The Handy Little Guide to...

Growth Mindset in Maths

A practical guide to embedding a growth mindset towards maths in your school.

Pearson

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Making sense of growth mindset

Global research has shown that learning is greatly affected by what learners perceive they can or cannot do.

Understanding mindsets

Carol Dweck's groundbreaking work in this area has had a huge impact on educational practice[1]. Dweck's research shows that everyone has a mindset – an idea about their own potential which determines their beliefs and behaviours. Those with a fixed mindset believe that qualities such as intelligence, talent and ability to learn are pre-determined. By contrast, those with a growth mindset believe that hard work, effort and commitment contribute towards success – it is within everyone's power to do well and to succeed.

> *"It's not surprising that studies have repeatedly shown that learners with a growth mindset achieve more in school and later on in life."*

[1]Dweck, C (2007) The New Psychology of Success (Ballantine Books)

Mindset in teaching for mastery

Teaching for mastery in maths is fundamental to the government's education reforms and is reflected in the 2014 English national curriculum for mathematics. The National Centre for Excellence in the Teaching of Mathematics (NCETM), Department for Education (DfE) and OFSTED have all endorsed this evidence-based approach which is inspired by some of the leading performers in mathematics education (including Shanghai and Singapore). At the core of a mastery approach is the belief that everyone can achieve in mathematics. Having a growth mindset is therefore critical to achieving mastery – the two concepts go hand in hand.

Nurturing growth mindsets

It is important to actively nurture growth mindsets from an early age. Children's beliefs about their own potential are heavily influenced by the perceptions of their parents, carers and teachers. If children hear the people around them saying they can't do maths, or that they don't like maths, this is likely to have a negative impact on children's learning. Ensuring that children, teachers and parents really believe this is the first step on a school's journey to teaching for mastery.

We've worked closely with teachers and experts to pull together this guide to help you as you embark on your own growth mindset journey!

Fixed mindsets and growth mindsets

It is not unusual for people to say "I can't do maths". You rarely hear people say this about reading or writing, so why is it so common? Interestingly, Dweck's research has shown that high achieving girls are some of the worst hit by fixed mindset thinking, which leads to them avoiding challenging work and higher level mathematics study.

When faced with difficulties, everyone has a choice. Learners with a fixed mindset will react differently to those with a growth mindset. Take a look at the common phrases below and have a think about your own mindset.

Don't worry if you think that you, or others in your school, have a fixed mindset in maths. Mindsets can change – where the fear of making mistakes and being judged is removed, learners can grow in confidence.

Fixed mindset	Growth mindset
I'm not good at maths - I've never been good at maths.	I'm finding maths hard now, but I can improve with time and effort.
I give up – I can't make this any better!	I can improve if I keep trying!
If I fail, I am a failure.	Most successful people fail along the way.
I can't do this – I keep making mistakes.	Mistakes help me learn!

Modelling a growth mindset in maths

Modelling a growth mindset in maths can help to dispel the myth that ability in mathematics is pre-determined. This guide explores 4 key principles, shown in the flow chart, which will help schools to embed the belief that everyone can do maths!

‘Everybody can’ in maths

Traditionally, maths lessons in England have been structured around ability groupings. Children deemed to be ‘less able’ have been given tasks pitched at their perceived level of understanding, whilst those thought to be ‘more able’ have been challenged with more complex mathematics.

Mastery rejects the idea that some children can’t do maths – because of this, teaching for mastery involves whole class teaching. All children should work on the same learning objective and activity. Children who grasp topics more rapidly should explore concepts in greater depth, whilst children who are struggling to keep up should receive targeted intervention to address any misconceptions.

This organisational shift alone is unlikely to be enough to change the status quo! The belief that maths is a gift that some children have, and some children do not, runs so deep that children, parents and teachers truly believe it. In her groundbreaking research, Jo Boaler exposes the damaging effect of this ‘myth’, highlighting that research has time and time again shown that ability in mathematics is not predetermined[2].

> *“Maths teaching for mastery rejects the idea that a large proportion of people ‘just can’t do maths’. All pupils are encouraged by the belief that by working hard at maths they can succeed.”*
>
> *NCETM, The Essence of Teaching for Mastery, 2016*

[2] Boaler, J (2015) *The Elephant in the Classroom: Helping Children Learn and Love Maths* (Souvenir Press)

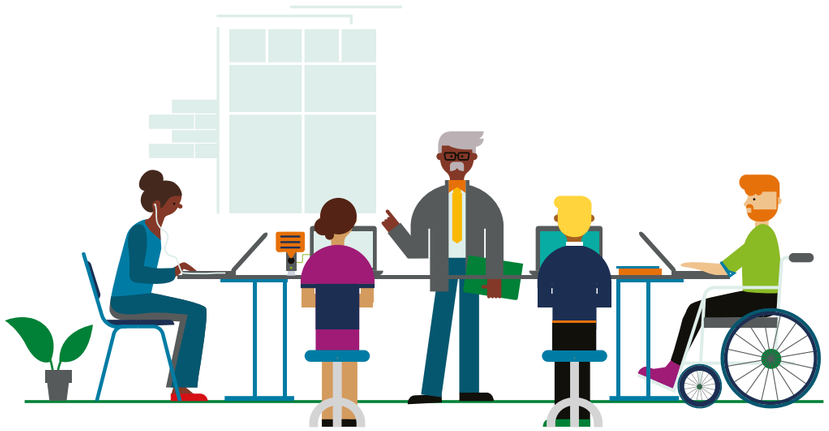
A whole school approach

Adults will have existing beliefs about their ability in mathematics, formed by their own experiences. Some teachers will love teaching maths, whilst others will dread their maths planning each week. In the same way, children are influenced by those around them – their classmates, teachers, teaching assistants and any other adults they meet in the school day. Just as schools come together to plan their approach to teaching a subject, it is important that schools take a consistent approach to embedding growth mindset attitudes.

A whole school approach is key – for growth mindset to be successful, a ‘can do’ attitude must become part of the school culture and ethos.

Tips

- **Mindset audit:** Consider conducting a mindset audit together in a staff meeting. Often people do not recognise that they have a specific mindset, and exploring this together is a great first step towards change. This audit may also highlight areas for further professional development for staff.
- **Nominate mindset champions:** Growth mindset is fascinating, and you’ll find that some staff are really interested by the educational research in this area. Consider nominating a mindset champion to help coordinate your approach as a school.
- **Growth mindset language:** Bring staff together to discuss growth mindset vocabulary. Language is important and the words used around learners has a profound effect on their mindsets. Encourage teachers to use consistent growth phrases such as “Everyone can!” “Mistakes can help you learn!” and “Just try a little longer”! It is critical that teachers remember to praise hard work and effort rather than success. Saying “Well done – you tried so hard and succeeded” is much more effective than saying “Well done – you’re so clever!”. It is important teachers use growth mindset vocabulary when talking together or with parents too – discussing ‘attainment’ rather than ‘ability’ is a small shift but one which will have a big impact over time.



Bringing everyone on board

Once the whole school has committed to encouraging a growth mindset, it is important to ensure that children and their parents and carers are bought into the idea too. Engaging busy parents and carers can be challenging, so it's a good idea to secure buy-in from the get-go. When children join the school, spend a small amount of time explaining the importance of exposing them to growth mindset messages and vocabulary at home. You could also draft a letter to send home which explains how parents and carers can help at home.

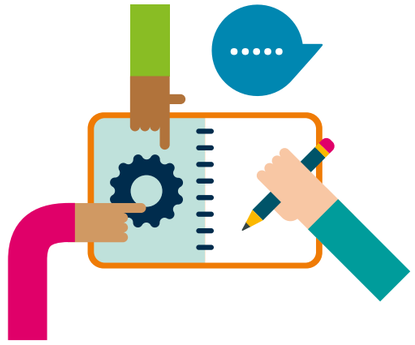
In school, you can use whole school assemblies and projects to further embed growth mindset attitudes.

Tips

- **Whole school assemblies:** Schools often have reward assemblies. Praise motivates children, but have a think about the awards given and the language used. Pick your language carefully and make sure you are rewarding children for their effort rather than by telling them they're 'clever' or 'smart'. This will help children to see the value in learning and will encourage them to take risks, to try harder and to persist with problems. You could even give an award for the most interesting mistake!

- **Whole school projects:** Whole school projects can be sent home and are a great way to engage children and their parents or carers in exploring growth mindset strategies together. These need not be focused on mathematics – the benefits will be reaped across the curriculum.

Project ideas



- [ ] Ask children to reply to an email or letter they have received from a friend who has said they can't do maths and don't see the point in learning any more. This will encourage them to reflect on learning strategies and will emphasise the benefits of learning mathematics. It's great for developing writing skills too.

- [ ] Identify key growth mindset characteristics, for example, determination, creativity, curiosity and bravery. Can children come up with characters to represent these traits and stories relating to the characters' own experiences? You could choose a set of characters to represent growth mindset throughout the school! This could run as an art and writing project.

Growth mindset in mathematics classrooms

It is not uncommon for children (or adults) to have had negative experiences of mathematics. Making mistakes or having a misunderstanding can leave a negative impression that has a long-term effect on attitudes towards mathematics. However, mistakes should be encouraged, explored and celebrated. In fact, research shows that mistakes actually increase a child's capacity to learn and grow the brain (Boaler, 2016). Explain to children that their brain is like a muscle which gets stronger with exercise.

Part of developing a growth mindset involves seeing mathematics as a creative, abstract and relevant subject, instead of a subject focused on learning procedures and rules. In class, work on tasks which involve more than one method, make connections across mathematics that have different solutions.

Tips

- **Embrace mistakes:** When time is short, it can be tempting to look for correct answers. However, mistakes are valuable opportunities to understand more deeply. Discussing them as they arise will help build resilience and perseverance. You could even try asking children to spot what mistakes other children might make – this puts children in control of their learning. Understanding why certain answers are wrong and why certain methods will not work, deepens understanding and challenges children.

- **Learning props:** Bring growth mindset to life in your classroom. Classroom displays are a great way to do this! Lower down the school you could use 'Thinking caps' to highlight the importance of taking time to work out an answer. Similarly a 'Hard hat' is a great way to show that someone is being resilient. In higher year groups you could talk about growth mindset learning dispositions such as, creativity and bravery. Why not write them on old wooden lolly-pop sticks and each week you could use them to ask the children to vote and nominate growth mindset champs!

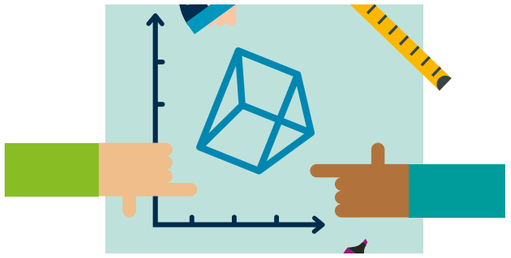
- **Mix it up:** Mixed groupings can lead to richer mathematical discussions and help children to learn from each others' mistakes. Do not group children by perceived ability and try mixing up the table groupings.

Self-assessing mindset

It's important that children recognise their own attitudes towards mathematics. The first step towards children developing a growth mindset is getting them to recognise any negative beliefs, fears or anxieties that they themselves have towards the subject.

It's also important to encourage children to reflect on how they themselves react to challenging mathematics. This gets them thinking about how resilient they are when faced with a more complex problems. Ask children to give their classmates tips to solve certain problems and explain how they moved forward when they got stuck.

Children often believe that learning maths fast means you're better at maths. It is important to remind children that it is okay to take time and to break difficult and complex tasks down into smaller ones. A mastery curriculum requires that right from the start, children are given time to think deeply about maths so that they understand the concepts as well as the procedures.

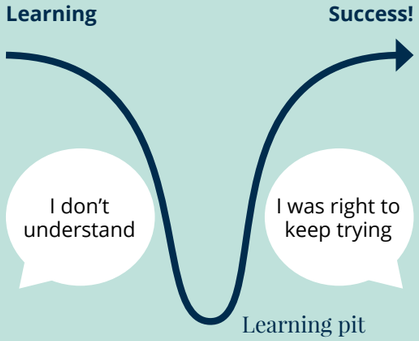


'What' questions

- ☐ What did you do today that made you think hard?
- ☐ What can you learn from this?
- ☐ What mistake did you make that taught you something?
- ☐ What will you do to improve your work?

Tips

- **The power of 'yet':** Encourage children to take risks, and not be frightened to fail. Many teachers refer to a 'learning pit'. The struggle in the middle forms a key part of the learning journey. To help them towards success, if a child says "I can't do it", add the word "yet" at the end of their sentence.



- **Encourage reflection:** Encourage children to reflect on their learning. You can do this by asking them to think about one question they would like answered, two things they're not sure about and three things they understand well enough to explain to someone else. This can be done at the end of each week, or at the end of each topic – whatever works best for you and your class! It's also important to ask lots of 'what' questions throughout the school day! Why not try some of the suggestions opposite.

Frequently asked questions

Where can I access resources and training to help me embed a growth mindset in mathematics?

There are a number of different resources available – some free, and some paid for. You may feel you require training, or training and resources. Have a think about your own needs and search the internet to gather some initial ideas.

We recommend Jo Boaler's ***The Elephant in the Classroom: Helping Children Learn and Love Maths*** and Carol Dweck's ***The New Psychology of Success***. The NCETM also have a variety of materials to support teaching for mastery with a growth mindset:
ncetm.org.uk

If you're looking for a high-quality teaching resources and training for your school, Pearson Primary offer a range of solutions to meet your needs. Power Maths has been developed specifically to support schools with implementing growth mindset in mathematics alongside a mastery curriculum:
pearsonprimary.co.uk/growthmindsetPM

Where can I find out more about mastery and how to implement a mastery approach?

You can access more mastery support from Pearson Primary on our website. You can sign-up to receive Mastery Hub updates and articles via email too!
pearsonprimary.co.uk/masterysupport

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