

# MENTOR HANDBOOK

## S4 | SUBJECT: GAPS AND MISCONCEPTIONS

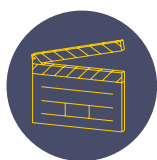
### STUDY

#### KEY TAKEAWAYS FOR THIS MODULE

Your teacher can better tackle knowledge gaps and misconceptions by understanding that:

- > A key reason for differing pupil needs is their different levels of prior knowledge.
- > Pupils may have – or develop – misconceptions: incorrect beliefs about a topic or subject.
- > Teachers can identify and overcome these incomplete mental models by using knowledge of subject and common misconceptions, for example to generate analogies based on existing knowledge.

Get yourself into a strong position to mentor your teacher by working through the following:



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**READ THE EVIDENCE  
SUMMARY BELOW:**

#### TEACHING CHALLENGE

Ms Brown is confident about what she wants pupils to learn. However, she is often surprised by the gaps in pupils' knowledge and the misconceptions they sometimes hold. How can she plan to address gaps and misconceptions so all pupils can access the curriculum?

#### KEY IDEA

Teachers should proactively find out about pupil prior knowledge and deliberately address common misconceptions and pupil knowledge gaps.

## GAPS IN PUPIL PRIOR KNOWLEDGE AND IMPLICATIONS FOR INDIVIDUAL NEEDS

Pupils enter the classroom with different prior knowledge. For example, some may have been exposed to a concept intentionally the previous school year, while other teachers did not prioritise the same concept; some may have been introduced to it at home or through personal interest, while others may not. These knowledge gaps have consequences for pupils' understanding: for example, if they lack important vocabulary, they may not be able to read a text, or may simply misunderstand it (Willingham, 2006). Ms Brown needs to identify who knows what if she is to make new ideas comprehensible by linking them to pupils' existing knowledge.

### WATCHING OUT FOR MISCONCEPTIONS

Misconceptions are potentially more problematic than knowledge gaps. Misconceptions are distinct from knowledge gaps (where pupils know nothing about a topic) and from errors (for example, a spelling mistake): they are beliefs which conflict with what is to be learned (Chi, 2009). A knowledge gap or an error can be addressed relatively simply but a misconception, whether held by pupils already or developed during a topic, may be harder to address. For example, if pupils believe that an apostrophe should be added whenever they see a plural 's', this is harder for Ms Brown to influence than if a pupil forgot or had never been introduced to the rule.

Most misconceptions are specific to the topic being taught. For example, a common misconception in adding fractions is that pupils should add the numerators and the denominators together. Ms Brown needs to identify common misconceptions: her more-experienced colleagues may have valuable knowledge here. Once Ms Brown has identified likely misconceptions in an upcoming topic, she can check whether pupils have those misconceptions and can seek to overcome them.

### RESPONDING TO PUPIL NEEDS

Ms Brown can anticipate and respond to pupils' knowledge gaps and misconceptions. Once she has identified the knowledge pupils need to understand a new idea, and the potential misconceptions they may hold or develop, she can design checks of pupil understanding to uncover these barriers for this knowledge (Christodoulou, 2017).

Where she identifies knowledge gaps, she can address them by explicitly teaching anything pupils must know to understand a topic, for example, prerequisite vocabulary, or knowledge which has been introduced in previous years. Where she identifies misconceptions, she can address them by offering analogies which bridge between pupils existing knowledge and their misconception (Luciarelllo & Naff, n.d.). For example, if pupils believe objects sink because they are heavy (a

misconception which confuses weight with density), she can give the example of a ship – which is obviously heavy, but floats – and use this to help pupils appreciate their misconception.

Developing pupils' subject knowledge also helps all pupils in two ways:

- > By ensuring pupils have increasingly developed and organised mental models upon which they can draw.
- > By reducing the new information actively being processed in pupils' limited working memory (Sweller et al., 1988).

### NUANCES AND CAVEATS

While there is much overlap between what pupils know, each pupil will also have unique areas of prior knowledge (and lack of knowledge), based on individual experiences. Identifying exactly what each pupil knows would be impossible for Ms Brown: it's more important that she identifies the most important knowledge for a topic and whether all pupils know that, than that she identifies everything they do and don't know (Christodoulou, 2017).

# SELECT

Before you observe, first select a **DEVELOPMENT AREA** to focus on. Next, familiarise yourself with the **FOCUSED DEVELOPMENT AREAS**, as you will zoom in on one of these during your observation. Finally, craft a **PRECISE TARGET** when you observe your teacher (examples are provided below).

| DEVELOPMENT AREA                                      | FOCUSED DEVELOPMENT AREA   | EXAMPLE PRECISE TARGETS  |
|---|--|--|
| Identify and pre-empt gaps, errors and misconceptions | <ul style="list-style-type: none"> <li>&gt; <b>Teacher, with the support of a colleague, identifies the potential misconceptions that pupils may hold regarding a concept and plans pre-emptively to prevent them occurring.</b></li> <li>&gt; Teacher, with the support of a colleague, identifies where pupils may make errors in the subject and plans pre-emptively to prevent them occurring.</li> <li>&gt; Teacher, with the support of a colleague, identifies where pupils may hold gaps in prior knowledge that may give rise to misconceptions and plans in extra support to fill in these gaps of knowledge.</li> <li>&gt; Teacher identifies where pupils hold weak prior knowledge around a concept, possibly resulting in misconceptions and plans in extra support in order to prevent or tackle these misconceptions.</li> </ul> | <p><b>If your teacher is...</b></p> <ul style="list-style-type: none"> <li>&gt; <b>Not doing it at all:</b> With the support of a colleague, review the material pupils will be learning and identify a common misconception that pupils may hold.</li> <li>&gt; <b>Doing it but needs some improvement:</b> With the support of a colleague, identify a common misconception related to the material pupils will be learning and plan how to pre-emptively explain this misconception to pupils, thinking aloud why the thought process or premise behind the misconception is faulty as well as exposing the correct way of thinking or correct premise.</li> <li>&gt; <b>Doing it well, but needs some stretch:</b> Where a common misconception related to the material you are going to teach is likely to stem from a deep-rooted misunderstanding, plan to pre-emptively explain how the misconception is based on a faulty thought process or premise, as well as the correct way of thinking or correct premise, and plan to revisit it multiple times to embed the correct way of thinking.</li> </ul> |
| Assessing to uncover gaps, errors and misconceptions  | <ul style="list-style-type: none"> <li>&gt; Teacher designs questions to ask for formative purposes to uncover gaps in knowledge, misconceptions and errors related to the learning goals of the lesson.</li> <li>&gt; Teacher sets up and delivers the assessment for formative purposes so that pupils answers are useful for uncovering gaps, errors and misconceptions.</li> </ul>   |  |
| Addressing gaps, errors and misconceptions            | <ul style="list-style-type: none"> <li>&gt; Teacher plans a proportionate response to gaps, errors and misconceptions following targeted assessment for formative purposes.</li> <li>&gt; Teacher plans and deliver an example or analogy to addresses misconceptions.</li> </ul>  |  |

### RECORD YOUR THINKING HERE

| DEVELOPMENT AREA          | FOCUSED DEVELOPMENT AREA  | EXAMPLE PRECISE TARGETS         |
|---------------------------|---------------------------|---------------------------------|
| (select before observing) | (select whilst observing) | (select/write whilst observing) |

## OBSERVE

Consider the following questions based on a short (approximately 15 minute) observation of your teacher.

What was your teacher's **previous** target? Are they meeting it? How do you know?

For the **DEVELOPMENT AREA** you are focussing on for this observation, what is your teacher already doing well?

Next, go to the previous page and select a **FOCUSED DEVELOPMENT AREA** to further zoom in on. Then select (from the examples) or write one **PRECISE TARGET** (bite-sized action) to coach your teacher on. You can choose to stick with the previous target if your teacher have not made enough progress yet.

How will you model the target to your teacher to show them what good looks like? What questions will you ask to check your teacher understands the model? For example, 'How it is different from your current practice?', 'What impact might it have on your practice and pupils?', 'What links can you see between the model and the module principles (below)?'

**Reminder: Your model should help your teacher develop their ability in some of the following:**

- > Identify possible gaps in knowledge, errors and misconceptions and plan how to prevent these forming.
- > Be aware of common misconceptions and discuss with experienced colleagues how to help pupils master important concepts.
- > Use assessments to check for prior knowledge and uncover errors and pre-existing misconceptions.

Next, meet with your teacher to work through the 'Feedback' stage of instructional coaching. See the guidance on the feedback stage in the appendices of the Mentor Handbook for support.

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#### REFERENCES

- Chi, M. T. (2009). Three types of conceptual change: Belief revision, mental model transformation, and categorical shift. In *International handbook of research on conceptual change*, 89-110.
- Christodoulou, D. (2017). *Making Good Progress: The Future of Assessment for Learning*. Oxford: OUP.
- Sweller, J., van Merriënboer, J. J., & Paas, F. G. (1998). Cognitive Architecture and Instructional Design. *Educational Psychology Review*, 10(3), 251–296.
- Willingham, D.T. (2006). How knowledge helps. AfT. [bit.ly/ecf-wil2](https://bit.ly/ecf-wil2)