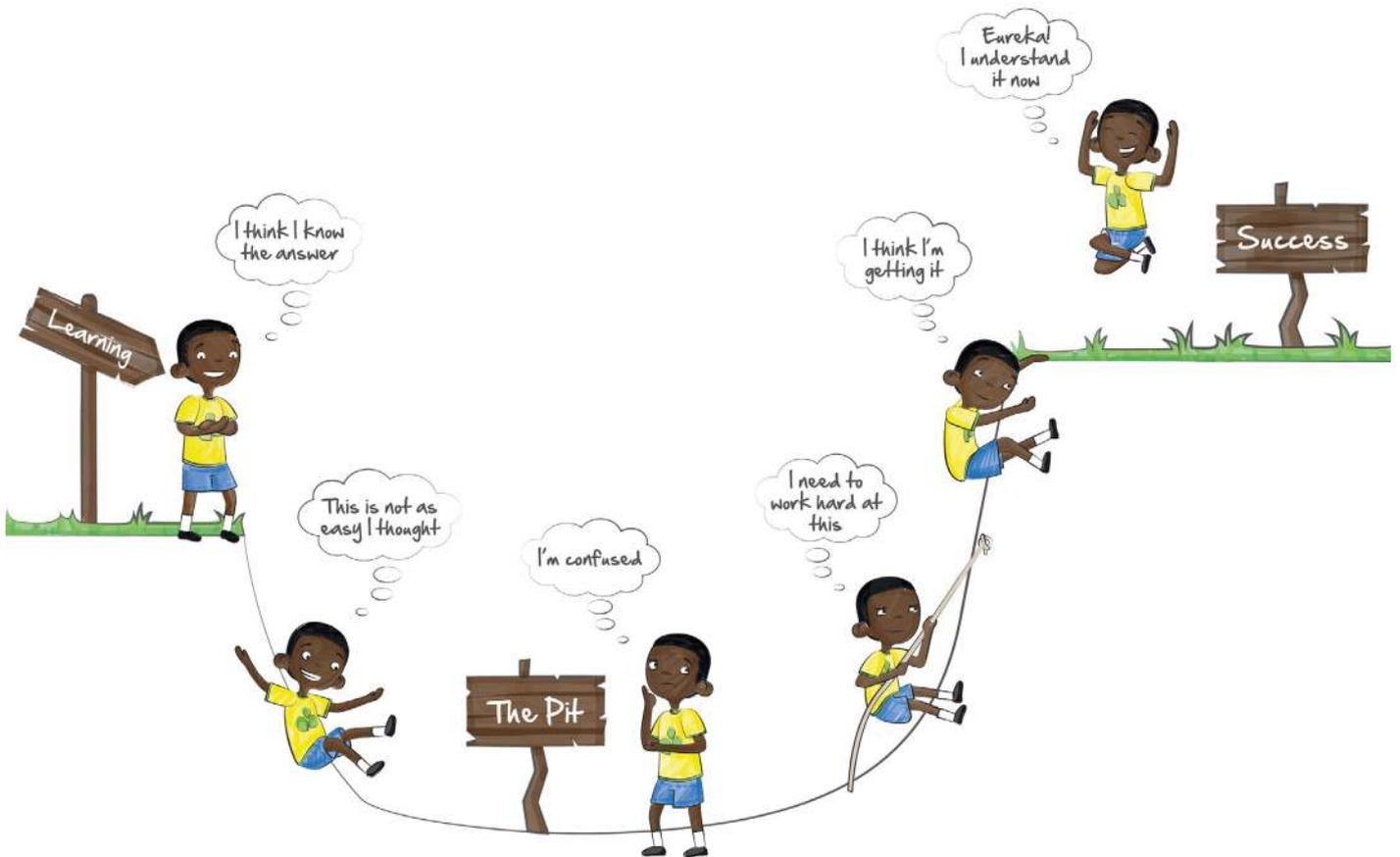




Challenging
LEARNING



AN INTRODUCTION TO
THE LEARNING PIT
BY ITS CREATOR, JAMES NOTTINGHAM

Authorised extract from
The Learning Challenge: Guiding Students Through The Learning Pit
by James Nottingham

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1. INTRODUCTION TO THE LEARNING CHALLENGE

1.0 PREVIEW

The most important points in this chapter include:

1. The Learning Challenge encourages learners to investigate contradictions and uncertainties so that they might more deeply understand what it is they are thinking about.
2. The Learning Challenge is a frame of reference for students to talk and think more accurately and extensively about their own learning.
3. At the heart of the Learning Challenge is 'the pit'. Someone is said to be 'in the pit' when they have a set of unresolved, contradictory ideas about something they are trying to understand.
4. Learners are not in the pit when they have no idea. To be in the pit is to have *many* ideas that are as yet unsorted.
5. The Learning Challenge is designed to help learners step out of their comfort zone so that they might discover insights that are more meaningful and long lasting.

1.0 INTRODUCTION

The Learning Challenge is designed to help students think and talk about their learning. In some ways, it is a child-friendly representation of Vygotsky's Zone of Proximal Development (1978) in that describes the move from actual to potential understanding. It can help develop a growth mindset (Dweck, 2006); prompt people to explore alternatives and contradictions; and encourage learners to willingly step outside their comfort zone.

The Learning Challenge can work with all school-aged students as well as with adults. Originally, I developed the model to help 9-13 year olds understand the role of uncertainty in learning but then broadened its application to be useful for anyone from the age of 3 onwards. Although it wasn't published until I wrote my first book, *Challenging Learning* in 2010, it has been shared far and wide at education conferences and workshops since the late 1990's. Since then, it captured the imagination of educators, students *and* their parents. It has featured in many periodicals, articles and books. It appears on many classroom walls around the world. It has even made it into the UK's *Financial Times* newspaper (Green, 2016).

I'd like to think its popularity is due to its contribution in making learning more engaging and long-lasting. And from what many people tell me, that is indeed a key reason. But of course it doesn't explain the whole story. Other reasons would include how well it sits alongside

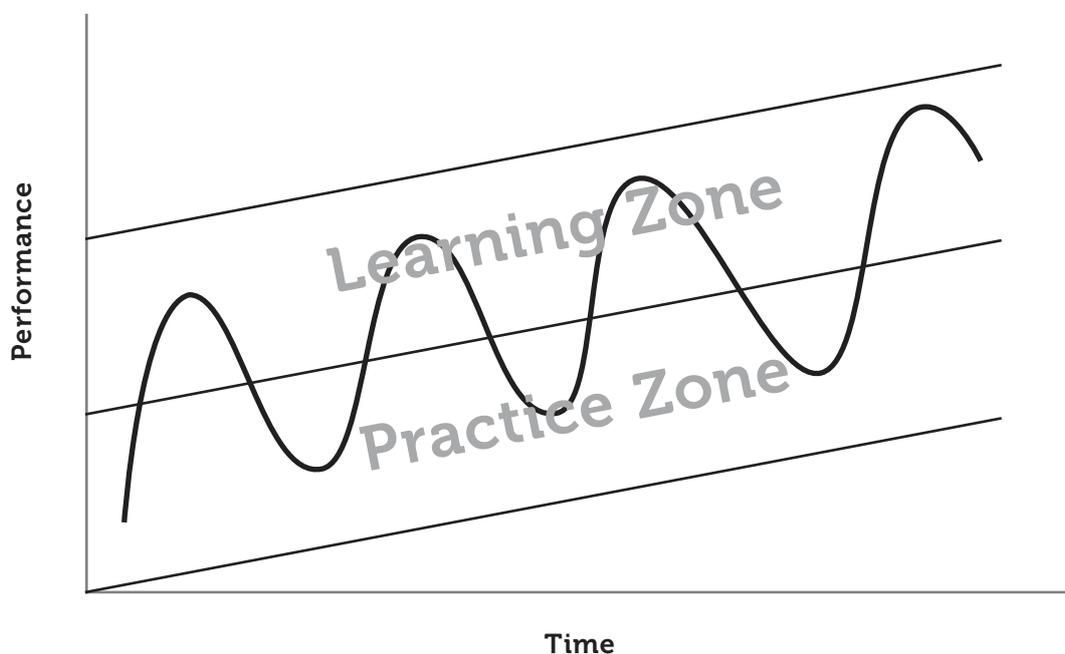
The LC sits comfortably alongside John Hattie's Visible Learning; Carol Dweck's Growth Mindset; Matthew Lipman's P4C; and Biggs and Collis's SOLO Taxonomy

John Hattie's Visible Learning (Hattie, 2011) and Carol Dweck's Mindset (Dweck, 2006). The model also helps to explain and build on the SOLO Taxonomy (Biggs and Collis, 2007) and is an effective way to structure Philosophy for Children (Lipman, 1922-2010) and other approaches to dialogue. It can guide metacognitive questions such as how does my final answer compare to my earlier thoughts; which strategies worked best for me this time; and what could I do better next time? It also offers a rich language and framework for talking about – and thinking about – learning in general.

Perhaps the main reason for the popularity of the Learning Challenge is its simplicity. It is easy enough to be understood by the youngest learners in schools and yet complex enough to keep the most advanced learners interested. Although that can also be a bit of a double-edged sword leading to some 'interesting' misinterpretations, the simplicity *and* complexity is also part of what makes the Learning Challenge relevant to so many people.

As with so many models, the Learning Challenge did not start life as the one you see described and illustrated in this book. In fact, it began life as the Teaching Target Model.

Figure 1: The Teaching Target Model



I created the 'Teaching Target Model' early in my teaching career as a way to explain to my students what progress looks like. This is how I explained it to them:

The (CA) line represents Current Ability. This is the upper limit of what you are able to do independently.

The (SA) line represents Subconscious Ability. This is what you are able to do 'automatically'. It is something you can do without having to think at all about it, like hold a pen, walk normally, say your name and so on.

The (PA) line represents Potential Ability. This is how far you can reach beyond what you can do comfortably right now. Typically, you will need to be challenged and/or supported to get to this next stage of development.

A good example to think about is learning to ride a bicycle. Presumably the first bike you rode had stabilisers (or trainer wheels) on the back. Though you might have found it strange to begin with, no doubt you will have got the hang of pedalling and before long will have been riding a bike with stabilisers with ease. This is what we could call an action within your Practice Zone. You didn't need to deliberately think about it; you just got on and away you went.

The LC began life as the Teaching Target Model that in itself is a description of Vygotsky's Zone of Proximal Development (ZPD)

Later, one of your parents will have suggested taking your stabilisers off the bike. Then what happened? You wobbled. You fell off and got back on again. You probably complained that it was it was easier before and asked why you had to do it. Nonetheless you persevered with encouragement and kept going until eventually you got the hang of it. Throughout that time of wobbling, feeling unsure, wondering if you would ever succeed, you were in the Learning Zone. One of the best-known Educational Psychologists, Lev Vygotsky called this the Zone of Proximal Development but we will call it the Learning Zone (or the Wobble Zone if you prefer).

That is what learning is all about: wobbling. If you are doing something that you can already do then you are practising. Whereas learning requires you to step out of your comfort zone; to go beyond your Current Ability (CA) and try things that will make you wobble. Playing it safe by staying in your comfort zone and doing what you can already do, will probably result in correct answers and completed work. I used to remind my students that we are here to learn together, not just 'do' together. So I encourage you to take every opportunity you can to go beyond your Current Ability (CA) and be prepared to wobble. If you are wobbling then you are learning. And if you are learning then you will flourish.

When a learner steps outside their comfort zone then they begin to 'wobble'

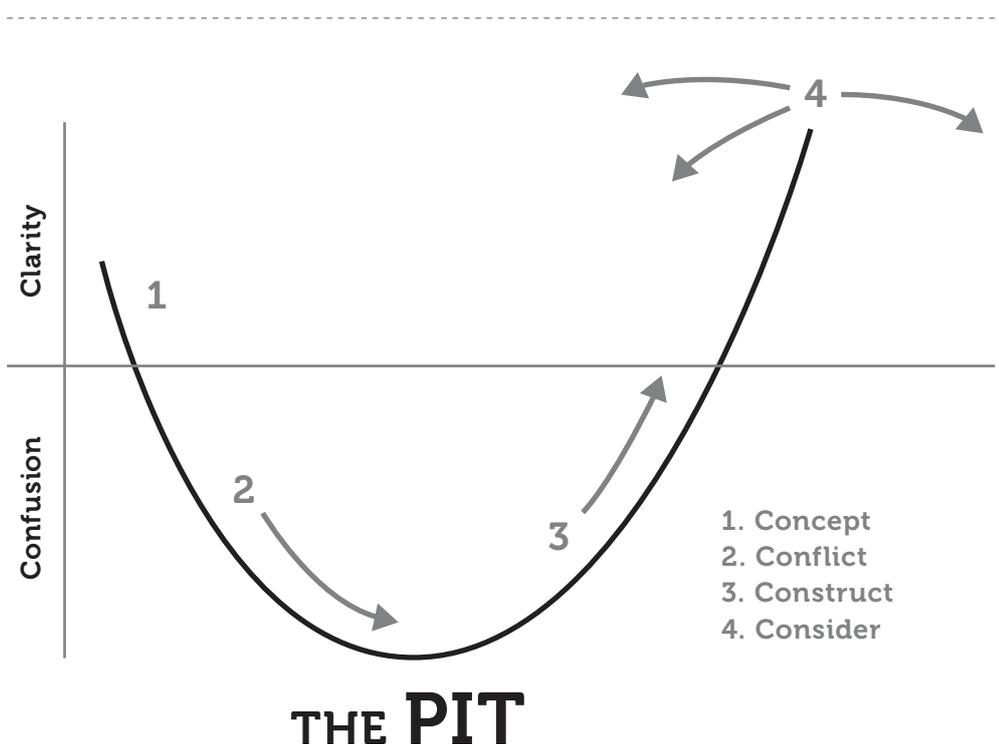
My students generally responded very well to this model. They felt as if they were being given permission to take risks, try new things and get things wrong. This contrasted with a common belief they had developed earlier in their school life that the most important thing was to get things right, even if that meant playing safe and going for the easier option. Of course I wanted them to get things right but I also wanted them to learn. So *if* it was a choice between getting things right or learning through mistakes then I was very much in favour of the latter.

A drawback to the Teaching Target Model however, was that I would represent the movement between practice and learning as a series of peaks and troughs, as you can see in Figure 1. My students would often interpret this as a series of mountains and valleys, with the top of the mountain representing the most 'wobbly' part of learning. Though in many ways this was nice, it just didn't quite feel right to me. On the one hand, I was trying to use the model to reassure my students that learning often makes people feel uncertain and vague but on the other hand, they were recalling the feelings of achievement and satisfaction people often feel when they reach the top of an actual mountain.

A 'pit' evokes feelings of uncertainty and discomfort whereas being at the top of a mountain evokes a sense of achievement and elation. That is one of the reasons why a 'pit of learning' works better than a 'mountain of learning'

So I knew it had to change but I wasn't sure how. Then when I heard John Edwards (see Acknowledgements) talking about a pit, I had my 'aha' moment. I just needed to invert the Teaching Target Model and make the 'Wobble Mountain' a 'Learning Pit.' That way, the uncertainty and risk of learning could be represented by a pit rather than a mountain top. And so the Learning Challenge evolved into the model you see today; one that has a pit at the core.

Figure 2: The Learning Challenge



1.2 THE LEARNING CHALLENGE: A QUICK GUIDE

The Learning Challenge promotes challenge, dialogue and a growth mindset. It offers participants the opportunity to think and talk about their own learning. It encourages a depth of inquiry that moves learners from surface level knowledge to deep understanding. It encourages an exploration of causation and impact; an interpretation and comparison of meaning; a classification and sequencing of detail; and a recognition and analysis of pattern. It builds learners' resilience, determination and curiosity. And it nurtures a love of learning.

The Learning Challenge is designed to encourage (literally: give courage to) your students so that they might better understand themselves and each other more; so that they develop a sense of clarity and discernment in their thinking; and ultimately so that they become more aware of who they are and what they stand for. As one of my students once said: 'how do you know what you think until you've thought it?'

Being in the pit represents being in a state of cognitive conflict

At the heart of the Learning Challenge is 'the pit'. A person could be said to be 'in the pit' when they are in a state of cognitive conflict. That is to say when a person has two or more ideas that make sense to them but when compared side by side, appear to be in conflict with each other.

Deliberately and strategically creating a state of cognitive conflict in the minds of learners is at the heart of the Learning Challenge.

Examples of cognitive conflicts that commonly arise during Learning Challenge episodes include:

Cognitive conflict is when a person has two or more contradictory ideas in their mind at the same time

- I believe that stealing is wrong but I also believe that Robin Hood did the right thing.
- Children are taught that an odd number cannot be divided into two but 3 cakes can be shared equally between 2 friends.
- I think it is wrong to kill animals but I also eat meat.
- Young children should not talk to strangers but are advised to approach a police officer or shop worker if they are lost.
- A liquid is thought of as a substance that flows freely but so does sand and that is not a liquid.
- Students know that studying will help to improve but often can't see the point in studying more.
- Telling a lie is viewed as a negative but writing fictional stories is viewed as positive – so what is the difference?
- Food is a substance that gives energy and yet many things give energy (e.g. sunshine or encouragement) but are not normally regarded as food.
- A hero is someone who takes risks on behalf of others but then so do terrorists.
- Young children are taught that an odd number cannot be divided by two and yet if a child has five pieces of fruit then they can still divide them equally between two people.
- Justice is seen as a good thing whereas revenge is thought of as a negative and yet they both seem to be about settling a score; so what is the difference?
- When we hold discussions with our students, we expect them to show respect for other people's ideas and yet there are many extreme views that perhaps we would not want them to respect.

Here are some common examples of cognitive conflict

When people think through these or other examples of cognitive conflicts then they are said to be 'in the pit.' There are more examples of cognitive conflict throughout chapters 5 and 10.

It is important to note that learners are not in the pit when they have no idea. The pit represents moving beyond a single, basic idea into the situation of having multiple ideas that are as yet unsorted. This happens when a learner purposefully explores inconsistencies, exceptions and contradictions in their own or others' thinking so as to discover a richer, more complex understanding.

In SOLO Taxonomy terms, being in the pit represents the Multistructural stage of learning and, as they come out of the pit – the Relational stage of learning. (See 1.3.7 and 9.1)

The SOLO Taxonomy can help to understand the LC (and vice versa)

And that is the point of the Learning Challenge: to make learning more challenging and thought-provoking. In other words, to get people into the pit! Though this might seem perverse – particularly given the ever-increasing pressures of the curriculum – the justification is that through challenge, your learners will develop more resilience, greater self efficacy and will build many of the strategies they will need for learning in – and beyond – school. Being in the pit is also where your students will think more deeply, more critically and more strategically.

The Learning Challenge typically has four stages:

Stage 1: Concept

The Learning Challenge begins with a concept. The concept can come from the media, conversation, observations or the curriculum. So as long as some of your students have at least *some* understanding of the concept(s) you wish them to explore then the Learning Challenge can work. This first stage equates to the *Unistructural* stage of learning in the SOLO Taxonomy (Biggs and Collis, 2007).

Stages one to four of the LC correspond directly with stages one to four of the SOLO Taxonomy

Stage 2: Conflict

The key to the Learning Challenge is to get your students 'into the pit' by creating cognitive conflict in their minds. This deliberate creation of a dilemma is what makes the Learning Challenge such a good model for challenge and inquiry, reasoning and reasonableness. Stage 2 of the Learning Challenge is equivalent to the Multistructural and Relational stages of the SOLO Taxonomy (Biggs and Collis, 2007).

Stage 3: Construct

After a while of being in the pit (and I'm being purposefully ambiguous by saying 'after a while' because it depends on context) your students will begin to make links and construct meaning. They will do this by examining options, connecting ideas together and explaining cause and effect. Often (though not always) this leads them to a sense of 'eureka' in which they find new clarity. This sense of revelation is one of the reasons why the effort of going through the pit is so worthwhile.

Stage 4: Consider

After achieving a sense of eureka, your students should reflect on their learning journey. They can do this by considering how they progressed from simplistic ideas (stage 1), to the identification of more complex and conflicting ideas (stage 2), through to a deeper understanding of how all these ideas interrelate to each other (stage 3). Now at stage 4, they can think about the best ways to relate and apply their new understanding to different contexts. This final stage of the Learning Challenge is equivalent to the Extended Abstract stage of the SOLO Taxonomy (Biggs and Collis, 2007).

1.3 UNDERPINNING VALUES

There are many values and beliefs upon which the Learning Challenge is based. Here are the most important ones.

1. Challenge Makes Learning More Interesting

At the heart of the Learning Challenge is the belief that challenge makes learning more stimulating and worthwhile. This is in contrast to making learning simpler and more elementary, which has its place but is not ideal much of the time.

To illustrate the point, please compare the two paths shown in Figure 3. As you will see, the path on the left is straightforward and is likely to get you to your destination quickly. Whereas the path to the right is filled with obstacles and will require greater effort to reach your goal. Of course if you were in a rush then the obvious path to take is the one on the left.

Linking challenge to making things more 'difficult' can be off-putting whereas describing challenge as making things more 'interesting' can make it much more attractive to students

Figure 3: The Path to Challenge



The LC encourages participants to take the challenging route

Taking the more challenging route prompts people to think more critically, creatively and collaboratively

But if I were to ask you to choose the path most *interesting* then which one would you go for? Which one looks to be the more engaging and thought-provoking? Which one is most likely to lead you into discussion with other people about the best strategies going forward? Which one are you most likely to look back on and review with enthusiasm? Which is going to give you the most satisfaction when you eventually reach your goal? And which route are you most likely to remember months, maybe even years from now because of the effort you had to put in to get through it?

Hopefully you've answered 'the right path' to each of those questions. If not then I've got a persuasion job on my hands as well as an instructional one!

This imagery is one way to describe the Learning Challenge journey. Taking on the Learning Challenge and going through the pit is the equivalent of taking the path to the right.

The Learning Challenge promotes a more rigorous and exploratory path to learning as a way to reach a deeper understanding of concepts.

That is not something that I would advocate in every situation or in every lesson. Of course, there are many situations in which an easy answer is needed. But I do think every student should frequently engage in the Learning Challenge so they will, as Guy Claxton would put it, 'build their learning muscles' (Claxton, 2002).

2. Dialogue Enhances Learning

The Learning Challenge relies on high quality dialogue. At its best, dialogue is one of the best vehicles for learning how to think, how to be reasonable, how to make moral decisions and how to understand another person's point of view. It is supremely flexible, instructional, collaborative and rigorous. Done well, dialogue is one of the best ways for participants to learn good habits of thinking.

As my co-authors and I explored in more depth in our book, *Challenging Learning Through Dialogue* (2017), Professor Robin Alexander (2006) found that:

1. Dialogue is undervalued in many schools when compared with writing, reading and maths.
2. Dialogue does not get in the way of 'real' teaching. In fact, by comparing PISA and other international tests, he shows it is possible to teach more through dialogue and yet still be 'at or near the top' of the tables.
3. Dialogue is the foundation of learning because it allows interaction and engagement with knowledge and with the ideas of others. Through dialogue, teachers can most effectively intervene in the learning process by giving instant feedback, guidance and stimulation to learners.
4. Dialogue in education is a special kind of talk, in that it uses structured questioning to guide and prompt students' conceptual understanding.

At its best, the LC leads to high quality dialogue between and 'within' participants

The Learning Challenge involves the type of reflective, respectful dialogue described. The focus for participants is in challenging each other, asking appropriate questions, articulating problems and issues, imagining life's possibilities, seeing where things lead, evaluating alternatives, engaging with others and thinking collaboratively.

A different way to describe this is to talk of the 'co-construction' of understanding. Written about by many theorists, most notably Lev Vygotsky (1978) and Jerome Bruner (1957), the idea of co-construction can be described using these main features:

- Learning and development is a social, collaborative activity. We don't learn inside a vacuum; we learn by mimicking and engaging with others.
- Social construction is connected to 'real life' in that it focuses on matters that are important and relevant to participants.
- Learning has a social context: participants learn from each other and influence each other's learning.

The dialogue generated by the LC leads to social construction of ideas

And so it is with the Learning Challenge. Lessons that are based upon or involve the Learning Challenge can be distinguished by these characteristics of co-construction.

3. We Are All Fallible

The Learning Challenge encourages *all* participants including the teacher or facilitator, to be open about their own fallibility and to willingly explore flaws in their own thinking so that everyone may learn more together. This means that phrases such as 'I'm not sure', 'perhaps', 'maybe' and 'I was wondering' are to be encouraged throughout the dialogue. To some people, these sorts of phrases reveal ignorance or weak-mindedness. Yet in the context of the Learning Challenge, they are intended to reveal the ideals of open-mindedness and hypothesis-testing.

The LC relies on the values of open-mindedness and a willingness to learn from others

It is as Bertrand Russell wrote in an essay lamenting the rise of Nazism in 1933, 'The fundamental cause of the trouble is that in the modern world the stupid are cock-sure whilst the intelligent are full of doubt.' Or as the celebrated Irish poet W B Yeats wrote in *The Second Coming*, 'The best lack all conviction, while the worst are full of passionate intensity.' (Yeats, 1919)

So when you engage your students in the Learning Challenge, please encourage - and model - the values of open-mindedness and exploration since these are vital for the success of this approach.

Linked to these ideals is the notion that there might not be one, agreed 'right' answer at the end of it all. Although most of the time, some form of agreement is reachable, there are occasions, particularly with the more open-ended, philosophical questions when no satisfactory conclusion is achievable in the timeframe you have. But that is not to say the experience will be any the less worthwhile, as is explored in principle four next. However, it would be worth mentioning that:

Sometimes participants in the Learning Challenge will enter the pit and stay there! They should not feel disheartened by this. Nor should they feel abandoned as they are likely to be in the pit with others. Instead, they should feel invigorated by finding one of life's great, unanswered questions.

4. Process Is As Important As Outcome

The process of learning is often more important than getting the right answer, particularly with Learning Challenge sessions. A learning focus includes an emphasis on questioning, challenging, striving to get better and on beating personal bests. This contrasts with a performance focus that hinges on grades, attainment, showing what you can do and on beating each other.

The process of going into the pit by asking questions and challenging each other's ideas is the primary focus of the LC. Reaching an answer is of secondary concern

As numerous teachers and their students will testify, far too many schools focus primarily on performance ('it's the grades that count') And yet improved performance comes from a learning focus whereas learning does not always come from a performance focus.

If you and your students focus on *learning* then their performance grades will also increase. However, if you and your students focus on grades alone then rich learning opportunities might be missed along the way.

That is why *process* is more important than getting the answer right in the Learning Challenge. Of course, if you can get your students to deeply engage in learning *and* help them to reach a satisfactory answer then that is ideal. But if your students go into the pit and don't come out (yet) then don't worry: it doesn't mean they haven't benefitted from the experience. So long as you keep encouraging them to go beyond their first answers to seek alternative explanations; ask questions such as why, if and what about; see problems as part of the learning process rather than things to be avoided; make connections, find the significance of parts in relation to the whole and look for ways to transfer ideas to other contexts, then they will *improve* their competence rather than simply *prove* they have got the right answer.

5. Hattie's Mindframes for Learning

John Hattie is currently Laureate Professor and Director of the Melbourne Education Research Institute. He is known throughout the world for his ground-breaking comparison of thousands of studies relating to learning. In his seminal book, *Visible Learning* (Hattie, 2008) he ranked 138 effects taken from 800 meta-analyses that included more than 50,000 studies in education. He updated this list to 150 effects in his follow-up book, *Visible Learning for Teachers* (Hattie, 2011) and more recently to a list of 195 effects in *The Applicability of Visible Learning to Higher Education* (Hattie, 2015) in which he compared more than 1200 meta-analyses relating to influences on learning and achievement.

Of the ten 'Mindframes' for learning proposed by John Hattie, the LC contributes significantly towards five of them

From all of this work, one of the many powerful messages is related to beliefs about learning: what Hattie calls Mindframes. Hattie has proposed 10 Mindframes so far. Of these, the ones that the Learning Challenge contributes towards include:

I enjoy challenge – Hattie asserts that we should teach students to recognise the benefit of challenge. He has found that too many of us rush to the aid of our students whereas it would be better to encourage our students to persevere and to learn from their errors. This idea is at the very heart of the Learning Challenge.

I engage in positive relationships – Hattie has shown that teacher-student relationships influence learning almost twice as much as the average effect. These relationships, whether student-teacher relationships or the relationships students have with peers tend to be improved by going 'through the pit' together. Indeed, it is the social effect of uniting together to get through the pit that is very often the first benefit noticed by teachers and leaders after their students have engaged with the Learning Challenge.

I use the language of learning – Hattie has found a strong link between a focus on learning (rather than a focus on teaching) and improved educational outcomes. The Learning Challenge offers an opportunity for students to talk about very abstract notions of learning in a more user-friendly and practical way. For example, being "in the pit" is shorthand for cognitive conflict or cognitive dissonance; coming out of the pit is a way to talk about social construction; and reviewing the learning journey is one way to make metacognitive strategies a part of daily conversation in the classroom.

I engage in dialogue, not monologue – The Learning Challenge is founded on challenge through dialogue. Sometimes this dialogue is internal. More often it is inter-personal, exploratory talk between students and students, and between students and their teachers. And what they talk about are concepts, strategies and attitudes for learning – all of which are building blocks for educational success.

I see learning as hard work – The Learning Challenge makes learning more engaging and longer lasting by making it harder work. The Learning Challenge takes a seemingly simple concept and reveals its complexities in such a way as to intrigue and beguile students. By working through these nuances, students ultimately reach a 'eureka' moment that convinces them that effort is worthwhile and that actually the harder learning is, the more satisfying it can be.

6. Dweck's Growth Mindset

Carol S. Dweck is the Lewis and Virginia Eaton Professor of Psychology at Stanford University. Her best-selling book, *Mindset* (2006) has sold over a million copies. In 2009, she received the E L Thorndike Award for Career Achievement in Educational Psychology. Previous winners include B F Skinner, Benjamin Bloom and Jean Piaget, so she is in good company!

The more students go through the LC the more likely they are to get into a growth mindset

Her research focuses on the beliefs people have about intelligence and talents and how these 'mindsets' affect behaviour. She examines the reasons why people get into different mindsets and the impact these differing beliefs have on motivation, resilience and success.

People in a growth mindset are more likely to enjoy challenge, engage with learning and to step out of their comfort zone

From her decades of research, Professor Dweck has described two contrasting mindsets: fixed and growth mindset. People in a fixed mindset think of talents and intelligence as relatively stable and innate. They say things such as 'I've always been good at this but I couldn't possibly do that.' Or 'I'm naturally good with languages but I don't have a musical bone in my body.' In other words, people in a fixed mindset believe that either you can or you can't and that's that.

On the other hand, people in a growth mindset think of talents and intelligence as highly responsive to nurture. They don't deny the role that genetics play but they see nature as the starting point rather than as the defining quality. So someone in a growth mindset would be likely to say, 'I have developed a talent for writing but I have never really committed to learning a musical instrument (yet).' Notice the word 'yet' – a very powerful word in the context of learning. Indeed the title for Dweck's TED talk that has been viewed 5 million times already and which I was honoured to introduce to the live audience was originally entitled 'The Power of Yet'. (2014)

Compare some of the differences between fixed and growth mindsets as shown in Figure 4. As you read through them, note that the Learning Challenge encourages and teaches the attitudes and behaviours of the growth mindset.

Figure 4: A Comparison of Fixed and Growth Mindsets

	FIXED MINDSET	GROWTH MINDSET
Beliefs	Intelligence and ability are fixed Nature determines intelligence and ability	Intelligence and ability can grow Nurture significantly affects intelligence and ability
Priorities	Prove myself Avoid failure	Improve myself Learn from failure
Response to Challenge	Feel inferior or incapable Seek ego-boosting distractions	Feel inspired to have a go Seek advice, support or new strategies
Mottos	If you're really good at something, you shouldn't need to try Don't try too hard; that way you've got an excuse if things go wrong	No matter how good you are at something, you can always improve Always try hard; that way you've more chance of success and making progress

The Learning Challenge particularly focuses on effort, having a go, taking risks, trying new strategies, seeking advice, looking for challenges, questioning yourself and others, persevering, and making progress. All of which are essential attitudes and behaviours of a growth mindset.

7. The SOLO Taxonomy

The SOLO Taxonomy stands for the Structure of the Observed Learning Outcome. It is a model first proposed by John Biggs and Kevin Collis in *Evaluating the Quality of Learning: The SOLO Taxonomy* (1982). SOLO is a means of classifying learning in terms of complexity, which in turn helps to identify the quality and depth of students' understanding.

Many people use the SOLO Taxonomy to describe a learner's progress from surface-level knowledge through to a deep, contextual understanding. This is also an aim of the Learning Challenge and so together, the two models sit perfectly alongside each other.

Further links between the Learning Challenge and the SOLO Taxonomy will be explored in depth in Chapter 9. For now though, here is a brief overview

The SOLO Taxonomy and LC fit together very well

NO IDEA

SOLO Term: Prestructural
Learning Challenge Stage 0



This is when your students have no idea about the concept or topic you have chosen. At this stage, the Learning Challenge will *not* work. Before you can get your students into the pit, they will need at least some idea about the concept in question. For example, you are unlikely to get 6 year olds into the pit about a concept as complex as global development but you could probably get them into the pit about friendship or fairness.

ONE IDEA

SOLO Term: Unistructural
Learning Challenge Stage 1



This is when your students have one idea or at least a basic set of notions about the concept or topic you have chosen. At this stage, the Learning Challenge is ready to begin. Generally you can start by asking what the concept means. So for example, 'what is a friend?' or 'what is global development?' And as long as *some* of your students (and not just the outliers) are able to give a reasonably accurate answer involving one or two facts about the concept then the Learning Challenge can begin

MANY IDEAS

SOLO Term: Multistructural
Learning Challenge Stage 2



This is when your students have many ideas about the concept or topic in question. At this stage, your students will be heading down into the pit, if they are not there already. Generally you will have encouraged your students into this stage by helping them to spot contradictions or problems with what they have said. For example, 'you say that friends are people you know but you know lots of people who aren't your friends, don't you?' or 'if global development is the equivalent of wealth then what about the wealthy countries with high levels of child poverty: are they developed?'

CONNECTING IDEAS

SOLO Term: Relational
Learning Challenge Stage 3



This is when your students begin to connect their ideas together and understand the relationships between them. In Learning Challenge terms, this is where your students construct understanding to the point of reaching a 'eureka' moment. With this new found sense of clarity and meaning, your students will feel a sense of accomplishment and their answers will be noticeably more exact and developed.

REVIEWING & LINKING IDEAS

SOLO Term: Extended Abstract
Learning Challenge Stage 4



This is when your students begin to connect their ideas together and understand the relationships between them. In Learning Challenge terms, this is where your students have a 'eureka' moment in which they reach a state of clarity and meaning. It is at this point that your students will feel a sense of accomplishment and their answers are noticeably more exact and developed.

8. A Language For Learning

The LC provides child-friendly language to help students talk about their learning spontaneously and sincerely

A key strength to the Learning Challenge is its role in providing student-friendly language to describe abstract notions such as metacognition, quantitative versus qualitative aspects of learning, and cognitive conflict.

For example, most teachers will have studied Vygotsky's Zone of Proximal Development (1978) but how many students regularly use Vygotskian terminology? However, with the Learning Challenge even the youngest school-aged child is able to indicate when they are in their Zone of Proximal Development by saying, 'I'm in the pit!'

Other language regularly used by participants in the Learning Challenge to help them describe abstract notions of learning include:

Wobbling, wobblers and being in the pit: user-friendly terms to describe a state of cognitive conflict (see 5.4.1)

Concept stretching: a way to describe the actions involved in challenging the meanings and applications of concepts (see 5.5 and 5.6)

Scaffolders: a collective term for a variety of strategies and tools used by participants to make sense of their learning (see 6.3)

Eureka: referring to the revelatory state a person achieves after working hard to achieve a moment of clarity (see 6.5)

Stage 1: a non-prejudicial way to describe having only basic, surface-level knowledge about a concept (see 9.1)

Stage 2: an alternative to saying 'I'm in the pit'

Stage 3: a way to indicate progress from quantitative to qualitative stages of learning (see 9.1)

Stage 4: indicating a participant is engaging in a metacognitive review of their learning journey (see 9.1)

Unpacking: a nice term to describe investigation into the underlying or hidden aspects of a concept or idea (see 4.4)

9. A Structure for Learning

The LC gives a structure to dialogue so that teachers can plan their lessons carefully if they wish to

One of the most common reasons given for the popularity of the Learning Challenge is its usefulness as a tool for planning and delivering a challenging, dialogue-based lesson.

As a novice teacher, I was told again and again that classroom dialogue would help my students to learn. Looking at Hattie's research more than two decades later, it turns out that advice was spot on: classroom discussion is ranked 10th in the Visible Learning list of factors influencing achievement with an effect size of 0.82, equivalent to double the average effect of 0.4 (Hattie, 2015).

However back then, I was apprehensive about starting anything remotely open-ended because of the fear of not being able to predict the topics that might come up nor anticipate the questions my students might ask. I worried that I might not know the answers to the questions that came up. I also felt pressure from the school leaders to have written plans for each stage of every lesson. Funnily enough, it seemed the leaders weren't happy to accept the plan, 'have a chat with the kids and see what happens.'

That was one of the drivers behind the Learning Challenge – to create a framework that would allow me to know where the lesson would go whilst also allowing enough flexibility for my students to follow lines of inquiry that were interesting and relevant to them.

Thus the Learning Challenge allowed me to predict the following stages of an open-ended, dialogue-driven lesson:

1. Identify a key concept
2. Ask students for their initial ideas about the concept (these will usually be simple, undeveloped notions)
3. Create cognitive conflict by identifying contradictions and exceptions to students' early answers
4. Ask students to compare their differing ideas by searching for similarities and differences
5. Help pairs or groups to select a thinking tool that will help them explain, sort and relate the ideas together
6. Challenge students to develop a robust definition of the concept that will stand up against 'what if' and 'how about' questions
7. Consider how students' final definitions apply to new contexts and reflect back over the learning journey

Here are the seven main steps of the LC

This sort of plan seemed to satisfy my leaders much better. More importantly, it gave me the confidence to introduce dialogue into lessons safe in the knowledge that I had a good idea of where the lesson might go!

This step-by-step plan is explored in much more depth in Chapter 2.

10. Learning For All

As you might have noticed in a couple of places in this chapter, I mentioned that the Learning Challenge works as long as some of your students have some understanding of the key concepts. This is because the Learning Challenge is collaborative in nature, bringing with it an expectation that participants will explain to and question each other. Those students who are initially unsure about the meanings of concepts tend to pick up interpretations from their more informed peers. That is assuming of course that those peers are not so far ahead that they use terminology or language that is incomprehensible. Thankfully this tends to be unlikely other than in the cases of the outliers. If those instances do occur then you can get students in the middle to help those outliers make links and to explain or question in more accessible ways. This is covered in more depth in 9.3 and 9.4.

The LC can work for all students who have a basic understanding of the chosen concept

In actual fact, it is very often those students who are not normally confident in lessons who excel more in earlier Learning Challenge lessons. That is not to say the higher-achieving students do not benefit; it is just that they tend to sit back in earlier episodes to weigh it all up. Perhaps they are so used to 'getting things right' in class that they are perplexed by the lack of an obvious answer or solution. Or maybe they are worried about appearing to be less 'perfect' in front of their peers? Either way, those who are used to getting top grades tend to hang back at the beginning whilst those who normally struggle in lessons generally take to the Learning Challenge like ducks to water.

That is not to say that the Learning Challenge is suitable for everybody right out of the box, as it were. Adaptation is sometimes needed. For example, participants with some forms of autism can find the standard Learning Challenge approaches a bit too open and free flowing. But of course, like any other pedagogical strategy, we should use our professional judgement and experience to adapt these approaches so that they provide positive and beneficial experiences for all of our students. Having worked in special educational needs settings as well as in mainstream education, I know this is sometimes not easy but it is possible and it is very rewarding for teacher and student alike when we get it right. This is explored in 9.3.

The LC sometimes needs adapting for students with special educational needs. This is explored further in 9.3

1.4 A PIT IS CENTRAL TO THE LEARNING CHALLENGE

The idea of a 'pit' fits perfectly with the notion that challenge is often unsettling and irregular

A small proportion of the people I meet say they like the Learning Challenge but would prefer it not to include a pit. They argue that the connotations are too negative. There are also issues with translation because some languages have no word for 'pit'. This has led to interesting variants such as goldmine, a black hole or even the iron pot that hangs over old cooking stoves. And these are all in addition to the problem of 'pit' being a rude word in Swedish!

In this brief section, I would like to justify the use of the term and idea of a pit and in so doing, explain a bit more about why I think a pit works best.

The aim of the Learning Challenge is to get participants out of their comfort zone. This is a deliberate and strategic objective. It is neither incidental nor casual. It is not something that happens parenthetically. The very purpose of the Learning Challenge is to step outside the familiar to explore ideas and experiences that are neither effortless nor soothing. And that is why the idea of a pit works so well.

When your students get into the pit, you should expect them to feel uncomfortable. I don't mean anxious. I don't mean overwrought or afraid. I mean the opposite of contented. I mean needed: spurred on to think more, try more and question more. That is why the idea of a 'learning mountain' or a 'cooking pot' does not work as well: neither of these evoke the feelings nor the situation that the Learning Challenge is trying to create. A pit works because it is uncomfortable without being frightening. It is provocative without being aggressive. It is consuming but you can always see out of it – unlike a mine that takes you right underground.

The pit represents being out of your comfort zone. This should not happen 'all' of the time but should certainly be a common feature of learning

Of course, a pit doesn't suit every purpose. There are times when it is better to allow your students to get through a task without being challenged. It can mean fewer behaviour problems; more time to support particular individuals; and it can give some students a sense of satisfaction at reaching their goals without having to ask for help or think too hard. Yet there are problems with this approach too. If your students stay in their comfort zone too much then they will not get as much opportunity to develop life skills such as resilience, persistence and determination. There will not be as much need to think collaboratively or to search for alternative solutions. And they will rarely feel compelled to look beyond the obvious or take intellectual risks.

So it is all about balance: balance between practice tasks and challenging tasks; between feeling the satisfaction of arriving at the answer easily and taking time to engage in lots of trial and error before reaching the eureka point. Balance between watching the world go by and getting into the pit to see what you can learn!

1.5 REVIEW

In addition to the main points identified in the preview, this chapter has also covered the following:

1. Although many people refer to the Learning Challenge as 'The Learning Pit' it is more accurate to say that the Learning Challenge *includes* a learning pit
2. Being 'in the pit' represents a state of cognitive conflict in which a person has two or more ideas that they agree with but when compared side by side, appear to be in conflict with each other
3. There are four stages of the Learning Challenge: Concept; Conflict; Construct; Consider
4. The Learning Challenge contributes significantly towards the Visible Learning Mindframes (Hattie, 2015)
5. There are also strong parallels between The SOLO Taxonomy (Biggs and Collis, 1982) and The Learning Challenge

Figure 5: The Main Steps in The Learning Challenge

Eureka!

Eureka: you found it! The feeling of enlightenment and discovery you feel at this stage is the ecstasy of learning. This is what makes the learning journey so worthwhile. Congratulations for persevering!



Concept

Find a concept worth exploring that you know a little bit about.



Question

Find the problems, the nuances and the exceptions to your concept. You can do this by comparing your concept with another, considering if it always applies, or trying to find a definition that works in all cases.



Cognitive Conflict

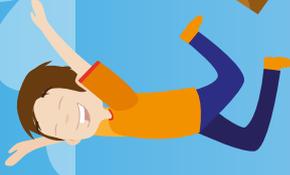
If you've uncovered lots of examples and exceptions to your concept, and realised how complex your chosen concept is, then you are in 'The Pit'. This is where deep learning really gets going.

Construct

Identify patterns, relationships and meanings between all the ideas you've uncovered. Distinguish between them by sorting, classifying, grouping or ranking. Use your findings to create a more precise understanding of your concept.

Consider

Look back at your learning journey. Which strategies worked best? How would you change next time? How can you apply your new understanding to different contexts?



Challenging
LEARNING

2. THE LEARNING CHALLENGE IN PRACTICE

2.0 PREVIEW

In this chapter, I run through a full Learning Challenge from stage one to stage four. This is to encourage you to jump in with both feet and have a go at a Learning Challenge before returning to this book to find ways to make things work even better.

In 9.4.3, I recommend the Ready-Fire-Aim approach. That is when we get 'ready' to have a go at something free from the anxiety of needing to be an 'expert' before we begin; then we 'fire' by taking a few early attempts at the new action; and *then* we 'aim' more accurately by interrogating the guide in a more focused way. I think this is a very practical way for three reasons:

1. It reduces the worry that so many of us in education have, that we need to be 'the expert' in the room. Instead, this approach encourages us to learn alongside our students
2. People are in a much better position to pick up on nuances and implied messages when they have experience under their belts to reflect upon
3. It fits perfectly with the classic educational mantra of 'Plan-Do-Review'

It is worth bearing in mind that the different steps of the Learning Challenge are not set in stone. They are recommendations for what could be used to support your students' thinking. As with all pedagogical processes, they should be adapted to suit your students, your context and your purpose.

The most common steps are shown below, with the ones in bold being those that would be attended to in every single Learning Challenge experience. The others are either optional or assumed.

1. Create the Learning Challenge Culture (see Chapter 3)
2. Remind your students of the ground rules for dialogue (see 3.4)
3. Share the Learning Intentions of the lesson (see 9.4.4.2)
- 4. Sit in a circle with your students** (see 3.4.2)
5. Share a stimulus such as an image, a book or an object (see 4.3)
- 6. Identify the most interesting concepts** (see 4.3)
7. Create thought-provoking questions about the concepts (see 4.4)
8. Select the best question (see 4.5)
- 9. Invite your students to air their first thoughts** (see 4.6)
- 10. Encourage your students to listen and respond to each other appropriately** (see 3.1 and 3.5)
- 11. Identify contradictions in the thoughts of participants** (see 5.3 and 5.4)
- 12. Explore alternatives and strive for meaning** (see 6.1)
- 13. Connect ideas and explain reasons** (see 6.3)
- 14. Construct a more sophisticated understanding of the central concept** (see 6.3.3)
15. Reach a 'eureka' moment (see 6.5)
16. Review the learning journey and look for other applications for the new learning (see 7.2)

The Ready-Fire-Aim approach encourages a 'try now, refine later' approach

The text in bold shows the steps that would ordinarily be taken in every LC experience

2.1 STAGE ONE: CONCEPT

The LC always begins with a concept. There is a list in section 4.2.1 of concepts that are commonly used in LC sessions

The Learning Challenge needs a concept to begin with. For the reasons discussed in 4.1, facts are not enough; the Learning Challenge needs a concept that your students have some knowledge about.

Good examples would include art and design; democracy; evidence and proof; fairness and fair test; food; good and bad; growth and development; happiness; love; money; names and identity; number; theory; truth. Many more concepts are explored throughout this book.

For the purposes of showing you the classic way to run a Learning Challenge, I have chosen the concept of real. It is an idea that often comes up with very young children as well as with the most mature students. There are many ways to draw out or identify key concepts with which to begin a Learning Challenge but these will be explored later in the book. For now, I am simply going to say what the concept is.

Concept: Real

Here is an example of how a concept such as 'real' can be explored

The concept 'real' is an interesting one. Some philosophers have said that all our experience (including dreaming) is a different 'real' from the reality of the physical world that exists independently of human experience. Though this is far from a globally accepted view, it is an interesting one nonetheless. It might lead your students to draw a distinction between real and imaginary or between real things that are tangible compared to things that are abstract.

Other interesting questions around this topic include:

1. If I pretend to be a police officer then what part of that role-play is real?
2. I blow a dog whistle that makes a sound humans can't hear then is the sound real?
3. In history, there are very often at least two different versions of events: one from the victors and one from the losers. How can we know which is the real version of events?
4. How do you know when what you see is really how *it is* rather than just how you see *it*?
5. What is the difference between real and opinion?
6. What do people mean when they say that is a 'fake watch' rather than a real one?
7. Is reality TV real?
8. Is there any way to be absolutely sure that aliens are not real?
9. In what ways are the stories of Harry Potter by JK Rowling real?
10. Can a lie be real?

Another way to explore the concept is to look at its opposite; in this case, *unreal*. For example, in what ways is a plastic toy, a dream, pretend money, magic or folk tales unreal? Though they might all be thought of as 'unreal,' they seem to be unreal in different ways. And that is without bringing in such things as optical illusions such as the famous duck-rabbit illusion.

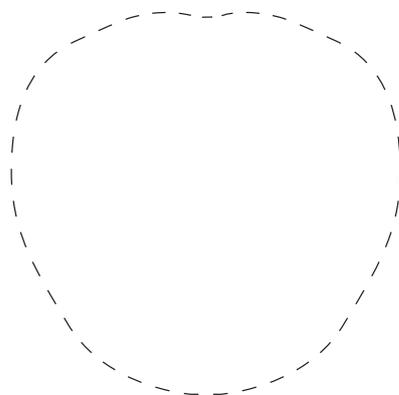
To begin a Learning Challenge session about real with your students, you could pick any of the questions above. Or you could do something like this:

Get hold of a real version and a toy version of the same thing: for example, a real apple and a toy apple. Then place them in front of your students and ask them to talk about the *three* apples in front of them. By saying 'three' apples, I am including an invisible apple in this scenario.

Figure 6: How Many Real Apples Are There?



Show students an apple, a plastic apple and an 'invisible' apple and ask them to decide which one or ones are real. This is a good way to begin exploring the concept 'real'



Invisible apple

Once your students have started to share their initial thoughts about the concept, it is time to set up some cognitive conflict so as to take them into the pit.

2.2 STAGE TWO: CONFLICT

Stage two of the Learning Challenge is concerned with purposefully creating cognitive conflict in the minds of participants. This is principally because when people are in a state of cognitive conflict, they tend to be spurred to think more deeply and urgently about their ideas. Compare this to when someone has an answer that they are satisfied with: that is when they typically relax and feel no compulsion to think further; they know the answer so why think more?

Cognitive conflict is about prompting people to seek solutions or alternative answers; to try to identify the cause and effects; to ask for advice; to think about the relative merits of one approach compared with another, and so on. In other words, the point of cognitive conflict is to get people to think.

Further reasons for cognitive conflict and how to set it up in the minds of your students will be explored in depth in chapter five. For now though, let's look at one way to create cognitive conflict in the minds of your students: through the use of wobblers (see 5.4.1).

Starting with the 'three' apples shown in Figure 6:

This is an example of how a dialogue might proceed if you were to ask students which of the apples in Figure 6 is real

YOU: What do you think of these three apples?

STUDENTS: Which three apples? There are only two of them.

YOU: No, there are three (count out all three, including the invisible one)

STUDENTS: There are only two (points to the two that can be seen)

YOU: (you hold up the invisible one and pretend to caress it and sniff it)

STUDENTS: That's not real. You are just pretending.

YOU: What makes you say that?

STUDENTS: Because we can only see two.

YOU: Does that mean it is only the things that you can see that are real? For example at the moment, I can't see my dog. Does that mean he is no longer real?

STUDENTS: No he is real because you've seen him before so you know he's there. He's just not with you at the moment.

YOU: OK but what about things that I have never seen before, such as the Great Wall of China? Does that mean that is not real because I haven't seen it before?

STUDENTS: But you have seen it on TV or online or in a photograph, haven't you?

YOU: Yes but I have seen all sorts of things on TV and online that are definitely not real!

STUDENTS: (Students suggest things they have seen online that are not real. You could respond directly to the most interesting of these examples or you could continue with the following dialogue:)

YOU: So let's leave out the invisible apple for now. What about the other two apples: are they both real?

STUDENTS: No, one is real and one is pretend.

YOU: What do you mean by that?

STUDENTS: One is plastic.

YOU: Does that mean the plastic one is not real?

STUDENTS: Yes.

YOU: But does that mean everything that is plastic is not real, for example, this chair?
This chair is plastic so does that mean it's not real?

STUDENTS: No!

YOU: Then why is this plastic apple not real?

STUDENTS: It is real.

YOU: So they are both real, is that right?

STUDENTS: Yes. No. Not sure.

With a dialogue similar to this, you will get your students into the pit. Once they are in the pit, you could use some of the following questions to deepen their dilemma:

Additional questions to ask 3–7 year olds:

- When we dress up, are we real?
- Are your dreams real?
- Are toys real? What about toy cars or plastic animals?
- Are things that we can't see, real?
- How do you know if something is real or not real?
- Is television real?

Here are some additional questions to select from to help students investigate the concept of real

Additional questions for 7–11 year olds:

- What is the difference between being real and being alive?
- When you look in the mirror, is your reflection real?
- Do you need to be able see, touch, feel, smell or taste something to know it's real?
- When are stories real?
- Is what's real for you the same as what's real for your friends?
- Is the sky real?
- Are rainbows real?

Additional questions for 11–14 year olds:

- Can something be real and not real at the same time?
- What's the difference between reality and perception?
- How do you decide when to believe what you see?
- What are the connections between reality, truth and fact?
- Can something that doesn't exist be real?
- Are people who have died still real?

Further questions to ask 14–18 year olds:

- What is the difference between reality and virtual reality?
- What is real about reality TV?
- Does one enter a different reality in one's dreams?
- If something has not happened yet but is inevitable, is it real?
- What did Albert Einstein mean when he said: 'Reality is merely an illusion, albeit a very persistent one'? What matters most, the answer to what is real or what we believe to be real?
- Are ideas real? Are they the only thing that is real?
- How do we know that our perceptions are real?
- Is mind or matter more real?

2.3 STAGE THREE: CONSTRUCT

Whilst struggling in the pit together, your students will begin to create meaning through social construction. To do this they will find patterns; make links; think about cause and effect; identify similarities and differences; and organise, distinguish, relate and analyse their ideas. This ultimately leads to a resolution of sorts, be it the 'right' answer or more usually, the 'best' answer given the resources available.

Figure 7 shows an example thinking activity for helping students think through different types of 'real'

To help them with this process, you could offer one or more of the following 'Pit Tools'. There are many more to choose from in 6.3.

2.3.1 Pit Tools to Help Young Students Construct Meaning

Suitable for 3 to 7 year olds

Figure 7: Concept Or Not?

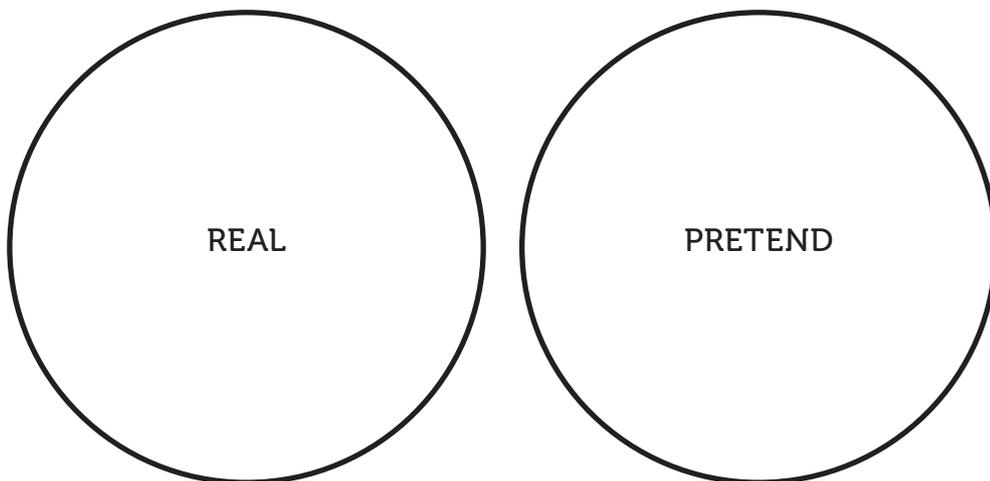
	REAL	NOT REAL	NOT SURE	REASON
Toys				
Barbie				
Aliens				
Plastic money				
Teddy bear				
What you see in the mirror				
What you can see when you close your eyes				
Sounds you can't hear				
Shadows				
Optical illusions				
Emotions				

Early Venn diagrams

Though Venn diagrams are more often used with older students, they can also help young children to think through concepts. This is particularly true if you use two hoops and keep them separate to begin with. Only when the children discover that some objects can go into both hoops, should you suggest that the hoops could be overlapping to take this into account.

Venn diagrams can help students to think through concepts. Even young children can use them if the circles are kept separate to begin with

Figure 8: Concept Venn Diagram



Objects for the children to place into the hoops

Toy money	Photograph of a house	Paper to represent an invisible object
Real money	Drawing of a house	An empty cup to represent a pretend drink
A book	A toy house	A toy teapot
A mirror	A banana	A teabag
A child's costume	A plastic banana	
A doll's shoe		

Here are some 'things' for young children to sort into the 'real' category or the 'pretend' category

You could also ask your students these questions:

- What is the difference between a real nurse and when we dress up as a nurse?
- What is the difference between imaginary play and physical play?
- Is all play pretend? If so, does that mean play is not real?
- What is the difference between dressing-up, for example as a superhero, and getting dressed?
- If dressing up is 'pretend' then are you not real when you dress up?
- If you play with a friend does that mean you haven't really been doing anything?
- What is the difference between playing and pretending?

Here are some additional questions to help young children think about the differences between 'real' and 'pretend'

2.3.2 Additional Pit Tools for Older Primary Students

Suitable for 7 to 11 year olds

In addition to the ideas shared in 2.3.1, you could also pick from the following tools for older students:

Figure 9: Concept Line

Older students could use this concept line to decide what is 'real'

REAL

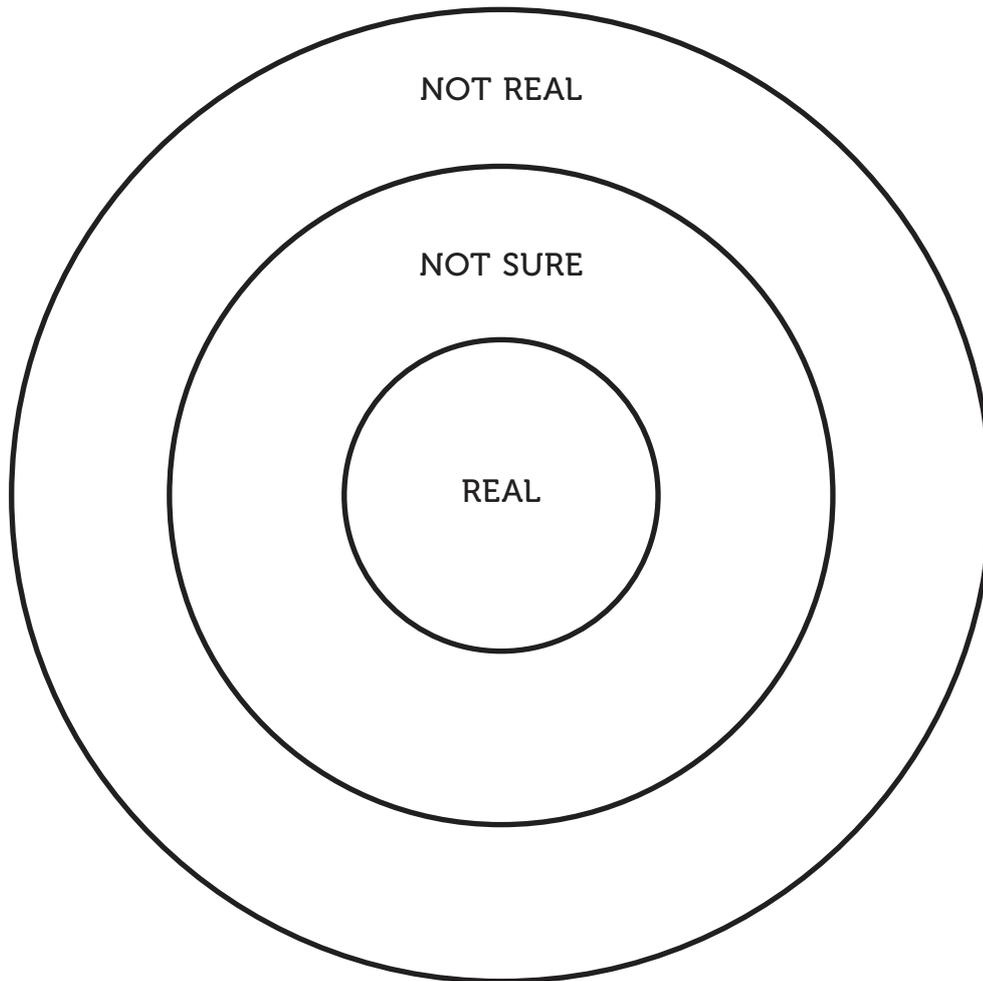
NOT REAL



Place these words and concepts at the appropriate place along the line shown in Figure 9. For further explanation about using Concept Lines, see 6.3.6

Role play	Pretend	Forgery	Dressing up
James Bond	Monsters	Toy soldier	Pets
Doll	The sky	Dreams	Thoughts
Rules	Words	Imaginary friend	Television
The news	Shadows	Aliens	Fake watch
Love	Happiness	Anger	Joke
Terrorism	Sport	Games	Disability
Online friends	Names	Photographs	Art

Figure 10: Concept Circles



Concept circles are a useful 'pit tool' for thinking about concepts

Place these words and concepts in the appropriate circle shown in Figure 10. For further explanation about using Concept Circles, see 6.3.7

Place these words and concepts in the appropriate circle:

- | | | | | |
|--------------------|--------------|---------------|---------------------|-----------------|
| Fake | Authentic | Pretend | Good | Bogus |
| Genuine | Realistic | False | Bona fide | Counterfeit |
| Copy | Mock-up | The Sun | Mother Earth | Ancient Gods |
| Online Gaming | School Rules | Beliefs | Television | Virtual Reality |
| Glamour Shots | Wrestling | Boxing | Praying | Advertising |
| International Laws | Space Travel | Space Tourism | Video Game Violence | |

Students should decide where best in the concept circle to place these ideas

2.3.3 Additional Pit Tools for Teenagers

Suitable for 11 to 18 year olds

Describe the similarities and differences between these pairs of concepts.

- Real and not real
- Reality and truth
- Fact and fiction
- Real and imaginary
- Reality and feeling
- Reality TV and TV news
- Real and dead
- Real and supernatural
- Reality and perception
- Real and make believe
- Real and pretend
- Real and tangible
- Reality and virtual reality
- Real and alive
- Real and copy
- Real and authentic

Here are some additional ideas for helping teenagers think about the concept of 'real'

Creating a Resolution

The LC does not 'need' to finish with a resolution but many students find it helps their thinking to do so

Once your students have found patterns, made links, thought about cause and effect, identified similarities and differences, and organised and analysed their ideas then they will be closing in on 'an' answer. Sometimes this might be the 'right' answer but more usually it is the 'best' answer that they are able to create given the resources available. An example of the sort of resolution your students might create can be seen together with Figure 24 in 6.3.3.

2.4 STAGE FOUR: CONSIDER

The fourth and final stage of the Learning Challenge is to consider the learning journey. Though you should be encouraging your students to think about their thinking throughout the Learning Challenge, stage four is also a great point at which to engage in metacognition.

In his book on Unified Theories of Cognition (1991), Allen Newell points out that there are two layers of problem solving: using a strategy to solve a problem and thinking about *how* to select and monitor that strategy. As he puts it, good problem solving often depends as much on the selection and monitoring of a strategy as it does on its execution. This is one way to describe metacognition. I will look in depth at other ways in Chapter Seven.

Metacognition Questions to Consider the Learning Journey

- What did you originally think 'real' meant?
- How confident were you of your answer at the beginning?
- Which challenges caused you to think again?
- How can we tell if something is real or not?
- Can something be real and not real (or fake) at the same time?
- How can we be sure that our lives are real?
- Is the future real?
- What helped you to make sense of the ideas you had in the pit?
- How sure are you that you have not accepted easy answers?
- How does your notions of 'real' differ now from the beginning of the lesson?
- What questions about real are you left with?
- What strategies did you use this time that could help you next time you're in the pit?

These questions can help students to reflect on their thinking journey throughout the LC experience

2.5 WHEN, WHERE, HOW?

This chapter has shared one example of a classic Learning Challenge lesson. In Chapter 10, there are six more full examples. In the meantime, I think it would be good to consider when, where and how you might set up a Learning Challenge.

It is fair to say that some people like to run a full Learning Challenge from start to finish every day of the week. Others design a whole series of Learning Challenge episodes that span a full topic of work. Some spot an opportunity during a lesson to set up an impromptu Learning Challenge and go for it. Others run stage 1, 2 and 3 in class and then set stage 4 for homework. Or set stage 1 as a preview activity, perhaps for homework, and then run stages 2, 3 and 4 in class. The thing is, even with the plainest of varieties, there are still many ways to run the Learning Challenge. It is entirely up to you how to organise it.

Here are some ways to get the LC going in a school

As a school leader, I used to encourage the following approach:

Term 1: Each member of staff runs a stand-alone Learning Challenge lesson at least once a week without feeling the need to integrate it into existing programmes of study. Learning intentions come from broader educational aims such as learning attitudes and skills rather than from the more subject-specific knowledge-based goals.

Term 2: Each member of staff runs a full Learning Challenge once a week within the normal programmes of study. So for example, a history teacher investigates a concept such as 'truth' with an older class one week and 'nation' with a younger class the next; or a primary school teacher picks a literacy concept such as 'friendship' one week and a science concept such as 'proof' the next.

Term 3: Each member of staff runs an impromptu Learning Challenge episode whenever they spot the opportunity to do so. They don't plan any full sessions but instead look for ways to integrate the approach into 'normal' curriculum lessons. Ideally they find at least one or two opportunities per week.

Term 4: The schools I worked in only had 3 terms but many of the schools I've supported since have had either 4 terms or 2 semesters. So a fourth stage to the development can be for staff to identify Learning Challenge episodes for small groups within a whole class. For example, a different Learning Challenge concept for each collaborative group or, more likely, the same concept for just a few groups with the rest of the students in the class working on a different set of tasks altogether. Typical sizes of the collaborative groups ranged from 3 to 6 with 3 or 4 being the optimum.

If you were to run a sequence such as this, you would have opportunity to develop facilitation skills in the earlier steps free from the constraints of the curriculum. Then in the latter stages, you would build up your experience of spotting opportunities to run Learning Challenge experiences as part of everyday learning. That would give you the best of both worlds: time to practise and play then time to refine and normalise.

As for the length of each Learning Challenge episode, this would depend on the experience and maturity of the students. Typical sessions last anything between 40 and 75 minutes or sometimes more if time and concentration levels permit.

As to the question, where: the Learning Challenge can pretty much be run by anyone with anyone. Normally it is school, kindergarten or college staff – teachers, leaders and support staff – who run Learning Challenge sessions. And yet sometimes youth leaders, parents and businesspeople run try the approach with the people they spend time with. Though the example I have shared in this chapter is very reliant on language and focuses on what we might say is a philosophical concept, that is not to say the Learning Challenge is restricted to such conditions. As I will share throughout this book, the Learning Challenge can work with different types of concepts and for different purposes. So long as you would like to engage people in deep thought then this approach is relevant for you.

The typical length of a LC is between 40 and 75 minutes. That said, some sessions are split into two shorter sections for the youngest students

2.6 REVIEW

In addition to the main points identified in the preview, this chapter has also covered the following:

1. The Learning Challenge begins with a concept. Facts are not enough to get your students into the pit with.
2. At the heart of the Learning Challenge is cognitive conflict, the purpose of which is to get people to think more.
3. Constructing meaning to climb out of the pit involves making links; thinking about cause and effect; identifying similarities and differences; and organising, distinguishing, relating and analysing ideas.
4. Metacognition plays an important role in the Learning Challenge. This involves getting your students to think about their own thinking. I've written more about this in 7.1.

**'A MAJOR PURPOSE OF EDUCATION IS TO CULTIVATE
OPEN-MINDEDNESS AND INTELLIGENCE.**

**DEFINED IN TERMS OF THE APTITUDE FOR ACQUIRING
KNOWLEDGE, INTELLIGENCE DEPENDS UPON AN ALERT
CURIOSITY. THE CULTIVATION OF INTELLIGENCE DEPENDS
ON FREEDOM TO EXERCISE CURIOSITY.'**

Jiddu Krishnamurti, 1895–1986
(Described by the Dalai Lama as one of the greatest thinkers of the age)

3. THE LEARNING CHALLENGE CULTURE

3.0 PREVIEW

This chapter focuses on the best ways to build a Learning Challenge culture. From creating ground rules to ensure your students engage respectfully and positively with each other through to identifying the skills and attitudes that will come out of Learning Challenge experiences.

The most important points in the chapter include:

1. As the facilitator, you set the culture of the Learning Challenge. Some of your responsibilities include encouraging and guiding your students by asking questions, showing interest, challenging ideas and asking for opinions, reasons, examples and comparisons.
2. You will notice positive effects if you ask your students to increase the amount of wait time between a person saying something and someone else responding to three or more seconds.
3. Ways to develop trust and respect amongst participants in the Learning Challenge include: humour; humility; playfulness; and an emphasis on challenge rather than point scoring.
4. One of the most important aims of the Learning Challenge is to teach your students how to learn the skills and principles for and of learning.
5. The Learning Challenge will benefit from – and can play a significant role in developing – a broad range of intellectual values such as being articulate, empathetic, rational and reasonable.

3.1 THE FACILITATOR'S ROLE

I will begin by looking at the role of the facilitator in creating a suitable culture for Learning Challenge experiences. For now, I will assume that that role will be taken by you but over time I would expect your students to grow more and more into the role.

Once we've looked at the role of facilitator, we will examine the behaviours and attitudes you should expect of all participants.

Please note that I am using the term 'facilitator' cautiously. Many people understand the term 'facilitator' to mean someone who makes things easier. In many ways though, that is contrary to the role in a Learning Challenge lesson. As I explain in Sections 1.3.1 and 5.2, the aim of Learning Challenge sessions is to make things more challenging and demanding. The focus is definitely *not* on making things easier as the term 'facilitator' would suggest. However, perhaps we could say that the facilitator is there to facilitate the *orchestration* of the process easier rather than to make the process itself easier. The facilitator should aim to make the running of the lesson more straightforward whilst also making the cognitive demands on participants anything but easy.

The role of the LC facilitator is to orchestrate the process so that participants listen, challenge, question and engage with each other

With that said, one of the most important functions of the facilitator is to show participants that you regard them as thinkers who have interesting and valuable ideas and actions to contribute.

As a facilitator, you should take an encouraging stance to make clear to your students the following attitudes:

- **I am interested in and respect your ideas**
- **I will show my interest by listening to you, questioning you and encouraging you to elaborate**
- **I am confident you are the sort of person who can come up with relevant questions, opinions, reasons, examples and comparisons**
- **I will work as much as I can with your questions, understandings, interests and values**
- **I am creating a classroom community in which we are a group of thinkers who can tackle questions together and work towards the best answers and understandings**
- **We should all feel secure enough to take intellectual risks**

Mary Budd Rowe found that the average amount of time a teacher waits after asking a question before asking another is less than one second

Showing patience is also an important function of the facilitator's role in creating the right atmosphere for the Learning Challenge. According to Mary Budd Rowe (1973), the average amount of time a teacher waits after asking a question is one second or less. That is not a lot of time for your students to think and it does not show a lot of patience!

All participants in the Learning Challenge should be encouraged to wonder, elaborate and pause for thought. Budd Rowe suggested a very simple way to make this more likely is by introducing 'wait time'. She observed that when teachers wait for a minimum of 3 seconds *before* taking an answer from their students and then wait another 3 seconds *after* taking an answer, the effects can be staggering:

- The length of explanations amongst advantaged groups increases fivefold, and amongst disadvantaged groups sevenfold.
- The number of volunteered, appropriate answers by larger numbers of students greatly increases.
- Failures to respond and "I don't know" responses decrease from 30% to less than 5%.
- The number of questions asked by children rises.
- The scores of students on academic achievement tests showed a tendency to increase.

Increasing this 'wait time' to 3 or more seconds can have a dramatic effect on learning

Budd Rowe's research is as relevant today as it was back then. And is doubly pertinent to Learning Challenge lessons seeing as they so often rely on high quality dialogue. It is also worth bearing in mind that Budd Rowe's research has been repeated many times over in many different countries since her work in the 1970's and the results are consistent: in the typical classroom students get very little time to process information, language and ideas and are therefore restricted in how well they can contribute to a dialogue.

There are also benefits for facilitators in increasing wait time for participants. Robert Stahl (1990) noticed the following improvements when the wait time was increased to 3 seconds:

- Teachers' questioning strategies tend to be more varied and flexible.
- Teachers decrease the quantity and increase the quality (and variety) of their questions.
- Teachers ask additional questions that require more complex information processing and higher-level thinking on the part of their students.

Do not be frightened of silences during a LC experience! Silence can give participants more opportunity to think

Incidentally, you can find out more about this research and some corresponding recommendations in a new book my colleagues and I have written called *Challenging Learning Through Dialogue* (Nottingham, Nottingham, Renton, 2017).

A classic way to increase thinking time is through the use of the strategy '*Think – Pair – Share*'. This is a simple and yet effective way to give your students time to process their ideas and select the language needed to contribute to the dialogue. The convention typically follows these steps:

- Someone asks a question
- Participants **think** to themselves for a minimum of 3 seconds
- In a **pair**, participants discuss possible responses
- Volunteers are invited to **share** their ideas with the larger group

Think-Pair-Share is a useful strategy for increasing 'wait time'

The advantage to this approach is that your students will get more opportunity to prepare and practise the language they need before responding. By preparing independently first, then verbalising their ideas, then comparing with other student's ideas, they will have time to rehearse and formulate their views. This in turn causes your students to be more willing to contribute their ideas, make better use of accurate subject language, and be more willing to take intellectual risk. All of which should be encouraged in Learning Challenge lessons.

3.2 TRUST AND RESPECT

Research by Bryk and Schneider (2002) amongst others has shown that nurturing trusting relationships is one of the key features of improving student learning. By trust, they mean the firm belief in a person's reliability, benevolence and honesty.

When trust is a part of Learning Challenge experiences then your students will feel able to take risks, make mistakes, express opinions and to collaborate with each other.

Some of the ways as facilitator that you can build trust and respect include:

1. Challenging, not point scoring

The Learning Challenge owes much to the Socratic tradition of education. Socrates (469–399 BC) often posed a series of questions to help a person reflect on their underlying beliefs and the extent of their knowledge. Such questioning was not about point scoring or proving someone wrong. Indeed, it is said of Socrates that he questioned his fellow Athenians not through an arrogant sense of his being right and them being wrong but through a desire to unearth contradictions and misconceptions that were blocking the way to true wisdom.

The LC follows in the 'Socratic Tradition' of questioning to 'understand' rather than questioning to 'defeat'

And so it is with the Learning Challenge. It is not designed to make your students feels bad about what they don't know or to worry them by being in the pit: quite the reverse actually.

The Learning Challenge is designed to cause participants to think more deeply and more compellingly about their learning. It promotes a spirit of exploration to identify complexity and subtlety. It is not about point scoring but about awareness, understanding and the synthesis of new ideas.

2. Humour and humility

Humour and humility are difficult to convey in a book but they are absolutely key aspects of the Learning Challenge.

If you were to give the impression of attempting to interrogate your students during a Learning Challenge episode in an effort to discredit or disprove their hypotheses then that would be both arrogant and discouraging. Instead, you should take a light-hearted and self-effacing attitude. This means using phrases such as 'Sorry, I don't understand' or 'I don't think I am very clear about this.' It means laughing with rather than at your students; admitting you don't have all the answers; asking unpretentious questions; and using a tone of voice and body language that suggest you are in the pit with your students.

Humour and humility will help LC participants to engage with each other in a more respectful and thoughtful manner

3. Playful Trickery

As you read through the example dialogue in Section 2.2, you might have thought it looked like I was suggesting that you trick your students. This is perhaps partly true. I *do* advocate a type of trickery in Learning Challenge lessons but *only* in the playful way that we might engage with young children. I definitely do not mean in the way that a con artist might try to trick someone. Think the 'coin behind the ear' trick rather than the 'watch off your wrist before you know it' trick!

You might also be interested to know that the root word for 'challenge' comes from the Latin, 'calumnia,' and it originally meant trickery!

3.3 LEARNING HOW TO LEARN

When people are hesitant about the Learning Challenge, it is often because they are not sure of its purpose. Generally these people are keen to have a go but can't quite see how to justify its inclusion in an already-overfilled curriculum.

One way to respond to this question is to say the Learning Challenge is process-based learning; it teaches people *how* to learn as well as *what* to learn. If we focus deliberately on ways **of** learning and teach each other the skills and principles **for** learning then we can increase the rate and depth at which we learn **how** to learn.

For me, the realisation that we need a more deliberate focus on learning how to learn came during a Philosophy for Children (P4C) conference in Bulgaria in 2003. During the event, I was asked to facilitate a P4C session with a group of local teenagers for the other delegates to observe.

The LC focuses on teaching participants 'how' to think rather than 'what' to think

I began the session with a fictional story about two hunters, Hank and Frank, who are chased by a talking bear. The teenagers then created a number of philosophical questions from which they chose their favourite: 'Why sacrifice yourself for others?' After a short pause for quiet reflection, I invited an eager young man to start us off by giving his first thoughts. This is what he said:

'It seems to me that 'sacrifice' is the most important concept in this question. I think someone might sacrifice themselves based on instinct, impulse or intuition. Of course, two of these are in the cognitive domain and one is in the affective domain, so I suppose we need to determine which of these is more likely in any given situation before we can answer the question effectively.'

All the other delegates were nodding approvingly at the boy's apparent confidence in thinking about and analysing the concept of sacrifice. As for me, I was like a rabbit caught in the headlights; I certainly had not been expecting that response!

To grab some thinking time for myself, I asked the teenagers to decide what these terms – instinct, impulse and intuition – had in common. Whilst they did that, I asked a friendly philosopher to suggest what I might do next.

Reconvening, I asked one girl to give her group's answer. She will for evermore be a favourite of mine after replying: 'Instinct, Impulse and Intuition have one thing in common ... they are all names of perfumes.' (at last: someone on my wavelength!)

Once the hour-long discussion had finished, I made a beeline for the organisers and moaned that they had staged all this: 'You could've told me you'd invited only the most talented philosophers from across Bulgaria to join us!' They laughingly explained they had simply invited volunteers from the local area to take part – there had been no selection process.

'So how come they're so adept at thinking?' I inquired. 'Because they've been taught how to think from an early age,' they said. 'But so have children in the UK and yet I haven't come across young teenagers as skilled in thinking as your students,' I countered. Their response was something that initially vexed, then intrigued, and ultimately emboldened me: 'From what we've seen in western countries, you don't seem to teach children how to think; instead you only teach them what to think.'

The more I work in schools around the world, the more I think these Bulgarian teachers may have been right.

For example, if I ask children at the end of primary school (9-11 year olds) if they think stealing is wrong, they all answer yes. But if I then ask why Robin Hood is thought of as a good man if stealing is wrong, they always retort: 'Because he robbed from the rich and gave to the poor.' Perhaps there's nothing too controversial there yet but if I press them to decide if it would be okay for me to steal, let's say from a bank, and give the proceeds to poor people, they almost always say yes. Rarely do the children seem troubled by the fact that stealing from anybody, no matter what the funds are used for is against the law.

Creating cognitive conflict is one way to create the conditions in which students want to learn 'how' to think

I wonder if this suggests the Bulgarian teachers might be right – that too many children are being taught what, rather than how, to think?

Yet teaching students how to think feels like something of an abstract concept. Perhaps the simplest way to picture it is to consider one strategy for thinking that we all use when faced with a difficult choice: to list advantages and disadvantages. Creating this structure in our head is common to all of us. But it is not a structure we were born with – we were taught it, and it has become one of our 'thinking tools.' The Learning Challenge allows us to model structures for thinking, for example by asking questions, giving counter-examples, asking for reasons, justifying answers, adding to the last idea you heard. All of these are new thinking structures, and the Learning Challenge encourages you to purposefully and strategically model and teach these skills to your students.

The LC uses structures for thinking that help participants make more considered decisions

Another example: I often notice teachers and parents praising children for saying the 'right' thing: 'it is wrong to kill; we must always be nice; you should never lie,' and so on. And on the face of it, this might seem reasonable. After all, we want young people to be moral and to do the right thing. However, what happens if they are faced with a dilemma but, up to that point, have only ever followed instructions? Such dilemmas might include eating meat whilst maintaining that killing is wrong; always telling the truth even if it is likely to hurt someone; always being nice even to someone who is either being racist or bullying a friend. What then?

Many parents will reply that they trust their children to do the right thing. But how do children know what the 'right' thing is unless they have learnt how to make moral decisions for themselves? In other words, how can they be moral if they haven't learnt *how* to think for themselves?

The Learning Challenge is a great way to teach your students how think; how to be reasonable; how to make moral decisions; and how to understand another person's point of view. It is supremely flexible, instructional, collaborative and rigorous. At its very best, the Learning Challenge is one of the best ways for your students to learn good habits of thinking.

This is also backed up by research. Learning to learn strategies - also known as meta-cognition and self-regulation approaches – have a very high impact on learning. Indeed, a number of systematic reviews and meta-analyses have consistently found high levels of impact for strategies related to meta-cognition and self-regulation. And although most of these studies have looked at impact on language or mathematics, there is evidence from other subject areas like science that suggest the approach is widely applicable.

Metacognition is a key feature of the LC

Analysis of results from the PISA 2009 and 2012 showed that the difference in reading performance between those students who generally know how to learn and those who don't was 107 PISA score points - the equivalent of more than two years of schooling.

3.4 GROUND RULES

The Learning Challenge relies heavily on dialogue. Indeed, the model is inextricably linked with high quality, exploratory talk.

Unfortunately though, Rupert Wegerif (2002) found that much of the talk that goes on in classrooms is not educationally productive or helpful for extending students' skills and understandings. It seems that many students do not use talk to work well together – and perhaps do not know how to do so.

To help improve the situation, Wegerif (2002) proposed the following ground rules as a basis for improving the quality of dialogue:

Ground rules can help to improve the quality of dialogue in a LC experience

Our talking rules

- We share our ideas and listen to each other
- We talk one at a time
- We respect each other's opinions
- We give reasons to explain our ideas
- If we disagree we ask 'why?'
- We try to agree in the end if we can

Remember: these are rules for talk. They are not the same as class rules for behaviour. If you also have class rules then they should be kept separate from the dialogue rules so that your students know the dialogue rules are there to help them learn how to talk with each other rather than learn how to behave. There might be some crossover but it is important to keep each set of rules separate and distinct.

Of course, these rules are not set in stone. You do not have to use these rules. Indeed, it might be better to ask your students to agree on their own set of rules. Either way, you should ensure there is an opportunity for your students to talk about the meanings of the rules and to agree the precise wording.

Make sure the ground rules you settled upon are displayed prominently for easy reference and reminding. This might seem unnecessary. Yet, researchers have found that a simple set of agreed ground rules that are constantly referred to have a far greater influence on improving the quality and focus of dialogues than if the rules are established and not frequently referred to. This is particularly true when students are working in the sort of smaller collaborative groups that Learning Challenge episodes often break into.

3.4.2 The Learning Challenge Circle

The LC works much better when participants sit in a circle with each other. This improves non-verbal as well as verbal communication

The Learning Challenge works best when your students arrange themselves in a circle. If your students are going to learn to respond to one another, they need to be able to see each other face-to-face. It is not a good idea to have your students in rows at their desks or in a big 'huddle' in front of the teacher as is common in so many primary schools. You do not want to have something as elementary as the physical setting working against what you are trying to do.

If you have a large group of students then you might consider splitting them up into two circles – an inner circle and an outer one as mentioned in Section 4.6. The inner circle can take part in the Learning Challenge dialogue and the outer circle can take notes, reflect on skills and 'pit tools' used, or gather their thoughts for when it is their turn in the inner circle. Every 5-10 minutes or so you can invite your students to swap places with each other so that the inner circle move to the outer circle and the outer to the inner. As they switch places, you could also give them time to compare notes with the person they are trading places with. My colleagues Jill and Martin and I have covered the variations on this idea and the resources you might use to support your students in *Challenging Learning Through Dialogue* (2017).

Whether your students are sat in one big circle or split into two, make sure that you are also sat alongside them. The Learning Challenge is about thinking *together*. It is not about your students

thinking and you watching. It makes a powerful statement about the collaborative aspects of learning if you are part of the Learning Challenge circle.

Unfortunately, it makes an equally powerful but opposing message if you are stood up and your students are sat down. Though that is a common stance in classrooms, it infers a power relationship of: 'I am in charge. I talk. You listen.' This is *not* something that sits very well alongside the Learning Challenge. So do all you can to arrange the space so that all of you – your students and you – can sit together and think together.

3.5 LEARNING CHALLENGE VIRTUES

The Learning Challenge will benefit from – and can play a significant role in developing – a broad range of intellectual virtues. Below is a comprehensive list of virtues. I recommend that you select one or two of them to have as a focus for each Learning Challenge episode.

1. Being Socially Sensitive

Including how to respond to others in socially appropriate ways (with respect and confidence; using tentative language; listening attentively; being supportive; taking turns and encouraging others)

2. Being Intellectually Sensitive

Including how to use critical, creative, logical, sequential, structural and semantic routines to develop the quality of thinking

3. Being Collaborative

Including how to oppose as well as support others in such a way as to improve the quality of everyone's thinking

4. Being Coherent

Including how to structure your own thinking and how to identify coherence and incoherence in others' thinking

5. Being Articulate

Including how to express ideas clearly so that others may understand them and respond appropriately

6. Being Empathetic

Including how to understand ideas in the way in which others do, and sometimes to think on behalf of others

7. Being Discerning and Selective

Including how to recognise and distinguish between different kinds of response, whether it is in relation to a question, a problem or another participant – and then how to respond most appropriately in return

8. Being Abstract

Including how to move from thinking concretely to thinking abstractly, and to be able to apply abstract insights to concrete notions

9. Being Rational

Including how to respond appropriately to the demands of reason and logic, and how to recognise good and bad reasons

10. Being Sequential

Including how to approach problems in the right order according to rational, logical demands

This is a long list of virtues. It is best to focus on just two or three during each LC experience

- 11. Being Reasonable**
Including how to support your own thinking with good reasons and to expect that of others irrespective of agreement or disagreement
- 12. Being Judicious**
Including how to make balanced judgements with the aim of making decisions that are wise and fair
- 13. Being Resilient**
Including how to resolutely defend your own position in the face of others' opposition if it helps in terms of seeking the truth
- 14. Being Open Minded**
Including how to show a willingness to change your mind and how to be open to the idea of others
- 15. Being Self Critical**
Including how to reflect analytically on the quality of your own reasoning and how to find ways to improve it
- 16. Being Comfortable with Discomfort**
Including how to challenge others and be challenged by them even if it causes discomfort and to be comfortable with that discomfort
- 17. Being Quizzical**
Including how to respond with curiosity to cognitive conflict and how to approach the problem positively and strategically
- 18. Being Holistic**
Including how to think about the dialogue as a whole and to consider the roles played by yourself and others
- 19. Being Autonomous**
Including how to think for yourself, making judgements based on the quality of reasons rather than on what others think would be the right thing to do
- 20. Being Habitual**
Including how to take all of these intellectual and social virtues into all areas of your life rather than reserve them solely for Learning Challenge lessons

3.6 CHAPTER REVIEW

In addition to the main points identified in the preview, this chapter has also covered the following:

1. Talking rules such as sharing ideas and listening to each other; giving reasons and explanations; talking one at a time; and respecting each other's opinions can improve the quality of Learning Challenge experiences.
2. The Learning Challenge is a great way for participants to learn good habits of thinking.
3. There are a number of seemingly contrary habits of thinking that are actually complementary and interdependent. These would include: being resilient whilst also being open minded; being collaborative as well as autonomous; and being self critical at the same time as being comfortable with discomfort.