It is an opportunity for teachers to inform and develop their practice for the ultimate benefit of the students. By developing a research-based critical approach to their practice, they are able to drive their own professional development, through meaningful collaboration with their colleagues. Participation in Lesson Study aims to develop self-efficacy: motivating teachers to improve by taking responsibility for their practice and reinforcing their beliefs in their ability to make a real difference to their students.
1. CONDUCTING A LESSON STUDY

- Consider the long-term goals for students.
- Compare your idea of the ideal student skillset with the reality you are faced with.
- Consider which steps you can take to get closer to the ideal.
- Can you articulate your aim concisely as one Research Question?
- Plan the content and processes according to the aim.

<table>
<thead>
<tr>
<th>Guiding Questions</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>What issues are you experiencing with regards to your teaching right now?</td>
<td></td>
</tr>
<tr>
<td>What skill or knowledge do you wish to develop in students?</td>
<td></td>
</tr>
<tr>
<td>What should you focus on?</td>
<td></td>
</tr>
<tr>
<td>Why is this important and what would it change?</td>
<td></td>
</tr>
<tr>
<td>What practical steps can you start putting into place to solve the issue above?</td>
<td></td>
</tr>
</tbody>
</table>
### 3.4. Decisions about the Lesson

<table>
<thead>
<tr>
<th>Guiding Questions</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>The Research Lesson will be taught by one member of the Group and observed by the others for the purpose of informing the Research Question.</strong></td>
<td></td>
</tr>
<tr>
<td>Do you need to teach a specific topic to address the Question? If so, consider which topics are coming up in the Scheme Of Work in 3-5 weeks' time or how this fits into the Scheme Of Work in general.</td>
<td></td>
</tr>
<tr>
<td>Do you need a specific type of task? (group-work is normally easier to observe as you can eavesdrop on students' conversations)</td>
<td></td>
</tr>
<tr>
<td>Can the Question/topic/lesson be distilled into some key Learning Objectives or Learning Outcomes for students?</td>
<td></td>
</tr>
<tr>
<td>Which teacher will deliver the lesson and why?</td>
<td></td>
</tr>
<tr>
<td>Some Lesson Study Groups plan the lesson without deciding this and the teacher is randomly selected before the Lesson is taught.</td>
<td></td>
</tr>
<tr>
<td>Some Groups take turns in delivering lessons.</td>
<td></td>
</tr>
<tr>
<td>Which class will be taught and why?</td>
<td></td>
</tr>
<tr>
<td>Will the entire class be taught or just a selection of students?</td>
<td></td>
</tr>
<tr>
<td>Will there be particular students on whom observers should focus, if so, why them?</td>
<td></td>
</tr>
</tbody>
</table>
4. PLANNING THE LESSON

4.1. Kick-starting the process

- Are there any particular teaching styles or pedagogies we will subscribe to? Why or why not?
- Consider making this lesson “non-traditional” and ambitious – it might be your only chance to teach like this!
- Group or paired work is often useful for observations because then observers can listen in on conversations amongst students.
- Search before you design: there are endless freely available teaching resources online, look them up before embarking on the lesson-planning process for inspiration and to potentially save lots of time.
4.2. Lesson Plan Template

It is useful to anticipate student responses when planning – so you may wish to consider the template below (see the Appendix for a detailed example).

<table>
<thead>
<tr>
<th>Teaching Questions and Notes</th>
<th>Anticipated Student Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
5. POST-LESSON REFLECTION

5.1. Personal Reflection

- What were your key observations and “take-aways” from the lesson?

Notes
5.2. Post-Lesson Discussion

- Focus on the learning aspects and the student experience as opposed to the teaching style.
- How did students respond to the tasks and why? What would you change in the future?
5.3. Lesson Study Report and Actions

<table>
<thead>
<tr>
<th>Findings</th>
<th>Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Looking back at the issues explored, your goals and aims, what have you found?</td>
<td>How will your findings change the way you teach (this topic, particular students or in general)?</td>
</tr>
</tbody>
</table>

Further actions:
- Share your Lesson Plan and resources – email to relevant subject teachers, put onto TES, etc.
- Feed back to your Faculty during the next meeting
- Tell the world about your experience of Lesson Study through Twitter @lessonstudyUK

*Page 322-324 Lesson Exemplar included in this document*
C.3. Personal Development Plan template
# Performance Management Action Plan

## Performance Management Targets

<table>
<thead>
<tr>
<th>Performance Management Targets</th>
<th>Performance Criteria</th>
<th>Actions and evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. To create alternative learning opportunities of students with diverse needs and implement</td>
<td>1) Establishing numeracy intervention programme for Y7 to Y10 students with the lowest maths ability</td>
<td>1) Regularly and thoroughly assess students to determine their need for numeracy support, GCSE predicted grades and gifted and talented status</td>
</tr>
<tr>
<td>sustained support and intervention strategies from an early stage (Objective 1 Professional</td>
<td>2) Ensure all Y10 and Y11 students with a Grade U in Maths receive the Entry Level Certificate</td>
<td>2) Create and monitor usership of the programme to assess the progress of students</td>
</tr>
<tr>
<td>Outcomes Colleagues should use progress measures to generate a data-driven objective that</td>
<td>3) Support U-grade and E-grade Y12 and Y13 Maths students through personalised learning plans</td>
<td>3) Ensure all Maths teachers play a part in supporting students with special needs (SEN or G&amp;T)</td>
</tr>
<tr>
<td>requires progress for all. For TLR postholders, this should relate to the achievement of their area)</td>
<td>4) Improve the provision and opportunities for gifted and talented Maths students</td>
<td></td>
</tr>
<tr>
<td>2. Engage in robust assessment and intervention cycles for Y11 and Y13 students to boost</td>
<td>1) Grades calculated using a balanced process</td>
<td>1) Regularly assess students (Maths Data Trackers - F/Maths/Trackers/Y11.xls)</td>
</tr>
<tr>
<td>attainment in line with their targets (Objective 2 Professional Practice / Relationships This</td>
<td>2) Students clearly aware of their Grades</td>
<td>2) Review assessment data to tailor teaching and learning strategies (My Teaching Plan below)</td>
</tr>
<tr>
<td>objective should seek to develop an individual's teaching and learning practice and</td>
<td>3) Students aware of their weaknesses and the steps they need to take to address them</td>
<td>3) Provide targeted support through additional taught sessions (Maths intervention plans, summary of grade improvement to Person X, meetings with X/Y/Z)</td>
</tr>
<tr>
<td>pedagogic capability and will include the informal observation of and the reflection on at</td>
<td>4) Teachers using QLAs to target teaching at weaker areas of understanding</td>
<td></td>
</tr>
<tr>
<td>least one lesson delivered by a peer,)</td>
<td>5) Intervention is effective and appropriate</td>
<td></td>
</tr>
<tr>
<td>3. Establish and sustain appropriate monitoring and intervention structures to support the</td>
<td>1) Clear timelines and assessment schedules in place for KS3 Maths, GCSE Maths, Entry Level Maths, GCSE Business,</td>
<td>1) Observe teaching and provide clear targets (Lesson observation feedback)</td>
</tr>
<tr>
<td>teaching and learning of all courses offered by the faculty. Objective 3 - Professional</td>
<td>GCSE Computer Science, BTEC L2 Business, A-Level Maths, AS-Level Maths, BTEC L3 IT, BTEC L3 Business and A-Level Economics.</td>
<td>2) Intervene with clear support plans when and as appropriate (Teacher support plans)</td>
</tr>
<tr>
<td>Development This objective should support the achievement of the individual's professional</td>
<td>2) Support and develop the teaching of all members of the faculty.</td>
<td>3) Assess the suitability of assessments and teaching plans to support the progress of students</td>
</tr>
<tr>
<td>development plan aligned with the Academy Development Plan / Team QIP.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Faculty Targets 2019-2020

Relevant ones to your Development Plan should be highlighted

<table>
<thead>
<tr>
<th>Area</th>
<th>What?</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Outcomes</strong></td>
<td>1. Yr11 GCSE maths, business &amp; CS <strong>100% 1+, 75% 4+, 60% 5+, 20% 7+</strong></td>
</tr>
<tr>
<td></td>
<td>2. Yr11 Btec Business 100% L2 Pass, 75% M+, 20% D+</td>
</tr>
<tr>
<td></td>
<td>3. Yr12 resit GCSE maths 30% 4+</td>
</tr>
<tr>
<td></td>
<td>4. Yr13 A Level Maths 100% E+, 50% C+, 20% A+</td>
</tr>
<tr>
<td></td>
<td>5. Yr13 Btec Business and IT 100% P+, 75% M+, 25% D+</td>
</tr>
<tr>
<td></td>
<td>6. Yr13 Economics 100% E+, 50% C+, 20% A+</td>
</tr>
<tr>
<td></td>
<td>7. Alp score 0.9+ for all yr13 classes</td>
</tr>
<tr>
<td></td>
<td>8. All U-Grade Year 11 Maths students entered into Entry-Level Maths</td>
</tr>
<tr>
<td><strong>T, L &amp; A</strong></td>
<td>9. Numeracy development plan improving KS3 outcomes and across the Academy</td>
</tr>
<tr>
<td></td>
<td>10. <strong>BS, CS, IT and Econ need to establish clear tracking structures</strong> (with deadlines and clear shared paperwork and spreadsheets)</td>
</tr>
<tr>
<td><strong>PD, B &amp; W</strong></td>
<td>11. Further improve the consistency of expectations and sanctions</td>
</tr>
<tr>
<td></td>
<td>12. Introduce basic rewards systems</td>
</tr>
<tr>
<td><strong>L &amp; M</strong></td>
<td>13. Most established members of the department being offered a development opportunity: Person X A-Level, Person X numeracy and A-Level, Person X mentoring, Person X Key Stage 3 and NQT, Person X Teach First, Person X new Team Leader and more</td>
</tr>
<tr>
<td><strong>6th Form</strong></td>
<td>14. Improving stem destinations</td>
</tr>
<tr>
<td></td>
<td>15. Introducing clear and sustained support and intervention strategies from an early stage</td>
</tr>
</tbody>
</table>

## Academy Targets 2019-2020

1. Our first priority is to get more level 5s from Year 11 in every subject – please review your plans and actions to achieve this

2. Our second priority is to get more A*A and B grades from Year 13 this summer – please look at the targets of your class and assess how they are progressing

3. Our third priority is to achieve an attendance rate of at least 96% - the marginal students that make a real difference to this figure are those that take one or two days off a month...

4. Our fourth priority is to increase reading amongst our students to reduce the gap between their chronological and reading age because this hinders access to the curriculum and therefore success
### Teaching Plan

<table>
<thead>
<tr>
<th>Class</th>
<th>Class Profile</th>
<th>Strengths and Weaknesses</th>
<th>Plan of Action</th>
</tr>
</thead>
</table>
| 13BMa     | 15 students 6 lessons a week  
* WAGs = 5U, 3E, 4D, 2C, 1B  
* TARGET = All E+, 8 C+, 3 A+  
* New Spec = lack of resources and few assessments | (i) Student X G&T  
(ii) Consistent U-grade students: Student X and Student X  
(iii) E/U-grade students: Student X, Student X and Student X  
(iv) Homework and additional work always completed (quality varies)  
(v) Early SOW targets for increased revision time: Pure2 by Dec and full coverage by Feb. | * Boundaries are under-estimates, grades should be better  
* Regular assessment and feedback + shared with parents  
* 6th lesson has been added on by Teacher + extra holiday sessions  
* Extra resources obtained (Resourceaholic, Practice Papers+ and Pearson/CMP workbooks) and papers constructed for Mocks  
(i) Extension using MAT/STEP + applied to Cambridge  
(ii) Parental meetings Aut1 + action plan – Student X is completely demotivated and has been trying to drop Maths since last year.  
(iii) Parental meetings Aut1/2  
(iv) Quantity decreased so that quality would increase  
(v) Additional (Pearson) workbooks and re-teach period from Feb-May |
| 12CMa     | 8 students 6 lessons a week  
Teacher1 (4)  
Teacher2 (2)  
* WAGs = 1U, 2E, 3D, 2C  
* Target = All E+, 4C+, 2A+ | (i) Consistent U-grade = Student X  
(ii) E-grade = Student X and Student X  
(iii) Lack of homework = Student X  
(iv) Homework and additional work mostly completed  
(v) Early SOW target: Applied by Dec and all Pure (completion) by Feb/March | * Teacher1 teaching Stats/Mechanics, then Pure (currently being covered by Teacher2)  
* New spec resources already developed from Year 13 teaching |
| 11Ma3     | 21 students 6 lessons a week  
* WAGs = 6 G1, 15G2-  
* Target = All G4+ May  
All G3+ Mar  
All G2/3 Jan  
All G2+ Nov | (i) Motivated and working well as a small class | * Covering Number, Algebra, Ratio, Proportion and Statistics in Aut1  
* Covering Geometry and Crossover skills Aut2  
* Homework = mixture of past papers and Mathswatch  
* Folders will include new flashcard system for revision |
<table>
<thead>
<tr>
<th>Class</th>
<th>Class Profile</th>
<th>Strengths and Weaknesses</th>
<th>Plan of Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>10Ma5</td>
<td>21 students 5 lessons a week Teacher1 (3) Teacher2 (2)  * WAGs = 14GU, 7G1  * Target = All G4 Yr11 May All G3 Yr11 Jan All G2 Yr10 May All G1 Yr10 Jan</td>
<td>(i) Motivated and working well as a small class (ii) Extremely poor retention (first test indicates)</td>
<td>(ii) Will start using flashcards and introducing more regular “revision” to help them remember the key topics</td>
</tr>
<tr>
<td>7B/Ma3</td>
<td>18 students 5 lessons a week Teacher1 (3) Teacher2 (2)  * SATs scores = 100 or below  * Maths age = 8.98 to 11.59 (Aged 11-12)</td>
<td>(i) High Maths age = Student X, Student Y, Student Z (also high Ninjas scores) (ii) Low Maths age = Student X, Student Y, Student Z (iii) High progression = Student X, Student Y, Student Z (iv) Low progression = Student X, Student Y, Student Z</td>
<td>(i) These students are stretched to complete high-level questions in lessons (ii) Need extra support (MDM focus) (iii) Merits, encouragement to complete more work, parental contact, Principal’s commendations, shout outs. (iv) Need support during MW lesson – might just be experiencing technical difficulties.</td>
</tr>
</tbody>
</table>
Additional Responsibility

<table>
<thead>
<tr>
<th>Strengths and Weaknesses</th>
<th>Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>13.3 Form Tutor</td>
<td></td>
</tr>
<tr>
<td>Team Leader of Maths</td>
<td></td>
</tr>
<tr>
<td>Team Leader of Bus &amp; IT</td>
<td></td>
</tr>
<tr>
<td>TF Mentor</td>
<td></td>
</tr>
<tr>
<td>NQT Mentor</td>
<td></td>
</tr>
<tr>
<td>Governor</td>
<td></td>
</tr>
</tbody>
</table>
## Records of Meetings

### Line Manager Meeting

<table>
<thead>
<tr>
<th>With</th>
<th>Person X</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Discussion Points</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Item 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Item 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Action Points</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Action 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Action 2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Group Meeting

<table>
<thead>
<tr>
<th>Meeting purpose</th>
<th>Faculty Meeting</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Discussion Points</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Item 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Item 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Action Points</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Action 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Action 2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Professional Development session

<table>
<thead>
<tr>
<th>Name of session</th>
<th></th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Discussion Points</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Item 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Item 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Action Points</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Action 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Action 2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Teaching Trio Meeting

<table>
<thead>
<tr>
<th>Trio Cycle</th>
<th>Term 2</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Members of Trio</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Trio focus</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Action Points</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Notes**

-
Evidence Log

Email to Headtreacher (01.01.19)

Stuff

7B/MA3 Assessment Summary (01.01.19)

Pasted here
D. Interview Guides
**D.1. Phase 1**

**Pre-LS1 Questions**

1. What do you perceive as the aim of teaching in general? How does the aim of teaching mathematics fit into that?
2. What are the most important pedagogical aspects of teaching mathematics for you and what do you base these on? Consider these based on your entire experience of teaching.
3. How much do you feel you are able to affect the learning of your students? What are the constraints to you doing so and can they be overcome?
4. What is your understanding of LS and how do you feel this might benefit you or your students, if at all?

**Post-LS1 Questions**

1. What were your main learning points from the LS and how will this affect how you teach from now on?
2. What problems did you experience with the LS? Do you feel the positives outweighed the negatives?
3. What would you have improved with the LS?

**Pre-LS2 Questions**

1. What do you recall being your main learning points from the previous LS and what have you done differently since then?
2. What would you like the outcomes to be for this LS?

**Post-LS2 Questions**

1. What did you learn from this LS?
2. How was this LS different to the first one?
3. What is your understanding of the purpose of LS now?
4. How would you re-evaluate your understanding of teaching mathematics as a result of your participation in these Lesson Studies?
### D.2. Teachers’ Sense of Self-Efficacy Scale

(Tschannen-Moran & Hoy, 2001)

On a scale of 1 to 9, where:

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nothing</td>
<td>Very little</td>
<td>Some influence</td>
<td>Quite a bit</td>
<td>A great deal</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Please respond to each question by considering the combination of your current ability, resources, and opportunity to do each of the following in your present position.

#### Factors 1: Efficacy for instructional strategies

1. To what extent can you use a variety of assessment strategies?
2. To what extent can you provide an alternative explanation or example when students are confused?
3. To what extent can you craft good questions for your students?
4. How well can you implement alternative strategies in your classroom?
5. How well can you respond to difficulty questions from your students?
6. How much can you do to adjust your lessons to the proper level for individual students?
7. To what extent can you gauge student comprehension of what you have taught?
8. How well can you provide appropriate challenges for very capable students?

#### Factor 2: Efficacy for classroom management

9. How much can you do to control disruptive behaviour in the classroom?
10. How much can you do to get children to follow classroom rules?
11. How much can you do to calm a student who is disruptive or noisy?
12. How well can you establish a classroom management system with each group of students?
13. How well can you keep a few problem students from ruining an entire lesson?
14. How well can you respond to defiant students?
15. To what extent can you make your expectations clear about student behaviour?
16. How well can you establish routines to keep activities running smoothly?

#### Factor 3: Efficacy for student engagement

17. How much can you do to get students to believe they can do well in schoolwork?
18. How much can you do to help your students value learning?
19. How much can you do to motivate students who show low interest in schoolwork?
20. How much can you assist families in helping their children do well in school?
<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>21.</td>
<td>How much can you do to improve the understanding of a student who is failing?</td>
</tr>
<tr>
<td>22.</td>
<td>How much can you do to help your students think critically?</td>
</tr>
<tr>
<td>23.</td>
<td>How much can do to foster student creativity?</td>
</tr>
<tr>
<td>24.</td>
<td>How much can you do to get through to the most difficult students?</td>
</tr>
</tbody>
</table>
D.3. Phase 2 Initial Interview

1. The research
   a) Purpose of my EdD (professional doctorate)
   b) Summary of the research (from Lesson Study to Professional Development)
   c) The importance of the context (scarcity of research in schools like ours)
   d) The necessity of your perspective as a teacher in the Academy
   e) Staff involved
      o Maths teachers, pastoral director, Principal and data manager

2. The logistics and ethics
   a) Researcher pledge – treating participants with respect and being transparent
   b) Email summary to be sent to you
   c) Free to withdraw anything at any point
   d) Audio recording – only to be heard by me, as a means of note-taking
   e) In addition to an emailed write-up of this interview, would you like a copy of:
      i. quotes/inferences from this interview,
      ii. specific sections/chapters (findings/about the Academy) and/or
      iii. the entire thesis?
   f) “Anonymity” of the Academy
      o reference to participants though roles
      o Internet “searchability”
   g) Do you want me to place a time limit on this interview?

3. Declaration of purpose
   This semi-structured interview aims to explore your beliefs and elicit your opinions. Should you
   not wish to follow certain lines of enquiry, this choice does not have to be noted (unless you want
   it to be).
   o Do you have any questions so far?

4. Biographical background
   a) Years of working in this school?
   b) Taught subject?
   c) Previous work experience?
   d) What line of work were your parents in at what level (managerial, professional, etc)?

5. Overall career path
   a) Can you map your career path from when you left school?
      o What was degree in/what did you do after school?
      o Did you work in any other field other than teaching?
   b) Why did you decide to become a teacher?
      o Who were the people who influenced/inspired you to become teachers?
   c) What were your expectations about teaching before you started?
   d) What were the initial experiences as a teacher?
      o Who helped you in the transition? How?
What do you consider to be the most crucial events in your career that might have affected it both positively and negatively? How so?

e) What are your future career ambitions?
   - Do you have a rough plan for the next 2-5 years?
   - What do you base these plans on?
   - Are you taking any steps towards these future plans right now?

6. Teachers’ freedom relating to practice
   a) How much freedom do you feel you exercise with regards to your choice of teaching methods and content?
      - Do you make these choices in collaboration with other teachers?
   b) To what extent do you feel able to initiate and lead developments within:
      - Your classroom?
      - Your form?
      - Your department?
      - Any other areas of responsibility?
   c) To what extent do you feel able to initiate and lead developments beyond your own areas of responsibility?
      - Do you feel you have any influence over policy and practice within school?
   d) Do you feel you are able to influence policy and practice beyond the school?
   e) In what ways are you involved in decision making at the school?
      - To what extent are you consulted about a wide range of issues within school?
      - Do you feel school leaders at this Academy enable teachers to influence the important aspects of their work?

7. Teachers’ professional development opportunities
   a) Have you engaged in any professional development opportunities that enhance your practice?
      - At this school?
      - Before?
   b) To what extent do you determine the nature of your own professional development?
      - Are you able to choose the professional development activities you take part in?
      - Which ones do you consider effective and useful for you now?
      - Which have been useful to you in the past?
   c) In what ways do teachers play leading roles in the provision of professional learning opportunities for other teachers in school?
   d) Do you feel able you would be able to offer these opportunities for other teachers yourself?
      - If so, do you feel the Academy is supporting you in doing so?

8. Teachers’ knowledge building and sharing
   a) How do you learn about effective practice?
      - How far do you learn about effective practice through conversations with other teachers?
   b) In what ways do reflecting on your own classroom experiences enable you to learn about effective practice?
      - How often do you do this?
      - Can you give an example of when you made a change as a result of personal reflection?
   c) To what extent do you learn about effective practice through collaborating with others to develop approaches to teaching and learning?
   d) What is the role of reading blogs, books and research in developing your effective practice?
   e) To what extent do you/have you learnt about effective practice through your own research informally or formally through courses and qualifications?
f) In what ways do teachers have opportunities to share their knowledge and practice of teaching and learning with each other at the Academy?
   o Can you give any examples of when you have benefited from this?
   o Do you feel you would find it useful to do more of this?
D.4. Phase 2 Final Reflective Interview

1. In terms of your priorities, issues and concerns, can you talk me through how things are for you:
   
   (a) in life right now?
   
   (b) in school right now?
   
   (c) with your most difficult class right now?

2. Expanding on this most “difficult” class:
   
   (a) What are the problems you are experiencing?
   
   (b) What are you trying to achieve with this class?
   
   (c) What did you do with them last lesson?
   
   (d) What solutions are you proposing to deal with these problems?

3. How did you craft these solutions?
   
   (a) Why do you think this might work?

4. How would you assess the quality of your teaching right now?
   
   (a) Good or bad?
   
   (b) What are some aspects of your teaching which you would like to keep?
   
   (c) What are some aspects of your teaching which you would like to change?

5. Have you experienced anything (external) since September which has developed your teaching?
   
   (new knowledge, skills, tools, strategies or resources)

6. How do you see yourself as a teacher?
## E. Teacher Profiles

### E.1. Teacher #1

#### E.1.1. Teacher #1 Phase 1 Summary

<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>#1 has been teaching for 15 years, in various settings including Further Education colleges and prisons.</td>
<td>As of April 2019, #1 is also taking on pastoral responsibility within the Academy.</td>
</tr>
<tr>
<td>#1 has been at the Academy since January 2015, where they joined as a supply teacher and has since taught multiple subjects including IT, Business and since 2016, Mathematics.</td>
<td>Facing deteriorating relationships with students due to an increased workload and multiple absences throughout the year.</td>
</tr>
<tr>
<td>#1 teaches most of the low-ability students maths and is known to have many difficult students “on lock”.</td>
<td>Concerns raised over the quality of their teaching of maths, as well as the achievement of their students in Business Studies. Workload after April might have tipped their performance</td>
</tr>
</tbody>
</table>

**Total TSES Score = 144 (67%)**  
**Average score = 6.00**  
**Range = 5 to 7**

#### Strengths

- Working with difficult students
- Cross-curricular knowledge
- Well-established within the Academy (one of the longest serving members of the department)

#### Issues

- Non-specialist subject knowledge of maths
  * Previous role became redundant, forcing #1 to re-specialise

#### Purpose of teaching

“The aim is to enable the student to succeed – by getting qualifications, this improves the employment prospects of students, and as an added plus, if the student truly gets the knowledge, they will even better at their jobs/would have got something more out of it. Maths, English and IT are basic skills which are fundamental. One cannot function in a first-world country without those three. Whilst science enriches your understanding of the world, they are not fundamental to one’s success in the world.”

* Education perceived as a tool for employment/financial independence

* Consistent with observations of their classes

#### Lowest scoring:

- To what extent can you provide an alternative explanation or example when students are confused?  
- How well can you respond to difficult questions from your students?  
- How much can you do to adjust your lessons to the proper level for individual students?  
- How well can you establish a classroom management system with each group of students?  
- How well can you keep a few problem students from ruining an entire lesson?  
- How well can you respond to defiant students?  
- How well can you establish routines to keep activities running smoothly?  
- To what extent can you craft good questions for your students?  
- How well can you implement alternative strategies in your classroom?  
- How well can you provide appropriate challenges for very capable students?  
- How much can you do to get students to believe they can do well in schoolwork?  
- How much can you do to improve the understanding of a student who is failing?  
- How much can you do to get through to the most difficult students?  

* Consistent with non-specialist subject knowledge
(Self-identified)
Point for development:
“I feel I can affect 60% of my students, but I feel that 10-20% have such a poor level of understanding/SEN, that I cannot reach and the last 20% do not enjoy mathematics.”
“Not being a maths specialist makes me doubt my teaching at times but I ask colleagues for help.”

Learning points from LS:
“The trio [LS] is to help us develop the different understanding and views of how something can be delivered. It’s always nice to see another person’s point of view and see someone else teach. Because it’s in a nice controlled environment, I feel I can ask questions without being judged for not knowing something. I like doing it within the department, seeing someone do something then ‘mimicking’ it is useful, especially coming from the specialists. The last qualification we did was a long time ago, so the next validation comes from students making progress. I hope this process will lead to this, in my case, by building my confidence.”

Points for improvement for LS:
“The timing is the problem, but then again giving a project too much time can also cause it to drag on. Doing it in short bursts is also more useful than spending continuous amounts of time on it.”

Appreciates the low-stake non-judgemental environment to develop their subject knowledge as well as working within the department

Contributions to meetings:
Pre-LS1 Meeting: #1 made numerous contributions to this meeting, noting the importance of knowledge retention before this is applied to problem-solving.
Pre-LS1 Meeting 2: #1 made multiple practical suggestions and took every opportunity to share their thoughts and ask questions, despite their relatively low subject/curriculum knowledge.
They consequently played a great part in the planning/design of this LS.

Lesson observations:
Strengths: breaking down tasks, laying down clear expectations from students
Points for improvement: assessing students’ understanding and using this to structure teaching, subject knowledge leading to lack of depth to the structuring of conceptual understanding

E.1.2. Teacher #1 Phase 2 Summary

Teaching experience: 14 years –
2yrs Further Education college, 4yrs prison, 4yrs college, 4yrs at the Academy (inc. 1yr supply)
Specialist subjects taught (not specialised):
adult education, Business, IT, (Maths)
Strengths: working with difficult students, well-established within the Academy
Weaknesses: non-specialist subject knowledge of maths

Current responsibilities: teacher of maths, business, and IT, Head of Year 10

Parental background: senior NHS dietician and accountant
Entry to teaching: Needed a job, was good at it and teaching came with childcare and flexibility
Support received: No formal training, very little support over the years, learnt on the job
Immediate career ambition: “Falling into” pastoral responsibility as Head of Year
Initial developmental priorities: Maths subject knowledge still not developed enough
Concluding state: In need of support with maths

Teacher identity
#1 has had a diverse teaching experience, having taught in Further Education, prison, and college. At the Academy, they were a cover supervisor teaching “project” (IT and life skills), Business (GCSE, BTEC Levels 2 and 3), IT BTEC Level 3, and now Key Stage 3 Maths. They have been at the mercy of educational policy whims since the start of their teaching career. Despite their middle-class background #1 considers themselves as an outsider without the ‘corporate

Final interview
This teacher did not give a final interview as they were on sick leave at the time.
polish’ of the more academic Teach First graduates who end up in more senior roles. Organised and pragmatic, they support inexperienced teachers to learn the school structures and have made multiple contributions over the years, despite never being consulted in an official capacity.

Started off teaching adults as their skillset was in demand in further education and they required a flexible job: “I was lucky that I had IT skills – so I could teach it easily, as opposed to the older teachers who didn’t have the right skills.”

Has had to adapt their teaching specialism due to the changing landscape of the sector as well as the changing needs of the Academy: “FE was drying, there were fewer job prospects, so for job security, I needed to move to secondary” “These have all been side pickings” “I’m falling into pastoral. How long I can maintain that, I don’t know, because it’s full on” “My future plans are dependent on the school plans and me being comfortable with these plans.” “At the end of the day it’s all about paying off the mortgage, you have to be more flexible.”

Initial secondary teaching experience was difficult and off-putting: “My initial feeling was Shock and horror – not about the teaching but I understood why students were not learning in college, why they were not getting jobs and going into crime. The fundamental teaching was inadequate. I was going to leave within two days because the pay wasn’t good enough, not considering the challenging environment I had to work in.”

Was not officially supported or trained through their initial teaching experience and overcome this through their personal skills as well as ad hoc support from individuals: “I was pro-active in my teaching, planning lessons and not just sitting there.” “I had no support, no line management when I started. The Humanities department, where I was based, were helpful. The staff were helpful and we always help new people.”

Draws the motivation to keep going from the personal impact they have had on students: “I had a mass-murderer in the juvie prison, in there for life. We got her signed up to the Open University. I was in education, so I didn’t see her crime, unlike the officers who did… I then found out she got a degree whilst in prison… That affected me in my personal philosophy: I planted the seed, the support I gave her helped her turn into a good individual. That support helped her get to the next stage.” “With my Y11 form, I had them since Y8. They also affected me philosophy… I got an email that said “thank you” – from Student X in Y11, now in Coloma. The genuine validations from the students mean a lot more to me than the presents the mums have bought.”

Finds the department collegial: “We discuss things as a faculty – we’re very faculty-led and very supportive. When I listen to others’ stories, you can
see why they’re envious and jealous of our department.”

Has freedom over teaching, through the staff council and their area of responsibility: “As long as they’re in line and they’re present, I’m able to run things my way, which is unsettling if you’re coming in new.”

Has made direct contributions to the Academy, suggesting the ECDL qualification and introducing paid trips: “If I see a problem and I think it can be solved, I’m happy to offer a solution to the principal. When I see these solutions enacted, that’s validation for me.”

Does not feel involved in broader decision making: “I don’t talk Teach First.” “I don’t feel comfortable because I don’t feel like I am regarded with the same regard, it is like a club and I don’t know the lingo, it’s like a stamp I don’t have.”

Found official PD activities non-impactful on practice and own experience to be the major driver of improvement: “It didn’t help with the teaching practices but enabled me to understand the schooling system.” “She bases her understanding of teaching on her own personal experience of teaching in this country, understanding the expectations” “10% is 100% useful and the rest is repeated, maybe nice to know.” “No, I don’t use the things they tell us to use in our teaching.”

Only found practical PD useful: “When she first came, learning how to use software, the practical stuff, was good.”

Learns vicariously: “I learn through podcasts and Youtube. My CPD for business is done by listening to LBC.” “I watch how to teach videos when I prep my lessons. I learn through more informal research, and as a dyslexic don’t like to read much. I learn from experiences.”

Optimistic in their outlook: “The places I have worked have not been happy places but my personality has not let them pull me down with them. If you over-reflected, you might lose track of the point. I work with her philosophy of planting seeds, not all of which are not going to grow into trees.”

Appreciative of collaborating to improve knowledge: “She has learnt the subject-specific stuff from me.

She learnt from everyone in the school and used to get Maths lessons after school with Danni Foster.

We still don’t collaborate enough. I would like us to share a lot more, all of the resources on the shared drive, so that we don’t reinvent the wheel all the time.”
### E.2. Teacher #2

#### E.2.1. Teacher #2 Phase 1 Summary

|-------------------|-----------------|
| • #2 had been teaching for 9 years prior to joining the Academy in September 2018.  
• They have taught in multiple schools before, including training as an NQT under the current senior manager of the department. | • Their start at The Academy was a relatively smoother one, whereby they mostly kept to themselves and got on with their teaching.  
• By the end of the year, Teacher #2 had established themselves well, although they were unable to quite progress to the next step (taking up additional departmental responsibility). |

<table>
<thead>
<tr>
<th>(Self-identified)</th>
<th>Total TSES Score = 180 (83%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Strengths</strong></td>
<td>Average score = 7.50 Range = 6 to 9</td>
</tr>
</tbody>
</table>
| Strong curriculum knowledge  
Experienced teacher | **Highest scoring** = 17. How much can you do to get students to believe they can do well in schoolwork? |
| **Issues**        | **Lowest scoring** = 4. How well can you implement alternative strategies in your classroom? |
| Some difficult students/parents | |

**Purpose of teaching**

“Education is a gateway, like a passport, to get into something (career/life)”

<table>
<thead>
<tr>
<th>(Self-identified)</th>
<th>Contributions to meetings:</th>
</tr>
</thead>
<tbody>
<tr>
<td>#6 does not identify aspects for development in their practice.</td>
<td>Pre-LS1 Meeting: #2 made numerous contributions to this meeting, including opening up the discussion of a functional maths LS project, which was finally approved by the planning group.</td>
</tr>
</tbody>
</table>

**Learning points from LS:**

Recently, what #0 and #4 did (the Algebra LS), I thought was really interesting – stretching the thinking and more enjoyable with regards to mathematics, as well as linking with other topics (the statistics LS which wasn’t carried out).  
I would describe it as more on problem-solving, functional skills and linking with other subjects. With regards to other subjects, it investigates means to make something difficult easier for students to understand.

**Lesson observations:**

**Strengths:** student participation, creating a calm environment  
**Points for improvement:** dealing with disengaged students and some issues with subject knowledge also observed

| Pre-LS2 Meeting 1: #2 made the suggestion for this LS focus as well, which was extended and adopted by the group. |
| Post-LS2 Meeting: #2 stated they had fun planning this lesson. |
### E.3. Teacher #3

#### E.3.1. Teacher #3 Phase 1 Summary

<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>• #3 taught in Greece after graduating and taught in a Special Needs school for a year prior to starting at the Academy in September 2018.</td>
<td>Teacher #3 joined The Academy in September 2018, having taught in a Special Needs School for a year prior to this. They had emigrated from Greece having been unable to secure a full-time teaching post there, despite their degree in Mathematics. With strong subject knowledge and generally academically able, they demonstrated potential for teaching, but they had major difficulties adjusting to the teaching workload and demands from the start. Their main developmental points had been behaviour management and they left The Academy (and the UK) at the end of the academic year.</td>
</tr>
</tbody>
</table>

**Strengths**
- Strong subject knowledge

**Issues**
- Class management (#3 had no experience of teaching full-size classes in UK until he joined the Academy)

**Purpose of teaching**
- Philosophical in-depth response
  - “The aim of teaching is to educate the students so that they can become independent adults, people with a critical way of thinking and able to act on their own to be able to be supportive to other people, not just in an individualist way, to be productive members of society, not only from an economic point of view, but in a more social manner.

  Overall, to create minds that can act on their own freely, without being manipulated by anyone, to have their own judgement.

  It was explained that he would be able to expand on any of this, when given a copy of the profile.

  Within this, maths can help to support this independence and creativity, it can be the tool to teach the children how they should approach every problem in their every day life. It is not only about functions and numbers, it is about being creative, to think in a critical manner, to be able to make a fair judgement about a problem you might face.

  Secondly, it is about the objectivity of maths in contrast to the subjectivity of everything else. Maths can teach kids a structural and anti-structural way of thinking.

  The first point is about the mathematical way of thinking (logic, reasoning) and the second is more

\[
\begin{align*}
\text{Total TSES Score} & = 114 \text{ (53\%)} \\
\text{Average score} & = 4.75 \quad \text{Range} = 3 \text{ to } 7 \\
\text{Highest scoring} & = 1. \quad \text{To what extent can you use a variety of assessment strategies?} \\
7. \quad \text{To what extent can you gauge student comprehension of what you have taught?} \\
11. \quad \text{How much can you do to calm a student who is disruptive or noisy?} \\
\text{Lowest scoring} & = 13. \quad \text{How well can you keep a few problem students from ruining an entire lesson?} \\
14. \quad \text{How well can you respond to defiant students?} \\
24. \quad \text{How much can you do to get through to the most difficult students?}
\end{align*}
\]
philosophical, constructing arguments and understanding mathematical truths.”

<table>
<thead>
<tr>
<th>(Self-identified)</th>
<th>Contributions to meetings:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Points for development:</strong></td>
<td>Pre-LS1 Meeting 1: #3 made one contribution to the meeting, critiquing a framework suggested by #5, which was eventually not adopted as part of the lesson plan.</td>
</tr>
<tr>
<td>“I believe I can do very little with regards to what I would love to do, because of the school and the exams. At the end of the day, we have to cover a very specific curriculum. The other thing is teacher life is quite stressful and it takes a lot of time to prepare my lessons and complete all the tasks I am requested to do. I do not necessarily then feel creative after all of this. My normal lesson will be a normal lesson to prepare students for their GCSEs and I do not have the time, I am too drained, I do not feel creative enough to plan the types of lessons I wish I could teach.”</td>
<td>Pre-LS1 Meeting 2: #3 shared cognitive issues they were experiencing with one of their classes</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Learning points from LS:</th>
<th>Lesson observations:</th>
</tr>
</thead>
<tbody>
<tr>
<td>“By observing other teachers, we will see different strategies and approaches to the lesson. By being observed, I will get feedback to improve my own practice. By becoming a better teacher, this will benefit my students. Hopefully I can improve my strategies to tackle bad behaviour or stretch the more able students.”</td>
<td>Strengths: subject knowledge and ability to understand and link concepts</td>
</tr>
<tr>
<td><strong>Points for improvement for LS:</strong></td>
<td>Points for improvement: lesson planning and managing the learning environment</td>
</tr>
<tr>
<td>None stated</td>
<td>None stated</td>
</tr>
</tbody>
</table>
### E.4. Teacher #4

#### E.4.1. Teacher #4 Phase 1 Summary

**Start of 2018-2019**
- #4 is a Newly-Qualified Teacher, who was training last year and spent a year teaching full-time.
- Since joining the Academy in September 2018, this is the first time they are taking full teaching responsibility.
- They have seen their teaching hours/responsibilities gradually increase in Term 2, from Term 1, this academic year.

**End of 2018-2019**
Teacher #4 joined The Academy in September 2018, having taught A-Level Maths in a Further Education college the year before. As an NQT, they were teaching on a slightly decreased timetable, with additional support from the Early Careers Framework initiated by the government for newly-qualified teachers (to reduce turnover). They started off the year slightly overwhelmed, but adjusted well and were considered a good teacher by the end of the academic year, ready to take on high ability classes and A-Level in particular. Their main developmental points had been to focus on exam preparation for Y10-Y13 (a key skill to elevating one’s status in school like The Academy).

**Total TSES Score = 179 (83%)**
- Average score = 7.46
- Range = 5 to 8
- Highest scoring = 1.
- To what extent can you use a variety of assessment strategies?
- 3. To what extent can you craft good questions for your students?
- 5. How well can you respond to difficult questions from your students?
- 6. How much can you do to adjust your lessons to the proper level for individual students?
- 8. How well can you provide appropriate challenges for very capable students?
- 9. How much can you do to control disruptive behaviour in the classroom?
- 11. How much can you do to calm a student who is disruptive or noisy?
- 14. How well can you respond to defiant students?
- 17. How much can you do to get students to believe they can do well in schoolwork?
- 21. How much can you do to improve the understanding of a student who is failing?
- 22. How much can you do to help your students think critically?
- 23. How much can do to foster student creativity?
- 24. How much can you do to get through to the most difficult students?
- Lowest scoring = 20.
- How much can you assist families in helping their children do well in school?

**Self-identified**

**Strengths**
- Strong subject knowledge
- Better understanding of and better relationship with students (since Term 1)

**Issues**
- Lack of experience teaching younger students

**Purpose of teaching**
- Views teaching as knowledge transmission and schools a means of establishing societal expectations
- “The general aim of teaching is to exemplify how students need to be as adult – societal rules, etc. But for me, the aim of teaching is to share my knowledge. The aim of teaching is to tell students why my subject is important to them. The aim of teaching maths is to be successful, in daily life, for example percentages. With regards to the harder mathematics, e.g. A-Level, this will lead them to specific professions.”

**Self-identified**

**Points for development:*
- “I think it’s impossible to give the same attention to an entire class of 30 students. One of the things that I would want to do is give students a more personalised experience. I would then plan and deliver my lessons as I do right now but if I had a

**Contributions to meetings:**
- Pre-LS1 Meeting 2: #4 suggested focusing the LS on AO2 and AO3 preparation (the application of problem-solving skills to exam-style questions), as this had been a weakness of the previous exam cohort in the GCSE exam.
smaller class, it would be easier to dedicate more
time to individual students and not have to rush
through things, whilst ensuring my advice is specific.
I feel pressured to be quick and I wish I were able to
spend more time marking and caring for particular
aspects of teaching.

I try not to assume that the students have any
prior knowledge. I try to start the topic from the
beginning, breaking it down as much as possible. I
would also try to extract answers from the students
before telling them, showing them graphs, equations
and discussing gradient, for example, before teaching
equations of straight lines. By establishing the prior
knowledge, I would be guiding them towards the
realisation of the theory. I do not give them the
formulae straight away.

I try to break things down as much as possible,
and try to explain the meanings behind formulae. If
this means I need to keep repeating myself, I do that
until I have driven the same consistent message
through.”

#4 discussed how students are starting to listen
to them and respect them and they were concerned
that #4 might be leaving. #4 was touched by their
attachment to them, because they thought the class
disliked them. I explained about their abandonment
issues – they’re used to teachers leaving.

**Learning points from LS:**

“My understanding is that we are doing this
because you want to find out how to facilitate their
learning and our ease, to teach in a more efficient
manner. By adding more people in the Trio, you are
taking ideas from more people.

You are trying to see how people change – the
second week I was crying, but I’m different now.
With time, you get used to things, the emotional
effect diminishes. As I am changing, I am growing
in confidence.

I am doing this because you are getting my
responses and I want to get the feedback and see my
own change. I am excited to see how I change
throughout. Secondly, if there is a way to do things
more efficiently, that will help the students, the
teachers, the process and the school.”

**Points for improvement for LS:**

None stated

They also suggested the introduction of
problem-solving tasks from Year 7 — “If we did a bit
of problem-solving at the end of each topic, then we
would be able to continuously address these issues.”

This was a crucial contribution which was
subsequently adapted by the department and
introduced across the first 3 years of teaching.

They played a great part in the planning/design
of this LS.

**Post-LS1 Meeting 1:** #4 was the only other
teacher who taught the LS and therefore took a lead
role in the post-LS discussion, contributing to
refinements to the lesson plan and resources.

**Post-LS2 Meeting:** #4 suggested an
improvement to one of the slides

**Lesson observations:**

Strengths: positive reinforcement to support
behaviour and clear and calm manner with students

Points for improvement: planning such that
lesson time is effectively used by picking up the pace
E.4.2. Teacher #4 Phase 2 Summary

<table>
<thead>
<tr>
<th>Teaching experience:</th>
<th>4 years – 3yrs college, 1yr current secondary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specialist subjects taught (not specialised):</td>
<td>Maths (Maths A-Level)</td>
</tr>
<tr>
<td><strong>Strengths:</strong></td>
<td>Subject knowledge</td>
</tr>
<tr>
<td><strong>Weaknesses:</strong></td>
<td>Does not stretch themselves</td>
</tr>
<tr>
<td><strong>Current responsibilities:</strong></td>
<td>Teacher of maths</td>
</tr>
</tbody>
</table>

**Parental background:** both parents professional
- Father senior manager at large Kuwaiti company

**Entry to teaching:** By chance, enjoyed tutoring and did not want to be an accountant anymore

**Support received:** Semi-formal training for Qualified Status, mentored and formally trained at the Academy as a Newly Qualified Teacher

**Immediate career ambition:** Additional responsibility in maths (being encouraged by mentors)

**Initial developmental priorities:** Teaching younger students and behaviour management – made good progress towards these

**Concluding state:** Picking up more responsibility in the department

---

**Teacher identity**

Found their experience overly challenging at the start of her role at the Academy: “I was actually overwhelmed and I empathise with the new teachers… I was not completely new to teaching. It’s still not perfect now but I’m not as overwhelmed as last year.”

Now feels more settled and is passing their wisdom to other newcomers: “And now I know the school and know what to expect, no need to run to #0 every time… #0 told me to break it down and it actually worked. I described this to X and she is now trying to come out of that shock. She hadn’t made the Seating Plans as well, she’s made them now. She was expecting nicely behaved students and she has some difficult students in there.”

Received effective mentorship from #0 and #7: “#0 is quick and knows what she’s doing, but #7 is very inspiring. [They] don’t shout, [they] just look at students. #7 is different but I observe what [they] say and try to replicate some aspects of this”

Feels supported by the department: “It was a ‘make or break’ situation – if it weren’t for the way our department works, especially how people judge you and how nasty they can behave [they were shouted at by a member of SLT in front of their class and made to feel humiliated]… You guys never actually put anyone down and there is someone there to help. If I was doing something wrong, no-one is going to make you feel bad or tell you off (that would have affected me emotionally because I tend to carry things around with me). The family support is there in the department and I really appreciate it.”

Their experience has altered their personality: “[The Academy] was a different thing altogether. Kids swearing and saying things I had never even heard such language in my life. [The Academy] changed me, in terms of my personality. I found a patience I didn’t know I had. By October, I felt I would not be able to teach. This was something major in my life. Even if I leave, I will never forget [the Academy].

---

**Final interview**

#4 rates themselves quite highly in terms of their teaching and the progress of their classes; they are very confident. Their thinking about educational goals and how to motivate and challenge students are not as developed; they only consider the basics of content delivery and assessment, they do not reflect deeply but are unaware of this. Their responses were very informal, personal and behaviour focused and they are very aware of their progress since last year.

Life revolves around school right now: “Most of time is in school anyway, so that comprises a lot of life right now… Busy at home and busy at school which then sometimes makes me very very tired”

Feels settled and is being urged to consider their next career move: “I would want to go for that KS3 things, more responsibility. I’m waiting on what [the principal] decides… [SLT person] was suggesting, if you think you are okay with your teaching and stuff, what would you like to do next.”

Does not find any of their classes challenging: “I don’t find any of them as challenging as I used to find them last year, not any of my lessons.”

Reflecting on Y7 Set 2, they seem to still not understand how to manage their expectations of younger students: “They struggle to even understand the basics. Because I’m struggling to even cover the basics, some of them will come over and ask me some really basic things and I think ‘did they even grasp the concept… I am covering the topics but they’re not allowing me to challenge them. I think that in their primary they are really pampered and that allows them to score higher and achieve their ability, which is not the same in secondary. There are different teachers and they’re discovering themselves so it’s not the same in terms of their focus on their subjects… They are, quite immature… In the beginning I was not as firm with them, now they have been separated, they know they have to come in and settle down so they don’t waste time… Routines...
I’m more patient, resilient. And I have made friends at work! We’re much closer to each other than people in other departments. And I feel I need to be able to express myself without getting judged, blowing off some steam after dealing with a difficult situation. This is important to retain your sanity.”

Their professional priorities are different this year: “So my priorities have changed. It was behaviour and planning but now I can focus more on the teaching and learning. The focus has changed to “how can I support my students. Last year, it was detentions, etc.”

The LS has stuck with them, unlike regular CPD sessions: “With trios, it was practical and I retained the information from that session. I remember what we did in the lessons with the equations and the shapes in the second one… Sometimes, they’re just entirely irrelevant! Only a few times I found it practical and relatable. Otherwise, I don’t even remember anything. Out of all them, 25% maybe helped me… In CPDs sometimes, they teach you stuff and pretend they would do things otherwise. But we all know that they would behave differently in real life.”

Prefers a personal approach to seeking support: “I would rather go speak to someone rather than go look on the internet or read a book about it.”

Is hesitant to pick up more responsibility due to the perceived impact on mental health/work-life balance: “She does also consider her family and personal life – as she gets older, her family want her to have more time for herself and are encouraging her to find a work-life balance.

She discusses a work-life balance. #0 mentions it doesn’t really happen. She talks about her marriage and says it was difficult. She chooses to still teach because she cannot see herself doing anything else.”

Did not quite know how to progress their career: “Let’s see if I would like to take more – this is my first step. And I hadn’t thought of this myself, I was persuaded to do this by #0. I don’t want to do things in an incorrect way, I want to be good at the things I do and take responsibility for the extra responsibilities… I am not well-versed with the roles available in schools, e.g. ACO, coordinators, TLR, etc. So I needed someone to suggest things and explain them to me. I had read about it but I never quite understood the type of responsibility that came with it or that it would be an option.”

and discipline… I have paired the ones that I think are really really weak but the ones I think are bright and waste their time, I’ve separated them so they are on their own…

Until now it has worked 50%, now that they know me. I’ve taught them only since January. They know now that I’m not going to allow them to leave the lesson unless they finish their tasks. They know that ‘we have to finish it, because she is evil’.

Do you think your lack of experience with KS3 also plays into this? “I would say yes, possibly. I wouldn’t be too confident saying it’s not that, so yes, that’s there too. Because half of the time I’m just trying to figure out what’s going on, what’s wrong with this, what is so hard?”

Only describes their goal with the class in terms of content coverage: In the beginning, I was like this is Set 2 so I have to finish what’s on the slides, I teach all of that stuff and then I give them exam questions. But this class it doesn’t reach the point where I want them to be as soon as I would like them to be. They’re slow. I try to finish everything that’s in the scheme of work first and then I decide if there’s enough time to stretch it or not… Yes, breaking it down [is important]. I think it’s just the fact that I’m not at a level where I feel okay to have fun, without losing them.”

Cannot identify any aspects of their teaching which needs to improve: “Year 7s is the only one where I would like to improve… I would like to be more firm in terms of sanctions, remembering all the time to sanction them for homework.”

Conversations with RJ and another member of SLT helped them make improvements to their teaching: “When I started my Y11, I was teaching them. That’s where I spoke to you and I realised that I didn’t have to teach them the scheme of work. Because it says we’re supposed to do that the whole term. If you had not told me, I would have never known… It’s not teaching at all, it’s revision. I did teach them whilst I was revising… You had a conversation with me, and then I went to [member of SLT] and [they] told me a lot of stuff actually. Gave me resources and everything.”

They are also adapting their approach to students (with emotional needs) based on observations and conversations with others: “It’s helping me understand them better. Things I would not do before, I’m doing that now. Such as I speak to them in a different way, knowing how they are.”

Projects confidence: “I might be confused in my head and look very confident. I see myself as a firm teacher who is approachable so I know that my students can approach me. They are not scared of me but they know they’re not going to mess around with me.”
### E.4.3. Teacher #4’s Teaching Plan

<table>
<thead>
<tr>
<th>Class</th>
<th>Class Profile</th>
<th>Strengths and Weaknesses</th>
<th>Plan of Action</th>
</tr>
</thead>
</table>
| Y11 Class X | 26 students  
6 lessons a week  
* Current Grades = 5 
G4, 21G3  
* Target = 
All G7 May  
All G6+ Mar  
All G5/6 Jan  
All G5 Nov | Strengths:  
• Motivated  
• Predicted grades 5+ for the whole class.  
Weaknesses:  
• Lack of basics.  
• Too energetic sometimes to complete the tasks properly.  
• Lack of revision  
• Lack of confidence | Maths intervention from November 2019 onwards. |
**E.5. Teacher #5**

### E.5.1. Teacher #5 Phase 1 Summary

**Start of 2018-2019**
- #5 has been teaching for about 10 years at another school.
- They joined the Academy in January 2019 as the Maths KS4 Coordinator.
- They teach physics as well as mathematics

**End of 2018-2019**
Teacher #5 joined The Academy in January 2019 as Key Stage 4 Maths Coordinator, having been teaching for 10 years. Despite this experience (which was not at a comparably challenging school), Teacher #5 did not adjust well to The Academy. Their curriculum knowledge was a strength, and they did contribute to the overall department. Their main development point was behaviour management. They left The Academy at the end of the academic year to teach abroad.

<table>
<thead>
<tr>
<th>(Self-identified)</th>
<th>Total TSES Score = 145 (67%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Strengths</strong></td>
<td>Average score = 6.04 Range = 5 to 7</td>
</tr>
<tr>
<td>Curriculum knowledge</td>
<td>Highest scoring =</td>
</tr>
<tr>
<td></td>
<td>2. To what extent can you provide an alternative explanation or example when students are confused?</td>
</tr>
<tr>
<td></td>
<td>3. To what extent can you craft good questions for your students?</td>
</tr>
<tr>
<td></td>
<td>5. How well can you respond to difficult questions from your students?</td>
</tr>
<tr>
<td></td>
<td>6. How much can you do to adjust your lessons to the proper level for individual students?</td>
</tr>
<tr>
<td></td>
<td>17. How much can you do to get students to believe they can do well in schoolwork?</td>
</tr>
<tr>
<td></td>
<td>18. How much can you do to help your students value learning?</td>
</tr>
<tr>
<td></td>
<td>19. How much can you do to motivate students who show low interest in schoolwork?</td>
</tr>
<tr>
<td></td>
<td>22. How much can you do to help your students think critically?</td>
</tr>
<tr>
<td></td>
<td><strong>Lowest scoring =</strong></td>
</tr>
<tr>
<td></td>
<td>9. How much can you do to control disruptive behaviour in the classroom?</td>
</tr>
<tr>
<td></td>
<td>10. How much can you do to get children to follow classroom rules?</td>
</tr>
<tr>
<td></td>
<td>12. How well can you establish a classroom management system with each group of students?</td>
</tr>
<tr>
<td></td>
<td>13. How well can you keep a few problem students from ruining an entire lesson?</td>
</tr>
<tr>
<td></td>
<td>14. How well can you respond to defiant students?</td>
</tr>
<tr>
<td></td>
<td>16. How well can you establish routines to keep activities running smoothly?</td>
</tr>
<tr>
<td></td>
<td>24. How much can you do to get through to the most difficult students?</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Issues</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Is still settling into the new post</td>
<td></td>
</tr>
</tbody>
</table>

**Purpose of teaching**

Scientific enlightenment as the goal of teaching

“The aim of teaching is to help students understand the universe. Everything is mathematics – if we look at the overall picture, getting a job is different, but understanding where we come from and where we are going, is more important.”

<table>
<thead>
<tr>
<th>(Self-identified)</th>
<th>Contributions to meetings:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Points for development:</strong></td>
<td>Pre-LS1 Meeting: #5 made some contributions to this meeting, relating the topic of the project to the national curriculum as well as suggesting a framework for teaching students problem-solving.</td>
</tr>
<tr>
<td>“Whenever possible, I try to start from the very basics. I want students to understand the exact steps they need to take to get to a solution. Once students build fluency, the steps come almost naturally. Behaviour is a huge constraint. Only once the behaviour is sorted, can I then teach the mathematics.”</td>
<td>Lesson observations:</td>
</tr>
</tbody>
</table>
This of course, depends on my own knowledge as well. This of course, can be overcome using different strategies?

**Learning points from LS:**

“Our last meeting (the only one on Trios/LS she has attended thus far) – you pick a concept, plan a lesson and see how effective it is. We want to see how we can improve the students’ skills and understanding of problem-solving, for example. I think the way we are going to plan lessons will be deeper and more careful and by looking at different aspects more closely, in a more targeted manner, we should be able to improve the students’ understanding.”

**Points for improvement for LS:**

None stated

**Strengths:** student involvement, curriculum knowledge

**Point for improvement:** planning lessons with clear learning objectives based on assessment of students’ prior learning and more consistent behaviour management
E.6. Teacher #6

E.6.1. Teacher #6 Phase 1 Summary

### Start of 2018-2019
- #6 had taught in a grammar school and in a Pupil Referral Unit (PRU) before joining the Academy in September 2017.
- As well as teaching Maths, they were also a Head of Year. They left this position at Christmas 2018, after four terms at the Academy, to start a new PRU.
- They returned in April 2019 after the PRU was closed down, just as a Teacher of Maths.
- Most experienced teacher in the department (20 years), with 10 years teaching in a grammar

### End of 2018-2019
- #6 is staying at Quest next academic year – content to carry on in their capacity as just Teacher of Maths for the time being.
- They will be teaching Y11 and hope to extend to teach more A-Level as well.
  * Bump in career so needs to resettle into the Academy before making more moves

### Total TSES Score = 185 (86%)
- Average score = 7.71
- Range = 6 to 9
- Highest scoring =
  8. How well can you provide appropriate challenges for very capable students?
  9. How much can you do to control disruptive behaviour in the classroom?
  10. How much can you do to get children to follow classroom rules?
  15. To what extent can you make your expectations clear about student behaviour?
  16. How well can you establish routines to keep activities running smoothly?
- Lowest scoring =
  19. How much can you do to motivate students who show low interest in schoolwork?
  23. How much can do to foster student creativity?
  * Highly reflective and scores congruent with observations
  * Highest total and average score also consistent with observations and performance (#6 is considered the ‘strongest’ member of maths)

### (Self-identified)
**Strengths**
- Subject knowledge (up to GCSE)
- Strong disciplinarian

**Issues**
- Formal and old-fashioned teaching style
  * Ingrained pedagogical disposition

### Purpose of teaching
Teaching is to pass knowledge and to ensure young people develop not just cognitively but physically and emotionally as well, developing them into young adults to make correct decisions.
  * Teaching as the transmission of knowledge (consistent with teaching style)

### Contributions to meetings:
- #6 was not at the Academy during LS1
- They were proactive, creative, and a good collaborator
  - Pre-LS2 Meeting 1: #6 supported other teachers, made multiple mathematical contributions to the lesson plan, produced the laser-cut manipulatives for students to tesselate with
  - Post-LS2 Meeting: Lesson delivered to Year 7 Set 1: top set class, they got on quite well.
  - Suggested an additional lesson task be added in (to clarify the actual rule of tesselation).
  - Suggested giving out isometric paper or grid paper to help students when doing TASK 6 (drawing their own shapes that tesselate).

**Lesson observations:** Strong disciplinarian, subject knowledge and teaches ‘off-the-cuff’

<table>
<thead>
<tr>
<th>Development opportunities this year: Pastoral role and teaching A-Level content + loads of own reflection</th>
<th>Contributions to meetings:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Points for development:</strong> watching newer teachers in contrast to own “old-school” way of teaching</td>
<td>* #6 was not at the Academy during LS1</td>
</tr>
<tr>
<td><strong>Learning points from LS:</strong> more peer assessment and groupwork required</td>
<td>* They were proactive, creative, and a good collaborator</td>
</tr>
<tr>
<td><strong>Points for improvement for LS:</strong> More open-ended tasks</td>
<td>Pre-LS2 Meeting 1: #6 supported other teachers, made multiple mathematical contributions to the lesson plan, produced the laser-cut manipulatives for students to tesselate with</td>
</tr>
<tr>
<td>* Shallow outcomes (stunted potential)</td>
<td>Post-LS2 Meeting: Lesson delivered to Year 7 Set 1: top set class, they got on quite well.</td>
</tr>
<tr>
<td></td>
<td>Suggested an additional lesson task be added in (to clarify the actual rule of tesselation).</td>
</tr>
<tr>
<td></td>
<td>Suggested giving out isometric paper or grid paper to help students when doing TASK 6 (drawing their own shapes that tesselate).</td>
</tr>
</tbody>
</table>

**Lesson observations:** Strong disciplinarian, subject knowledge and teaches ‘off-the-cuff’
**E.6.2. Teacher #6 Phase 2 Summary**

| Teaching experience: | 22 years –
5yrs secondary in South Africa,
2 terms supply in London, (‘learning the hard way’)
10yrs grammar,
5-6yrs Pupil Referral Unit,
2yrs current secondary |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Specialist subjects taught (not specialised):</td>
<td>Graphics Design, Maths, (Maths A-Level)</td>
</tr>
<tr>
<td>Strengths:</td>
<td>Subject knowledge (up to GCSE), Strong disciplinarian</td>
</tr>
<tr>
<td>Weaknesses:</td>
<td>Old-fashioned teaching style</td>
</tr>
<tr>
<td>Current responsibilities:</td>
<td>Teacher of maths</td>
</tr>
<tr>
<td>Parental background:</td>
<td>Father a teacher</td>
</tr>
<tr>
<td>Entry to teaching:</td>
<td>Restricted entry into engineering in post-Apartheid South Africa, teaching was a “safe and known” path</td>
</tr>
<tr>
<td>Teaching second choice profession</td>
<td></td>
</tr>
<tr>
<td>Support received:</td>
<td>Formally trained in South Africa (supported by certain colleagues)</td>
</tr>
<tr>
<td>Immediate career ambition:</td>
<td>None for now! Was the Head of a Pupil Referral Unit for a while and Head of Year 10 at the Academy over a short period of time (wants to avoid stress)</td>
</tr>
<tr>
<td>Initial developmental priorities:</td>
<td>Self-described as “old fashioned” this is an eternal development point, but not a priority</td>
</tr>
<tr>
<td>Concluding state:</td>
<td>Picking up more responsibility in the department</td>
</tr>
</tbody>
</table>

**Teacher identity**

#6 does not feel the need to collaborate with others: experienced and confident in their ability to address students’ needs and achieve good results with all their classes. They are deeply reflective about their practice, and given more autonomy over their PD, would likely be able to support others or engage in activities which would directly improve their practice/those of others.

Found English secondaries very challenging despite having taught in challenging schools in South Africa: “The paradigm shift in my career was moving to England – I was quite firm in South Africa. There was a culture shock when I first came here. The first school I interviewed with said the school was “lively” but it wasn’t just a little bit talkative. In the first week, I realised I was not the teacher I thought I was – in terms of behaviour management and delivery. But in that school, I doubted all of those qualities. My friends told me it would get better. I wanted to go back in the first few weeks. There were kids doing minimum work – they were jumping out of the windows!”

Confident in their competence and do not follow rules/structures: “I’m passionate about my teaching – I feel I teach a lot and stretch them as much as possible. For my low-ability class, I differentiate accordingly. I’m not questioned by anyone, so I feel I’ve got the freedom in terms of what I do in class and how I do it and the pace I teach to as well.”

Frustrated by hierarchical leadership structure at the Academy: “When you have conflicting feedback, it’s more of a challenge. Everything was pushed onto me, and I did it, but you need to have that support. And I didn’t have it. It becomes frustrating after a while and he felt undermined, and if it’s not there, you feel the lack of support and not heard.”

Feels supported and listened to in the department: “The leaders here don’t really enable us here” “It’s difficult in this school – in my previous school you could speak to SLT. Here, loads of staff

**Final interview**

#6 is very comfortable in their role and their ability to carry it out well. They consider themselves a good teacher. Their disciplinarian approach is the foundation of their approach in the classroom and they base their effectiveness on the ‘good behaviour’ of the class as well as students’ grades. Their reflections about students and their teaching practice do not stretch beyond the face-value to encompass broader pedagogical or philosophical aspirations.

Notes the ever-increasing workload challenge of teaching, despite being very experienced: “Every year, it gets a little bit more challenging. As a teacher, I can compare 10 years ago or 15 years ago and every year you’ll see that there’s slightly more work you’ll have to do as a teacher, as a normal teacher. Teaching in general, not just this school.”

Despite this, they do not feel stressed, are comfortable and choose to adopt a positive outlook.

They conflate compliance and engagement: “my way of teaching is totally different from everyone else’s, because for me, I can’t have someone talking when I’m teaching. I have this OCD, you have to be paying attention… Because what happens is that if they’re not doing that and they’re taking notes down whilst I am teaching, they will ask me ‘sir, I don’t know what I’m doing’ and if five people do that, how are you going to deal with those five people and have continuity in the lesson. So you are gonna revert back to teaching it again, no you can’t do that. Or teach it to five individual people, and you don’t have the time, what’s gonna happen to the flow of the lesson.

Their most challenging class follows their rules and meets their behaviour expectations, they are now aiming to close the gaps in their knowledge: “Because they came from different classes, different teachers, the gaps are immense. Some of them don’t know at all, some of them don’t know that they have to sit down quietly and just do their work.”
are afraid to say anything. In terms of #0 and SLT#1, I have no issues telling you and asking for support. There were a few things I have previously raised – and the inconsistency is still an issue, affecting new staff in particular. This is why I like our department.”

Current Academy PD provision not considered in line with the needs of the teachers/Academy: “I think it [PD] should be more focused on what the needs are. A lot of training is what Ofsted wants, not what the actual teacher wants. I believe we should have a much more focused safeguarding one in this school. They should consider the strengths and weaknesses.”

Differentiates approach to classes based on students’ needs: “I have two totally approaches for my two extreme classes – top set Y11 and bottom set Y10.

The most important thing is the students learning – if everyone in my set 1 Grade 6 and above, that’s great, for the bottom set a Grade 1, I would be happy. That’s what I expect from them, and I would be proud of them.”

Considers published literature obsolete and irrelevant to their practice: “I try and read a little bit online – one person’s experience is not the same as another’s. I thought books were biased and unrealistic and most of the information is obsolete.”

Some students are seen as having more potential than others: “I said potentially there’s about 4-5 of you that should go on to do the Higher tier.”

“Because she’s a weak child, academically… She needs one-to-one support. When I go to help her out with a particular topic, she understands it and she does it. But then when I go back after five minutes, she’s stopped where I stopped or she stopped before doing the last part. She’s like she doesn’t know she needs to go on.”

“I think she needs one-to-one intervention, which I don’t believe she deserves, she does not want to work in Maths. I would rather have one of the other 24/25 students working and the one student I can try and give the best that I can.”

This student is NOT a weak child academically. They came into secondary school with very strong scores and have been regressing since Y7, from set 1 to set 2, now set 3. The “intervention” required here might simply be to speak with the student in an open and encouraging manner.

They are aware of how they need to improve their practice and can articulate this, however, this does not translate into actual changes to their practice: “I think sometimes I go a little bit too fast, and I over-expect.”

“Getting them to give me some ideas or in groupwork, put them in groups, I don’t think I do that often enough. Just putting them in groups and discuss, I’m going to try it out with my Year 10s at the moment, because I’m doing the problem-solving questions.”

A developmental activity which actually had an impact of them consisted of data analysis: “Honestly? I think focusing on the high attainers and pushing the borderlines, after our last meeting, I didn’t know we had to push the higher grades, instead of the middle ones. (Discussed in a departmental meeting, to improve progress scores). I didn’t know that at that time, not just getting them to pass, but boosting the P8 scores and ALPS scores. “

Looking at the data, has enabled them to understand how to improve their Key Performance Indicators, because their teaching is already very good and this helps them improve their class ‘on paper’.

Their view of themselves is someone who is consistently good: “I see myself not as a phenomenal teacher because there are other teachers that are very good, I just my teaching as good. I haven’t seen lessons to wow me. I know some lessons don’t go as planned. But consistently, some people expect things which don’t happen in the real world but I’m not this teacher who comes around and does this and puts all things on the board and stuff. But it’s all about progress, if you look at results and consistency.”
### E.6.3. Teacher #6’s Teaching Plan

<table>
<thead>
<tr>
<th>Class</th>
<th>Class Profile</th>
<th>Strengths and Weaknesses</th>
<th>Plan of Action</th>
</tr>
</thead>
</table>
| 11M/Ma1 | 29 students 6 lessons per week Target grades for all students is 6+ Three students have achieved a grade 4 in the last years exam and my intention is to ensure these grades go up | All students are potentially a grade 6+ students, however, there are some that lack effort and focus All students work at a good pace and getting through the topics much quicker including the grade 7-9 topics | *Envisage on implementing intervention classes on Wednesday for targeted learners who are underperforming.*  
*Interventions for those students who intend on improving from grade 7 to 8/9*  
*Also, covering the more AO2 and AO3 type questions* |
### E.7.1. Teacher #7 Phase 2 Summary

<table>
<thead>
<tr>
<th>Teaching experience:</th>
<th>Parental background: both parents professional, father a partner lawyer in a large firm</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 year – Current secondary only (Had also done some voluntary teaching during their gap year)</td>
<td><strong>Entry to teaching:</strong> Joined Teach First as was unsure what to do after graduating</td>
</tr>
<tr>
<td><strong>Specialist subjects taught (not specialised):</strong> Economics Business Maths</td>
<td><strong>Support received:</strong> Formally trained through Teach First (extensive mentoring)</td>
</tr>
<tr>
<td><strong>Strengths:</strong> Subject knowledge (inc. Maths)</td>
<td><strong>Immediate career ambition:</strong> Moving to a “less hectic” school and still considering a career in finance</td>
</tr>
<tr>
<td><strong>Weaknesses:</strong> KS3 teaching</td>
<td><strong>Initial developmental priorities:</strong> Developing well as a Maths teacher but would require more support with managing younger students</td>
</tr>
<tr>
<td><strong>Current responsibilities:</strong> Teacher of economics and maths</td>
<td><strong>Concluding state:</strong> Leaving the Academy at the end of the year to teach just Economics at a private school</td>
</tr>
</tbody>
</table>

### Teacher identity

Teacher #7 is a highly reflective teacher and has faced immense challenges from the start of their career. Learning to teach economics required huge time investments and upskilling, which they are proactive about and as a result, have managed to make a lot of progress with. Despite their difficulties, they are able to contribute to extra-curriculars. They also have a clear understanding of their effectiveness in various areas and know what would need to be done to improve, given enough time. They are open to change and therefore discussions and observations with more experienced teachers are practically valuable but more pedagogically oriented developmental opportunities are also taken on board and result in changes in beliefs, knowledge, and practice.

Being a volunteer teacher during their gap year was enjoyable: “Coolest thing I’ve ever done that. So that was teaching and sport coaching, from primary schools, leading some classes, doing one-to-one and then I actually did some secondary school maths lessons and a physics lesson.”

Joined teaching as was unsure about their career path and was inspired by a relative: “Firstly, I actually didn’t really know what I wanted to do after uni and I thought that Teach First and teaching for 2 years would be a good option and if I didn’t like it, it would also be an option to move on to something else hopefully having developed some skills. Also a little bit of a social conscience as well, it might not seem that but I have a little bit of that… I have family members who are teachers, especially on my dad’s side. My auntie and my uncle are both teachers and my uncle was probably the most inspirational dad’s side. My auntie and my uncle are both teachers family members who a

### Final interview

They are able to pinpoint the impact of their specific teaching strategies and get to the root of current issues, to devise new strategies for those. They consider themselves neither good, nor bad, but instead stronger and weaker in various aspects. They are au fait with current educational thinking, such as cognitive science and this is clearly influencing the way they think about teaching. An INSET delivered by another member of staff explained the concept of a reading age and they now consider how that permeates all the aspects their economics teaching. Their thinking about these ideas has been deep and directly influenced their strategies.

#7 finds themselves with many broad career options right now and they are consulting with a range of people and doing some ‘soul searching’ to figure out what they should do next and how this maps to their long-term goals such as having a family and job satisfaction.

At an important decision point regarding future options: “I have a lot to think about at the moment, in terms of my career and in terms of long term what I’m gonna do”

Their peers and partner are not teaching: “[partner] is motivated by money, not me. And I feel pressured by that… Whenever I see my mates, they always have the same stories, whereas you can always spend ages talking about the things that go on in teaching. It’s just a much more interesting conversation… If I were to go into the city, it would be with a long-term goal of coming back into teaching. And maybe when I have kids, potentially going into a private school where you get discounted fees or being a housemaster.”

Things are good and settled and he is starting to see an impact: “I feel like I am making progress with things like behaviour management (with younger kids), especially with Year 7s. I’m getting...
until my last lesson of the day. It was full on trying to get everything together, trying to get everything sorted, trying to get my head together for my last lesson of the day. I didn’t think it would be as time-pressured.”

They put in a lot of effort to keep up with the challenge of teaching A-Level economics in particular: “Just not being experienced enough at economics, having not done it at A-Level, I was chasing my tail learning what I was about to teach, either the night before (I was going to bed reading a textbook) or literally I would get in at 6, watch videos and plan a lesson on it.”

The observation of another effective economics practitioner was very practically useful for them at the start: “With economics, I got recommended someone to go and see through TF at another school in Pimlico which was helpful, I observed a couple of Econ lessons. It was a TF ambassador that teaches Economics. Really helpful in actually planning medium-term – when am I introducing graphs, when am I introducing exam technique, when I am doing definitions tests, how many multiple-choice tests am I doing, how am I structuring a week or a month or two months of lessons.”

They can now see an improvement in their practice and understand their next developmental step: “First year economics, having struggled so much with it, now I’m really enjoying it. I know it, I understand it and I’ve got content that I’ve used last year so I can adapt that and it’s taking me less time to plan which gives me more time to focus on other areas of it. So it may be that I can structure an exam-style question, spend more time deconstructing it or I might get a bit more time to mark their stuff now. That reduction in the time planning has freed up some other areas.”

They make teaching choices in collaboration with others, especially with regards to maths, which they are completely new to teaching this year: “#6 and you, and a tiny bit from #2 and #5 as well. Mainly you, a little bit from #6. I show them a lesson, and they just say that’s too difficult, that’s too easy, spend a bit more time on that, that’s not enough questions, they need to practice more.”

They are also collaborating with their Teach First trainee teachers/peers: “We’re going to start our third TF assignment, a collaborative one with other Business teachers, based on the flagship subject pedagogy, which for business is case studies. So we’re collaborating to create a case study and we’re implementing that into different lessons, into the GCSE Business class on stakeholders.”

And they contribute to the Academy outside of lessons: “I do girls’ football and will be doing golf/cricket, which I am initiating. School trips as well. Work experience for the Year 13s, which Students X and Y wrote about in their personal statements.”

more used to that, which is satisfying. What is nice as well, with my Y13 boys, is that they are buying into working a bit harder and they are realising that these exams are actually pretty close and they need to do a hella lot of work. They are putting a lot of time into their homework. Even when I say “have a think about how you’re going to write this 25-marker in the afternoon”, some of them will come with a full plan.”

Their current challenges are very contextualised: “Seeing progress, and trying to get progress out of students like Student A who has to ask me what the most basic words mean. After Teacher E did the Monday CPD on reading ages, ever since she did that, when their reading age is 14, they understand 75% of the words. I have now seen it a lot with Sarmmed who just doesn’t get the gist of a lot of Student A in Econ. He seems to use the same 150 words and same sentence structure over and over again in his essays. I don’t think he got the required grade to get into Econ, he can’t have got a 5 in English.”

The current issue of reduced access due to poor literacy is different from the previous issue of inability to contextualising economics concepts due to reduced cultural capital. The latter has been addressed through distinct strategies: “No, that was more about contextualising information and relating it to the real world. Now, that has improved. What they are doing with Teacher X is weekly they write about a news article and they discuss it. And trying to do as many case study lessons as possible, I did one on the Corona virus yesterday. I try and summarise it as best as I can but I also give them a FT article to give them access to the way to more developed ways of writing about the economy and that includes finance as well. Whereas I don’t think they’re used to reading.”

They are prioritising based on the proximity of exams: “I think using my suggested points, compared to theirs. I write very key brief points and they will just flesh it out, without any fancy vocabulary. They don’t need anything demanding in terms of literacy… I give them the analysis and I also give them some suggested evaluative points… I don’t know if I’m seeing an improvement in literacy, but an improvement in Economics”

The quality of their teaching is “a mixture”: “KS5 is my strength and I think especially contextualising what we’re learning… Whereas Maths I struggle to do that with things like converting a decimal into a fraction because I just know how to do it.

I think my marking and feedback, especially for Economics, is one of my strengths now.

I’m still interested in developing my teaching of Maths and I still listen to Craig Barton’s podcast. He’s a massive fan of cognitive science and I still listen to that.”
They can influence things in the department in a practical manner and feel RJ is the only school leader to enable this: “Yeah, within the department. For example, the plan of the BTEC course, the delivery of Economics, … I don’t think there’s anything greater than departmental yet.”

They appreciate the relevance of training which is practically useful with regards to the delivery of exam courses and learning specific strategies, as well as more pedagogically oriented ones undertaken through Teach First. However, a particularly impactful one changed their approach to teaching mathematics: “Paradigm shifting, yes. And I just had no idea about that whole world of education.” The implications to their practice is: “The way I think about how I’m delivering, for example, introducing a new topic in maths. It’s more about how I’m thinking about how the students are thinking. Rather than here you go, you should now be able to do it, but actually it’s more about what the students are thinking with each stage of the explanation. That’s something I was much better at with economics, because I was learning it as I was teaching it. I could understand exactly how they were thinking. But with Maths, I couldn’t at all. Because I have not really struggled with it and it’s now breaking it down and explaining it in a clear manner. Then how practice it, how you vary that practice and how you’re checking for understanding the whole time.”

They have also followed this through with further research: “I have also started listening to Mr Barton’s podcast, which is good. He talks about theories of teaching and learning and interleaving into my practice. It’s not necessarily maths specific either.

I have his book as well.”

They know exactly what they would find most useful at this point in time: “…I would love to hear an experienced Maths teacher sit there and say ‘this is how you pitch it to the middle level’, this is how you pitch it to the top set, this is how you pitch it to a bottom or second bottom set. I know that’s difficult to do in one session but just to go through different topics like that and to give some ideas as to okay, you could do this for your starter, this time how could you assess for learning, this time, what practice questions could you set them. How to plan a Maths lesson. How to create independent learning (for business and economics). We get told, do your flipped learning, but actually I was speaking to someone elsewhere, and they’re saying this is something they’ve been trying to hammer home for the last few years and it’s been massively worthwhile.”

And they admit this varies based on their “mood”: “Sometimes when I’m annoyed or getting angry, when I’m a bit tired or a bit grumpy, things can spiral out of control a little bit. But when I’m in a better mood, when I’m prepared and ready to teach them, I think a lot of their personalities will come out in a much better way than previously.”
### E.7.3. Teacher #7’s Teaching Plan

<table>
<thead>
<tr>
<th>Class</th>
<th>Class Profile</th>
<th>Strengths and Weaknesses</th>
<th>Plan of Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y13 Economics A-Level</td>
<td>7 students</td>
<td>Literacy skills – essay writing</td>
<td>(i) Speak with EDE/ABO about essay writing for EAL students</td>
</tr>
<tr>
<td></td>
<td>5 lessons a week (+Wed P7 for catch-up)</td>
<td>5/7 EAL</td>
<td></td>
</tr>
<tr>
<td></td>
<td>* Current Grades = 2C, 1D, 2E, 2U</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>* TARGET = Student T - A</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Student U - B</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Student V - C</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Student W / Student X / Student Y /</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Student Z - D</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>5</strong></td>
<td><strong>5/7</strong></td>
<td></td>
</tr>
</tbody>
</table>