

Challenging students with a *Learning Pit*

A few months ago, I was with a friend driving to a theatre in a town we don't know well. Normally, that would be OK because we'd simply follow the instructions given by his GPS. However, this time *Natalie the Navigator*, as we like to call his GPS because of its beautiful female voice, wasn't working, leaving us stranded with no idea which way to go. Sounds unremarkable until I admit this wasn't the first time we'd driven to that same theatre; in fact, we'd been there three times already in the previous 12 months. But each time, we'd relied on Natalie to get us there and in so doing, given up on the art of navigating ourselves.

This got me to thinking: how many students in schools right now are making a similar mistake; not of course with navigation, but with their learning? How many students rely on their teacher to get them to the answer? Sitting back and waiting for directions, knowing full well that not only will their teacher show them **how** to get there but will even decide **where** they need to be in the first place. Sure, when it works, like GPS, its great; but what happens when there is no Natalie, no teacher to guide them; then what? Won't these students be just as lost as Gordon and me?

This is one of my reasons for designing the Learning Pit, [Ref 1](#) a framework for teaching that puts the challenge back into learning. The Pit encourages children not to sit back and wait for the answer to fall into their lap; instead it requires them to think about almost every decision that they make.

Here's an example as to how this might work in practice. Please note that the teacher is trying, in a sense to 'block the students normal route', to find problems with every answer given and in so doing, causing the students to think more about their answers.

TEACHER: What is history?

ADAM: Things that happened in the past?

TEACHER: So, would your breakfast be 'history'?

ADAM: Yes, sort of.

SUSAN: But we're not going to study what Adam had for breakfast are we?

TEACHER: Why not? What difference does it make if we study it or not?

RACHEL: Because that's what history is about. Studying things that happened in the past

TEACHER: So if we were to study Adam's breakfast then would we be 'doing history'?

RACHEL: I guess so though why would we study that? That's boring.

TEACHER: But we study what past civilisations eat don't we? For example, what the Romans eat during their orgies

TAS: Yes, but the Romans are important. Adam's not important.

ADAM: Thanks very much.

TAS: You know what I mean. The Romans had a big impact on our lives whereas Adam hasn't.

ANITA: So maybe history is studying important things from the past?

TEACHER: But do these events have to be in the past?

ELLIE: Of course they do otherwise they wouldn't be history, they'd be the present.

TEACHER: But did anyone watch the airplanes flying into the twin towers in New York thinking, "This is history in the making"?

SAM: But that was still the past because there was a time delay between it happening and the pictures being shown on our TV's

MOHAMMED: But that would mean everything that is shown on the news is history wouldn't it?

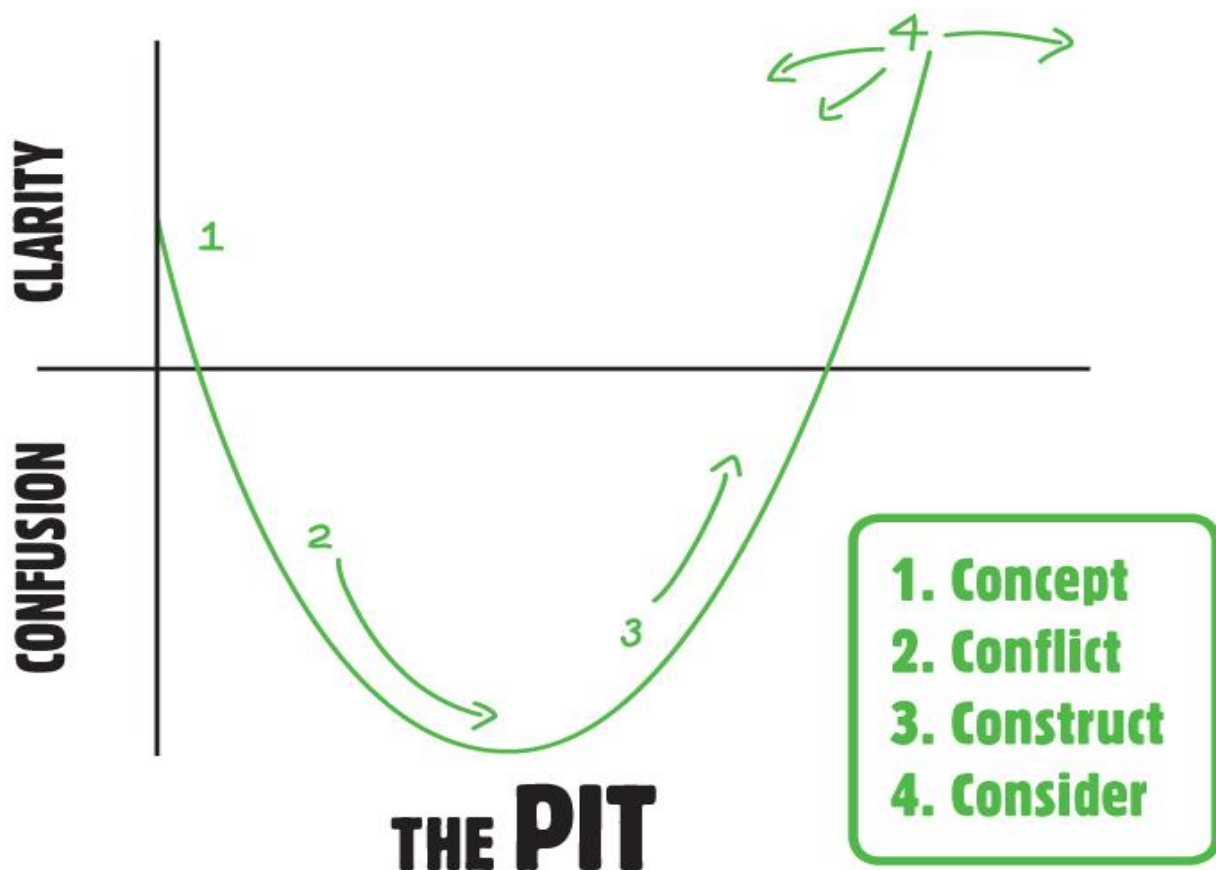
TEACHER: Exactly! So, in fact every time we read, listen to or watch something, anything, we're doing 'history'; is that right?

SARA: No, of course not.

TEACHER: Why not? What is history then?

It is at this point that students realise they don't know exactly what the concept, in this case 'history', really is and so embark on research to find the answer(s). Teachers that observe lessons such as this, remark that children are more animated and focussed on their research than normal. I think this is because they are answering a question that **they have asked** (however much I have engineered it) rather than answering a question that was posed by the teacher, which is what more often happens.

To help explain to my students why I'm challenging them so much, I tend to use the following diagram and explanation:



Stage 1: Identify the key concept

The learning pit always begins with an important concept, since it is through conceptual analysis that children gain an understanding of their world. Example concepts include: art, bullying, culture, democracy, existence, growth, identity, justice, knowledge, language, music, number, originality, poetry, questions, reality tv, science, tourism, and so on.

Stage 2: Challenge

In his analysis of more than 500,000 educational studies, Professor John Hattie of Auckland University cites 'challenge' as one of the 3 most important aspects of expert teaching (as well as deep representations and feedback) [Ref 2](#). Stage two of the learning pit is concerned with just that: challenging students to think more deeply, purposefully, critically and creatively.

Stage 3: Construct

This is the point at which students co-construct an understanding of the key concepts through continued dialogue and study with each other. According to many notable educational theorists such as Lev Vygotsky, Jean Piaget and John Dewey, there is no such thing as knowledge "out there" independent of the knower, but only knowledge we construct for ourselves as we learn. Stage three recognises this by creating the conditions necessary for meaningful dialogue

Stage 4: Reflect

If you reflect on anything you have learned, you soon realise that it is the product of repeated exposure and thought. Thus, stage four is concerned with students revisiting and reflecting upon their learning journey.

Outcomes of the Learning Pit

Students who regularly go 'through the pit' achieve **higher exam grades** and are better learners. This is borne out by statistical analysis as well as teachers' testimonials. But why?

When students are 'in the pit', they think more because of the dilemmas they face when in the pit. These dilemmas cause them to think more, work harder and focus more intently both on the problem and on possible solutions. This in turn helps to make students **better thinkers**, thus increasing the chances of higher exam grades.

Furthermore, since self esteem comes from one's confidence in being able to cope with difficulties as well as a conviction that success is attainable, being in the learning pit and coming out the other side, **builds students self esteem**.

And finally, when students do come out of 'the pit', they feel an overwhelming sense of achievement and empowerment. They experience the 'eureka' moment that says 'I have worked it out for myself; I have **overcome the challenges** and found a decent answer."

- (1) *The Learning Pit has been adapted from an idea first conceived by Dr J Butler and Dr J Edwards*
- (2) *Hattie, J., Influences on student learning, Inaugural Lecture: Professor of Education, University of Auckland, August, 1999*

Growth and change

Age Range: 4 years +

Stage One: Identify the concept

Children and young people are often very interested in the ways they change and grow. And yet, though it seems that everything is destined to change in some way, everything does not necessarily grow. For example, the weather changes every day but we wouldn't say it was growing. Thus, comparing these two concepts could be a useful way to help learners explore each one.

Furthermore, when people use the concept of growth, they may refer to an increase in size or quantity. On the other hand, they may be using the term as a metaphor relating to personal or social development. And this 'personal growth' may be qualitative or quantitative: considering if people are becoming better, more experienced or more capable in some ways.

Change, on the other hand, is another more-complex-than-at-first-we-think concept. In some respects the world we live in doesn't change very much. For example, the earth's rotation around the sun every 365 $\frac{1}{4}$ days or the position of the Equator remains constant. But in other ways it is forever changing. In geography, we might study the violent changes that form mountain ranges, and in history describe the significant changes throughout the ages. In some subjects we might even look at how humans have looked for ways to force change, for example attempts to reverse climate change or to overthrow governments.

Potential for challenge

- What's the difference between growth and change?
- Is there an opposite of growth?
- Is there anything that doesn't either grow or change with time?

Stage Two: Problematising the concept

The following dialogue is used to illustrate how we might begin to challenge children's understanding of growth and change with young children (4 – 9). Key differences to tease out are: growth and development, growing and multiplying, growth and progression, time and growth

TEACHER: Do all things grow?

CHILDREN: Yes

TEACHER: Plants? (yes) Children (yes) Adults (maybe) What about building blocks?

CHILDREN: No, blocks can't grow

TEACHER: But what if I built a tower with some of the bricks. That would be growing wouldn't it?

CHILDREN: Yes

TEACHER: So, building blocks can grow?

They're divided at this point. Some think yes, so no, and some are not sure

TEACHER: What's the difference between this type of growing and the way plants grow?

CHILDREN: Plants grow by themselves but you're making the bricks grow

TEACHER: But I thought we made all of our plants grow by watering and feeding them?

CHILDREN: But plants grow outside without our help. The bricks wouldn't do that.

TEACHER: OK, so growth means changing without our help, is that right?

CHILDREN: Yes

TEACHER: But the weather changes without us doing anything, doesn't it? But weather doesn't 'grow'

CHILDREN: No

TEACHER: So, what's the difference between growing and changing? Can we think of examples of things that change, things that grow and then things that do both?

Deepening the learning pit (4 – 9 year olds)

| | Growth | Change | Both | Neither | Reason |
|-------------------------------------|--------|--------|------|---------|--------|
| You get one year older | | | | | |
| You put on weight | | | | | |
| You have a hair cut | | | | | |
| You make a new friend | | | | | |
| A plant gets bigger | | | | | |
| Your toy gets broken | | | | | |
| You move to a new school | | | | | |
| A goldfish dies | | | | | |
| You learn to play the piano | | | | | |
| You forget some facts you once knew | | | | | |
| You learn how to share | | | | | |
| You learn to be more patient | | | | | |
| You remember a dream | | | | | |
| It stops raining | | | | | |
| You get a new baby brother | | | | | |
| You build a sand castle | | | | | |

Deepening the learning pit (9 – 14 year olds)

TEACHER: What's the difference between growth and change?

MICHAEL: There's no difference

TEACHER: Are you sure? But we could say that the weather changes but it doesn't grow, does it?

AMY: Hurricanes grow in force and intensity

TEACHER: Aha, very good. So they are one and same thing then? Well, let's test that: can anyone think of something that changes but doesn't grow?

STUDENTS: A table, a pencil, a stone, basically an inanimate object

TEACHER: But is that true? For example, a book grows doesn't it? Sometimes we say, 'the book's growing on me' or it would grow as you write it, wouldn't it?

They're divided at this point. Some think yes, so no, and some are not sure

TEACHER: Let's see if we can agree on some examples. Here's a list to start you off but please add your own examples to it. Grow that list!

| | Grow | Doesn't grow | Change | Doesn't change | Type of change or growth |
|--------------|------|--------------|--------|----------------|--------------------------|
| The weather | | | | | |
| A river | | | | | |
| A puppy | | | | | |
| Adults | | | | | |
| Children | | | | | |
| An idea | | | | | |
| Dreams | | | | | |
| A soap opera | | | | | |
| A computer | | | | | |
| History | | | | | |
| Farming | | | | | |
| Countries | | | | | |
| Beliefs | | | | | |

Deepening the learning pit with questions and activities

When I use the following questions, I let pupils know they should question the questions, and spot assumptions. So, for the question 'What makes people change?', a child might argue that nothing 'makes' them change, they just change. This could develop into an interesting discussion about whether every change has a cause. There would be opportunities for pupils to list possible causes of changes they can identify together.

Young children (3 – 7)

Questions

- Are we growing all the time?
- What does growing mean?
- What does changing mean?
- What makes people change/grow?
- Does everything grow?
- What are ways people change and grow?
- What are ways people change but not grow?
- Are there ways people grow up not change?
- Are there ways people neither grow not change?

Activities

Look at pictures of babies, toddlers, children and adults. Identify examples of change and of growth

Keep a class diary for the week, recording the change in weather, meals, activities, games, stories and so on, together with the growth of plants

Read 'The very hungry caterpillar' by Eric Carle



Juniors (7 – 11)

Additional questions

- Does growing always mean changing?
- Does changing always mean growing?
- How many examples can you think of things that grow without changing?
- How many examples can you think of things that change without growing?
- If something increases in size or number, does that mean it has grown?
- Can you grow and not grow at the same time?
- Can you un-grow?
- Will your body always keep growing or changing or both?

Further activities

Link the concepts of change and growth to topics on habitats, evolution, life-cycles, metamorphosis, world development, photosynthesis and so on

For homework, ask your students to find examples at home of things that change, never change, grow, and never grow

Write a poem with the title, 'Growing and changing'

Secondary Students (11 – 18)

Additional questions

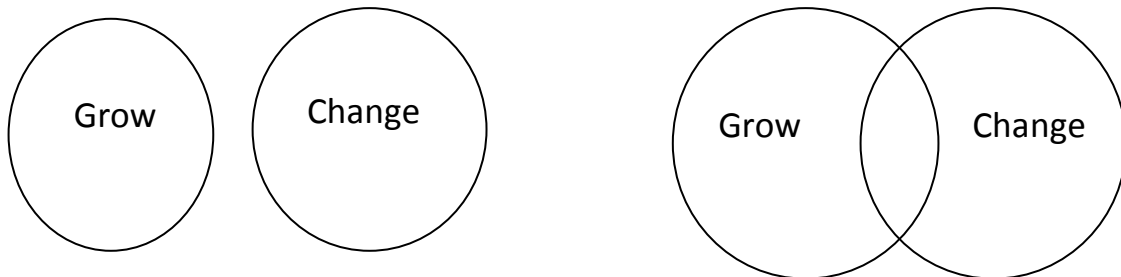
- What are the connections between growth, change and time?
- Is growth a good or bad thing?
- Is change a good or bad thing?
- In what ways can a person's personality grow? Or change?
- How does a person's mind grow?
- Can a person's feelings grow? How?
- Which things do you wish would never change? And never grow?
- Is there anything we can do alter the way we grow or change?
- When we change our mind, is this really changing?
- What forms of growth are there?
- Can we stop ourselves changing? Would we want to?
- Can we stop ourselves growing? What would be the benefits?
- Is growth the same as progress?
- As people grow, is there anything that remains constant?

Stage Three: Construct understanding

Venn diagrams are a useful tool to help students identify the key characteristics of concepts such as growth and change.

For 5 – 7 year olds, ask them to sort a set of objects into 2 hoops, one representing ‘things that grow’ and the other ‘things that change’.

For older students, go for the traditional design of two over-lapping hoops, or add a third hoop for ‘progress’ or ‘development’



Suggested objects for Venn diagram (5 – 9 year olds)

| | | | |
|--------------|---------------|----------------------|--------|
| Carrot | Toy | Pencil | Flower |
| Tin of beans | Teddy bear | Picture of a baby | Paper |
| Balloon | Cup of tea | Picture of a grandma | Seeds |
| A plant | Clump of hair | Pair of shoes | Water |

Additional concepts for older students (9 – 18)

| | | |
|-------------|---------------------|--------------|
| Sadness | Happiness | Fear |
| Kindness | Empathy | Love |
| Talents | Friendship | Personality |
| Mind | Feelings | Families |
| Teamwork | Understanding | Culture |
| Faith | Beliefs | Decisions |
| Equality | Technology | The internet |
| History | A river | Tides |
| Climate | Wind | Ozone layer |
| Politicians | An old dog | Thinking |
| Traditions | Scientific theories | Reputations |
| Celebrity | The news | Media |
| Art | Architecture | Construction |
| School | Education | Learning |

Stage Four: Reviewing the learning journey

Possible meta-cognition questions

- What's the difference between growth and change?
- Is there anything that doesn't either grow or change with time?
- How many examples have you thought of things that grow without changing?
- How many examples have you thought of things that change without growing?
- Which things do you wish would never change? And never grow?
- How does your idea of growth and change differ from the beginning of the lesson?
- What questions about growth and change are you left with?

Proof and Evidence

Age Range: 9 – 18 year olds

Stage One: Identify the concept

It is notoriously difficult to prove anything beyond all doubt. For example, a student might say they can prove who they are by showing their passport but this might be a forgery. Or they might say they can prove that the sun will rise every morning but there is a minute possibility that the world will end before tomorrow and with it all sunrises! Though this may seem facetious, it is actually a wonderful rich vein of thought to explore with students. Not only can you have a lot of fun with it but students will gain a greater insight into such problems as:

Problems within the concept

- The difference between proof and evidence
- Whether it's possible to prove anything at all
- In what circumstances might enough evidence prove a case?
- And what is enough evidence?

Stage Two: Problematising the concept

Drawing on ideas from the following dialogue, see if you can unpack and unsettle the students' concept of what proof and evidence is.

TEACHER: I bet you cannot prove anything to me!

ADAM: I can! I can prove that I'm sitting here

TEACHER: How

ADAM: Well, look here I am (waving)

TEACHER: But how do I know that I'm not just imagining you?

RACHEL: You could walk over and touch Adam.

TEACHER: But when I touch things in dreams, it doesn't mean I've actually touched them so perhaps I'm dreaming this whole conversation

RACHEL: But you need to be asleep to dream and you're not asleep

TAS: No you don't you can daydream without being asleep

TEACHER: Good point, Tas. So, can anyone prove that this isn't all a dream?

ANNIE: You don't smell things in your dreams but I can smell things here

TEACHER: But how do you know people can't smell in their dreams?

ANNIE: Well, I never have

TEACHER: Is that enough evidence to prove that people can't smell?

LAURIE: I guess not

TEACHER: OK, let's take an example: could we ever prove that ghosts do or do not exist?

ANITA: Yes, if someone were to see a ghost that would prove ghosts exist

TEACHER: But what if no-one else could see this ghost?

ANITA: OK, if everyone could see the ghost then that would prove the existence of ghosts

TEACHER: Does that mean if just one person cannot see the ghost, then there are no ghosts?

KALIM: No, if the majority can see the ghost then that would be enough

TEACHER: So is proof to do with what the majority believe?

ELLIE: Yes

TEACHER: But there was a period of history, in the 10th century, when the majority of people thought the world was flat; so had they 'proved' the world was flat?

Deepening the learning pit

Starter activities and questions

1. Ask your students to pair up. Student (A) comes up with an example of something he or she can prove; student (B) tries to find a way to call into question the absolute certainty of student A's assertion
2. Ask groups of students to come up with as long a list as possible of 'things' they can prove. In each case, encourage them to find exceptions that cast doubt upon their assertions.

Questions

Use the following questions to think about different aspects of proof and evidence. In each case, encourage the students to find exceptions that cast doubt upon the assertion

- If we can touch, taste, smell, hear and see something, is that enough evidence to prove something exists?
- If our gut instinct tells us something is real, does this prove its existence?
- If my pet is a bird, is that enough to prove that my pet can fly?
- If I have a pet dog, does that prove my pet can bark?
- Do you have enough evidence to prove beyond all doubt who you are?
- If no counter-evidence can be found, does that mean something has been proved?
- It's the beginning of December and Tom the Turkey is reflecting on his life. Every day for the past 300 days, Tom has been cared for by Farmer Jones. He's been well fed, watered, sheltered and given medicines whenever he needed them. Is this enough evidence to prove that Farmer Jones loves Tom?
- The sun has risen every day since the earth was formed. Is this enough evidence to prove that the sun will rise tomorrow?
- If your finger prints were found at the scene of a crime, does that prove you were there?
- You see smoke, is that evidence or proof (or neither) that there is a fire?

Additional questions and activities for older students (14 – 18)

- I. Ask the students whether they think Descartes was right in the following extract:

The philosopher, Descartes is renowned for subjecting everything to doubt and, in so doing, questioning whether anything can ever be proved. A classic example of this is whether we can prove that life is not a dream. In the end, he decided that there was just one thing he could prove: that he was something.

He went on to claim that even in mathematics nothing could be proved since there was a tiny possibility that a malicious demon was trying to deceive him at all times. His well-known claim, 'I think, therefore I am', was the only thing he felt he could prove because even if a malicious demon were trying to trick him, the demon would be unable to trick him into thinking he didn't exist (because to doubt one's existence is to exist as a doubting thing)

Use the following questions to extend their thoughts. As with the younger students, encourage everyone to think of exceptions that will cast doubt on the certainty of 'proof'

- There has never been an occurrence of someone living forever. So, does that prove that one day I too will die?
- Does proof come from when evidence is incontrovertible?
- If one has absolute proof for the repeated occurrence of an event, is that enough to predict with absolute certainty that it will happen in the future?

- How could you prove to a blind person that there are colours?
- A philosopher, David Hume wrote, 'A wise man proportions his belief to the evidence.' What did he mean by this?
- Has anything ever been proved for all time?
- How much evidence is required to prove something?
- Can you prove that you are not simply a figment of someone's imagination?
- If you are able to prove something which is later found to be false, was it ever proved?
- Do we really need proof?

Stage Three: Construct understanding

Encouraging your students to draw comparisons between similar or linked concepts may help them to focus in on the important characteristics of proof and evidence.

What are the similarities and differences between the following?

- Proof and evidence
- Evidence and data
- Proof and facts
- Proof and truth
- Proof and knowledge
- Proof and faith
- Proof and observation
- Evidence and facts

Stage Four: Reviewing the learning journey

Possible meta-cognition questions

- Is proof the same as evidence?
- How much evidence do we need to prove something?
- Is it possible to prove anything without hindsight?
- Why is it important to search for evidence and proof?
- What are the problems with evidence and proof?
- How does your idea of proof and evidence differ from the beginning of the lesson?
- What questions about proof and evidence are you left with?