THIRD SPACE LEARNING

The Secondary School Guide to Metacognition

Examples, tips and strategies to successfully embed metacognition across your secondary school to raise maths attainment

SLT Guides

Contents

Introduction

What is metacognition?

Metacognition is an awareness and understanding of one's own thought processes.

It is one of three essential components of self-regulation; supporting students to think about their own learning more explicitly:

Cognition – the mental process involved in learning
Metacognition – Often described as 'learning to learn' or 'thinking about thinking'
Motivation – willingness to engage our metacognitive and cognitive skills.

> Metacognition and self-regulation approaches to teaching support students to think about their own learning more explicitly, often by teaching them specific strategies for planning, monitoring, and evaluating their learning.
>
> EEF, Teaching and Learning Toolkit[1]

Most teachers support metacognition and self-regulation everyday, often without realising it, but this automaticity is why it can be difficult to give concrete examples and share best practice. In other words, teaching metacognitive strategies is easier said than done.

This guide aims to bridge the gap between research and practice in the classroom.

We've dug into the research to summarise the key information teachers need to know about metacognition - specifically in regards to maths teaching and learning - and provide practical and advice for today's maths classrooms.

Throughout the guide we've drawn on our experience as online one to one maths tutoring providers, training over 4,200 maths tutors since 2013 to help 150,000+ students develop their metacognitive skills.

Why is metacognition important?

> "There is a strong body of research from psychology and education demonstrating the importance of metacognition and self-regulation to effective student learning. The Sutton Trust-EEF Teaching and Learning Toolkit—which summarises international evidence—rates 'metacognition and self-regulation' as a high impact, low cost approach to improving the attainment of disadvantaged learners."
>
> Metacognition and self-regulated learning guidance report, EEF[2]

Studies reviewed by the EEF found disadvantaged students are less likely to use metacognitive strategies, so it can be a great way to support your students who need it most.

When students use metacognitive activities effectively, they:

- Set goals;
- Select specific strategies to enhance their learning experiences;
- Use self-assessment or self-questioning to monitor their own learning.

Metacognitive processes have become increasingly researched in recent years, with findings being applied to students' problem-solving skills, study strategies, reading comprehension interventions, and learning strategies.

> Cognitive processes are the range of learning skills that students possess. In contrast, metacognitive processes enable students to self-evaluate the effectiveness of their cognitive processes.
>
> **Schraw, 1998.[3]**

The benefits of metacognition in the classroom

Raises attainment

7+ The EEF's report states that the potential impact of metacognition and self-regulation approaches is high (+7 months additional progress).

Closes the attainment gap

The EEF report states that there is some indication that students who come from disadvantaged backgrounds are less inclined to utilise such tactics and, as a result, could potentially gain the most from them.

The EEF's research indicates that using metacognitive teaching strategies is beneficial for learners who are at a disadvantage compared to their peers.

Develops more independent learners

When young people are capable of monitoring their progress, it enables them to manage their own thinking and independent learning, both in and out of the classroom.

Easy-to-implement

In effect, a metacognitive approach to teaching does not require specialist equipment, nor any other large purchases. It only requires teachers to be trained effectively in metacognitive practices.

Therefore, professional development and training opportunities are the main expenses for integrating metacognition in education.

Transferable

Metacognition helps learners transmit their knowledge and understanding across tasks and contexts, including reading comprehension, writing, maths, memorising, reasoning, and problem-solving.

Improves resilience

By identifying their successes and failures, and which specific strategies work best for them, learners have a toolkit for perseverance with their work.

Supports emotional and social growth

Gaining awareness of their own thinking, learning processes and cognition allows learners to think about how to be happy and confident in themselves. Metacognitive thinking also allows learners to consider things from others' perspectives.

Read: What Is A Growth Mindset And What Does It Mean For Kids And Parents[4]

3 min read

Boosts motivation

Research shows metacognition increases learner motivation because learners feel more in control of their own learning. Learners who make use of metacognitive strategies are more aware of their own thinking and more likely to be active learners who learn more deeply.

Maths & metacognition

Although the skills of planning, monitoring, and evaluating are common to all subjects, the way in which these skills are applied can vary depending on the specific subject. For instance, planning an essay requires a different skill set than planning how to find the tangent to a curve.

When used hand-in-hand with approaches that support oracy and talk in the classroom, metacognitive strategies are particularly effective for building mathematical skills and confidence.

One to one teaching provides a unique opportunity for focused maths talk. All teachers wish they could sit side by side with their students and discuss maths and problem solving in depth – but in a busy class of 30, this isn't always possible.

Third Space Learning provides online one to one maths tutoring for primary and secondary students. With their dedicated maths specialist tutor, students work through topics at a pace that suits them.

Tutors model different strategies and narrate their approaches to maths problems. When students move on to more independent practice, tutors ask questions to support students to do the same to develop their metacognitive skills.

The EEF found that metacognitive strategies are most effective when embedded in the curriculum and a specific subject lesson. This means that to foster metacognitive awareness in mathematics, learners must acquire it in the mathematics classroom.

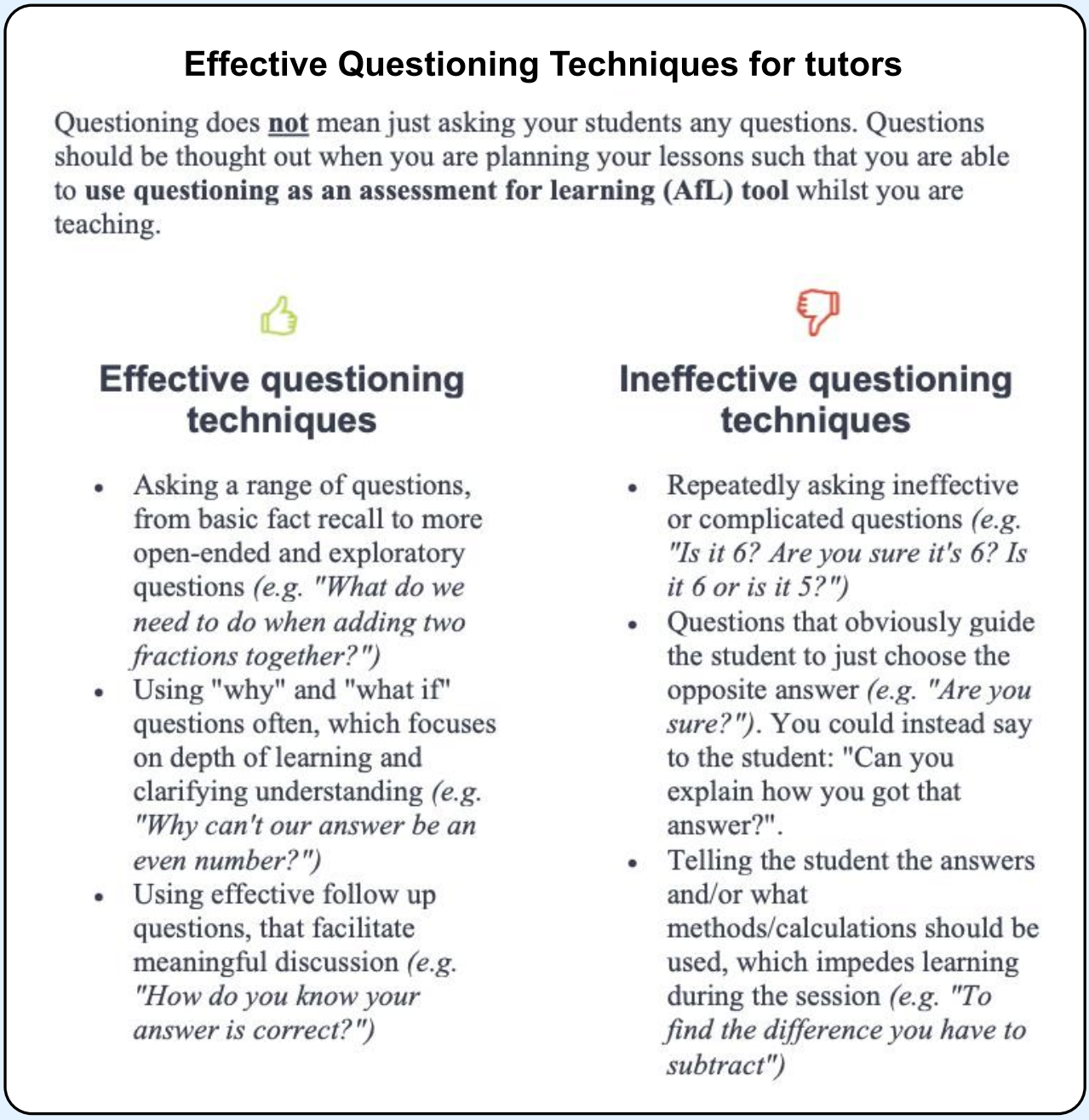
Research has shown that intervention programmes targeted metacognition:

- Are more successful at raising maths attainment
- Have a higher impact than curriculum reform and computer-assisted instruction
- Reduce maths anxiety

At Third Space Learning we embed the teaching of metacognitive skills within our maths lessons.

Our team of pedagogical experts carefully design curriculum-aligned lessons that actively develop metacognitive strategies. Our tutor training programme places a big emphasis on encouraging metacognition in students.

Third Space Learning tutors are trained to engage young learners and promote the **development of metacognitive skills through questioning**. One to one tutoring allows students to feel more comfortable and confident in verbalising their thoughts, reflecting on their progress, and actively participating in the learning process, which may not be possible in a whole-class environment.



Effective Questioning Techniques for tutors

Questioning does **not** mean just asking your students any questions. Questions should be thought out when you are planning your lessons such that you are able to **use questioning as an assessment for learning (AfL) tool** whilst you are teaching.

Effective questioning techniques

- Asking a range of questions, from basic fact recall to more open-ended and exploratory questions *(e.g. "What do we need to do when adding two fractions together?")*
- Using "why" and "what if" questions often, which focuses on depth of learning and clarifying understanding *(e.g. "Why can't our answer be an even number?")*
- Using effective follow up questions, that facilitate meaningful discussion *(e.g. "How do you know your answer is correct?")*

Ineffective questioning techniques

- Repeatedly asking ineffective or complicated questions *(e.g. "Is it 6? Are you sure it's 6? Is it 6 or is it 5?")*
- Questions that obviously guide the student to just choose the opposite answer *(e.g. "Are you sure?")*. You could instead say to the student: "Can you explain how you got that answer?".
- Telling the student the answers and/or what methods/calculations should be used, which impedes learning during the session *(e.g. "To find the difference you have to subtract")*

A resource used in our tutor training programme to develop questioning techniques

Step by step: how to teach metacognition

Research has shown that students' use of metacognitive strategies significantly improves when their teachers explicitly state the cognitive processes required to complete a task.

To help teachers with this, the EEF produced an evidence-based 7-step framework for teaching metacognitive skills. It can be applied to all subjects and to any age group.

Read: Metacognition and Self-Regulated Learning Guidance Report[5]

We've summarised the EEF's report below and practical examples from our own online one to one KS2 maths tuition so you can see each step in action.

1 Activating prior knowledge

When delivering a new topic, teachers should find opportunities to activate prior knowledge that is relevant to the new topic at the start of the lesson. This technique supports students to assimilate the new information with previously learnt material and also reduces the demands placed on their working memory during the lesson.

Using a low-stakes quiz is one of the most effective ways of activating prior knowledge and can take as little as 5 minutes at the start of a lesson. This could be a quick recap quiz as a class or could take the form of homework set in advance of a new lesson.

Practical examples to activate prior knowledge

In Third Space Learning's online one to one maths tuition, our lessons begin with an introduction slide to activate prior knowledge. Additionally, the tutor can use it diagnostically to get an understanding of what the student knows or does not know.

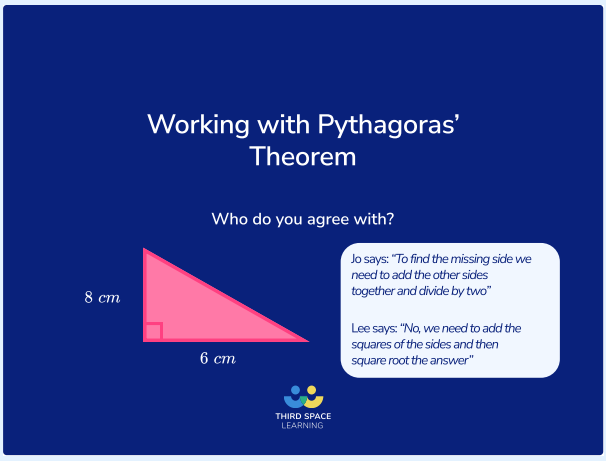
By asking carefully considered questions, tutors can model various planning techniques for their students.

For the GCSE lesson, examples may include:

- How do you know that Lee is correct?
- How has Jo/Lee worked out their answer?
- Do you remember the formula given by Pythagoras' Theorem?
- How could you use it to answer this question?
- Would you change your method if you were not trying to find the longest side?
- How do you know which side is the longest?

The tutor may also encourage monitoring metacognitive strategies. For example, asking students:

- How confident are you about your explanation?



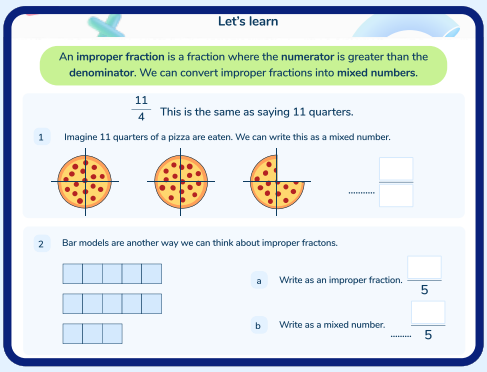
Third Space Learning's online one to one GCSE maths revision programme introduction slide

2 Explicit strategy instruction

Explicit instruction is an important stage in developing metacognitive skills. It ensures that students are secure in their knowledge of the different cognitive strategies available to them for problem-solving. Explicit instruction is teacher-led and the quality of the instruction is likely to depend on the pedagogical knowledge of the teacher.

Providing clear worked solutions with notes that detail each step is an effective method for explicitly teaching new topics.

Practical ideas for explicit instruction of metacognitive skills



Tutors engage students in their Third Space Learning one to one maths tutoring by asking questions.

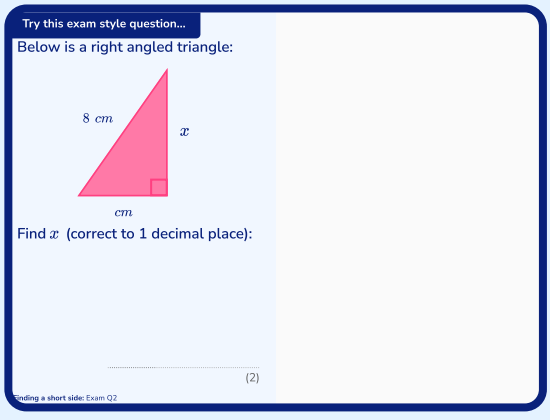
In this KS3 Third Space Learning lesson, the explicit instruction stage teaches students how to use visual representations and bar models to help them understand conceptually how to convert between mixed and improper fractions.

Students could also be asked to evaluate the success of various cognitive strategies so that they are actively engaged in this stage. For example:

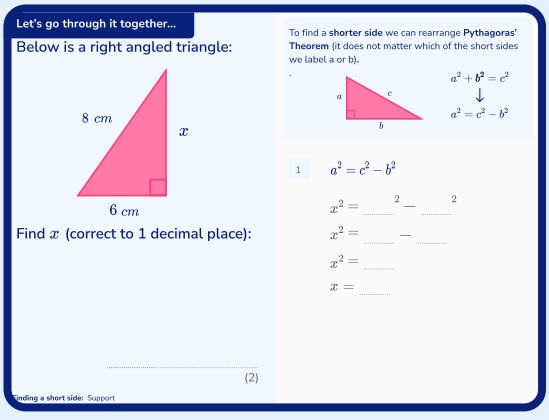
- How could you check if the mixed number you found is actually correct?
- How do you think a student may get stuck here?

Our GCSE revision programme takes a slightly different approach. As this is a revision programme, we want to ensure that revision is focused on the areas where students need the most support and doesn't waste time on topics students are already secure in. For this reason, students jump straight into an exam style question without help from the tutor. The tutor can then use this as an assessment point and decide what level of instruction, modelling and guidance a student needs.

Does the student already know which strategies to use and accurately carry them out? If yes, students can move onto more independent practice. If not, tutors can explicitly teach students the strategies needed with the support slide.



Students first attempt an exam style question alone.



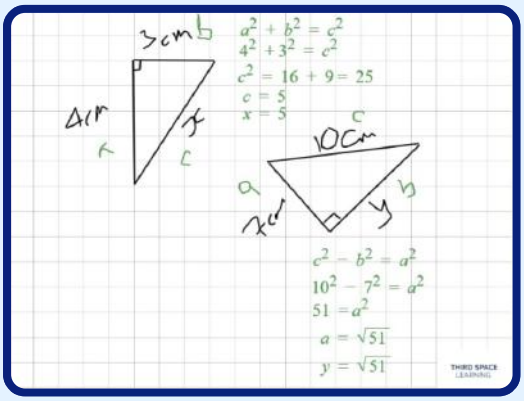
For students unable to complete the exam-style question alone, tutors can use support slides.

For example in this support slide, the student is guided through how to apply the formula for Pythagoras' theorem to find both the hypotenuse and a short slide.

After explaining the formula, tutors may ask students to consider questions such as:

- How can I identify the hypotenuse (longest side) of a right angled triangle?
- If I knew the two shorter sides of a right angled triangle, how could I use Pythagoras' theorem to find the hypotenuse (longest side)?
- If I had the hypotenuse and a shorter side, how could I find the other short side using Pythagoras' theorem?

If needed, tutors may also choose to bring up a blank slide and draw out some simpler examples to build understanding.



Slide showing examples and explicit instruction.

3 Modelling of learned strategy

This stage is also teacher-led but the students will need to engage at a higher-level compared to the previous stage.

Modelling a new strategy offers two important benefits for students:

- Firstly, they learn how to apply the new strategy to solve problems.
- Secondly, it is an opportunity for the teacher to model metacognitive strategies if they think-aloud and verbalise their decision-making processes.

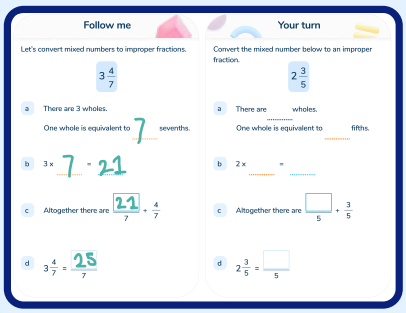
Modelling a strategy using worked solutions has been shown to be an effective form of explicit instruction in mathematics, especially for novice learners (Manson and Ayres, 2019).

However, expert learners benefit more from partial worked solutions due to the expertise-reversal effect. The amount of detail included in demonstrating a new technique should depend on the students' proficiency and the difficulty of the technique.

Example-Problem Pairs is a very effective approach for modelling in mathematics.

The teacher presents two very similar problems to the class (one on each side of the board). On one side, the teacher models a complete solution and students then attempt the question on the other side of the board, using the worked solution as a guide.

Practical ideas for modelling of learned strategy



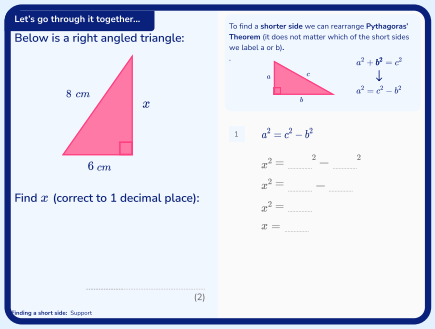
Third Space Learning's tutors verbalise and model their metacognitive skills to students.

In our online one-to-one tuition, our tutors demonstrate maths concepts to students and also explicitly explain and demonstrate the metacognitive skills that students need to improve their maths performance.

Students and tutors can discuss ideas through their audio connection and the tutor can reveal the planning, monitoring and evaluating thought processes of an expert.

For example:

- "The first thing I would always try to do with questions like this is to..."
- "I might check at this point that I am on the right track by..."
- "To check if the answer is correct, I would..."



Tutors break down complex multistep questions step by step

In our GCSE revision lessons, the support slide allows tutors to break down more complex questions and walk through them step by step.

For example in this Pythagoras' theorem question, a tutor would either model or guide the student through a problem solving approach by finding CB in order to find CD (x).

- I have been asked to find x in this question, but I cannot find it straight away because I do not have enough information – what side can I find and how?
- How does finding CB help me to find x(CD)?

4 Memorisation of learned strategy

Students will eventually need to memorise new strategies if they are to use them successfully under exam conditions and beyond. However, a teacher may choose to let their students refer to their notes in the early stages of the learning process.

This benefits the students by reducing their cognitive load, allowing them to focus more on applying the new process rather than remembering it.

Memorising a new strategy requires students taking responsibility for their own learning, with the teacher taking a supportive role.

Practical ideas for the memorisation of learned strategy

Within each Third Space Learning one to one tutoring session, students are encouraged to memorise metacognitive strategies through the independent practice they complete at the end of each session.

During the sessions themselves, the tutor can ask questions to make sure the student is practising using the metacognitive strategies the tutor just demonstrated.

For example:

- What did you notice first?
- How could you check that the answer is correct?
- How do you know what strategies to use here?
- What could you start by working out?

5 Guided practice

Scaffolding is an effective form of guided practice; the process of supporting students to answer a question through a series of hints or prompts. In mathematics, scaffolding has been found to be positively correlated with the development of metacognitive strategies.

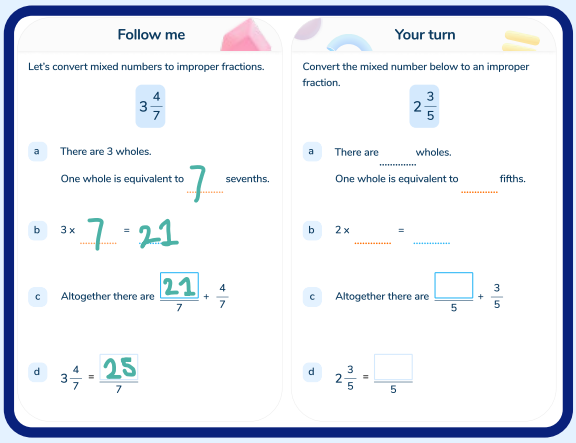
Guided practice is likely to involve adapted activities, allowing students to work at different levels or at a different pace to each other.

Verification feedback (identifying if an answer is right or wrong without further explanation) is an effective way to support guided practice (Guo and Wei, 2019)[9]. Teachers act as facilitators at this stage with the majority of the work being completed by the students.

In mathematics, when students are given a copy of the answers, they can provide themselves with verification feedback which is an effective way to prepare them for independent practice.

Practical ideas for guided practice

Every Third Space Learning tutoring lesson uses our structured curriculum of intervention lessons, in which paired examples give the student an opportunity to practise completing a question with a perfect model answer (as well as all the support they might need from their tutor). This provides scaffolding for the student to approach the question in easy digestible steps.



Students complete the 'your turn' section, using their tutors example and guidance to help them

Our GCSE lessons provide as much or as little scaffolding as an individual student may need.

Once a student has completed a support slide, the tutor will ask the student to recall what they have learnt and then give them a chance to apply it once again. If the student seems confident, the tutor can take the student straight through to an assessment slide. If not, the tutor can pull up a blank slide and give the student more practice questions on the topic before moving on.

They might ask:

- Which side can we start by finding here?
- How will you apply Pythagoras to answer this question?
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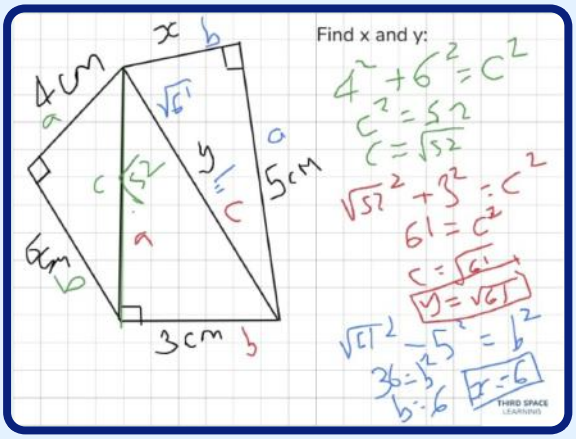


An example slide a tutor may use if students need guided practice.

6 Independent practice

The five preceding stages are essential stepping stones towards students being able to complete independent learning and practice.

Independent practice involves intelligent practice where students get a chance to make active choices in how to manage, organise, deploy, monitor and evaluate metacognitive skills.

This stage is student-led and teachers are used as a source of expertise when necessary.

Practical ideas for independent practice

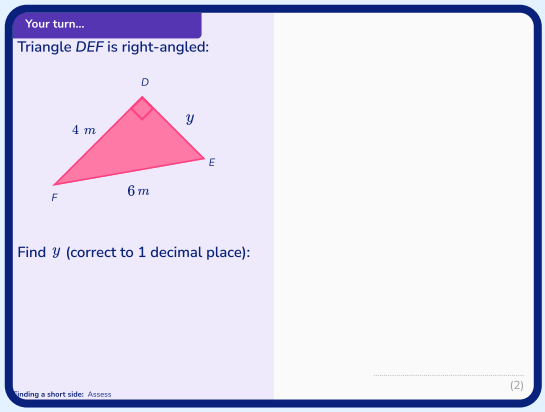
In Third Space Learning's tuition, students have a tutor on hand to give effective and timely feedback whilst supporting motivation with specific praise that develops a growth mindset.

For example:

- "Excellent demonstration of converting to an improper fraction correctly, I saw that you drew a bar model and that helped you remember what to do!"
- "I see you picked up on the mistake in the last question correctly, can you explain why so many students make this mistake?"

At GCSE, our exam question slides give students the ability to demonstrate and practise what they have learnt. Tutors encourage students to talk through their thought processes as they choose which strategies to use in order to break down each question:

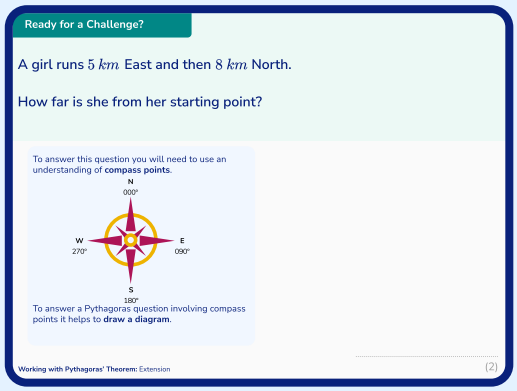
- Can you approach this question by yourself?
- What strategies are you going to use?
- Can you talk me through your thinking?



Exam style questions in Third Space Learning's GCSE revision programme

During independent practice, challenge is also crucial to allow students to develop and progress their knowledge of tasks and themselves. Our Third Space Learning lessons end with a challenge slide which extends students' thinking.

Extension questions in our GCSE programme allow for all students to be stretched and supported in the way that best supports their learning. These also give them an opportunity to think about how they can apply the strategies they have practised in a more unexpected context. For example, in the challenge question below, students need to either mentally construct or sketch the triangle described in order to apply the techniques they have learnt in the lesson.



A challenge slide from Third Space Learning's GCSE programme.

7 Structured reflection

When students are encouraged to share reflections of the learning process with their teachers, it significantly improves students' ability to use metacognitive strategies.

Part of its success is because it provides opportunities for teachers to intervene or adapt their strategies to further enhance students' learning.

For example, a study found that secondary students' attainment when learning Pythagoras' Theorem was significantly higher when metacognitive prompts were introduced at the end of each lesson compared to control groups taught by the same teacher (Baliram & Ellis, 2019)[6].

The prompts completed by the students were:

- 'Today, I learned...'
- 'I can now apply...to solve...'
- 'I understand...but still don't understand...'

The first 5-10 minutes of the next lesson was dedicated to whole-class feedback based on any misconceptions identified by the teacher from these prompts.

Practical ideas for structured reflection

This is why we build in structured reflection time into our Third Space Learning lessons. Structured reflection time is when a tutor questions students to encourage active reflection on their learning.

Metacognitive Questions for Mini-Plenaries	
Creating	Can you think of other strategies you might have used when calculating (link to lesson...)? How would you check if someone had understood this lesson?
Evaulating	How efficient were the strategies you used to find the answers? Which part of this lesson do you feel you did really well on? Which part of this lesson did you find the hardest?
Analysing	What made the learning easier? Explain how the strategies you used were successful.
Applying	How could you use what you learned here in other areas of Maths? When might you need to use what you have learned in real life?
Understanding	What do you think are the most common mistakes people make when learning about (link to lesson...)? What is the most important thing we need to know when learning about (link to lesson...)?
Remebering	Tell me 3 things you remember from this lesson. Tell me one new thing you have learned today. What skills did you use in this lesson?

Example questions for mini plenaries taken from Third Space Learning's initial tutor training programme

The 3 stages of metacognition in the maths classroom

Here, we'll see how metacognition might look in the maths classroom while students are planning, monitoring and evaluating.

Planning Stage

- When presented with a probability question, a student decides whether to draw a sample space, Venn diagram or tree diagram.
- When preparing for an assessment, a student chooses between reviewing notes or answering practice questions.
- When approaching a maths problem, a student asks themselves questions such as:
  - Have I done something like this before? If so, what did I do?
  - How is this similar or different from the examples I've seen before?
  - What can I find out, even if it isn't what the question is asking for?

Monitoring Stage

- A student checks their answers while completing an exercise to see whether they are using an effective strategy.
- When solving questions involving angles, a student checks whether their answers make sense compared to the diagram. For example, asking themselves if an acute angle makes sense in that particular situation.
- A student may ask themselves the following type of questions:
  - Am I getting the right answers?
  - Am I using the most efficient method?
  - Could I get the same answer using a different strategy?

Evaluating Stage

- A student reflects on the effectiveness of a strategy selected in terms of accuracy and efficiency. For example, realising that using the alternate segment theorem would have been a quicker approach than using geometrical reasoning and other circle theorems to reach the correct answer.
- When evaluating their performance, students may use self-reflection questions such as:
  - Were any of my steps irrelevant?
  - What could I do differently to be more efficient next time?
  - Which topics should I revise before the next assessment?

10 practical metacognitive strategies for the classroom

Planning Stage:

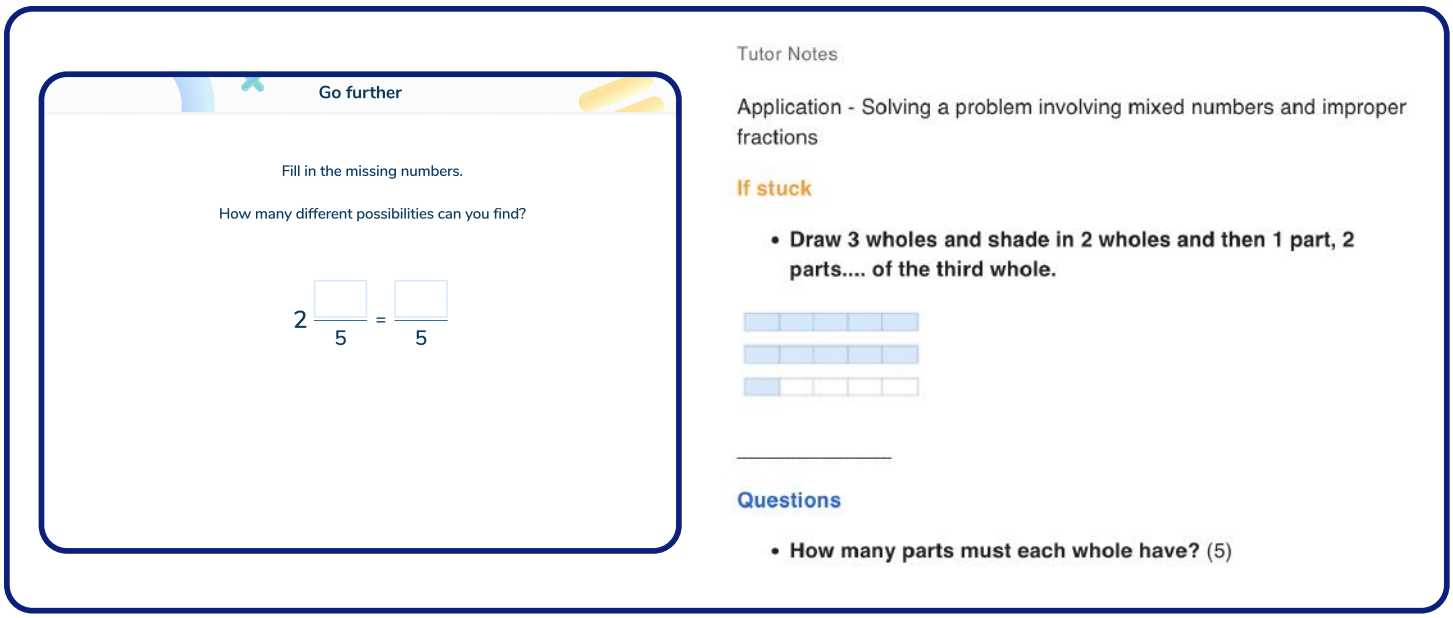
1 Break the problem down

Maths problems, especially multi-step word problems or problem-solving questions, can be overwhelming. Students might rush in and make mistakes.

Get learners to take a step back to 'unpack' the question to make sure they understand it. Ask them questions like:

- Is this something you have done before?
- Is it similar to something you have done before?
- Is there anything you recognise?
- What are the important elements of the question or task?
- What resources do I need to answer this question?

Not only will it boost their self-confidence if they know they have solved a problem like this before, but it will also help them to make connections in their learning and activate prior knowledge.



In our online one to one maths tutoring, lessons are structured to guide students from guided to independent practice. We provide tutors with questioning prompts to help students to use metacognitive strategies when working more independently.

Read: Effective Questioning In The Classroom: 9 Tried and Tested Techniques For Teachers[7]

5 min read

2 Peer and partner work

Talking with their peers, asking reflective questions, and debating approaches to problem-solving helps learners to develop **higher-order thinking and reasoning skills**. Such conversations can create productive conflicts that help learners develop multiple perspectives, leading to deeper understanding.

Interacting with peers can be more effective in achieving successful learning than working only independently and can be as effective as working one on one with an adult.

Purposeful peer work allows learners to:

- Examine their thinking process and the approach they used in order to identify different ways of solving a particular problem;
- Explore diverse appropriate strategies or varying viewpoints;
- Use active listening and reading strategies;
- Think aloud;
- Test out ideas and methods that are different from their own;
- Debate or negotiate to reach a consensus in decision-making before presenting to the group.

In practice, this often means reducing teacher talk time. At the beginning of a lesson, a teacher will speak for a short time to set up a task, with learners then working independently to decide on an effective strategy and engaging in discussion and 'metacognitive talk' with their peers.

With younger students or those not yet confident with peer work, teachers can provide a structure for discussion, through questions, guidance and templates.

3 Goal setting

During the planning stage, learners should set themselves short-term goals or targets. This might look like a checklist or a success criteria.

Short-term goals:

- **Keep students on track** – Breaking a learning task up into smaller, more easily attainable chunks, in the form of goals, will enable learners to keep track of their progress.
- **Make students more productive** – Learners are less likely to procrastinate if they only have to focus on one small task at a time.

Monitoring (or doing) stage:

4 Questioning

Many learners are afraid to ask their teachers or their peers for help for fear of looking silly or inattentive. However, it is important that a teacher creates a learning environment that encourages learners to ask for help and not to fear making mistakes.

This will avoid cementing any misconceptions or misunderstandings they may have into their long-term memory. Asking questions allows learners to not only consolidate their new and prior knowledge, but also enables students to figure out which topics they don't understand as well.

Asking questions allows learners to seek feedback and advice on how to improve or adapt their strategies so they can become better learners.

"Third Space Learning provides the opportunity for the children to ask questions and apply skills in a safe environment where they are not afraid to fail in front of their peers. Very good for increasing confidence and this is demonstrated in class lessons where less able mathematicians are beginning to contribute more ideas."

Helen Soderstrom
Assistant Headteacher, Mount Nod

Questions might include:

- What steps should I take first?
- What do I already know about this topic?
- How can I check that I am doing this right?

5 Monitoring progress

Learners need to be constantly monitoring their progress whilst completing a task. This might look like:

- Referring back and assessing their progress towards their goals.
- Self-questioning to ensure they are on the right track.
- Checking methods and looking out for calculation errors which might affect the outcome.

6 Improving self-regulation

Self-regulation, or metacognitive regulation, can be defined as one's ability to manage thoughts, feelings, and actions whilst striving towards a goal. In other words, they are students who actively engage in the full metacognitive cycle and are aware of which phase they are working at.

How can we help learners to improve their self-regulation?

- **Manage time effectively** – Encourage learners to keep to deadlines and to adapt strategies based on how long the task is taking them.
- **Remove distractions** – Help learners to remove different distractions and help them to reflect on its impact on their productivity.

7 Developing resilience

When working on a new or difficult task, learners can find it daunting. When learners are stuck, they should ask themselves metacognitive questions, such as:

- What could I do differently?
- Have I seen anything like this before?
- What support will help me? *(for example, books, resources, manipulatives, peers, teachers)*

This will put them in a position to overcome obstacles along the way and, where possible, try different strategies before going to the teacher or teaching assistant for help.

Read: What Is A Growth Mindset And What Does It Mean For Kids And Parents[8]

3 min read

Evaluation (or reviewing) stage:

8 Self-evaluating

After successfully completing a task, learners may not remember what they struggled with, and may not realise how much new knowledge they have acquired.

It is important that learners engage in self-evaluation so that the next time they complete a task, they can apply what they have learned and avoid making the same mistakes.

Teachers can encourage self-evaluation by asking learners to review their corrected homework, classwork and exams, engage with teacher feedback and perform self-marking against a success criteria.

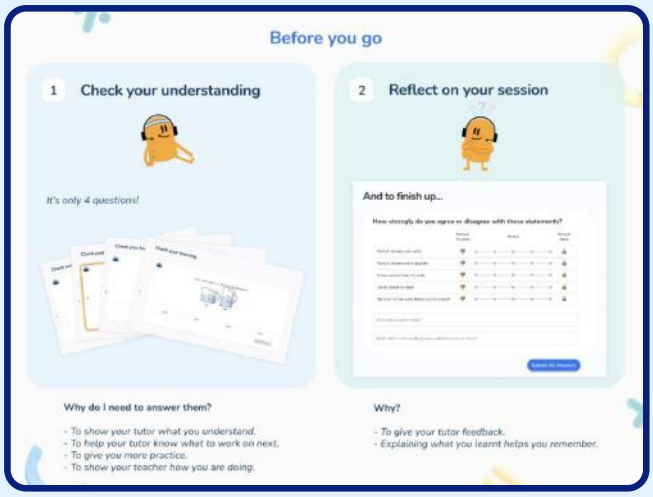
Teachers can also ask students to self-question:

- What did I learn about this topic that I did not know before?
- What was easy for me?
- What content was challenging to learn?
- Do I understand it now?
- Why did I make the mistakes that I did?
- Where did I succeed?
- Where did I go wrong?

"[Self regulated] learners are proactive in their efforts to learn because they are aware of their strengths and limitations and because they are guided by personally set goals"

BJ Zimmerman, Becoming a Self-Regulated Learner: An Overview[9]

In Third Space Learning's intervention, all tutoring sessions end with a series of post-session questions to help students to reflect on their own learning and understanding of the content and strategies covered. The outcome of these post-session questions additionally help us to assess students' progress to inform the programme of lesson objectives they'll cover in future sessions.



Post-session questions help students to reflect on their learning

9 Test yourself

Learners can use self-testing to help them remember information and to control the learning process. Self-testing and retrieval practice allows learners to review what content they know well, identify what they need to practise more, and what they need to re-learn.

There are various ways in which teachers can encourage students to self-test, including:

- Completing practice tests
- Quizzes
- Flashcards
- Teaching peers

10 Identifying the best metacognitive strategies

There are many metacognitive strategies out there and there will be some which are more effective than others – but this will be highly dependent on the individual using them!

If students spend time building their own individual armoury of metacognitive skills to draw upon, they can make the most out of their learning in the classroom.

Teachers can encourage learners to do this in many ways, such as:

- Reflect on the pros and cons of the methods and strategies students have used;
- Rank metacognitive strategies from the most to the least effective for them;
- Recognise what mistakes they made when trying new metacognitive strategies and what they can improve on the next time they use this strategy.

How to embed metacognition across your school

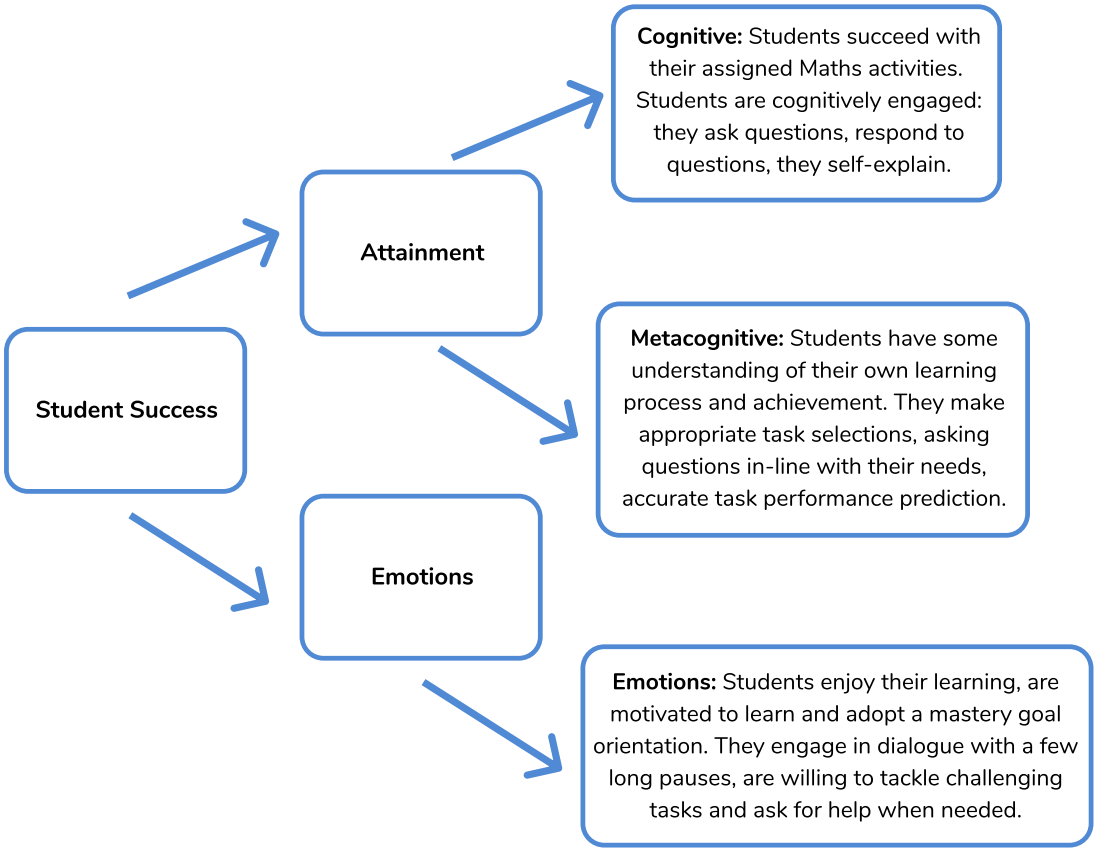
Overall, the costs associated with implementing metacognition in schools are low and can broadly be divided into two main costs: skills and support.

Boosting staff skills

It is key to invest in appropriate CPD - this is where the majority of costs associated with metacognition arise. However, it is an essential start up cost as teachers need to be confident in understanding the metacognitive demands of the topics they are teaching so that they don't miss opportunities to develop students' metacognitive knowledge and skills.

At Third Space Learning, we provide our tutors with explicit training on metacognition and the best ways to develop these skills in our online one to one context. Tutors receive initial and ongoing training on the metacognitive knowledge required to approach tasks in maths.

We also recognise the important role that enjoyment and fluent dialogue play in motivation, which we name 'Emotions' in our framework. That's why we put a huge focus on rapport and relationship building in our training and programme.



Third Space Learning framework for student success, with a focus on metacognition and cognition

Supporting staff to develop metacognition

Once teachers have received initial training, schools should support teachers to implement ideas into lessons.

To do this, schools should ensure metacognition features regularly on their CPD timetable, with opportunities for teachers to discuss and share good practice. It is also a good idea to include it as a focus for observations and learning walks to see good practice in action and identify opportunities for further development. This requires SLT & staff time and resources to complete, but should be a low cost considering schools should already be covering staff salaries, materials and equipment for teaching.

Every week with Third Space Learning, each tutor has one of their lessons evaluated by an expert and they are then given support in integrating metacognitive and other teaching strategies into their sessions.

Continuous CPD is also delivered and used to help tutors understand how to encourage and support students' metacognition in the specific domain of maths.

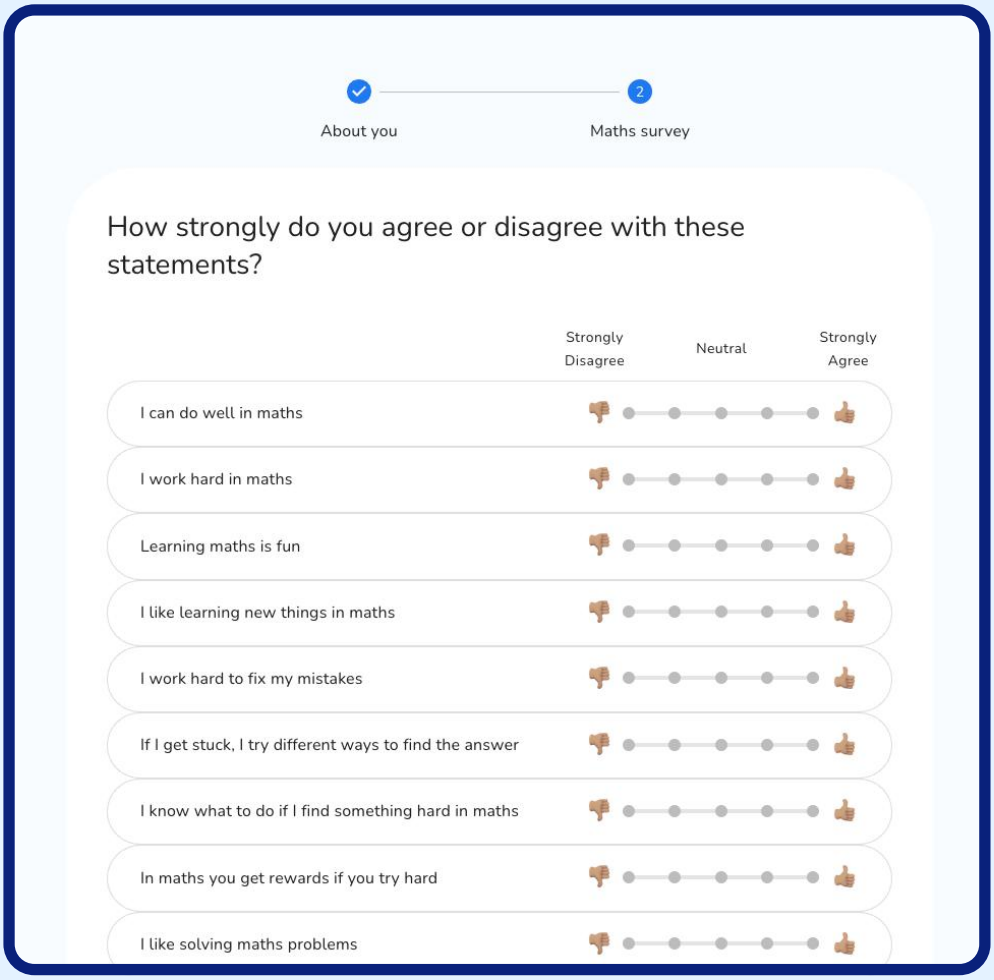
Reflect on the success of metacognition in your school

As with any initiative in schools, it's important to reflect on its success to decide if existing approaches are having the intended outcomes or if changes are required.

Here at Third Space Learning, we assess the impact of metacognition in our lessons by using student self-reporting questionnaires.

Each programme begins with a diagnostic assessment where we ask cognitive (domain specific), affective (emotional) and metacognitive questions. At the end of our programmes, students take a similar assessment. We then cluster students into groups and then track which areas they have improved in.

This gives Third Space Learning an idea of which areas we are having the most (or least) impact in and this informs and supports our continuous professional development of tutors and curriculum design.



Before starting tutoring with Third Space Learning, students answer metacognitive and emotional questions about maths. This helps us to measure progress and adapt sessions.

Challenges of embedding metacognition

While metacognition is a valuable tool for students, it also comes with its own set of challenges:

1 Metacognition is difficult to define

Metacognitive skills can become automatic, especially for teachers, which can make them difficult to identify, verbalise and teach. The EEF acknowledges that metacognition can be hard to define and describes it as an 'elusive' topic.

It's also something that we, as humans, sometimes do and develop naturally so it can be tricky to identify concrete examples. However, it is the explicit instruction of these techniques that can have a huge impact on student progress, especially among disadvantaged students.

2 Metacognition requires CPD for staff

Teachers, and other educational staff, need to be shown how to develop students' self-regulation, emotional control, and independence.

Although metacognition is about learners taking control of their own learning, a teacher's role is vital to develop students' metacognitive skills and strategies to empower them to do so.

A great place for staff to start is over on the Third Space Learning blog:

- What Is Metacognition And Why Does It Matter For Education?[10]
- How to Teach Metacognitive Skills: Practical Examples For Primary & Secondary Students[11]
- Metacognition In The Classroom: A 7-Step Practical Approach To Maths Teaching[8]

3 Metacognition requires careful planning

Metacognition is most effective when embedded in a school's curriculum and a specific subject lesson. As the EEF states, "without cognition, there is no metacognition".

Introducing new content alongside metacognitive skills can cause cognitive overload, which can hinder the learning process. Metacognitive teaching activities should be strategically integrated to avoid disrupting the ongoing learning process.

Organising the planning process with the aid of templates, teacher modelling, worked examples, and breaking down tasks into smaller steps can prove advantageous in achieving this objective.

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