A **Routledge** FreeBook

ROUTLEDGE OSIRIS WORLD EDUCATION SUMMIT FREEBOOK 2021

UNLEASHING GREAT TEACHING AND LEARNING

World Education Summit
Powered by Osiris Educational

Routledge
Taylor & Francis Group

World Education Summit
Powered by Osiris Educational

OSIRIS Educational

Professional learning for a digital world

WORLD EDUCATION SUMMIT

22nd – 25th March 2021

A global, virtual four-day conference for all teachers and leaders, delivering support and strategies for impactful teaching and learning.

Celebrate best practice in leadership and teaching from around the world and gain insight from global headliners, school leaders and teachers.

Find out more → **worldedsummit.com**

Routledge Authors Speaking:

- Prof. John Hattie

- Prof. Steen Nepper Larsen

- Prof. Guy Claxton

- Prof. Pak Tee NG

- Dr John Almarode

- Prof. Pasi Sahlburg

- Prof. Paul Kirshner

- Michael Harpham

- Prof. Dylan Wiliam
- Dame Alison Peacock
- Dr Shirley Clarke
- Prof. Michael Fullan
- Prof. Andy Hargreaves
- James Nottingham
- Dr. Tina Rae
- Steve Chinn
- Lisa Cherry

TABLE OF CONTENTS

004 • INTRODUCTION

006 • 1: IS LEARNING A VISIBLE PHENOMENON?

035 • 2: PUNCH AND JUDY

054 • 3: UNDERSTANDING ACHIEVEMENT AND INFLUENCES FROM THE SCHOOL

065 • 4: TEACHER LEARNING

079 • 5: PARADOX 4: TEACH LESS, LEARN MORE

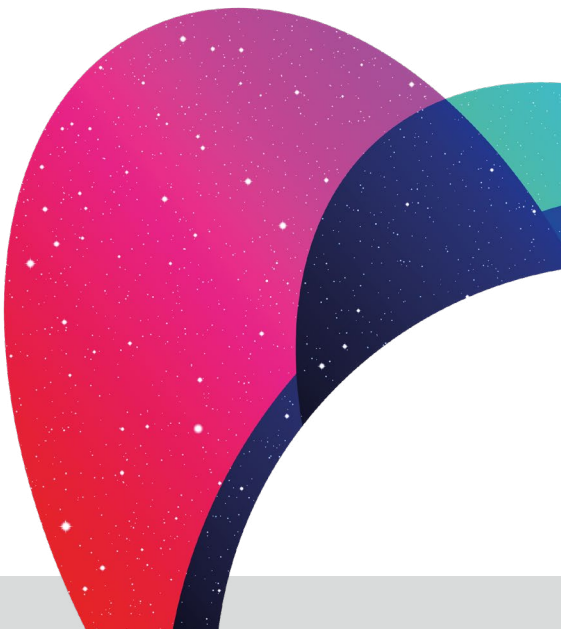
099 • 6: THE ROLE OF THE TEACHER IN INCLUSIVE EARLY CHILDHOOD SCIENCE TEACHING AND LEARNING

121 • 7: LESSONS FOR THE UNITED STATES FROM INTERNATIONAL EDUCATION SYSTEMS

130 • 8: THE TEN DEADLY SINS OF EDUCATION

142 • 9: PROGRESS OVER TIME: STEP BY STEP SUCCESS

154 • 10: PRIOR KNOWLEDGE



INTRODUCTION

ROUTLEDGE OSIRIS WORLD EDUCATION SUMMIT FREEBOOK 2021

Welcome to the Routledge Osiris World Education Summit FreeBook 2021. We hope you find it inspiring, thought-provoking and full of ideas and strategies transferable to any educational setting. This FreeBook showcases 10 chapters taken from our extensive range of leading Education titles written by international experts, many of whom are speaking at this Summit. We believe these extracts can help make a difference to the learning in your school and will inspire teachers and school leaders to think about their roles and reflect upon what the purposes and aims of education ought to be.

As you read through this FreeBook, you will notice that some extracts reference previous chapters – please note that these are references to the original text and not the FreeBook.

Chapter 1 discusses the fundamental question as to whether learning is a visible — or an invisible — phenomenon. Using the twin lenses of Visible Learning and educational philosophy, this is one of the many topics discussed in extended conversations between John Hattie and Steen Nepper Larsen in their 2020 book *The Purposes of Education*.

In chapter 2 Guy Claxton cuts through the ongoing log-jam of arguments and false oppositions about traditional vs. progressive teaching with elegance and precision. With an evidence-based approach mixed with wisdom and compassion he exposes the flaws in both extremes and signposts the way to a brighter future for the teaching profession.

Chapter 3 critically examines one of the major influences shaping student achievement today and provides an overview of the latest research findings on academic achievement, along with relevant research-based instructional strategies. It is extracted from Visible Learning Guide to Student Achievement by John Hattie, Eric M. Anderman.

Unleashing Great Teaching argues it is within every teacher to be better next year than they are this year. In this chapter David Weston and Bridget Clay explain the building blocks in teacher learning to make this a reality.

Lessons can be learned from the incredible story of education in Singapore, which transformed its education system from a struggling one to one that is hailed internationally as effective and successful. In Chapter 5 Pak Tee NG explains the Teach Less, Learn More paradox.

INTRODUCTION

ROUTLEDGE OSIRIS WORLD EDUCATION SUMMIT FREEBOOK 2021

Chapter 6 John T. Almarode focuses on The Role of the Teacher in Inclusive Early Childhood Science Teaching and Learning and how it supports the process of planning, developing, and implementing science instruction for early learners.

In Chapter 7, from *Flip the System US*, Pasi Sahlberg highlights the lessons from around the globe that would benefit the US education system, many of which have been developed from their own world-class research programme but which they have failed to implement.

How Learning Happens introduces 28 giants of educational research and their findings on how we learn and what we need to learn effectively, efficiently, and enjoyably. The focus on chapter 8 in this FreeBook is a cautionary tale of the Deadly Sins of Education – the prevalent myths around teaching and learning that sound temptingly logical, but which actually prevent learning

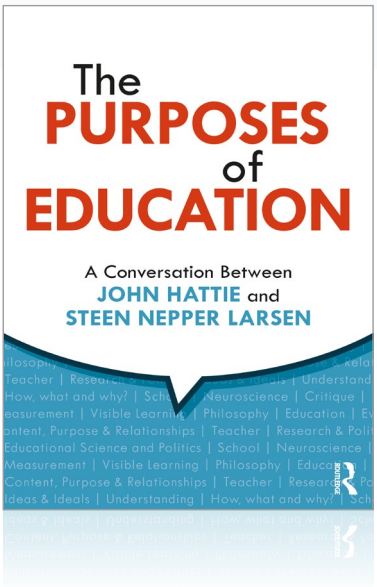
In chapter 9 Michael Harpham explains what every teacher needs to know about improving pupil progress. He explains how, by looking in more detail at curriculum maps, programmes of study, schemes of work and lesson plans, you can help develop and deliver progress in and beyond the classroom.

Finally, in chapter 10 Mike Bell explains the vital first step in a five-step learning cycle that successful teachers, consciously or unconsciously, take their students through. Assessing your students' prior knowledge will ensure your words do not 'fall on deaf ears', and if you find that prior knowledge is missing, repairing this is an important first step in their learning.

CHAPTER

1

IS LEARNING A VISIBLE PHENOMENON?



IS LEARNING A VISIBLE PHENOMENON?

By John Hattie and Steen Nepper Larson

Excerpted from *The Purposes of Education: A Conversation Between John Hattie and Steen Nepper Larsen*

IS LEARNING A VISIBLE PHENOMENON?

By John Hattie and Steen Nepper Larson

Excerpted from *The Purposes of Education: A Conversation Between John Hattie and Steen Nepper Larsen*

HITTING THE ZEITGEIST

Steen: *Visible Learning* was your tenth book, and maybe not due to your knowledge, maybe you couldn't have anticipated it, but it indeed really did hit the zeitgeist of the moment (Hattie 2009).

John: As I said to you, I don't regret writing the book. As an academic, I can spend my whole life, and no one would care. The fact that people care is wonderful. But wow, what a responsibility to now get the message as I understand it as right as I can.

Steen: There's very, very big difference between probabilities . . . and strict laws or even causes.

John: Exactly. Yes the book deals mostly in leading to probability claims, and all the effort then needs to be focused on the fidelity of implementation and thence the impact of implementation at the local level.

Steen: I also studied mathematics when I was younger. I used to love mathematics, like my dad, who was a mathematician and engineer. And as we both know there is a very big difference between probabilities and causality . . .

John: Totally.

Steen: . . . and a deduction logic and all that.

John: Yes.

Steen: And that means that, all the reasonable reservations and clear-sighted limitations for the actual use of your studies and work – they seemed to vanish. They were disappearing.

John: Sure, and one of the things I'm doing now in what I'm writing is saying for each meta-analysis and each influence more is needed to delve deeper.

Steen: Great. I welcome that.

John: I am adding a new metric to the database – a credibility index. For example, if a meta-analysis is based on 20 studies, you don't have much confidence. If five meta-analyses are based on 2,000 studies, you had more confidence. For each influence, I am looking at the number of meta-analyses, the number of studies, the number of students, and the number of effects to form this indicator of credibility (see www.visiblelearningmetax.com).

IS LEARNING A VISIBLE PHENOMENON?

By John Hattie and Steen Nepper Larson

Excerpted from *The Purposes of Education: A Conversation Between John Hattie and Steen Nepper Larsen*

Steen: That's one of my critiques, because it can be very hard, maybe even impossible, to see what each meta-analysis covers in your first *Visible Learning* book.

John: Well, it is. That's a very good argument, and so I'm working on that and have since published much on many specific influences, thus delving deeper into the particular meta-analyses.

Steen: So when I called your approach megalomaniac, I was not referring to your person, but to the research attitude in the book.

John: I know, but megalomaniac means an obsessive desire for power, and that I do not have.

Steen: Meaning that if you forget to talk openly about the validity and limitations of your scientific results, they risk becoming megalomaniac.

John: Aha, then we agree.

TO HELP THE TEACHER TO SEE THE INVISIBLE

John: But here's the problem. I can't stop classroom observation coming, but I can change the methodology of classroom observation. So, I said to our team here, "We need to invent something that has classroom observation, in the sense of what Danielson (Danielson 2011) and Marzano (Marzano 2018) did, to help the teacher see that other 80% (and note, Danielson and Marzano never introduce their matrices for them to be abused this way). We need to introduce not for the accountability. We need to do it in a way that doesn't have another person in the room because they can't see it through the eyes of the students. And their presence changes the nature of what happens in the class. We can't have a video because the trouble with video is, for every hour of video it's two hours of analysis. It's not the best use of teachers' time to sit and analyze what they did – too expensive for the return."

Steen: I know, and another thing is that you might be able to teach or study students, but it is very many years ago you were seven years old yourself, so how can you at all think as a pupil being seven years old? It is not possible to enter the students' minds and to be like them. You're not like them.

IS LEARNING A VISIBLE PHENOMENON?

By John Hattie and Steen Nepper Larson

Excerpted from *The Purposes of Education: A Conversation Between John Hattie and Steen Nepper Larsen*

John: That's right, so we asked the question: "Can we invent a technology that can help the teacher see the 'other' 80%?" And it had to be scalable because there's no point doing it with 10 or 20 teachers only. We want to change the world, so we have. And it's a free app on the Apple Store, and it's very simple. It is called *Visible Classroom*. The teacher takes out their phone, they either dial a local number or they just turn on the recording app within *Visible Classroom*. There are two options – one to just receive a transcribed script with minimal coding (the free version), or the for-purchase version where a real-time captioner (a person who listens to the transcript and turns it into a written text) transcribes the voice and simultaneously codes the transcript. Oh, there is a third version where this transcript is deeply coded – and we are aiming to use AI as much as possible to do this to reduce costs.

And if you do it live then within three seconds we can reproduce, on a whiteboard or on the students' iPads, everything you say, with the highest levels of reliability. And for many students, particularly those below average, they're not as fast at picking up what you mean. We know from this research – and we've only done around about 7,000 to 8,000 teachers at the moment – that teachers, on average, give eight to ten instructions for every part of a lesson.

"Steen, I want you to get your reading book out. I want you to turn to page 52. Today, you have to use the blue pen. When you finish the first page, I want you to turn it over, and I want you to color in the picture on the back. And then at the end of this, go and get the book from the library." Now, for the struggling students, they might recall getting the book from the library. The bright students know that the only thing that mattered in that was turn to page 52. The beauty of this technology is the students can go back and review the instructions and get rid of the extras and focus on the important. The beauty of this technology is when the teacher is talking and working with another group, then all students can 'listen in' and read the transcript of what the teacher is saying: "Oh my goodness, that's what I'm supposed to do." I can see it.

The other thing is I can, if you want, ask the students to rate their learning, and we use six items from the Gates-MET study (Kane & Staiger 2012). These items ask about their learning in the lesson. As the teacher walks out of the room, they instantly can get their transcript, they can get it automatically coded for 16 of the variables that really matter, and they can see the students' rating of their learning.

IS LEARNING A VISIBLE PHENOMENON?

By John Hattie and Steen Nepper Larson

Excerpted from *The Purposes of Education: A Conversation Between John Hattie and Steen Nepper Larsen*

We know that by doing it for five sessions of two hours over two weeks, we can improve 70% of the teachers on the things that matter. They are much more aware of their impact, their levels of language, their talking speed, their proportion of surface to deep, how they teach, and the level and amount of their teaching. Now, my point is that we are informing the teacher more about how they are seen through the eyes of their students, and helping them see how students are reacting to their teaching. And our argument is that if teachers then want to use that as evidence for any kind of performance review, they can. That's their decision, and what then matters are their interpretations of the evidence, not merely the evidence. We need to privilege their interpretations and enhance these interpretations.

CAN WE EVER GET 'RID OF' THE CONCEPT OF LEARNING?

John: I want to ask you a question. I've just read the continental European educational philosopher Gert Biesta's newest book, *The Rediscovery of Teaching*, and both you and Biesta talk against the present 'learnification' of education, and all that 'learning nonsense', as you call it (Biesta 2017; Larsen 2014a, 2015a). What is your conception of learning?

Steen: I think we should try to get rid of that term, 'learning', in a way.

John: Tell me more.

Steen: My idea is that, at least in Denmark, learning was originally in the 1960s to the 1980s a counter-concept coming from the reform pedagogical and leftist movement, stating that bottom-up and not top-down learning should be promoted and established. Students and pupils should have the right and the possibility to organize their own problem-based group work, and organize their own educational system and study activities from below. But from the 1990s and onwards, the concepts of 'learning' and 'competence' were fused closely together and were becoming governance concepts, stating that we should have learning goals and inscribe them into mandatory descriptions of every subject, every year in the school, every year in a university. It is hard to imagine and to accept that today's universities have learning goals inscribed into their study regulations and courses. By the way, I have also read Biesta's new book, actually during the long plane ride from Denmark to 'down under'.

IS LEARNING A VISIBLE PHENOMENON?

By John Hattie and Steen Nepper Larson

Excerpted from *The Purposes of Education: A Conversation Between John Hattie and Steen Nepper Larsen*

John: Oh, I can see all that, but then, Biesta's book, he overstates his case against learning and introduces a derogatory term for what he opposes: 'learnification'. But then, what does he propose instead with respect to learning.

Steen: He criticizes the lack of substance in the learning ideology and emphasizes the role of the teacher.

John: Well, so do I.

Steen: Yeah, but where do you disagree with him, then?

John: I'm struggling with his notion of what he's opposing. He is careful to say he is not against learning but more against its over-dominance in the current debate, which means more critical questions about the purposes of education get missed.

Steen: What he wants to do is to defend the Lithuanian-French philosopher Emmanuel Levinas' logic of exteriority against learning regimes and constructivism. Instead of stating, "Now, we tell you guys to construe or to interpret the things you like . . .", **Biesta favors that teaching processes open the door to exteriorities. But basically he is critical against voluntary constructivism**.

John: So am I. I see constructivism as a theory of knowledge. It's not a theory of teaching. I want students to construct language, too. But that doesn't mean that you have a particular form of teaching to do it; but it does mean that more often than not you have to actively 'teach' students how to construct knowledge, introduce them to the valued forms of knowledge you want them to relate and extend to prior understanding, etc.

Steen: **Biesta's idea is that we should deal with things we do not know of – the exteriority, the transcendental questions, ontology, and the impossible** – and embrace dissensus and fight against 'learnification'.

John: Yeah, but you have to know stuff . . .

Steen: Biesta also emphasizes the importance of the capacity to wonder (Thaumadzein in Greek).

John: Absolutely, wonder is often the precursor to investing in knowing.

IS LEARNING A VISIBLE PHENOMENON?

By John Hattie and Steen Nepper Larson

Excerpted from *The Purposes of Education: A Conversation Between John Hattie and Steen Nepper Larsen*

Steen: Yes, here all the three of us do agree. Biesta also states that the students should adopt and live with a concept instead of interpreting the concept. It can be hard to know exactly what that means and implies. But his position concerning the role of the teacher. Pupils and students don't need a teacher to tell them exactly what to do, think, and 'learn'. He favors – like **Sloterdijk – the endless 'second birth'** (Sloterdijk 2013/2009) of a freethinking person and not to forget humble existential being in the world.

John: I agree with that.

Steen: According to the Danish professor in life-long learning, Knud Illeris, who has made a useful definition of the term in *Sociologisk leksikon* (which I have edited together with my colleague, sociologist Inge Kryger Pedersen), learning can broadly be defined as a permanent change in capacities, not only due to oblivion, biological maturation, or ageing. Often – but not always – learning is connected to deliberate interpretation, intention, and handling of the processes leading to learning, as a change in capacities, 'producing' new possibilities to act and think differently (Illeris in Larsen and Pedersen [eds.] 2011: 380–381, see also Illeris 2004, 2018). Learning is not just coming from the outside. Learning is always incarnated in the individual and has a specific expression. But learning probably also contains enigmatic elements that you can never come to understand in your own person or reconstruct 1:1 in theories of learning. At the same time, it is important to stress that learning is a contested concept in modern societies. More or less everyone favors more learning even though not very many people agree to the same definition of the term.

John: Yes, this notion by Illeris is powerful. I see learning as moving from attending to surface to deep to transfer, but this is more a guide for teachers. Illeris' 'definition' goes deeper, more into the meaning of learning. And yes, like most worthwhile claims, it is a contested word. But then I have never been a fan of claims that you have to define a word before you can use it. If this was the case, we could not talk about electricity or magnetism. Our psychological concepts are more rich, more conditional, and nuanced than a simple dictionary definition. Illeris shows this wonderfully.

So can I ask you this? This is a legitimate question. Steen, how do you learn?

IS LEARNING A VISIBLE PHENOMENON?

By John Hattie and Steen Nepper Larson

Excerpted from *The Purposes of Education: A Conversation Between John Hattie and Steen Nepper Larsen*

Steen: I more or less think that this question is hard to answer because, for me, learning has now been more or less smashed down as a concept and destroyed by its political and bureaucratic success.

John: No. You're not answering my question.

Steen: I could probably learn in very many ways, if I should answer in a positive way, inspired by Illeris' definition. I could, for example, learn through not speaking, listening, reading, playing, investigating, writing, sensing, moving my body . . . and in very many other ways.

John: Yes, you can.

Steen: Listening to a very good speech. Reading a very difficult argument or an enigmatic poem. Bicycle riding, moving the body through the town and landscape, making love, visiting art exhibitions and concerts, experiencing surprising communicative events together with my family, students, good friends . . .

John: This helps highlight a major problem for me – even we as adults do not have a rich or deep language about how we learn; so what chance children? We do not have great access to higher-order cognitive processes. There can be a more active discussion about how we think, strategies, revisit ideas, grapple with the unknown, how new ideas attach to old, and so on. It should not be assumed that students know how to learn, nor that there is one right way to learn, that learning is necessarily fast and easy. This is among the beauties of highlighting the notion of learning. So what's wrong with having a debate about that question, which Biesta seems to be opposing?

WHAT WORKS THE BEST IS THE MOST IMPORTANT QUESTION

John: Sure, but then I go back to the *Visible Learning* book, and I should've been smarter when I wrote it. There are sections that have been misinterpreted and I could have written these parts better. I said this book is not going to investigate the quality issues in meta-analyses and this has falsely been misinterpreted as I did not care for quality. I said enough times that achievement is but one important outcome in schooling, but this has been misinterpreted as if I am obsessed with achievement and nothing else matters. I spent pages on each influence looking for moderators, trying to

IS LEARNING A VISIBLE PHENOMENON?

By John Hattie and Steen Nepper Larson

Excerpted from *The Purposes of Education: A Conversation Between John Hattie and Steen Nepper Larsen*

understand the variability, but so many just look at the list of influences and imagine that is it. I spent about 30 years (it started in Seattle in 1984) trying to work out the story as to the common denominators for those influences above compared to those below 0.40, but some still question why I just list the influences in a league table. The book was about the research, in that sense, it is a rear-mirror vision, but that is the case with all literature reviews – the literature collections are the data to tell a story for the future. I do believe that it is worthwhile to develop a model, and a model should predict as much as it also aims to explain.

Yes, I have pivoted to emphasizing more 'Know Thy Impact', begging the questions we have talked about relating to educators' meanings of impact. I have worked with teams in thousands of schools around the world and seen the impact – in person, in the words and actions of the students, and in the evidence. We have learned lots, we have written a further 20 books, and we have become smarter in our implementation – and not once have we told a teacher 'how' to teach. In essence, we go back to the reason why most educators entered the profession – to have a positive impact on students.

Most important, I hope to have changed the question from 'what works' to 'what works best'.

It is fascinating and exciting that expertise is a common denominator among the top influences. And given that there are so many educators and schools with this expertise, we should constantly esteem this expertise and ask not how to change the profession but how to scale up the excellence that is all around us.

I get frustrated when I hear educators, parents, and politicians asking for more 'stuff', smaller class sizes, more ability groups, more dense curricula, bring on the tests – and not asking for resources for enhancing the expertise. Yes, it is not cheap to do this, but it is the right stuff.

The core notion is turning students on to a passion of learning, I think that's a really critical thing we should do. And again, it begs the question: learning about what, to what depth of knowing and understanding.

Steen: I have already mentioned one of my favorite living philosophers, the hyper-productive German thinker Peter Sloterdijk, and his view on intergenerational generosity can be paraphrased this way: "We have the capacity to 'spoil' and

IS LEARNING A VISIBLE PHENOMENON?

By John Hattie and Steen Nepper Larson

Excerpted from *The Purposes of Education: A Conversation Between John Hattie and Steen Nepper Larsen*

to inspire one another, to give each other all kind of good ideas" (Sloterdijk 2013/2009).

John: Yes, such caring can be transformative. To paraphrase Einstein, we have come to know schooling as a process of our past thinking. It cannot be changed without changing our thinking.

Steen: It starts when you are a parent, and you have this little kid, and you protect it, give it food, breastfeed it, jump around with it, and play with it in every kind of sense. And we keep inspiring one another because we are unfinished creatures. We are going through a long second birth after we've been born. And we are born with the chance and task to develop our identity as a lifelong process of inter-being and becoming, oscillating between stable and dynamic 'elements', conceptualized by the French philosopher, hermeneutic, and phenomenologist, Paul Ricoeur in his master-piece *Oneself as Another* (Ricoeur 1995a). We have these tremendously plastic brains that can develop and change qualitatively all through life. The utmost enigmatic brains will not be fixated when you are turning 16 years old (Fuchs 2009, 2018; Larsen 2013a). How do you view positions like that when you're talking about plastic biology, you're talking about inspiring possibilities?

John: Yes, we go through dramatic transformations in our brain structure and wiring and firing as we grow. And yes, inspire, I think that's a really great part of it. Now, the difficulty with students is that there's no question they can also inspire each other about the wrong stuff, and that's why we have schooling. Now, with you, as adults, we hope you're at the stage when you have those critical judgment skills where you say, "Not good enough. I don't accept it." But with seven- or eight-year-olds, they don't have those skills, which is why we have to teach them about openness versus indoctrination. We need to build evaluative skills and judgments.

Steen: You also have the famous *Lord of the Flies* novel that tells you that some students might develop all kind of non-moral behavior and even become violent and kill one another (Golding 1954).

John: Sure, but even going back to the research that we're doing now in our team here, listening in to the private language that students have when they're in classrooms and understanding how they interact. They are human beings that are interacting in a private language. It's not the language of schooling. So

IS LEARNING A VISIBLE PHENOMENON?

By John Hattie and Steen Nepper Larson

Excerpted from *The Purposes of Education: A Conversation Between John Hattie and Steen Nepper Larsen*

often, the talk has nothing to do with the lessons. And certainly, we know that if you allow students to talk to each other too early in the learning equation about their work, they could reinforce wrong things very successfully. After they have knowledge, then getting them to discuss can be so powerful to consolidate the learning. So, yes, inspiring, but there is a constraint on inspiring, and that there is good, bad, right, wrong inspiring.

Steen: And the philosophers, they also stress this idea that if you have a little calf, a big cow, in a few months, the little calf is as good in using its capacity to walk and to eat grass as the big cow. And it seems to me that human beings have to have at least 15 to 20 – maybe even 35 years if you come from Italy, wild jokes being that they still live with their parents when they're 35 – before you leave home. So we have a very long period for upbringing mankind, while we do not have enough automatic instincts we can count on.

John: And here in Australia there is a new phase of life from age 17 to 27, which is yet to be named (perhaps tween-teens), but it is quite different from 20 years ago. Many jobs, tertiary education of a multitude of versions, moving in and out of the family home, and there are fewer ladders to get onto, fewer anticipations of longer-term employment, and with more wealth a great social life.

But returning to your claim, yes, the human has a longer dependency span. We have a long weaning time, and as our brains take quite some time to develop, we have a long post-weaning dependence, with much adult investment.

Steen: Yes, ontologically speaking our being is a being in language and social interaction. We cannot escape this double condition, this double fact.

John: And the cow doesn't have it in the same way that they can learn through a language. And because we have a language, we have more chances of getting it right and getting it wrong.

Steen: That's true.

John: And I think that's a key part of how we develop – the language of learning, how we develop the language of questioning, how we build that on to content so that we know what the right language of questions are.

IS LEARNING A VISIBLE PHENOMENON?

By John Hattie and Steen Nepper Larson

Excerpted from *The Purposes of Education: A Conversation Between John Hattie and Steen Nepper Larsen*

Steen: It means that, in a way, your answer to this question, "Why does mankind need education?" – which we'll come back to later in our conversation and donate our mutual attention to – is also related to the idea that we should be able to create and generate societies and make social bonding like, for example, the early French sociologist Émile Durkheim wrote about more than 100 years ago (Durkheim 1956/1922) . . .

John: Yeah, we do. Absolutely.

Steen: . . . and social communication.

John: And as you saw in the *10 Mindframes for Visible Learning: Teaching for Success*, I think schooling needs to be among the most civilizing organization in society (Hattie & Zierer 2018). It is, for good or bad.

THE STATISTICIAN AS SOCIOLOGIST

Steen: So how do you then come to and up with this interpretation? I agree with you, but you were trained as a statistician, and now you are becoming a sociologist. That's really interesting.

John: I thought you were going to say I'm becoming a philosopher.

Steen: You are closer to sociology than you are to philosophy, or to . . .

John: Am I?

Steen: . . . art, literature, poetry, and so on in your replies here, not to say that it's wrong.

John: No one has ever accused me of being a sociologist.

Steen: No, it is not an accusation. It's more like an observation.

John: One of your colleagues, Hanne Knudsen, interviewed me and somehow decided to title her article that I was a statistician not a philosopher – as if you have to be one or the other (Knudsen 2017). Surely a little philosophy rains on every parade. Like I just said to you the other day, with my own students. My philosophy as a parent is that I want to teach them to give back.

Steen: Okay, I have another theme and question for you because at home, in Denmark, I often deal with architects and people studying architecture in the

IS LEARNING A VISIBLE PHENOMENON?

By John Hattie and Steen Nepper Larson

Excerpted from *The Purposes of Education: A Conversation Between John Hattie and Steen Nepper Larsen*

art schools. In the old days, I would say it was maybe easier to make a kind of a drawing or a model of a construction, or come up to some meeting, and let the drawings talk for themselves or the model talk for itself. But right now, the architecture school students, they go through rhetoric training. They go through talkative procedures in order to present something, to learn to be outspoken. It means that the whole literature or rhetoric and social communication becomes a major part also of being a successful architect. Meaning that you should be able to talk about the purpose of the building, the idea and the narrative of the building. How it fits into the structure of the historical town, or whatever. Could you see a certain parallel here? That from your field, primarily to come up with figures from educational statistics and say, "These data talk for themselves."

John: No, no. Data never speak for themselves, as we have already discussed.

Steen: Okay, now I know it is not your position, but I guess you must also have felt a rising urge or pressure towards coming up and out to perform – like the architecture students – and to be able to build up a stronger and more coherent narrative about the overall purpose of the data on learning impact?

John: I would like to argue that has been the dominant theme for 40 years, particularly as a statistician. I was taught that it was not the data; it was the interpretation of the data. The core question is: Can you defend the interpretation? And it's the Nietzsche argument. There is no such thing as immaculate perception. There is no one right way but there are multiple interpretations. For example, 30 people can look at a mountain. They can see different things. But the mountain doesn't change. And my whole logic as a researcher is: How do you draw common themes? How do you draw a narrative? How do you perceive data? How could you be wrong? I would argue that this approach is throughout my work. I'd like to think even in *Visible Learning* I've made some strong statements that could be shown to be wrong. Even in the book I wrote in the 1990s on *Self-concept* (Hattie 1992a), the whole first chapter was about kind of a philosophy of thinking about how you could be wrong, the purposes and value of developing models, and the need to make bold claims. Bold is not necessarily agreeing with what is claimed to be known by now. Bold is making testable claims that future observations might reveal to be false. I take the risk of being wrong. In the true Popperian manner.

IS LEARNING A VISIBLE PHENOMENON?

By John Hattie and Steen Nepper Larson

Excerpted from *The Purposes of Education: A Conversation Between John Hattie and Steen Nepper Larsen*

Steen: But it will maybe also soon be stated as a general mandatory capacity (and inscribed into business and policy papers) that every human being should be able to describe him- or herself in developmental terms (i.e., 'developmentalism' as a new ideology, a new 'ism). Implying that one thing is to be a good carpenter or a good architect, but also claiming that it becomes more and more important to double yourself in a narrative practice beside what you are good at. The new ideal is to become a performative and strategic subject wanting to control *The Presentation of Self in Everyday Life*, due to the anticipatory title of a famous book of the Canadian sociologist Erving Goffman (Goffman 1959).

John: Totally. But I want to hear their perceptions of the classroom, or whatever, because it's their perceptions that matter to them. What is their story about what it means to be learning in their class, for example?

Steen: But it could also mean that people are more or less becoming what I call strategic animals, trying to instantiate, and fertilize, and even fuel their ever-ongoing talkative self-doubling.

John: Yeah, but that is why we should be looking for contrary information about our story; that is why we should reflect through the eyes of others.

THE QUESTION OF PLACEBO IN THE *VISIBLE LEARNING* PROGRAM

Steen: Let's move to another question because back home at the university I have a colleague, Kirsten Hyldgaard is her name, and she is a Lacanian psychoanalyst and a historian of ideas. Recently, she wrote a very dense and eye-opening critique of our *Visible Learning* program (Hyldgaard 2017).

John: Okay. I'd love to see it, in English.

Steen: I will give it to you, or rather, I'll ask her to send it to you in an English version. Now I'd like to pose a question that she'd probably love to hear your reply to.

John: Sure.

Steen: And it goes like this: In medicine, the researchers try hard to overcome placebo problems and challenges when they search for evidence, and as you know, they high-prioritize RCT-studies in evidence-based medicine. Is there

IS LEARNING A VISIBLE PHENOMENON?

By John Hattie and Steen Nepper Larson

Excerpted from *The Purposes of Education: A Conversation Between John Hattie and Steen Nepper Larsen*

something called a placebo problem in evidence-seeking educational research, based on *Visible Learning* principles? And if the answer is affirmative, do you see and try to anticipate or even solve placebo problems in the *Visible Learning* program? Is there a placebo problem here?

John: Oh, without a question, she's right, and I've tried to tackle this in a number of ways. Let me start to answer her by looking at a particular kind of placebo, and that's the Hawthorne effect.

Steen: Yeah, I know that, from sociology.

John: And I've been fascinated with that study for many years. In fact, I've gone back and read the original transcripts of the work. Because the argument, as you know, is that people who are involved in a study or in an experiment are more likely to change because they know they're involved in a study and experiment. But if you actually go back and look at the Hawthorne study, it was done in the company General Electric. It was done with these women, who were doing a very tedious task of putting the filaments in light bulbs. My reading of that study is a little different in terms of what a Hawthorne effect is. At the end of each day, they were told how well they were doing. And they knew that they were being compared to another group. So my argument is that the Hawthorne effect is more related to this feedback they received about their progress. And in many ways, and this is too strong, but my answer to your colleague would be: "If that's all we need to do in education to enhance people's ability to improve in light of feedback, I'll take a placebo, thank you."

We do need to do better than in medicine, where a placebo deliberately is a non-effect. It's similar to the question I asked in the early days about the meaning of the 'zero' effect-size – students develop and grow anyway. What's the best estimate I can have for annual growth for students who never go to school? And I did derive an estimate of this growth, not very well. I admit it, because it was hard to get these data. I looked for evidence from countries where students didn't go to school. Nepal, Guatemala, these places. And I tried to look at the development quotient. My best estimate – and it's a very, very crude estimate – was that an effect-size of 0.15 is what you get by developmental placebo, not effects. So you've got to beat that. So in schools the 'placebo' reference point is not zero or the non-effect, but about 0.15.

IS LEARNING A VISIBLE PHENOMENON?

By John Hattie and Steen Nepper Larson

Excerpted from *The Purposes of Education: A Conversation Between John Hattie and Steen Nepper Larsen*

If you do not do much in school, students are still going to learn. You go to some of those countries, and you look at their 15-year-old students who've never been to school. Their street smarts are incredible. They've obviously learned how to live in their learning society. And so, yes, there is a placebo effect; and any intervention needs to be better than this effect.

Steen: Okay. Seen from the eyes of, for example, the school leaders, you go out there to the countryside, and you meet maybe 50 or 100 school leaders or administrative people. And they have now more or less 'bought' your *Visible Learning* program. Could there then be a placebo effect from the eyes of how they handle it? That they want to be a part of it, they want to show the 'right' figures, they want to succeed, and, last but not least, they want to show that they succeed?

John: Yes, they can indeed, Steen.

Steen: So there can be a placebo from the eye of the administrator?

John: Yes, there can be, and it does happen.

Steen: But this 'noisy' over-confirmative behavior is not scientific . . .?

John: And it drives me mad because I get people saying, "Oh, we've done *Visible Learning*." When people come to me, as they do, and say, "I want to introduce your *Visible Learning* program," my comment is: "And what is the problem to which *Visible Learning* is the answer?" And too many of them don't have an answer. Merely having a book study, picking the bits you like or are already doing, and then saying you're doing or done *Visible Learning* is absurd.

Steen: They think it's a package that they can buy – order and implement.

John: Correct, but it is less a program, and more of developing a way of thinking. What we do when we start our *Visible Learning* programs with schools is conduct a good old-fashioned needs analysis. We spend a lot of time on diagnosis because we know that if we don't understand the context, we don't understand what's working or what's not working. We ask the educators to do a needs analysis, as it is their interpretations of the evidence that we want to reveal. We argue very strongly that we are more about the *how*, and not the *what*, because *Visible Learning* can be undertaken in any kind of context. We are not so interested in how teachers teach, but the impact on the students. We ask, for example, teachers about their vision of a good learner in their

IS LEARNING A VISIBLE PHENOMENON?

By John Hattie and Steen Nepper Larson

Excerpted from *The Purposes of Education: A Conversation Between John Hattie and Steen Nepper Larsen*

class, and we ask a sample of students. If this is similar then wonderful, but too often students think learning is coming prepared, sitting up straight, doing the work and handing it in, and watching the teacher working. Ouch, therein starts the program.

We also ask all about their notion of impact. What do they mean, about what, for whom, and to what magnitude? And we teach them how to use artefacts of student work to help answer and reflect on their beliefs about impact, use effect-sizes from tests and assignments, and use student voice about their views of impact. If students do not believe they have progressed then we have a sad state indeed.

Steen: Okay. I'm not a specialist in medicine but, basically, if you take this very, maybe too simplistic logic, you have some cancer medicine, and an idea that it might be curing something. And then you have a harmless and neutral product, you could compare the possible effect to, like a chalk or a vitamin pill. And you blindfold people – both the test and the control group – through all this testing based on the RCT evidence standards. Do you have a similar test logic that you use in educational statistics trying to decipher and estimate impacts and effects of different learning 'interventions', and is there something like a zero logic coming in education, like a harmless and neutral chalk or a vitamin pill?

John: Yes, I do, and yes there is . . .

Steen: I nearly can't wait to hear your answers.

John: . . . I take the view that you've got two ways of looking at the vitamin pill. One is to consider it the 'zero point' and that if students don't grow, whatever that means, then the intervention has not worked. But I think that's too minimal because my argument is that virtually 97% of things we do to students positively enhances their learning. Almost every intervention can beat the 'zero point'.

So I do use an average effect across all influences, which is 0.40. Now care is needed, and building local norms and understandings is critical. Probably the greatest moderator is how narrow or wide the measure is. If it is narrow, it is easier to get higher effects. But the message is to decide on some locally agreed standard and use this. For example, in our program we work with schools to build some local standards from their past tests. We also compare

IS LEARNING A VISIBLE PHENOMENON?

By John Hattie and Steen Nepper Larson

Excerpted from *The Purposes of Education: A Conversation Between John Hattie and Steen Nepper Larsen*

the impact across various years, subjects, and sub-groups of students. So my 'placebo' is much greater than the zero, or absence of an intervention.

Steen: If you were really a trickster, you could be building some wrong ideas in your own offer and see if the smart people would ever find out.

John: Yes, you can.

Steen: And you could build in some quotations, measurements, algorithms, whatever, that'll completely fool people to see whether or not they could be able to falsify your program.

John: Yes, but the students are harder to fool, if they are not progressing in their learning. So we need to ask more comparative questions, ask what works best, determine one's personal best and beat this.

You could get dramatic changes in schools by focusing on very narrow things, and that's a worry, but that's something that we're very, very aware of.

But I want to go back a step. If your colleague Kirsten Hyldgaard is asking about whether we need more control over placebos in the same way as doctors, then my measurement self has no trouble with randomized controlled trials (RCTs) in education. I've been involved in conducting some RCTs in England right now. I just don't think that RCTs are the gold standard. I think that's a major, major mistake when you privilege a method as the gold standard.

Steen: And what are their prime faults, or the prime mistakes they're doing?

IS THERE A BLINDNESS OF SEEING IN THE *VISIBLE LEARNING* PARADIGM?

John: First, let me give you a higher principle. The higher principle is, I think, beyond reasonable doubt (promulgated by Michael Scriven, see Cook et al. 2010). This is kind of like a jury, where you have to put up a case as to why you're going to do this program rather than this program, with the evidence, with the context, and so on, and the aim is to convince, beyond reasonable doubt, that this is what you as a researcher and teacher should do. This begs where the evidence is.

If you use good methodology, you're more likely to go beyond reasonable doubt. I wrote this review of a report once about a particular group of

IS LEARNING A VISIBLE PHENOMENON?

By John Hattie and Steen Nepper Larson

Excerpted from *The Purposes of Education: A Conversation Between John Hattie and Steen Nepper Larsen*

randomized controlled studies that were criminally incompetent. The studies were based on very few students, were very poorly controlled studies, but they were randomized controlled studies. And they were privileged in being published and well cited – primarily because they were RCTs. There are poor as well as good randomized controlled studies. I think there is something like 150 reviews of educational interventions in the US What Works Clearinghouse. What's the average number of articles each review is based on? Two, because those are the only articles that passed their criteria (Lortie-Forgues & Inglis 2019). And their argument is: "On these two, we can make these conclusions, but of course we need more research." On the basis of this poverty of RCT articles, the average effect-size across the 141 reviews is 0.03. So if schools are forced to choose intervention from these sites, they are doomed to failure. They review some influences where there are oodles of evidence that are not RCTs, and they have much more robust findings that can led to powerful interventions. It is criminal to claim any higher order of truth, and that's the problem with the medicine model where they've privileged methodology, and, hopefully, in education, we'll never privilege methodology. We'll privilege a way of thinking, and this is where beyond reasonable doubt is so powerful. We, as researchers, needs to have compelling evidence and a narrative or story about this evidence. Of course, for the teacher or the person who needs to be convinced, the option is to say, "I don't accept your evidence." And I, as the person convincing you, have to listen to you and understand how you think so I can marshal the evidence and narrative so as to convince you. But in doing this I may find contrary evidence, or you could advance contrary evidence – hence the development, enhancements, and refinements happen – or it could devastate and kill the story. But that is how we advance. That's how we can contribute to a learning society. I wonder how you and your colleague, Hyldgaard, will react to these reflections?

Steen: Well, it sounds like a good critical consciousness 'loaded' with carefulness is needed when you deal with such difficult questions of statistical validity and evidence.

John: Yes, of course, it is.

Steen: Some of my other colleagues in Denmark, Søren Christensen and John Krejsler, differentiate between what is evidence based and what is evidence

IS LEARNING A VISIBLE PHENOMENON?

By John Hattie and Steen Nepper Larson

Excerpted from *The Purposes of Education: A Conversation Between John Hattie and Steen Nepper Larsen*

informed (Christensen & Krejsler 2015). In education and pedagogy, they favor the search for and spreading of evidence-informed practices.

John: Yes, but I don't make that distinction.

Steen: Why not? Let me pose you a question even though – you know – I am very skeptical towards evidence 'thinking' as such, and especially within the field of education (see, for example, Larsen 2019b). Do you see your results produced by the *Visible Learning* programs and your correlation tables based on all the data and the meta-analyses you have piled up as a provider of evidence-based global knowledge? Or 'only' as an attempt to help the teachers to work as evidence-informed professionals, strengthening their expertise?

John: No, that's far too narrow a concept of evidence. If I'm a teacher, and I've been teaching 20 years, why are you denying that evidence?

Steen: Maybe because of your 'elaborated' and cunning experience is much more than just immediate and vanishing experiences.

John: Yes. Such experience can be construed as a form of evidence.

Steen: Well, in Denmark one of the worst, most insulting things that have been said about teachers is that they are 'hit by their own experience', meaning that they don't want to listen to real science but only to believe in their own limited horizon of subjective experience . . .

John: Yeah, but experience is evidence, and of course subject to the rules of evidence – can it be validated, triangulated, convincing; and how does the narrative the teacher pronounces fit with this evidence? It must be contested and subjected to falsification – by other teachers, by students, by artefacts of student work, by interpretations of test scores, and so on.

Steen: . . . some researchers, politicians, and school administrators claim that the teachers are too much flavored by their own experience (in Danish: *erfaringsramte*, hit or struck by experience in English) and they have to wave the experience goodbye to become evidence based and effective.

John: Of course not. No, no, no. I want the same standards of enquiry, and interrogation, and deductivism for your experience as I want for the research out there. I want to question your evidence. I don't think your evidence is right

IS LEARNING A VISIBLE PHENOMENON?

By John Hattie and Steen Nepper Larson

Excerpted from *The Purposes of Education: A Conversation Between John Hattie and Steen Nepper Larsen*

just because you have it. I want to say, "Show me the evidence." You could bring along evidence that when you did this, these students did this, that, and the other. That's evidence.

Steen: The idea is, among these colleagues of mine, that instead of finding an evidence-based logic test to be mandatory, you could be informed by different types of evidence . . .

John: Oh, you can be.

Steen: But it all depends on the content, the subject, and the context (Larsen 2011, 2014c, 2015d, 2017b, 2019a, 2019b). Your *Visible Learning* paradigm risks to 'produce' a blindness in seeing if it does not integrate questions concerning the content, the subject, and the context in its approach and procedures for investigation and examination.

John: I think evidence should include the research studies. It should include teacher experience. And they both should be subjected to the same evaluative and falsification notion. What is your narrative, and can you defend your narrative? The evidence doesn't do it. It's the interpretation of the evidence. I want to know how you interpret that evidence.

DIFFERENT PERSPECTIVES ON THE SAME 'THING' MUST BE PROVIDED

Steen: I would then like to ask you a question. Because it seems to me that you are always coming back to this question about the interpretative strength, the strong narrative, the strong interpretation of data, and the critical question examining of arguments.

John: Yes, the key question is: "What evidence would you accept you're wrong?"

Steen: And how do people build up that capacity? Does it come through reading and training?

John: That's the point of schooling.

Steen: Yeah, but as a statistician you have an approach, but as a sociologist, a philosopher, and a historian, you apply utmost different ways of reflecting.

John: Yes, and there are statisticians who don't think this way.

IS LEARNING A VISIBLE PHENOMENON?

By John Hattie and Steen Nepper Larson

Excerpted from *The Purposes of Education: A Conversation Between John Hattie and Steen Nepper Larsen*

Steen: I guess so. So your idea is now that this capacity for interpreting can be trained in very many different ways?

John: I think it's the fundamental purpose of education, to give you different perspectives of the same thing. Recall the mountain story – there can be many perspectives, and you need to start by understanding the person's concept of the mountain.

Steen: I once was a teacher in a, what do you call it, People's Folk Academy (in Danish: Højskole), which has a long history in Denmark: more than 150 years of self-organized schools in the countryside with a lot of so-called practical and theoretical subjects, ranging from art programs to physical activities. These schools have a high autonomy, they get state support, you don't pass exams or get a diploma or a certification there, and you don't get qualified for specific jobs within the societal division of labor. And in the 1990s I 'ran' this philosophy course, or workshop, about theories of acknowledgment, actually, epistemology. It was called "Why a bottle is not just a bottle?" It was a pretty smart title because you could take a simple and utmost concrete beer bottle, and start to discuss what it is. It could be seen as a phallus symbol, a potential weapon, and suddenly it awakens the long time forgotten memory of your drunken favorite uncle's long-term 'suicide', etc.

And the beer bottle can be a part of a modern artwork, labeled 'Danish Culture'. Put a nail through it and hang it on the wall of a modern art museum. It could be deposit, worth one Danish Krone (Crown), and could be seen as a container for all kind of fluids. It could be an object of a color. So there were so many interpretations of just a simple bottle. So my idea was, of course, to give all these kinds of ideas of how we can interpret the world differently. But it seems to me that both this bottle example and your defense of multi-perspectivism provide the open and ever-changing interpretation logic with a much higher and more important role than a stricter scientific deductive logic. But how does that relate to your credo to be a good deductivist?

John: You sound like a modern creativity test – how many unusual uses can you think of for a tin can? Yes, there can be multiple interpretations, but just because you have made an interpretation does not make it true, valid, or replicable. The interpretation is the first part of the narrative. You can even enjoy the narrative, but this is insufficient to be a valid theory. It needs

IS LEARNING A VISIBLE PHENOMENON?

By John Hattie and Steen Nepper Larson

Excerpted from *The Purposes of Education: A Conversation Between John Hattie and Steen Nepper Larsen*

evidence, it needs a counterfactual, it needs a search for contrary evidence. You could, for example, line up all the competing theories for the data in *Visible Learning*, but then the fun begins. And if only others would put up competing theories. Indeed, in education we need more competing theories.

TO GO THE ABDUCTIVE WAY

Steen: In most method books around the globe, you are normally also introduced to two other ways of scientific thinking and reflecting: induction and abduction.

John: I'm a great fan of abduction.

Steen: So am I. Abduction is quite often being seen as a deviation, because you have to be inventive while you do research. You have to dare to meet the challenge and honor the ambition to combine things from different worlds, even though they are not combined themselves, and to qualify and master different ways of reasoning,

John: My friend Brian Haig has written on abduction in factor analysis and research design and I find him convincing (he also was my prefect when I was in High School, and then my tutor in first year university; see Haig 2014, 2018). Like in *Visible Learning*, there is the bringing together of multiple data sets to be analyzed (for means, variation, moderators, regularities) and then the search for meaning occurs. A key step in abduction is detecting empirical phenomena, which is more than just data – they are the relatively stable, recurrent, general features underlying the data. Then we construct plausible models of the relations between the influences, and these are tested against rival claims aiming for high levels of explanatory power and generalizability. A good theory provides a better explanation of the evidence than its rivals.

Hence, in *Visible Learning* there is no shortage of data, and my task was to detect the general features underlying the data – particularly advance plausible models as to what are the underlying relations between those influences above and below the average. From this, I developed the big themes, then reversed the process to seek contrary evidence, alternative rival claims, until I was sufficiently satisfied the model was defensible. Others now can provide alternative explanations, and I continue to add data, which could well reverse the evidence for my claims. Bring it on.

IS LEARNING A VISIBLE PHENOMENON?

By John Hattie and Steen Nepper Larson

Excerpted from *The Purposes of Education: A Conversation Between John Hattie and Steen Nepper Larsen*

Steen: One thing that worries me is that if you happen to be a teacher, and you have this class, and it's full of problems, because there are all kind of problems among the students or the pupils. And you have more than enough to do without handling all these different learning goals, and all these different human beings, all these different conflicts, and all these different tensions. And then there will be somebody – like you or one of your international colleagues – coming in with an advice, stating, "Well, this is more than 0.40. This is 1.80 or 0.80 effective. 'Know Thy impact!' Change what you do, and how you think." Would you understand a teacher who states, "I have enough to do, and I cannot use the *Visible Learning* program because it will not help me in this very specific situation, in which I have to invent my own ways of handling all these tasks and conflicts"?

John: My first reaction to that is teachers, in general, have the same time, they often have the same kinds of students as their neighbor class, the same curricula, the same school leaders, the same political press – and some have higher impacts than others despite these similarities. Some teachers do prioritize learning and maximizing impact on their students and others aim to get through the curricula, engage students in interesting and engaging tasks, and see success as having all hand in the work, on time. Also, I'm quite happy for you to say, "I don't need to learn all this *Visible Learning* stuff." But I still think there's a moral obligation on you to demonstrate to me, as your principal, or as the parent, or as the student, or to the community of people, you have got evidence that you're having a reasonable, appropriate, and desirable impact on these students – and again can defend the domain in which the impact relates to.

What I'm trying to do in the *Visible Learning* work, particularly our programs in schools, is not to privilege any kind of teaching. We are neutral on how one teaches. We say, "We will come in, and we will help you understand your impact." Because I know, as teachers, they have very strong theories of teaching. They may not be based on the research. They may not even have heard of Heidegger or Rousseau, but they have very strong theories about what works for them and their students. If you go in and change what they do without changing how they think about what they do, you haven't got a good chance. But there are not many teachers that we have met who aren't interested and keen to learn more when you help them understand their narrative and their impact and, sometimes, the inconsistencies between those.

IS LEARNING A VISIBLE PHENOMENON?

By John Hattie and Steen Nepper Larson

Excerpted from *The Purposes of Education: A Conversation Between John Hattie and Steen Nepper Larsen*

And most teachers, not all, absolutely want to have an improvement agenda. They don't want a change agenda, they want an improvement agenda. And if they already have sufficiently high impact and can defend the worthwhileness of their content, challenge, and coverage of all students, we simply say, "Permission to keep doing what you're doing. Why would we change you?" Why would we make them use any particular, no matter how desirable, teaching method? To the contrary, the majority of professional learning and education works on the assumption "Steen, you are not doing a good enough job. Come, and I'll improve you or change you. I'll watch you teach and show you how to teach better." I think that's insulting, particularly for those already have high impact.

'KNOW THY IMPACT' ON MORE OR LESS EVERYTHING?

Steen: Okay, then let us try to approach another topic and raise a new debate. Is it possible to translate this logic of teaching, and schooling, and learning to other branches of human interaction? For example, if you 'have' a lover or a wife: "'Know Thy Impact' on 'your' woman!" Or 'lifted' into another sphere: "'Know Thy Impact', if you are an artist, on people looking at art!" Will all these different domains obey same logic that you should strengthen your impact?

John: No, no. Sometimes we should accept beauty and wisdom and give and receive the love of others. Not everything is an experiment, we do not need to think abductively all the time, sometimes we should just smell the roses.

Steen: Because my concern is now that if it is the most wanted clue to come to know your impact, it is a kind of thinking that places you in the very center of the narrative. And the question here – the counter question – could be: Why do pupils and students let you have impact upon them?

John: Well, because it's compulsory. But also we want to make our classes and schools so inviting that students want to come and be impacted. This is why making learning interesting, and challenging and showing the students they progress are so critical.

Steen: And there must be different systems at and in play here. One for love, one for art, one for education . . .

IS LEARNING A VISIBLE PHENOMENON?

By John Hattie and Steen Nepper Larson

Excerpted from *The Purposes of Education: A Conversation Between John Hattie and Steen Nepper Larsen*

John: Why not. I don't want to go into art and love because they don't have the same moral issues about being responsible for people who are yet to be responsible for themselves; and in the process of being taught responsibility – which entails knowing, understanding, etc. These other domains don't deal with development of human beings.

Steen: So you think that this whole logic is also embedded in this Kantian notion of the pedagogical paradox (Kant 1971/1803)?

John: Yes.

Steen: We are, when we do schooling, forced to let people be liberated in a position where they cannot liberate themselves.

John: Correct. We need to teach them to be liberated in the Freirean notion. Absolutely, yes, and hence the importance of developing knowledge, critique, evaluation – to allow them to be critics of what they have received through their schooling.

Steen: And that's very different from a love relation or an art relation.

John: Yes, and for parenting, for sport, etc. We are working in our team on *Visible Learning* in parenting and coaching in sport. Because in parenting and in coaching you've got the same kind of moral imperative in a different way about the responsibilities for people and the paradox, yes.

Steen: Okay, but where to find the limits for that narrative? Because I can see it in sport and parenting. But what else could there be . . . leadership, for example?

John: Of course, you can relate the *Visible Learning* messages to leadership in schools.

Steen: Yeah, but not in love?

John: No, there is a fuzzy boundary about applying notions to the education domain.

Steen: Not in art?

John: No.

Steen: Not in belief systems? But you have had fathers or preacher men, big leading church authorities, telling you how to believe.

IS LEARNING A VISIBLE PHENOMENON?

By John Hattie and Steen Nepper Larson

Excerpted from *The Purposes of Education: A Conversation Between John Hattie and Steen Nepper Larsen*

John: Yes, but they cannot address the core scientific question about what evidence would they accept that they were wrong.

Steen: But it's just to know what you think about whether these basic principles of 'Know Thy Impact' can be transported and translated to other spheres.

John: But that's not fair, Steen, because you talked about 'Know Thy Impact' in terms of the narrow notion of knowing thy impact on others. Then you went to belief systems. When you go to belief systems, yes, I do think there is some generality in terms of how we question, how we accept negative evidence, how we are aware of our confirmation biases in every area. But that's a different part of it. And I think there are rules, procedures, and understandings about methodology in religion, art, love, etc. But in terms of having an impact on other people, that gives us an extra obligation in our discipline of schooling to be very aware of the moral imperative. And it does, as you have said 1,000 times, and I'm agreeing with you, beg that moral purpose question much more. In art, is there a moral purpose question? No, or not in the same sense. You can invoke one through art, you can develop a narrative, but you do not use evidence, abduction, seeking negative evidence in the same way. Beauty transcends in this case.

Steen: Maybe the students and the students also allow you to impact upon them when you show them that you 'incarnate' and demonstrate a certain quality in what you're talking about.

John: Yes, they can indeed, and this is a very powerful notion.

Steen: And you possess knowledge of what you're talking about. And they cannot foresee or anticipate what you would say in five or ten minutes. The quality of teaching should not let them fall asleep, and it invites their intellects and attentions to sparkle.

John: You're absolutely right. Education as sparkle – it sounds great. But there is a legal requirement that they're forced to go to school.

Steen: Yeah, so the rules are here, but not in Denmark. Teaching people to learn something is mandatory, but not to go to school. That's different in Denmark. You have the right and the opportunity to homeschool and to go together with other parents and establish state supported so-called free schools (in Danish: *friskoler*).

IS LEARNING A VISIBLE PHENOMENON?

By John Hattie and Steen Nepper Larson

Excerpted from *The Purposes of Education: A Conversation Between John Hattie and Steen Nepper Larsen*

John: Oh, you can do homeschooling here. But they have to attend some form of schooling.

Steen: In my home country, students do not have to attend a school. You can organize schooling yourself or together with other people. But they have to, in the end, to pass exams.

John: Oh, okay. So there's requirements on pupils and youngsters to do certain things.

Steen: Yeah, but you don't have to go to school. So that's what people didn't understand, while we were riding on our racing bikes 4,200 km through Europe – Spain, France, and Germany – with Albert, our 12-year-old son, back home from Malaga far down south to Denmark far up north in spring 2012. "How could you take him out of school for so long?" We just answered that we had taken the responsibility over him for two months, and he'll come back and take the exams. But that's the Danish way.

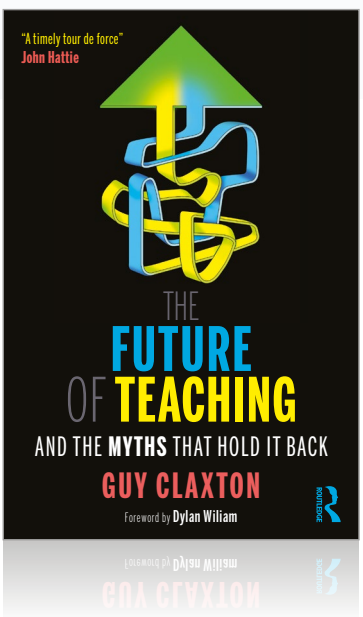
John: In New Zealand you can be fined and even jailed for taking your child out of school for an extended time without prior permission. Yeah, but the notion that the society forces schooling on students gives us an even higher level of responsibility than many of us ever realize.

- **Is learning a visible or invisible phenomenon?**
- **Is it possible to anticipate the quality of learning in a lifetime perspective of the individual?**
- **Is there something called a placebo problem in evidence-seeking educational research, based on *Visible Learning* principles?**
- **How can abductive thinking qualify educational research?**

CHAPTER

2

PUNCH AND JUDY



PUNCH AND JUDY

By Guy Claxton

Excerpted from *The Future of Teaching: And the Myths That Hold it Back*

Forfoughten, *adjective*. (Obsolete). Worn out with fighting.

(OED)

A BRIEF HISTORY OF BATTLE

In the 1970s and 80s – so the story goes – the Progs were top dogs, and the rhetoric of child-centred or holistic education held sway. According to the Trads, children were chatting, following their own childish interests, and generally fiddling about, while standards were slipping and knowledge was being ignored. Teachers, mesmerised by this holistic rhetoric, were abrogating their responsibility to actually *teach*: to tell children important things they needed to know and to ensure that they had learned them properly. Surveys showed that many children didn't know basic facts about their world, and examples of laissez-faire teaching were increasingly discussed. And so, entirely unsurprisingly, the pendulum began to swing back in the Trads' direction. In the mid-1990s a Conservative government began "putting things right".

Out went a raft of liberal reforms, and back came Knowledge – with a vengeance. And this trend intensified still further when a Conservative government was elected in 2010 and Michael Gove was appointed secretary of state for education. But it wasn't only right-wingers who wanted a more traditional turn. Several educational writers of a more left-wing bent, genuinely worried that children from disadvantaged communities had been particularly ill-served by the progressive ethos, joined the call for a more rigorous curriculum. Today, in the UK and in many countries round the world, it is this Trad alliance that is in the ascendant, and the Progs are on the back foot.

THE DAISY CHAIN

In June 2013, The Curriculum Centre, an offshoot of the Future Academies Trust, published a slim book by a young English teacher called Daisy Christodoulou. It was called *Seven Myths about Education*, and it immediately touched a nerve with the British education community. When it was reprinted by a mainstream publisher a year later, its influence expanded and it rapidly became a worldwide hit. It quickly became the go-to source of justification for the many educators who felt out of step with what they saw as a flawed progressive orthodoxy which had taken hold in a great many schools. The book boasted forewords by American academic E.D. Hirsch and widely acclaimed British educationist Dylan Wiliam. The latter said that *Seven Myths* "may well be the most important book of the decade on teaching (and I reluctantly

PUNCH AND JUDY

By Guy Claxton

Excerpted from *The Future of Teaching: And the Myths That Hold it Back*

include my own works in this assessment) . . . I've never said that about a book before, but that's how good I think *Seven Myths about Education* is" – an endorsement that no doubt encouraged the education community to take it seriously.[1]

The book offered a clear analysis of seven "myths" which purportedly underpinned the progressive view and scientific arguments as to why these beliefs were so misguided and damaging. It drew on research in cognitive psychology that showed, it was claimed, why the progressive view was simply wrong about children's minds. It was a mistake to ask them to think about things in an imaginative, critical or independent way when they had little knowledge to think *with*, so the first job of the teacher was to tell them things that were true and important. When they had accumulated enough such information, the ability to think critically about such knowledge and apply it appropriately to the solution of new problems would automatically emerge. Apparently, the science required us to sweep away such distractions as group work, project work, or the attempt to teach "thinking skills", and get back – to use two phrases much in vogue – to a *knowledge-rich* curriculum that was to be conveyed through *direct instruction*: the DIKR agenda.

Christodoulou was not alone in voicing these concerns. Around the same time Tom Bennett, who went on to found the influential ResearchED organisation, published a book called *Teacher Proof: Why Research in Education Doesn't Always Mean What It Claims, and What You Can Do about It*.[2] In it he dished out a sharp kicking to many of the educational fads and fashions that had been around for some time: Brain Gym, Learning Styles, Emotional Intelligence and Learning to Learn (or L2L), for example. The latter was briskly dismissed in Bennett's trademark style: "Learning to learn. It isn't even a thing. We've been hoaxed . . . the hipsters are selling snake oil on this one. Don't waste your time." And having rubbished a four-year enquiry into L2L by academics at Cambridge, King's College London and the Open University, the champion of research-based practice advised instead:

My intuitive default is that learning happens anyway . . . I have some strong opinions about this: I suspect that children learn when they are told stuff, and forced in some way to remember it, and practise it.

A couple of years later David Didau produced *What If Everything You Knew about Education Was Wrong?* which echoed many of Christodoulou's arguments, criticisms and sources. Didau too was convinced that direct attempts to help children think and learn better were misguided and should be abandoned in favour of the knowledge-rich curriculum. In 2019, he followed up with another book, *Making Kids Cleverer*,

PUNCH AND JUDY

By Guy Claxton

Excerpted from *The Future of Teaching: And the Myths That Hold it Back*

which went further.[3] Here is the catechism of his manifesto:

Q. What is the purpose of education?

A. Making children cleverer.

Q. How do we make them cleverer?

A. By getting them to know more.

Q. How do we get children to know more?

A. By teaching them a knowledge-rich curriculum and focusing on strengthening their access to knowledge stored in long-term memory.

Q. Why should we be interested in making children cleverer?

A. Because this seems to be the best bet for improving children's welfare. (p15)

In 2016, the teachers at a notorious free school, Michaela Community School in North-West London, produced a collection of essays extolling the virtues of their ultra-strict DIKR approach. Called *Battle Hymn of the Tiger Teachers: The Michaela Way*, they rejected any kind of collaborative group work, exploratory talk or project-based learning and echoed the belief that cognitive science had conclusively shown that there are no "general or transferable cognitive skills," and that "learning and remembering facts . . . is the route to understanding and critical thinking" (p17). Like David Didau, they were guided by the assumption that "all there is to intelligence is the simple accrual and tuning of many small units of knowledge that in total produce complex cognition" (p19).[4]

Seven Myths was not the first rumbling of discontent about progressive education. Back in 1996 journalist Melanie Phillips has published a book called *All Must Have Prizes*, in which she anticipated the current concern about the rise of the "snowflake generation": young people who were intolerant of challenging tasks or ideas. She argued that "at some point in the last few decades, the educational world came to agree that its overriding priority was to make children feel good about themselves: none of them should feel inferior to anyone else or a failure" (p12). Yet overprotecting children from the harsh realities of frustration, failure or disagreement in school (or at home) was simply storing up trouble for them later on, she said.[5]

Expressing similar concerns – though with a more overtly political tone – academics Kathryn Ecclestone and Dennis Hayes argued in *The Dangerous Rise of Therapeutic*

PUNCH AND JUDY

By Guy Claxton

Excerpted from *The Future of Teaching: And the Myths That Hold it Back*

Education that a preoccupation with young people's well-being was leading schools to "jettison and disdain the intellectual in favour of the emotional", and "turning schools into vehicles for the latest political and popular fad" (p64).[6] These lines of argument appealed to those many educators who – like Ecclestone and Hayes – were especially (and rightly) concerned about issues of social equity and mobility. Some believed that the biggest crime of progressive teaching was to short change children from poor, disadvantaged or marginalised communities. The dubious concern with developing "life skills" serves only to distract teachers from giving such children the one thing that would truly enable them to expand their life choices: access to the "powerful knowledge" and "cultural capital" possessed by those from more fortunate or mainstream backgrounds. Instead of giving them a diet containing the rich, chewy and nourishing subjects of the traditional curriculum, schools under the sway of progressive ideology were offering them pabulum and saccharine. Learning to learn and project-based learning, though well intentioned, has turned out to be tools for keeping the working class in its place.

In 2002, soon-to-become chief inspector of schools Chris Woodhead published a book called *Class War: The State of British Education*, in which he ridiculed much progressive thinking, describing one book (to which I have to say I contributed), *Schools in the Learning Age*, as "a mishmash of tautology and gobbledegook" (p49) being peddled, in the main, by left-wing academics.[7] He imported the American term of abuse "The Blob" to describe (and deride) those who worked in teacher training and educational research.[8]

Such attacks on "trendy" educators and their subversive ideas also found favour with right-wing politicians and social commentators. In March 2013, 100 such educators (of which I was one) signed a letter to *The Independent* newspaper complaining about the regressive direction of education policy. British Secretary of State for Education Michael Gove responded with a vituperative newspaper article containing a torrent of boo-words and playground name-calling. These scholars and researchers were, he said, "the new Enemies of Promise . . . a set of politically motivated individuals who have been actively trying to prevent millions of our poorest children getting the education they need." He used Woodhead's term The Blob to describe this "network of educational gurus . . . Marxists . . . ultra-militants . . . the guilty men and women who have deprived a generation of the knowledge they need . . . operating by stealth . . . in thrall to 1960s ideology." And Gove proudly announced that "We are restoring the rigour they abandoned."[9]

PUNCH AND JUDY

By Guy Claxton

Excerpted from *The Future of Teaching: And the Myths That Hold it Back*

If it was needed, right-wing journalist Toby Young explained in *The Daily Telegraph* – with a liberal use of scare quotes – that The Blob

> all believe that skills such as 'problem-solving' are more important than subject knowledge; that education should be 'child-centred' rather than teacher-led; that 'group work' and 'independent learning' are superior to direct instruction; that the way to interest children in a subject is to make it 'relevant'; that rote-learning is bad, along with discipline, hierarchy, routine and anything else that involves treating the teacher as an authority figure.

Everything in the quotes was to be taken as self-evidently stupid or damaging.[10]

THE ANIMUS

It is unfortunate that the discussion of education and its purpose has descended, particularly in England and the USA, into a vitriolic battle in which anything goes, rather than a civilised debate. Clearly we must dig deep to find the roots of the disagreement. Perhaps what is being fought over is two contrasting views of what it means to be "fully human" and how education should be configured in order to help this flourishing to come about. Ecclestone and Hayes express the traditionalists' view forcefully:

> Intellectual culture is central to our concept of what it is to be human . . . Comprehensive education . . . was the culmination of the idea, embodied in the traditional grammar school, that all children are capable of becoming fully human by gaining knowledge of the range of subjects that constituted a liberal education . . . Education has knowledge and understanding, *clarity*, as its aim in order to move beyond narrow personal and social concerns and problems . . . If a subject is to be educational, it must be based on the intellectual disciplines . . . It is the rationality and the logocentricism [sic] that makes us fully human.

They quote approvingly the philosopher Michael Oakeshott:

> Every human being is born an heir to an inheritance and to enter this common inheritance of human achievements through education is the only way of becoming a human being, and to inhabit it is to be a human being. Not to inhabit it is to be less than human.

It is reason and knowledge that lift us up and enable us to become "dispassionate" and "disinterested".

PUNCH AND JUDY

By Guy Claxton

Excerpted from *The Future of Teaching: And the Myths That Hold it Back*

There is, of course, truth here, but as so often with those taking entrenched positions it is overstated and polarised. Anything to do with "emotion" is demonised and becomes the very antithesis of reason. To the extent that education concerns itself with matters non-intellectual, it is seen as preventing children – and especially children from disadvantaged, marginalised or low-income backgrounds – from becoming all they could and should become. To encourage children to engage with their felt responses to significant issues is to treat them as less than fully human and as incapable of becoming so. It is to "see children as incapable of education because they are no longer seen as truly human". Thus Ecclestone and Hayes ask, rhetorically,

> What sort of child, young person, adult, what sort of *human being*, is presupposed [by progressive education]? We argue that the answer will invariably be someone vulnerable and diminished who needs . . . a lot of emotional support . . . [It implies that] we are all, to a greater or lesser extent 'damaged' . . . We suggest that everyone concerned about education should denounce and reject such images.[11]

Well, if this were an accurate depiction of progressive education, I would be denouncing and rejecting with the best of them. And yes, there is a grain of truth here too. Some progressives – both teachers and parents – have lapsed into an overprotective, hypersensitive attitude that may do their children no good in the long run. And some may have adopted an anti-intellectual stance, neglecting the mind in favour of a preoccupation with 'happiness' and 'well-being'. But the version of progressivism I'm more familiar with seeks to foster the well-rounded, well-balanced child, not the illiterate snowflake. To be fully human, in my book, is to score well on knowledge *and* reason *and* imagination *and* empathy *and* literacy *and and and*. . . . Progressives see *themselves* as rebalancing an education that has become lopsided in favour of the abstract and the abstruse. And so the battle lines are drawn and the Punch and Judy Show plays out – when what is needed is a willingness to listen to and learn from each other. (Of course, to those in warrior mode like Ecclestone and Hayes, any such talk smacks of 'compromise' and will be interpreted as an insidious invitation to betray core principles, and thus fiercely resisted.)

PUNCH AND JUDY

By Guy Claxton

Excerpted from *The Future of Teaching: And the Myths That Hold it Back*

Traditional	Progressive
Emphasis on knowledge	Emphasis on whole child development
Preparation for further study	Preparation for life
Motivated by grades/rewards/punishments	Motivated by intrinsic love of learning
Character = good behaviour	Character = adventurous spirit
Focus on achievement	Focus on development
Content is predetermined and scheduled	Content can be opportunistic/responsive
Little choice/control by learner	Significant choice/control by learner
Little space for learners' own interests	Considerable space for learners' own interests
Disembedded from real-life concerns/contexts	Embedded in real-life concerns/contexts
Major emphasis on reading and writing	Emphasis on talk
Understanding demonstrated by explanation	Understanding shown by making and creating
Learning is (primarily) individual	Learning is (equally) social and discursive
Time to practice skills	Time to experiment and investigate
Teaching by informing and explaining	Teaching encourages grappling and thinking
Learning is memorising	Learning is exploring

Table 2.1 Points of difference between traditional and progressive approaches to education

Table 2.1 maps some of the common beliefs and attitudes that distinguish between Trads and Progs. When horns are locked, each of these pairs of attitudes can be treated as if they were mutually exclusive. Of course they are not. Each can be treated as a spectrum or a continuum. It is perfectly possible to blend and balance aspects of the left- and right-hand columns, and in reality there are few teachers who permanently camp at one extreme or the other. Nor do all these different attitudes have to go together. It is perfectly possible to teach factual knowledge through group work, or to emphasise both achievement and oral fluency. But Table 1.1 shows the ways in which these different dimensions have often been bundled together and set against each other.[12]

The table is mostly self-explanatory, so I shall only elaborate on a few aspects of the Trad/Prog differences here. For Trads, 'good character' tends to refer to being polite, studious and, perhaps, being a 'good sport' or a 'team player'. Progs tend to take a broader view of character, including such attributes as kindness, well-being or an

PUNCH AND JUDY

By Guy Claxton

Excerpted from *The Future of Teaching: And the Myths That Hold it Back*

adventurous spirit. They often esteem character development more highly, and see the development of 'all-rounders' as a core part of every aspect of the school. It follows that Progs are more inclined to offer some choices and share aspects of control with their classes – because they see it as a key part of their job to help students develop their ability and appetite for taking responsibility for managing their own learning.

In traditional schools, writing is usually the main way in which students give evidence of their knowledge and understanding, and the main style of writing is expository and argumentative: you explain, you reason, you critique. Some traditional schools value speech, but it tends to be only in the context of formal, and rather adversarial, 'debating'. In more progressive schools, other methods of displaying your thinking are more common. The development of 'exploratory talk' between students is seen as important, and they are often able to display their progress in a variety of more creative ways: through mini-TED talks, videos, artistic products and so on. In general, Progs value collaborative learning, encouraging learners to explore ideas in discussion, while Trads see learning as mainly a solo activity, involving solitary reading, thinking and writing.

EDUCATIONAL EXTREMISM

I have tried to be as even-handed as possible so far. But people in the opposing camps tend not to be so fair-minded. They often exaggerate and distort each other's positions, choosing to point out worst-case examples and try to pass them off as typical. They select the most impressive-sounding research evidence that suits their case, and dismiss or critique anything that purports to support 'the opposition'. By the same token, they will be inclined to present a sanitised or idealised version of their own position, painting 'my side' as the Bright Side and 'their side' as the Shadow Side. So we have to distinguish between the fair-minded and the Punch and Judy versions of both traditional and progressive education.

We also have to acknowledge that there are indeed better and worse versions and implementations of both traditional and progressive philosophies – so there will always be naïve or ineffective examples of whichever philosophy you wish to critique. Some Trad versions are so boring and alienating that they don't even get students very good grades, let alone prepare them for a life of learning. It's not that they aren't teaching enough "knowledge" (as E.D. Hirsch, for example, claims);[13] it's that they are teaching plenty of it badly. There are still some Mr and Ms Gradgrinds out there,

PUNCH AND JUDY

By Guy Claxton

Excerpted from *The Future of Teaching: And the Myths That Hold it Back*

believing that they have no alternative but to try to 'rack up the results' by force-feeding facts down reluctant gullets.

And, yes, as I said in the Prologue, there are Prog versions which have sacrificed 'the basics' on the altar of some naïve Rousseauean belief in the 'noble savage' and think that the less adults interfere with child development the better things will be. And there have been some teachers, especially in early years and primary, who think that education is all about kids being happy and having fun, and who don't see that it is part of their job to be coaching the development of self-regulation. Sticking up a few of what Tom Sherrington rightly calls "the cheesy growth mindset posters", and thinking that is 'job done' in terms of developing resilient learners, is both naïve and ineffective. Sherrington says, quite rightly, "There's no evidence that posters lead to changed behaviours. A good rule of thumb is 'Live it; don't laminate it'. Too often all the effort goes into signposting the *intention* to change behaviours or a culture – and not into actually securing the change."[14]

So when progressives look at traditionalists, they are inclined to imagine a heartless and draconian Mr Punch, 'drilling and filling' tender young minds with facts of mind-numbing tedium and irrelevance to their lives. By contrast, when traditionalists look at progressivism, they see Judy: an ineffective teacher who abrogates her responsibility to be the adult in the room, refusing to know what is best for children and being unwilling to accept her role as a natural authority. Instead Judy swans about, asking children what they want to do, unaware that they are failing to master the 3Rs of reading, 'riting and 'rithmetic, and is deeply hurt and confused when Ofsted puts her lovely school into Special Measures. Trads imagine not the noble savage, but untamed savagery: children running riot like the fictional boys in that curriculum classic, William Golding's *Lord of the Flies*.[15]

THE DIKR VERSION

> ***Cabal***: a group of people united in some close design, usually to promote their private views or interests in an ideology.

The DIKR lobby, however, have taken to weaponising research in a big way, and they seem to have formed a small but noisy clique. At the core are a group of education professionals who fervently believe that progressive education is not only ineffective but also has actively damaged the life chances of large numbers of young people. And they think that research in cognitive science has proved their case. Their critique of

PUNCH AND JUDY

By Guy Claxton

Excerpted from *The Future of Teaching: And the Myths That Hold it Back*

progressive teaching is not just opinion: it is fact. Some of the key players (and their key texts) we have met already. They include Daisy Christodoulou (*Seven Myths about Education*), Tom Bennett (*Teacher Proof* and *ResearchED* magazine), David Didau (*What If Everything You Knew about Education Was Wrong?* and *Making Kids Cleverer*), and Katherine Birbalsingh (*Battle Hymn of the Tiger Teachers: The Michaela Way*). They are often supported by Martin Robinson (*Trivium 21C: Preparing Young People for the Future with Lessons from the Past*), Tom Sherrington (*Rosenshine's Principles in Action*), and Carl Hendrick (*The Research Informed Teacher*).

They frequently draw on the work of a small number of academics (dead and alive): E.D. Hirsch (*Cultural Literacy* and *Why Knowledge Matters*), Herbert Simon and Allan Newell (*Human Problem Solving*), Daniel Willingham (*Why Don't Students Like School?*), Paul Kirschner (*How Learning Happens*, with Carl Hendrick), John Sweller (cognitive load theory), Nick Rose (*What Every Teacher Needs to Know about Psychology*, with David Didau), Katherine Ecclestone and Dennis Hayes (*The Dangerous Rise of Therapeutic Education*), and David Geary (*Children's Mathematical Development: Research and Practical Applications* and chapters in *The Evolved Mind*).[16]

The group is also enthusiastically supported by some influential politicians and commentators in the UK such as reactionary schools minister Nick Gibb, ex-secretary of state for education Michael Gove, and contrarian journalist Toby Young. As an illustration, here is how Gove and Gibb have made use of the writing of US cognitive psychologist Daniel Willingham.[17] First, we have Gove talking to a conference of the Independent Academies Association in 2012:

> One of the biggest influences on my thinking about education reform has been the American cognitive scientist Daniel T. Willingham . . . [who] demonstrates brilliantly in his book, that *memorisation is a necessary precondition of understanding*.[18]

And now here is Gibb, as recently as 2017, talking to the Global Schools and Education Forum:

> Daniel Willingham talks about [how] an educated person has vast amounts of knowledge in his or her long-term memory which you can retrieve instantly . . . As Daniel Willingham has said, education is about long-term memory, ensuring that we have facts and knowledge *securely embedded in long-term memory*.[19]

It sounds as if Gove and Gibb have an eminent psychology professor on their side. But as James Mannion and Kate McAllister have noted, the politicians' reading and

PUNCH AND JUDY

By Guy Claxton

Excerpted from *The Future of Teaching: And the Myths That Hold it Back*

interpretation of Willingham's thinking is selective and skewed. In their book *Fear Is the Mind Killer*, they contrast Gove's and Gibb's claims with what Willingham actually wrote. The following excerpts are from the same chapter in Willingham's book *Why Don't Students Like School?* as the dictum "factual knowledge must precede skill" that the Trads are fond of quoting. Willingham writes, for example:

> The implication is that facts must be taught, *ideally in the context of skills . . .*
>
> *We want our students to think, not simply to memorise.* When someone shows evidence of thinking critically, we consider her smart and well-educated. When someone spouts facts without context, we consider her boring and a show-off . . .
>
> The conclusion from this work in cognitive science is straightforward: we must ensure that students acquire background knowledge *in parallel with practicing critical thinking skills . . .*
>
> In this chapter I describe how cognitive scientists know that *thinking skills and knowledge are bound together . . .*
>
> *Our goal is not simply to have students know a lot of stuff – it's to have them know stuff in service of being able to think effectively.*[20]

Willingham even quotes approvingly from physicist and professor of natural philosophy Joseph David Everett, writing in 1873:

> There is a great danger in the present day lest science teaching should degenerate into the accumulation of disconnected facts and unexplained formulae, *which burden the memory without cultivating the understanding.*[21]

Clearly, a closer reading of Willingham's work reveals a far more sophisticated understanding of the relationship between knowledge and critical thinking than these politicians and their acolytes seem willing to acknowledge. To summarise: knowledge may be *necessary* for critical thinking, but it is not *sufficient*. It is abundantly clear that Willingham's central message is one of balance, and he could not sum up the twin insights of cognitive science more clearly:

> It is certainly true that *facts without the skills to use them are of little value*. It is equally true that one cannot deploy thinking skills effectively without factual knowledge.[22]

It is notable what a tight-knit bubble of mutual appreciation the DIKR proponents have created for themselves. For example:

PUNCH AND JUDY

By Guy Claxton

Excerpted from *The Future of Teaching: And the Myths That Hold it Back*

- Christodoulou's *Seven Myths* is endorsed by Hirsch ("A splendid, disinfecting book"), Bennett ("This book . . . is correct"), and Dylan Wiliam ("may well be the most important book of the decade on teaching").
- The first three issues of Bennett's magazine, *ResearchED*, carried front cover photos and main interviews with Christodoulou, Kirschner and Willingham, articles by Sherrington, Hendrick and Rose; glowing reviews of books by Hirsch, Willingham, Christodoulou, Birbalsingh and Didau and papers by Kirschner and Sweller; and an interview with Gibb (what is he doing in a research publication?).
- Robinson's *Trivium in Practice* is endorsed by Bennett ("compulsory reading").
- Wiliam endorses Didau's *What If . . .* ("My new favourite book on education") and *Cleverer* ("Didau has done it again!"). Didau acknowledges the influence of Robinson, Hendrick and Rose. Kirschner wrote the foreword for *Cleverer*, and Geary an endorsement ("an invaluable resource").
- Birbalsingh's *Battle Hymn* is endorsed by Bennett, Christodoulou, Hendrick, Sherrington and Young.

A particularly interesting example of the bubble at work is Kirschner and Hendrick's book *How Learning Happens: Seminal Works in Educational Psychology and What They Mean in Practice*. The blurb (emphasis added) says that the book

> introduces 28 *giants* of educational research . . . on learning and teaching, chosen from fields of educational psychology and cognitive psychology. Many of these works have *inspired researchers and teachers all around the world* and *left a mark on how we teach today*. The book offers a roadmap of *the most important discoveries* in how learning happens.

In an interview in *The Psychologist* magazine to promote the book, Kirschner elaborates, "These are the Jonas Salks, the Louis Pasteurs, the Marie Curies of education."[23] So we have our hopes set high for the global impact of the studies quoted. Surprising then that the *only* people to endorse the book are Daniel Willingham, Dylan Wiliam, Tom Sherrington, David Didau and Tom Bennett.

It is worth noting that, out of these 28 highly influential pieces of "research", five are by Kirschner and his collaborators (Sweller, Clark). Another one is by David Geary, a powerful influence on Sweller. Another is by Willingham. And an eighth by the godfather of direct instruction, Barak Rosenshine. Many of these papers do not report original research but are just overviews and opinion pieces. Of the other contributors, Allan Collins, John Seely Brown and Barry Zimmerman get two papers each, and all

PUNCH AND JUDY

By Guy Claxton

Excerpted from *The Future of Teaching: And the Myths That Hold it Back*

the rest – including such mini-giants as Carol Dweck, Jerome Bruner, David Ausubel, Herbert Simon and Allan Newell – get just one each.

It is also worth mentioning that 19 out of the 28 papers were published before 1990 – 30 years ago and more. Of the three articles published in the last ten years, none reports original research. One by Barak Rosenshine reviews ten principles of direct instruction that he claims are supported by research, but no evidence is offered in the book. The second is by Daniel Willingham and colleagues and is a review – not a systematic meta-analysis – of research on the effectiveness of ten different learning techniques, written "to help students and teachers". The third is by Kirschner himself and a colleague that reviews arguments against what they call three "urban legends": the ideas of today's children as *digital natives* and as capable of "*self-education*", and the reality of *learning styles*. The chapter is a review by Kirschner of his own review. The DIKR crowd seem to enjoy recycling not only each other's work but their own as well. It must be reassuring to those of us who struggle to keep up with the welter of publications these days to know that little of major significance has happened in the educational, cognitive and learning sciences in the last 30 years, and none at all in the last ten.

We'll look in more detail at their attitudes to research in chapter X. Suffice it to say here that, though the DIKR people profess to respect research, the evidence they present is in fact highly contested, cherry-picked to support their case, and often out of date. And they seem blissfully unaware – or deliberately disdainful – of the vast majority of education and cognitive science research, not to mention the many innovations going on around the world, that show that it is perfectly possible to develop positive learning dispositions and educate the 'whole child' whilst retaining a healthy respect for rigour, knowledge and grades.

HIT OR MYTH? THE DIKR ASSUMPTIONS

So what are the mainstays of the DIKR view of education? Here is a catalogue of some of the half-truths and misunderstandings that have been paraded as full-truths – and also a few from the wilder fringes of the progressives for good measure. As your "advance organiser", each entry is accompanied by a bald statement of the judgements to which the discussions in this book will lead.

- Progressive nonsense is rife in schools and teacher training.
  – *Some truth, but much less than DIKR lobby claims and unquantified.*

PUNCH AND JUDY

By Guy Claxton

Excerpted from *The Future of Teaching: And the Myths That Hold it Back*

- Constructivism is a flawed ideology.

  – It is not an ideology; it's a well-established theory about the way learning happens (about as strongly supported by evidence as the theory of evolution by natural selection). Some, however, have made the mistake of assuming that constructivist theory leads directly to a single kind of constructivist pedagogy.

- Progressivism prohibits teachers from telling students things.

  – Possibly a while ago, in a few places, but not now.

- Knowledge is facts.

  – Isolated facts are a small and relatively unimportant kind of knowledge.

- Core – or 'powerful' – knowledge should be (taught as) incontrovertible.

  – No it shouldn't. Today's young people need a much more critical attitude towards knowledge claims.

- Powerful knowledge is what the traditional curriculum teaches.

  – Mostly untrue: there are many much more powerful things that young people need to know.

- It is fairly obvious what all today's young people will need to know.

  – No it isn't. It is a complicated, urgent and unresolved question.

- Mathematics and science are prototypes of all subjects.

  – Untrue: they are very unreliable guides to how to teach areas such as history, art, design technology or PE.

- School knowledge is fundamentally different from 'folk knowledge' and has to be learned differently.

  – Some bits of maths and science, maybe, but most school knowledge is best learned as a more sophisticated elaboration of everyday knowledge.

- Subjects are sacrosanct and should be kept separate. Inter- or multi-disciplinary studies are naïve and confusing.

  – Subject disciplines are specialised ways of thinking and learning that have evolved from common human capabilities. There is no good reason why they should not be blended and interwoven in school as they are in life.

- The ability to think about something emerges naturally from knowing lots.

  – Untrue. You can be very knowledgeable and a poor thinker.

PUNCH AND JUDY

By Guy Claxton

Excerpted from *The Future of Teaching: And the Myths That Hold it Back*

- Knowing lots makes you 'clever'.
  – *Untrue, naive and misleading.*
- It is impossible to 'teach thinking'.
  – *Untrue: it is well proven that you can.*
- All 'thinking skills' are tied to specific content: nothing is generic.
  – *Very simplistic and misleading. Thinking skills come in many shapes and sizes. Some are very content specific. Some can readily be generalised and adapted to new domains. And some are indeed fairly generic.*
- It is not our job (and/or not possible) to develop students' 'epistemic character' – their general attitudes toward learning.
  – *Depending on your values, it is desirable and perfectly possible.*
- The attempt to 'teach skills' necessarily competes for time and attention with proper learning, to the detriment of education (proper).
  – *Not necessarily at all. Learning to think critically, for example, develops as a by-product of a certain style of teaching.*
- Progressivism especially disadvantages already disadvantaged children by distracting teachers from transmitting the 'powerful knowledge' they need and deserve.
  – *Possibly in a few earlier incarnations but not now.*
- You have to know lots before you can think about it.
  – *Utterly false. Secure knowledge and understanding generally arise from thinking, discussing and reflecting.*
- There are critical differences between the way 'experts' think and learn and the way 'novices' do.
  – *Of course there are, but what is important is how you can assist children in developing expertise.*
- Children are novices, so they cannot be expected to think like experts.
  – *You would be surprised!*
- The fundamental architecture of the mind was discovered 50 years ago.
  – *Nonsense. Possible architectures are highly contested and rapidly evolving.*
- Mind consists of a very limited capacity short-term store (aka 'working memory') and a limitless long-term store.

PUNCH AND JUDY

By Guy Claxton

Excerpted from *The Future of Teaching: And the Myths That Hold it Back*

– 'Store' is a metaphor that is going out of fashion. There are other, quite different but highly credible, ways of looking at memory.

- Everything we learn has to go through the limited capacity short-term store.

  – No it doesn't.

- The 'cognitive load' of learning can (and should) be reduced by putting lots of facts into long-term memory.

  – No it shouldn't: not always.

- The fact that we can now google lots of things doesn't mean we shouldn't teach them rigorously – because . . .

  – A small amount of truth, but the digitisation and democratisation of knowledge (and expertise) makes a huge difference to which education needs to respond.

- Memorisation is good for the mind.

  – It is one trainable faculty among many, most of which are more important.

- There is a single 'best way' of teaching.

  – No there isn't: it depends on who you are teaching and what you are teaching for.

- There are only two kinds of teaching: direct instruction (good) and pure (or 'minimally guided') discovery learning (bad).

  – Naïve and untrue.

- So project-based learning has been proven to be a waste of time.

  – Untrue.

- Good teaching involves lots of repetition, testing and spaced-out retrieval practice.

  – This is only necessary under the peculiar conditions that are predominantly found in stereotypically traditional classrooms.

- Research will tell us 'what works' in teaching.

  – Untrue. Research feeds our sense of what might be possible. Our values determine whether we should do it.

- Randomised control trials pitting one teaching method against a 'control condition' yield the best evidence of 'what works'.

  – Untrue – even in medicine.

PUNCH AND JUDY

By Guy Claxton

Excerpted from *The Future of Teaching: And the Myths That Hold it Back*

SUMMARY

It's time for the educational Punch and Judy Show to stop. 'Traditional' and 'progressive' education are both caricatures, and bashing cartoon images of each other is unprofitable and unedifying. It is true that the search for a genuinely empowering education has thrown up some false prophets, led to some dead ends and generated some naïve hype. Those cheesy growth mindset posters really don't have much effect. But the quest is serious and necessary, and early failures do not signify that the effort itself is misguided. Good progress has been made and is there to be seen by those who have eyes to see. The attempt to block such urgent enquiries by the DIKR cabal have to be resisted and their arguments exposed as exaggerated, misleading or sham.

[1] Daisy Christodoulou, *Seven Myths about Education*, Abingdon: Routledge, 2014.

[2] Tom Bennett, *Teacher Proof: Why Research in Education Doesn't Always Mean What It Claims, and What You Can Do about It*, Abingdon: Routledge, 2013. Quotes from pp160, 170.

[3] David Didau, *What If Everything You Knew about Education Was Wrong?* Carmarthen: Crown House, 2015; David Didau, *Making Kids Cleverer*, Carmarthen: Crown House, 2019.

[4] Katherine Birbalsingh (ed.), *Battle Hymn of the Tiger Teachers: The Michaela Way*, Woodbridge: John Catt Educational, 2016.

[5] Melanie Phillips, *All Must Have Prizes*, London: Little Brown, 1996.

[6] Kathryn Ecclestone and Dennis Hayes, *The Dangerous Rise of Therapeutic Education*, Abingdon: Routledge, 2008.

[7] Bill Lucas and Toby Greany (eds.), *Schools in the Learning Age*, London: Campaign for Learning, 2000. My chapter (pp5–11) was titled "What would schools look like if they were truly dedicated to helping all young people to become confident, competent lifelong learners?"

[8] Chris Woodhead, *Class War*, London: Little Brown, 2002, p159.

[9] Michael Gove, I Refuse to Surrender to the Marxist Teachers Hell Bent on Destroying Our Schools. *The Daily Mail*, March 23, 2013.

[10] Toby Young, Amoeba That Fosters the Great Class Divide. *The Daily Telegraph*, March 29, 2014; Toby Young, *Prisoners of the Blob: Why Most Education Experts Are Wrong about Nearly Everything*, London: Civitas, 2014.

[11] Ecclestone and Hayes (2008). Quotations from pages 142, 143, 144, 148, 162.

[12] In what follows I'm pointing out what Trads and Progs tend to *act (and talk) as if they believed* – regardless of whether they consciously espouse the positions that I am stating rather baldly here.

PUNCH AND JUDY

By Guy Claxton

[13] E.D. Hirsch, *Why Knowledge Matters: Rescuing Our Children from Failed Educational Theories*, Cambridge, MA: Harvard Education Press, 2016.

[14] See https://teacherhead.com/2017/10/15/school-walls-are-oozing-with-unhelpful-growth-mindset-cheese/. "Live it, don't laminate it" comes originally I think, from Mary Myatt, *Hopeful Schools*, London: Mary Myatt Learning Limited, 2016.

[15] Interesting to contrast this pessimistic view of human nature, as expressed by a rather misanthropic William Golding ("I have always understood the Nazis because I am of that sort by nature", he once said), with the "Real-life Lord of the Flies" story recently uncovered by Dutch historian Rutger Bregman and described in his book *Human Kind: A Hopeful History*, London: Bloomsbury, 2020.

[16] Most of these appear in other notes. Those that don't are David Didau and Nick Rose, *What Every Teacher Needs to Know about Psychology*, Woodbridge: John Catt Educational, 2016; Tom Sherrington, *Rosenshine's Principles in Action*, Woodbridge: John Catt Educational, 2019; Carl Hendrick, *The Research Informed Teacher*, Abingdon: Routledge, 2021; David Geary, *Children's Mathematical Development: Research and Practical Applications*, Washington, DC: American Psychological Association, 1994; David Geary, Educating the Evolved Mind: Conceptual Foundations for an Evolutionary Educational Psychology. In Jerry Carlson and Joel Levin (eds.), *Educating the Evolved Mind*, Charlotte, NC: Information Age Publishing, 2007, pp1–100.

[17] I am quoting liberally from Mannion and McAllister's dissection of these abuses of knowledge in their excellent book *Fear Is the Mind Killer: Teaching Children How to Learn*, Woodbridge, Suffolk: John Catt Publications, 2020, pp85–86. Willingham's book is Daniel Willingham, *Why Don't Students Like School?* San Francisco: Jossey-Bass, 2009, pp25–52. All emphases in the following quotes are added by me.

[18] Michael Gove, *Secretary of State for Education Michael Gove Gives Speech to IAA*, November 14, 2012. Accessed February 19, 2019. www.gov.uk/government/speeches/secretary-of-state-for-education-michael-gove-gives-speech-to-iaa.

[19] *Should We Fill 21st Century Learners Heads with Pure Facts?* Debate from the 2017 Global Schools and Education Forum. Accessed February 18, 2019. https://vimeo.com/209041563.

[20] Willingham, 2009, pp20–38, emphases added.

[21] Ibid., p20.

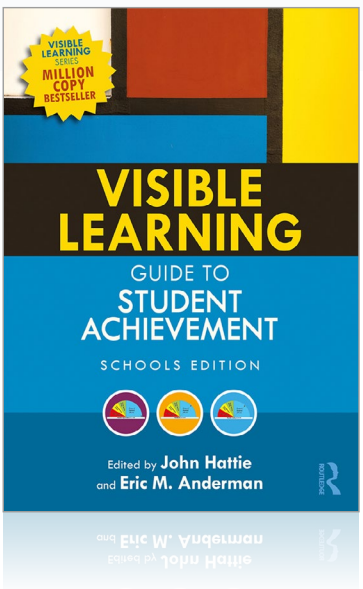
[22] Ibid.

[23] Paul Kirschner, Interview with *The Psychologist*, 2020, 33, 65–66.

CHAPTER

3

UNDERSTANDING ACHIEVEMENT AND INFLUENCES FROM THE SCHOOL



UNDERSTANDING ACHIEVEMENT AND INFLUENCES FROM THE SCHOOL

By John Hattie and Eric M. Anderman

Excerpted from *Visible Learning Guide to Student Achievement: Schools Edition*

UNDERSTANDING ACHIEVEMENT

The first edition of the *International Guide to Student Achievement* was designed as a comprehensive resource examining and summarizing influences on student achievement. In that book, we asked an international array of scholars to discuss the major research-based correlates of achievement. The primary aim of this revised edition (*Visible Learning Guide to Student Achievement*) is to provide educators with a more user-friendly compendium of research summarizing these major influences – and with a particular focus on the school sector. As educators throughout the world seek to improve student learning outcomes and thus to enhance achievement, the information presented in this book provides practitioners and policy makers with up-to-date research on academic achievement, along with relevant research-based instructional strategies.

The original *Guide* contained nine distinct sections. In that first edition, each section contained a series of short chapters focusing on a larger thematic topic. For example, one section ("Influences from the Teacher") contained 18 brief entries, each written by experts, regarding the various ways in which teachers influence student achievement. Each entry had a similar organizational structure, including (a) an introduction, (b) a brief summary of research evidence, (c) recommendations, and (d) conclusions.

Although the previous edition was rich in information, it did not include summary information for each section that provided educators and policy makers with a brief synthesis of major research findings in each area. In this updated edition, each section begins with a brief summary of the major influences on achievement associated with that particular section. This is followed by a few of the key entries from the original *Guide*, all of which have been recently updated by the authors to reflect recent research developments. Each chapter then concludes with a user-friendly "summary table" that synopsizes the key research-based influences on achievement from that chapter. Both the summaries provided at the start of each chapter and the summary tables provided at the end of each chapter succinctly identify the major influences on achievement, as well as practical implications for educators. All of the summary information reflects both the entries from the original *Guide* and research findings from the updated entries.

UNDERSTANDING ACHIEVEMENT AND INFLUENCES FROM THE SCHOOL

By John Hattie and Eric M. Anderman

Excerpted from *Visible Learning Guide to Student Achievement: Schools Edition*

WHAT IS ACHIEVEMENT?

In this section, we briefly (re)introduce the elusive concept of "achievement," in order to provide a framework for the book. **Academic achievement** is a universally valued educational outcome. Valuing of high achievement is engrained in the fabric of many societies. Parents want their children to achieve at high levels, administrators want their schools to be high performing, regional school leaders (e.g., superintendents) want their regions' aggregated achievement to be strong, and even politicians want local and national data to be indicative of high achievement. Indeed, throughout much of the world, children learn from an early age that high achievement is necessary in order to succeed both professionally and financially.

It is impossible to avoid the constant messaging that emphasizes the value of achievement in society. For example, the valuing of achievement is accentuated through highly publicized results of large-scale internationally comparative studies (e.g., the Programme for International Assessment [PISA] and the Trends in International Mathematics Science study [TIMMS]), which regularly report that students in some countries achieve at higher levels than others. Achievement scores are also used as a tool to measure the effectiveness of schools or of specific teachers (with these scores being reported widely and publicly). There are even reminders about the importance of achievement in seemingly unrelated aspects of daily life; for example, it is not uncommon for real estate agents to emphasize that a home that is for sale is in a high-achieving neighborhood and thus has more financial value (Seo & Simons, 2009).

DEFINING ACHIEVEMENT

Whereas achievement is highly coveted, there is no universal agreement on what truly constitutes "achievement." Achievement can be defined in many ways. In the first edition of this book, Guskey (2013) wrote an introductory chapter that provided a framework for understanding this broad construct. Guskey defined achievement, in its simplest terms, as "the accomplishment of something" (p. 3). Guskey noted that in education, achievement is closely tied to learning goals; these could be a student's personal learning goals, curricular goals or teacher's instructional goals, as well as a host of other types of goals.

Guskey identified several significant points that should be considered in discussions of student achievement. Those include the following:

UNDERSTANDING ACHIEVEMENT AND INFLUENCES FROM THE SCHOOL

By John Hattie and Eric M. Anderman

Excerpted from *Visible Learning Guide to Student Achievement: Schools Edition*

- Learning goals (and achievement outcomes that are tied to those goals) can be classified across three dimensions: *cognitive goals*, *affective goals*, and *psychomotor goals*. Thus, assessments of achievement can focus on cognitive, affect, or psychomotor outcomes (or any combination of those outcomes).
- There are many conceptualizations of cognitive, affective, and psychomotor achievement outcomes. For example, there are many types of achievement outcomes that can be assessed in the cognitive domain (e.g., memorization of facts, ability to solve problems, etc.), the affective domain (e.g., engagement, socioemotional outcomes), and the psychomotor domain (e.g., running speed, performing a specific gymnastics routine).
- School curricula often emphasize cognitive achievement outcomes; nevertheless, achievement in the affective and psychomotor domains, while often not assessed regularly, represent achievement outcomes that should not be ignored. In recent years, educators have begun to recognize the importance of affective outcomes in particular (e.g., Collaborative for Academic, Social, and Emotional Learning, 2019; Frey, Fisher, & Smith, 2019).
- Although achievement can be thought of as a summative construct that encompasses multiple content areas, achievement is usually examined within specific content areas (e.g., mathematics, reading, chemistry, etc.). Moreover, there is some variation in content areas that are taught and assessed across countries.
- Achievement can be conceptualized both in terms of *attainment* of knowledge or skills (i.e., what a student has learned at a particular point in time) or *improvement* in knowledge or skills (i.e., changes in academic performance over time). Both attainment and improvement are valued outcomes, but they represent different types of achievement and need to be assessed differently.
- Measures of achievement are not all created equal; some measures more accurately assess achievement than do others. Thus, the reliability and validity of measures of achievement should be considered in the reporting of achievement outcomes.
- Measures of achievement are designed for many purposes. For example, measures of achievement can be used to assess:
  - Learning upon completion of a specific unit of instruction
  - Learning within a specific course
  - Readiness for postsecondary education
  - Eligibility for instructional support services

It is essential that the purpose for which an achievement measure was designed is

UNDERSTANDING ACHIEVEMENT AND INFLUENCES FROM THE SCHOOL

By John Hattie and Eric M. Anderman

Excerpted from *Visible Learning Guide to Student Achievement: Schools Edition*

aligned with the ways that achievement outcomes derived from those measures are being reported and used.

WHAT VARIABLES ARE ASSOCIATED WITH ACHIEVEMENT?

This book is about correlates of and influences on achievement. Some of the most commonly considered correlates of achievement include demographic variables (e.g., socioeconomic status, age, or gender), noncognitive variables (e.g., motivation and engagement), school-related variables (e.g., school size, school grade configurations, etc.), and instructional practices (e.g., grouping practices, technology usage, etc.) (Hattie & Anderman, 2013; Hattie, 2009). But in addition to the more typically discussed correlates, achievement also is related to an enormously wide range of other variables (some of which may seem quite odd!). Indeed, a careful examination of the research literature indicates that scholars also have examined the relations of achievement to variables as diverse as body-mass index (which is weakly and negatively related to achievement) (He, Chen, Fan, Cai, & Huang, 2019), homelessness (which is, for the most part, related to lower achievement) (Manfra, 2018), and dietary intake (which is related to achievement through a variety of mechanisms) (Burrows, Goldman, Pursey, & Lim, 2017), among others.

The remaining chapters in this book include discussions of correlates of achievement within specific categories. We have tried to provide information about the correlates of achievement that are most often discussed in the literature and valued by practitioners. The original *Guide* contained nine distinct sections; in this updated version, the former "sections" have been repurposed into shorter chapters. The chapters specifically examine the following influences on achievement:

- Influences from the student
- Influences from the home
- Influences from the school
- Influences from teachers and classrooms
- Influences from the curriculum
- Influences from teaching strategies

In the original *Guide*, we included separate sections examining influences from teachers and classrooms; in this new version, those have been combined into one comprehensive chapter. The original *Guide* also contained two sections that are not

UNDERSTANDING ACHIEVEMENT AND INFLUENCES FROM THE SCHOOL

By John Hattie and Eric M. Anderman

Excerpted from *Visible Learning Guide to Student Achievement: Schools Edition*

included in this updated book. Those included an initial section that contained six entries examining multiple perspectives on understanding the broad concept of achievement and a final section that examined achievement from an international perspective, wherein there were distinct entries examining achievement across a variety of nations (e.g., Russia, Finland, Ghana, and South Korea).

SUMMARY

We believe that this new edition will serve as a practical and useful guide. School personnel throughout the world constantly work toward enhancing students' academic achievement. We hope that the information contained in this book, which is all rooted in science, can help educators, administrators, and policy makers in their daily work. Numerous interventions, innovations, and novel instructional practices are introduced daily in schools throughout the world; it is our hope that this book can assist educators in critically examining their daily practices and the implementation of new strategies in light of research on correlates of academic achievement.

REFERENCES

Burrows, T., Goldman, S., Pursey, K., & Lim, R. (2017). Is there an association between dietary intake and academic achievement: A systematic review. *Journal of Human Nutrition and Dietetics, 30* (2), 117–140. https://doi.org/10.1111/jhn.12407

Collaborative for Academic, Social, and Emotional Learning (CASEL). (2019). What is SEL? Retrieved from https://casel.org/what-is-sel/

Frey, N., Fisher, D., & Smith, D. (2019). *All learning is social and emotional*. Alexandria, VA: ASCD.

Guskey, T. R. (2013). Defining student achievement. In J. Hattie & E. M. Anderman (Eds.), *International guide to student achievement* (pp. 3–6). New York, NY: Routledge/Taylor & Francis Group.

Hattie, J. (2009). *Visible learning: A synthesis of over 800 meta-analyses relating to achievement*. New York, NY: Routledge.

Hattie, J., & Anderman, E. M. (2013). International guide to student achievement. New York, NY: Routledge.

He, J., Chen, X., Fan, X., Cai, Z., & Huang, F. (2019). Is there a relationship between body mass index and academic achievement? A meta-analysis. *Public Health (Elsevier), 167*, 111–124. https://doi.org/10.1016/j.puhe.2018.11.002

Manfra, L. (2018). Impact of homelessness on school readiness skills and early academic achievement: A systematic review of the literature. *Early Childhood Education Journal*. https://doi.org/10.1007/s10643-018-0918-6

Seo, Y., & Simons, R. A. (2009). The effect of school quality on residential sales price. *Journal of Real Estate Research*, 31(3), 307–327.

UNDERSTANDING ACHIEVEMENT AND INFLUENCES FROM THE SCHOOL

By John Hattie and Eric M. Anderman

Excerpted from *Visible Learning Guide to Student Achievement: Schools Edition*

INFLUENCES FROM THE SCHOOL

Academic achievement is affected at multiple organizational levels. Whereas some effects occur at the classroom level, students are always nested within larger school structures. Thus, the policies and practices implemented at the school level often affect the types of instructional practices that are implemented in individual classrooms. Moreover, when effective policies are implemented consistently across classrooms and grade levels, they can have strong cumulative effects on achievement.

In the original *Guide*, we invited authors to comment on a variety of influences from the school. That section, which was edited by Catherine Bradshaw (University of Virginia), included the entries and authors listed below.

Charter Schools and Academic Achievement

Ann Allen

Ability Grouping*

Ed Baines

Evaluating and Improving Student-Teacher Interactions

Anne H. Cash and Bridget K. Hamre

Mixed-Grade Elementary School Classes and Student Achievement

Linley Cornish

School-Based Mental Health

Erin Dowdy, Matthew P. Quirk, and Jenna K. Chin

Achievement in Faith-Based Schools

L. Mickey Fenzel

Class Size*

John Hattie

Financing Schools*

Eric A. Hanushek

Influences of School Layout and Design on Student Achievement*

C. Kenneth Tanner

UNDERSTANDING ACHIEVEMENT AND INFLUENCES FROM THE SCHOOL

By John Hattie and Eric M. Anderman

Excerpted from *Visible Learning Guide to Student Achievement: Schools Edition*

Grade Retention

Shane R. Jimerson and Jacqueline A. Brown

Inclusive Education

Geoff Lindsay

School-Wide Positive Behavior Interventions and Supports and Academic Achievement

Kent McIntosh, Sophie V.Ty, Robert H. Horner, and George Sugai

School Connectedness

Clea McNeely

Teacher Mentoring, Coaching, and Consultation

Elise T. Pas and Daniel S. Newman

The Link between Student Mobility and Academics

Bess Rose and Catherine P. Bradshaw

Service-Learning

Shelley H. Billig

Single-Sex Schools and Academic Achievement

Shirley L. Yu and Isabel Rodriguez-Hejazi

Summer School and Student Achievement in the United States

Jordan D. Matsudaira

Within Class Grouping: Arguments, Practices, and Research Evidence

Yiping Lou

Special Education and Academic Achievement

Benjamin Zablotsky and Michael S. Rosenberg

Social and Emotional Learning and Academic Achievement

Jessika Zmuda and Catherine P. Bradshaw

Middle School Transitions*

Eric M. Anderman

UNDERSTANDING ACHIEVEMENT AND INFLUENCES FROM THE SCHOOL

By John Hattie and Eric M. Anderman

Excerpted from *Visible Learning Guide to Student Achievement: Schools Edition*

Four of the chapters (noted with an *) have been updated for the new edition and are presented later in the chapter.

Next we present a brief overview of some of the major school-level influences on achievement. We have organized this into discussions of (a) the organizational features of schools, (b) services provided by schools, and (c) instructional practices that are implemented throughout schools.

ORGANIZATIONAL FEATURES OF THE SCHOOL

"Organization" is a broad term that refers to numerous aspects of schooling. Organizational features are largely determined by school administrators, and many are dependent on funding. Moreover, some of these structures are easily malleable, whereas others are extremely difficult if not impossible to change.

One of the most salient organizational features of the school is the grade configuration. Whereas there are numerous determinants of these configurations, most schools utilize fairly standard configurations, with elementary or primary schools serving young children, middle schools serving early adolescents, and high schools serving older adolescents. There are few effects of these configurations, although when instruction is not developmentally appropriate, students can experience declines in achievement as they transition into the higher grades (e.g., from elementary school into middle school). Moreover, although most schools separate students into distinct grade levels, some schools are organized with mixed-grade classrooms (i.e., students from different grade levels are placed in the same classroom). Such arrangements are not deleterious to achievement, but benefits seem to only accrue when schools organize these classrooms into truly nongraded classrooms (i.e., classrooms where work is individually tailored to student needs, regardless of the students' grade levels).

Another organizational feature of schools is class size. Although many argue that smaller class sizes lead to higher achievement, research suggests that class size is not strongly related to achievement. Rather, the types of instructional practices used by teachers are what really make a difference in terms of achievement. Thus, a student who is enrolled in a small class (e.g., one with 8 students) but who receives poor instruction will probably not achieve as well as a student who is enrolled in a larger class (e.g., one with 25 students) but who receives evidence-based instruction and academic support.

UNDERSTANDING ACHIEVEMENT AND INFLUENCES FROM THE SCHOOL

By John Hattie and Eric M. Anderman

Excerpted from *Visible Learning Guide to Student Achievement: Schools Edition*

Finally, some schools are affiliated with specific faiths or organizations. Students who attend faith-based schools (e.g., Catholic schools) often achieve at higher levels than students who attend non-faith-based schools. These effects are quite likely attributable to the faith-based schools having fewer behavioral infractions and a positive, supportive school climate. Moreover, charter schools also continue to grow in number. Attending a charter school (i.e., a school that receives public funds but is independently operated) generally does not yield sizeable achievement benefits, despite much public rhetoric.

SERVICES PROVIDED BY THE SCHOOL

Schools also are characterized by the types of services that are available to students and families. The provision of services is tied to school budgets, which are affected by local and national economic conditions. When available, these services can address a variety of needs, including academic and wellness/mental health needs.

Schools can provide a wide range of mental-health services. Student mental health can be addressed via the provision of services from school counselors, school psychologists, school social workers, and other mental-health professionals. Although the quality and duration of services varies, research generally suggests that when students are experiencing social or emotional stressors, the provision of mental-health support is related to increased academic achievement for those students.

Services designed to support academic success also at times are implemented at the school level. For example, some schools adopt school-wide programs that focus on students' socioemotional learning (SEL). Whereas there are many extant SEL programs, research suggests that when schools implement SEL programs that are evidence-based and when those programs are implemented with fidelity, students' achievement is enhanced.

INSTRUCTIONAL PRACTICES

Whereas instructional practices are often determined by classroom teachers, there are many instructional practices that are implemented (or mandated) at the school level. In order to be effective, these practices must be implemented appropriately and consistently. Moreover, the practices need to be tailored to the developmental readiness of the students. Thus a practice that is effective with a fifth-grade student may not be effective for a first-grade student.

UNDERSTANDING ACHIEVEMENT AND INFLUENCES FROM THE SCHOOL

By John Hattie and Eric M. Anderman

Excerpted from *Visible Learning Guide to Student Achievement: Schools Edition*

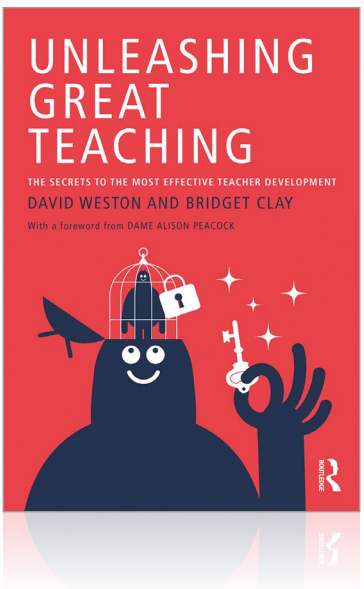
Grouping practices also are often mandated by school policy. This includes both between-class grouping (e.g., grouping students into "advanced" or "regular" algebra) and within-class grouping (i.e., arranging students into small learning groups within a classroom). Despite popular beliefs, there is little research indicating that the use of between-class ability grouping is related to academic achievement. Within-class grouping can be homogeneous (i.e., students are organized into groups of peers with similar abilities) or heterogeneous (i.e., students are organized into groups of peers with varying abilities). Whereas all students experience some achievement benefits from working in small groups, lower-ability students benefit more from working in heterogenous groups, whereas average-ability students benefit more from participation in homogeneous groups.

We next present updated versions of four of the chapters that appeared in the original *Guide*. The chapter then concludes with a table that summarizes the main takeaway points.

CHAPTER

4

TEACHER LEARNING
THE BUILDING BLOCKS



TEACHER LEARNING: THE BUILDING BLOCKS

By David Weston and Bridget Clay

Excerpted from *Unleashing Great Teaching: The Secrets to the Most Effective Teacher Development*

Phil will never forget his first driving lesson. His instructor, Len, was a reassuring figure: calm, soft-spoken and never in a rush. Len's car was an old Renault with super soft suspension and a faint smell of lemon air freshener.

Stepping through the driver's door into that seat was an odd experience. Everything felt familiar after the seventeen years Phil had spent as a passenger, and yet everything was also very new. First there was the physical closeness of all the controls, the three pedals, the wheel and gear stick. But then there was the sensation of just looking at the road from a new perspective, clutching the keys in his hand with a sense of anticipation.

Phil remembers Len looking at him and smiling: 'We won't go far unless you put the key in the ignition, you know.' Okay, so this was actually happening!

Len asked Phil to push the accelerator slightly to get a feel for it, then to press the clutch and move into first gear. He explained biting point, asking Phil to gently release the clutch and gently press the accelerator. Obviously, Phil immediately stalled.

Len chuckled and told him not to worry. On the second go he managed it, and then released the hand brake. Excitement and horror – they were moving!

Suddenly, instructions were coming faster. Look in the rear mirror, look in the side mirror, use the indicator, move your foot to the brake, change gear, look over your shoulder, keep both hands on the steering wheel, be aware of that car. Everything started happening at once. Everything was unfamiliar. Phil felt overwhelmed with all the jobs and forgot the clutch. They stalled.

Thump.

'Don't worry,' said Len, 'you'll get familiar. Let's try again.'

***

Phil's first driving lesson is a great reminder of what a new teacher is going through. Every teacher has spent many years in a classroom before they begin the job, but never as the person in charge. Things are both familiar and unfamiliar. Everyone brings baggage from their schooldays, but also must come to terms with being in charge of thirty children or young adults, smoothly directing the lesson, watching the timing, giving feedback, constantly scanning the room, maintaining self-awareness, operating electronic systems, locating and distributing books, and so many other things.

TEACHER LEARNING: THE BUILDING BLOCKS

By David Weston and Bridget Clay

Excerpted from *Unleashing Great Teaching: The Secrets to the Most Effective Teacher Development*

The fact that we can be both experienced and inexperienced at the same time is just one of the reasons that teacher learning is a complex process.

A MODEL OF LEARNING AND REMEMBERING

What's actually going on when you learn something new? Sweller (1988)[1] suggested that learning is a process of changing what's stored in your *long-term memory*. It involves gradually moving along a scale from *novice* to *expert*.

Let's use a very simplified model of the learning process, based on the work of Atkinson and Shiffrin (1968)[2] and Baddeley and Hitch (1974)[3] (see Figure 4.1).

In this model we've got a few key elements.

Sensory memory is a super short-term memory. It maintains an impression of everything you have just heard, seen, tasted, smelled or felt.

Attention is the process of focusing on certain sensations that are in the sensory memory. If you think about the little finger on your right hand then you will be aware of what it is touching, how warm it is, whether it feels uncomfortable or not.

Up until you thought about it, you probably hadn't been aware of those sensations. But it is possible to deliberately direct your attention, thereby ignoring other sensations.

Attention is not always deliberately directed. If you step on a sharp stone, then you suddenly become aware of your feet. If you are working on a piece of writing, then you can sometimes become distracted by perceived hunger, thirst, tiredness, threat, etc. – i.e. the sorts of things that we've evolved to pay attention to in order to help us survive.

In that first driving lesson, *Len* was helping direct attention to the most relevant and important sensations around him.

In the development of teaching, we want to help teachers stay focused on the most relevant sensations and information to avoid confusion and distraction.

Working memory is where we temporarily store sensations or ideas – it's like a temporary jotting pad. It has very limited capacity; we can only store a few elements at once. However, there are thought to be two distinct channels within working memory: the first is sounds and words, the second is images and shapes. The two

TEACHER LEARNING: THE BUILDING BLOCKS

By David Weston and Bridget Clay

Excerpted from *Unleashing Great Teaching: The Secrets to the Most Effective Teacher Development*

channels work in parallel. We can learn more when the information coming into both channels is complementary. We refer to this in Chapter Six when exploring effective delivery of expertise.

Figure 4.1 A simplified model of memory and learning.

Even though working memory is very limited, we often 'cheat' the limits by remembering a block of information as a single chunk. E.g. the word 'moon' doesn't require four spaces, one for each letter, M – O – O – N, as we are able to quickly match the pattern of the word to our long-term memory of the word 'moon' and just keep the memory of the whole word in working memory.

The more knowledge and memories we hold in our heads, the more we can take complex sensations and chunk them, 'cheating' our normal limits and enabling us to progress to more complex overall thinking and increase our general fluency.

However, where we don't have enough experience or knowledge then we cannot chunk, and our working memory can be overloaded. This is what the inexperienced driver experiences during that first driving lesson – they are unable to group together lots of familiar sensations as 'driving' as nothing is familiar. It's impossible to hold everything in their working memory at the same time.

In teacher development we often see situations where teachers' working memory is overloaded: when attempting to operate a new, unfamiliar piece of software during a challenging class; or when a beginner teacher attempts to combine classroom management with explanation and questioning.

Encoding is the process of turning short-term memories into long-term ones. Not all memories are encoded equally. The strength of the memory can be affected by many factors, including:

- which sensations or ideas seem more relevant to the task at hand;
- the intensity of our emotion at the time; and
- how hard we've worked at making meaning.

TEACHER LEARNING: THE BUILDING BLOCKS

By David Weston and Bridget Clay

Excerpted from *Unleashing Great Teaching: The Secrets to the Most Effective Teacher Development*

Interestingly, an explicit *intention* to try and learn something appears to have no impact on how effectively we encode it. What matters is the process of thinking used, the environment around us and where we are focusing our attention.

A series of driving lessons accompanied by regular practice should encode the sensations and experiences of driving into long-term memory.

In working with inexperienced teachers, we want them to encode a huge amount of knowledge and skill while engaging in the stressful activity of directing a whole class of students. They are naturally drawn to pay attention to the things that are most important to them, but these are not necessarily the stimuli that would be most important to an expert.

Experienced teachers sometimes must interrupt their automatic process of making sense of what they are seeing or else they end up encoding the familiar and filtering out the unfamiliar. This is what makes learning something unfamiliar so difficult – new ideas get harder to assimilate and existing thinking becomes increasingly entrenched. We also need to repeatedly encounter new or improved ideas so that they can be at least as strongly encoded as old habits and thinking. This is probably one of the reasons that effective teacher development almost always requires a sustained cycle of encountering ideas – one encounter appears to be unlikely to encode a suitably strong new pattern of thinking.

Retrieval is the process of accessing memories from long-term memory. It is mainly a pattern-matching process where the contents of working memory are matched against long-term memories to find a best fit.

Interestingly, remembering something strengthens *and* modifies the original memory. For example, if you retrieve your memory of oranges while also thinking about an unpleasant taste, then the original memory of oranges is now modified to be more associated with an unpleasant taste. Similarly, if a teacher on repeating a successful lesson finds that it now goes wrong, that teacher may then make negative associations with that content or class.

Each time you practise driving a car, you are retrieving the memory of the various sensations and tasks. Repeated practice means repeated retrieval, and this means stronger memories.

The way that retrieval works is a challenge when a teacher is trying to change the way they think about something. Every time the old, out-dated memory is triggered, it

TEACHER LEARNING: THE BUILDING BLOCKS

By David Weston and Bridget Clay

Excerpted from *Unleashing Great Teaching: The Secrets to the Most Effective Teacher Development*

can be strengthened. It's hard to embed new ways of thinking, and hard to change old ones.

THE IMPLICATIONS

We can use this model to help understand that learning is a continuum. It is very different to engage in a task when we have very few relevant memories than to engage in that same task when we have many relevant memories. More knowledge of, and experience in, a task allows us to move from being a *novice* to gaining greater *expertise*, although there is really no limit to this level of expertise – you can pretty much always become more expert.

SOMEONE WITH MORE EXPERTISE . . .

. . . will be familiar with most of the situations or problems they face in a particular domain. For example, an expert quadratic equation-solver will recognise the vast majority of problems as familiar and remember which strategies to try first. A teacher getting students to form a line outside the classroom can rapidly recognise and attend to a student who is not paying attention – the pattern of action and response is stored.

Someone with more expertise will be clearer on what success looks like, clearer on what the best routes to success look like and will be able to apply rapid and accurate correction if they deviate from this. For example, a dancer has a much stronger awareness of his balance, of the tension in various muscles, of where he is in contact with the floor, his momentum, etc. and this allows him to make quick corrections on the fly. A teacher of French is able to spot a common writing error with tenses and can almost effortlessly recall the best remembered options for corrective feedback.

Someone with more expertise will have better developed mental models which effectively predict and explain what is happening and which help to select alternative strategies where necessary. For example, an expert baker understands immediately why a dough feels too wet and can take informed corrective action. An expert violin teacher can identify an error with use of the bow from listening to the tone, using a clear model of how musicians develop to identify what the appropriate intervention is for this level of skill.

Finally, more expertise enables you to complete a task using less of your working memory, freeing up space for awareness of other activities or for combining multiple

TEACHER LEARNING: THE BUILDING BLOCKS

By David Weston and Bridget Clay

Excerpted from *Unleashing Great Teaching: The Secrets to the Most Effective Teacher Development*

expert skills. For example, an expert driver can turn a corner without having to think about each element of using mirrors, using the clutch, brake and accelerator, changing gear and turning the wheel. An expert teacher can demonstrate how a piece of equipment works at the front of the class while focusing much of their attention on the reactions and mood of the class.

All these benefits require thinking, habit and practice to become 'hard coded', more automatic and deeply ingrained. This can be beneficial, but it also comes with a cost. The more that certain patterns of thinking are ingrained, the harder it is to shift them. It is not impossible, but it requires a different approach to learning if we all want to avoid being 'set in our ways'.

This means that learning something new is much harder for those who already have some expertise.

NOVICES . . .

. . . have no (or few) long-term memories associated with the particular task and domain. They tend to use a fairly blind application of rules or a very loose goal-seeking behaviour, making guesses at what will help them move to a 'success state'. Similarly, an inexperienced practitioner is uncertain about what a successful process or outcome looks like or how effectively they are doing.

A novice is unfamiliar with the sensations or thinking patterns of carrying out the practice. They can be easily distracted by unusual sensations, finding it harder to focus on the things that are task-critical. They are likely to be clumsy or error-prone and are less effective at diagnosing and correcting as they go. It is a lot harder to work out what to concentrate on and to filter out the unimportant. Novices are rapidly and easily overwhelmed.

A novice will not have developed mental or muscular habits/patterns associated with the task – each individual step requires more explicit thinking and concentration. Where the expert can carry out some elements of a task automatically, with little effort, a novice puts in painstaking effort to carry out even the smallest step. Novice drivers find their first, short journey exhausting and challenging.

The state of not knowing about something is not pleasant. From an evolutionary standpoint, it helped our ancestors to survive if they viewed unexpected and unexplained situations as more dangerous than familiar ones.

TEACHER LEARNING: THE BUILDING BLOCKS

By David Weston and Bridget Clay

Excerpted from *Unleashing Great Teaching: The Secrets to the Most Effective Teacher Development*

While not knowing something can feel stressful, we also find learning very rewarding. We have all felt the pleasurable sensation of making sense of a puzzle, of when something confusing comes into focus, of when we get a new idea that helps explain previously confusing processes.

IMPLICATIONS FOR TEACHER LEARNING

Learning is a continuum and, depending on whether we are a novice in an area or whether we have some expertise, our learning will look different. The challenge then is to design teacher learning so that it deals with an ever-changing mix of both deeply ingrained thinking, when some teachers are experts, and a tendency to be overwhelmed, when they are novices.

In the intensity of the classroom, professional learning must be available for immediate use. It must be flexibly adapted to new and unexpected scenarios, applied on the fly and its results interpreted smoothly. Even when assessing and planning lessons, the time pressure is such that knowledge needs to be readily available for use – there is very little time to translate theory painstakingly into practice.

A classroom is too demanding a place to be a novice in any more than a small number of aspects. In fact, even brand-new teachers are not novices in every respect. From attending school themselves, they will have a lot of existing models and schemas for how classrooms work. Even outside the classroom, teachers do not have time to reinvent every wheel. They need to plan great lessons rapidly and efficiently and to assess effectively.

Clearly, we want to help teachers increase their level of competence in the most important and common tasks and experiences that they will encounter in the classroom. We also want to challenge areas of expertise that are outdated, incomplete or simply mistaken.

TEACHER LEARNING AS A NOVICE

An individual is neither a novice nor an expert, but will have areas or domains where they are a novice and others where they are expert. At the start of their career, teachers will have more domains which are new to them, but having been to school, they will have existing schemas, mental models and preconceptions; i.e. they have some expertise in key areas.

TEACHER LEARNING: THE BUILDING BLOCKS

By David Weston and Bridget Clay

Excerpted from *Unleashing Great Teaching: The Secrets to the Most Effective Teacher Development*

In those domains in which you are a novice, you have no existing models to group and clarify all that is going on in your working memory, so it is very easy to become overloaded. Structures that help teachers form simple models help them to deal with this. Worked examples, role modelling and mentoring all focus their attention on the key elements. This kind of support can be really helpful when something is completely new.

TEACHER LEARNING AS AN EXPERT

Once you have some expertise in an area, it is much more difficult to set aside lessons that have already been learnt. We all have existing mental models which we use to explain and predict. To challenge one of these models implies that much of what we have thought and done will have been wrong. We all need to guard against this in case it leads us to reject new ideas and approaches.

This is nothing new.

> In 1846 a young doctor, Ignaz Semmelweis, suspected that the cause of 16% infant mortality in one clinic might be the failure of doctors to wash their hands. When he ran an experiment and insisted that doctors wash hands between each patient, the deaths from fever plummeted. However, his finding ran so against the established practice and norms that his findings were not only rejected but widely mocked despite being obviously valid. This reactionary short-sightedness gave rise to the term The Semmelweis Reflex: 'the reflex-like tendency to reject new evidence or new knowledge because it contradicts established norms, beliefs or paradigms.'[4]

STICKING WITH WHAT WE KNOW

One of the pitfalls here is *confirmation bias*[5] – a mental failing that means we try too hard to explain everything using our existing mental models. This leads us to dismiss, diminish or reject elements that do not fit and over-emphasise elements that do. You see this regularly in political debate – a strong supporter of one argument will see many flaws in their opponents' argument, while quietly ignoring or even denying anything good or of value. It is a failing built into how we learn and can be difficult to overcome.

For teachers, such biases can lead to superficial adoption of ideas or practice, or an incorrect assumption that what we are seeing or hearing is what we already think or do.

TEACHER LEARNING: THE BUILDING BLOCKS

By David Weston and Bridget Clay

Excerpted from *Unleashing Great Teaching: The Secrets to the Most Effective Teacher Development*

As we describe later in this book, one of the solutions to this issue is to ensure that teacher learning is directly linked to ongoing, robust evaluation of students' learning. This means that, even when a teacher believes that a new practice makes sense or feels better, they need to continue learning and refining it until there is a demonstrable improvement in outcomes for their students.

A second pitfall is *sunk cost bias*.[6] This is also known as the 'IKEA effect' – you're much more likely to invest in and believe in things that you have worked hard on. This is a common pitfall amongst teachers where, after spending time and effort focusing on a particular aspect of practice, they are automatically inclined to see it as successful.

Again, constantly linking back to the benefits for students and evaluative practice can help mitigate these risks. Meaningful feedback and challenge from peers can also support this. It also helps to be aware that the risk is there.

A third pitfall that makes it hard for us to change our thinking is the *Dunning–Kruger effect*.[7] This is a cognitive bias where those with just a bit of knowledge feel misplaced confidence in this knowledge and superiority, compared to those with more knowledge. In teacher learning, it is crucial to ensure that there is both exploration of the theory and experimentation in the practice of new ideas. If this experimentation is then evaluated and linked back to the student learning or expected impact, this lowers the risk of misplaced confidence in one's knowledge resulting in misguided practice.

REJECTING SOMETHING NEW

As well as the many temptations to over-value what we already know, there are also biases which encourage us to reject anything new. Not only are we over-confident that our existing thinking can explain ideas, we tend to assume any disagreement is likely to be a character flaw in the other person. This is known as the *fundamental attribution error*.[8]

A classic example of this goes back to driving. If you accidentally make a swerve into another car, then you believe you made an honest mistake but are otherwise a good driver. If someone does the same to you, then you probably immediately assume they are a bad person, rather than assuming it was an honest mistake.

You can almost certainly recognise this in colleagues that you have worked with. In fact, typically, when we talk about biases, we find that audience members can easily

TEACHER LEARNING: THE BUILDING BLOCKS

By David Weston and Bridget Clay

Excerpted from *Unleashing Great Teaching: The Secrets to the Most Effective Teacher Development*

recognise each bias in their colleagues. But beware also the bias blind spot – the mistaken assumption that others commonly suffer from these biases and errors while you yourself are hugely less prone. Everyone believes this. Everyone is wrong!

Fortunately, these biases are not the only psychological factors at play. Just as strong as our inclination to fool ourselves is our psychological need to form and maintain social bonds. If we are faced with an incongruous situation, then the threat of looking silly or losing face in the eyes of someone we respect and value can overcome our resistance to changing our thinking.

This means social bonds can lead to group-think. If a group reach a cosy consensus with which an outsider disagrees, it may be seen by the outsider as a flaw in their character. Equally, someone from within the group may, if they like and respect the outsider, choose to reinterpret things by saying 'what she says sounds wrong, but actually I think that we are both right because . . .'

Another variation is the *Halo Effect*,[9] where you are much less likely to doubt statements made by someone you respect. The reverse is that we are likely to excessively doubt statements made by someone we dislike.

It might happen more subtly than this. As we discuss new ideas with colleagues, we are likely to view respected colleagues' ideas more charitably and be less likely to question them deeply, instead choosing to encourage and praise.

On the other hand, this powerful social impulse can also be used to break group-think. If a respected expert and professional comes to work with a group of teachers then, as long as the relationship is maintained, the desire to impress the expert can break the cycle of group-think and offer a route into entirely new thinking.

> *Powerful professional development tends to be a bit disruptive and a bit uncomfortable. While it is easy to veneer existing practice with a shiny new approach, powerful professional learning takes place in the core – in beliefs, mental models and expectations.*

The expert, from outside our usual group, is able to offer a brand-new perspective on what may be familiar issues. They can give more convincing explanations that help to address teachers' concerns more effectively than pre-existing mental models. They can present just enough challenging information to disrupt existing thinking without causing teachers to retreat into their comfort zone or get hostile.

TEACHER LEARNING: THE BUILDING BLOCKS

By David Weston and Bridget Clay

Excerpted from *Unleashing Great Teaching: The Secrets to the Most Effective Teacher Development*

> Successful facilitators build a relationship with participants that allows them to share values, understanding, goals and beliefs with participants, while providing important challenge at the same time.
>
> (Cordingley et al. 2015)[10]

Confirmation bias	We try too hard to explain everything using our existing mental models, leading us to dismiss, diminish or reject elements that don't fit and over-emphasise elements that do.
Sunk cost bias	You're much more likely to invest in and believe in things that you have worked hard on.
Dunning–Kruger effect	Those with just a bit of knowledge feel misplaced confidence and superiority in this knowledge compared to those with more knowledge.
Fundamental attribution error	We tend to assume any disagreement is likely to be a character flaw in the other person.
Halo Effect	We are much less likely to doubt statements made by someone we respect. The reverse is that we are likely to excessively doubt statements made by someone we dislike.

Table 4.1

SUMMARY

Learning is hard. Learning as a teacher, with all the inherent challenges of the classroom, staffroom and working with young people, is even harder. There are innate biases encouraging us to stick with what we know and reject new learning. Not only that, sometimes there is a pressure to know what you're doing to the point that identifying what you don't know is implicitly discouraged.

Some people see teaching as a vocation or that good teachers are 'born and not made'. What that hides are how many different aspects of good teaching there are, and how a teacher's practice constantly needs to be adapted to meet the needs of the students in front of them. A key part of professional learning is seeing it as continuous and constant. You will be a 'novice' in some aspects of your practice, an 'expert' in others for the length of your career.

To overcome this, we need to be aware of our innate biases. We need to ensure that there are opportunities to engage with expertise that will disrupt our thinking and we need to be aware of and open to new evidence and research challenging our thinking. We need to rigorously link our learning and practice to the impact on students, and ensure we use meaningful feedback and evaluative practices to support this.

TEACHER LEARNING: THE BUILDING BLOCKS

By David Weston and Bridget Clay

Excerpted from *Unleashing Great Teaching: The Secrets to the Most Effective Teacher Development*

By engaging in learning that is rooted in evidence-informed theory and in our own contexts and practice, we can avoid some of these pitfalls.

In this book, we summarise ideas from research and practice that are helping schools to do this and to create much more effective professional learning.

FURTHER READING

Fernandez, E. (n.d.). A Visual Study Guide to Cognitive Biases – https://www.scribd.com/doc/30548590/Cognitive-Biases-A-Visual-Study-Guide

Clark, R. E., Kirschner, P. A., & Sweller, J. (2012). Putting Students on the Path to Learning – an American Educator article on key ideas about memory and learning from cognitive science. https://www.aft.org/sites/default/files/periodicals/Clark.pdf

NOTES

[1] Sweller, J. (1988). Cognitive load during problem solving: Effects on learning. *Cognitive Science*, 12: 257–285. doi:10.1207/s15516709cog1202_4

[2] Atkinson, R. C., & Shiffrin, R. M. (1968). Human memory: A proposed system and its control processes. In Spence, K. W., & Spence, J. T. *The Psychology of Learning and Motivation* (Volume 2). New York: Academic Press. pp. 89–195.

[3] Atkinson, R. C., & Shiffrin, R. M. (1968). Chapter: Human memory: A proposed system and its control processes. In Spence, K. W., & Spence, J. T. *The Psychology of Learning and Motivation* (Volume 2). New York: Academic Press. pp. 89–195.

[4] 'Ignaz Semmelweis' (2017) in *Wikipedia: The Free Encyclopedia*, Wikimedia Foundation Inc., viewed on 19 November 2017. https://en.wikipedia.org/wiki/Ignaz_Semmelweis

[5] Eysenck, M. W.,; & Keane, M. T. (2010). *Cognitive Psychology: A Student's Handbook*, 6th Edition (Kindle Location 8389). Taylor & Francis. Kindle Edition.

[6] Arkes, H. R., & Ayton, P. (1999). The sunk cost and Concorde effects: Are humans less rational than lower animals? *Psychological Bulletin*, 125(5): 591–600. http://dx.doi.org/10.1037/0033-2909.125.5.591

[7] Kruger, J., & Dunning, D. (1999). Unskilled and unaware of it: How difficulties in recognizing one's own incompetence lead to inflated self-assessments. *Journal of Personality and Social Psychology. American Psychological Association*, 77(6): 1121–1134. CiteSeerX 10.1.1.64.2655 Freely accessible. doi:10.1037/0022-3514.77.6.1121

[8] Ross, L. (1977). The intuitive psychologist and his shortcomings: Distortions in the attribution process. In Berkowitz, L. *Advances in Experimental Social Psychology*. New York: Academic Press. pp. 173–220.

TEACHER LEARNING: THE BUILDING BLOCKS

By David Weston and Bridget Clay

Excerpted from *Unleashing Great Teaching: The Secrets to the Most Effective Teacher Development*

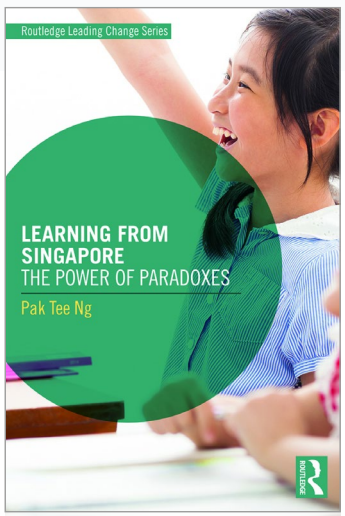
[9] 'The Halo Effect' (2017). in *Wikipedia: The Free Encyclopedia*, Wikimedia Foundation Inc., viewed on 19 November 2017. https://en.wikipedia.org/wiki/Halo_effect

[10] Cordingley, P., Higgins, S., Greany, T., Buckler, N., Coles-Jordan, D., Crisp, B., Saunders, L., & Coe, R. (2015). Developing great teaching: Lessons from the international reviews into effective professional development. *Teacher Development Trust*. http://TDTrust.org/about/dgt

CHAPTER

5

PARADOX 4: TEACH LESS, LEARN MORE



PARADOX 4: TEACH LESS, LEARN MORE

By Pak Tee Ng

Excerpted from *Learning from Singapore: The Power of Paradoxes*

> More of the same teaching that did not work previously is not the way to inspire better learning.

When cooking a meal and feeding a child, one has to prepare food ingredients and cook them into a palatable dish, before giving the food to the child. To complete the process, the child has to ingest, digest and absorb the food into the body. Teaching and learning is a similar process. The teacher has to prepare the learning ingredients and design a palatable lesson before 'feeding' the child with the material. To complete the process, the child has to ingest, digest and absorb the material in the lesson.

Using the feeding analogy, a common teaching and learning problem is this: the teacher may be very conscientious in wanting to 'feed' the child, but the child refuses to eat! When that happens, what does the teacher do? Teach again! More teaching! More of the same teaching! The teacher shoves the information down the child's throat. If teaching does not succeed at 9 o'clock in the morning, it will be repeated at 4 o'clock in the afternoon. This, in Singapore, is called 'remedial lessons'.

Teachers in Singapore teach a lot. They are very conscientious at teaching, re-teaching and more re-teaching if necessary. But there is an underlying assumption that their students will only learn if they teach. If students do not learn, then the solution is to teach more! But more of the same teaching that did not work is not the way to inspire better learning. To help students learn better, teachers have to understand how their students learn and tailor teaching strategies accordingly. This is analogous to saying that if customers are staying away from a restaurant, the chef may wish to find out what customers like and examine the taste of his dishes. If one keeps serving the same dish that has proven to be unappealing to diners, it is hard to imagine that business will miraculously improve.

When you visit a doctor, one of the things that a doctor must do is to diagnose your problem before giving you medication. Can you imagine a doctor who prescribes two aspirins three times a day regardless of what you are suffering from? The same can be said for teachers. Teachers have to find out why students are not learning instead of just teaching more using the same method. But for some teachers, their teaching methods are fixed regardless of the profile of their students. Their teaching approach has not changed for years! Therefore, the reminder is for teachers to focus less on repetitive teaching as a solution to a learning problem. If teachers teach less but teach better, then students will be able to learn better and be more motivated in their learning. The idea is for teachers to review their teaching with a view to engage their

PARADOX 4: TEACH LESS, LEARN MORE

By Pak Tee Ng

Excerpted from *Learning from Singapore: The Power of Paradoxes*

students in the learning process. Learner-centredness is at the heart of pedagogy. This, to me, is the essence of the message of 'Teach Less, Learn More' (TLLM).

WHAT IS TLLM?

TLLM started with Prime Minister Lee Hsien Loong and his National Day Rally speech in 2004. He was explaining that there was a lot that the government had recently done and would continue to do in the education system in terms of provisions and reforms. However, he cautioned that, given more resources, schools should not add more homework or increase the content because that would defeat the whole purpose of the education reform. In fact, he preferred to cut down on some of the syllabi so that there would be less pressure on the children and more space for them to explore. Then he said:1

> We have got to teach less to our students so that they will learn more. Grades are important—don't forget to pass your exams—but grades are not the only thing in life and there are other things in life which we want to learn in school.

The phrase 'teach less, learn more' then caught on. Citizens asked about it. The media asked about it. In 2005, the MOE formally launched 'Teach Less, Learn More' (TLLM) as a policy. Tharman Shanmugaratanam, who was then Education Minister, explained that TLLM was a paradigm shift about teaching and learning and was a continuation of TSLN. The objective was to shift the focus of education from quantity to quality. He explained how TLLM could be implemented:2

> We will seek to cut back on quantity, careful and calculated cuts, so as to provide more 'white space' in the curriculum, space which gives schools and teachers the room to introduce their own programmes, to inject more quality into teaching, to reflect more, to have more time for preparing lessons and to give students themselves the room to exercise initiative and to shape their own learning.

Just a year before the launch of TLLM, the MOE launched the 'Innovation and Enterprise' (I&E) initiative. I&E aimed to develop intellectual curiosity and a collective enterprising spirit among students.3 TLLM continued the journey by bringing the I&E spirit into the teaching and learning process. More importantly, TLLM brings into focus the effort at shifting Singapore's performance-driven education based on quantifiable indicators, to quality-driven education based on a broader definition of success and diverse learning pathways. The emergence of the TLLM initiative as part

PARADOX 4: TEACH LESS, LEARN MORE

By Pak Tee Ng

Excerpted from *Learning from Singapore: The Power of Paradoxes*

of TSLN is a sign that change in the Singapore education system has shifted from tweaking the macro structures to dealing with the finer aspects of the dynamics of teaching and learning.

TLLM entails a different understanding of knowledge and pedagogy. It is an overarching principle to guide educators as Singapore develops a new learning environment for students, one that emphasises 21st century skills and not just academic content. In the TLLM paradigm, students will be less dependent on rote learning, repetitive tests and standardised instruction. Lessons should engage students through experiential discovery, differentiated teaching, the learning of lifelong skills, and the building of character through innovative and effective teaching approaches and strategies. This 'quality' breakthrough requires teachers to review the 'why', 'what' and 'how' of teaching.4 It also requires students to become engaged learners: young people who are proactive and interested in the process of teaching and learning. It is envisaged that teachers and students will be involved in a wide variety of learning activities such as brainstorming, problem solving, undertaking real world tasks and even peer teaching using various pedagogical modes such as collaborative learning, problem-based learning and project work.5

Large-scale education reforms from other parts of the world have served as valuable lessons for Singapore. From the late 1950s through the 1960s, the United States has launched a series of large-scale national level education reform. There was a suite of initiatives at the system level to reform schools and curriculum. However, after more than a decade, it was clear that other than isolated examples, there was hardly any substantial change in the classroom.6 Elmore noted that fundamentally, despite the extraordinary costs of making large-scale system level changes, getting teachers to change their practices in their daily work was a far more complex process than what many policy makers had anticipated.7 With the great pressure and incentives to undertake innovations, many schools adopted high-sounding reforms but only implemented them superficially. On paper, there were changes. In reality, the dynamics of teaching and learning in the classroom were untouched.

Singapore understands this. Singapore recognises that education reform is not just about tweaking macro structures. The effort must reach the fabric of schools and alter the nature of instruction and interactions in the classrooms. Altering system level structures alone does not necessarily translate into achieving engaged learning among learners.8 I often say to school leaders and teachers in Singapore that students do not experience policies. They experience their teachers. That is why

PARADOX 4: TEACH LESS, LEARN MORE

By Pak Tee Ng

Excerpted from *Learning from Singapore: The Power of Paradoxes*

beyond the system level structures that were put in place, TLLM attempted to reach into the very fabric of schooling—the dynamics of teaching and learning in the classroom. This of course is easier said than done.

There are three aspects of engaged learning: affective, behavioural and cognitive. Students who are affectively engaged find learning interesting, rewarding and motivating. Students who are behaviourally engaged see the relevance of learning in school to their lives. Students who are cognitively engaged find intrinsic motivation in undertaking challenging learning tasks which require substantial intellectual effort.9 To help teachers understand and implement TLLM, the principles for engaged learning were disseminated in a 'Toolkit for Engaged Learning and Teaching' to all schools in 2005. According to the toolkit, students are engaged when teachers10

- select pedagogy that is suitable for their students' learning styles;
- design a learning experience that stretches thinking, promotes interconnectedness and develops independent learning;
- create a classroom environment that is safe, stimulating and engenders trust;
- adopt assessment practices that provide timely feedback regarding student performance and information to improve learning; and
- select relevant, authentic and meaningful learning content for students.

Determining whether education has moved from 'quantity' to 'quality' is tricky. Some of the 'signposts' are as follows:11

- Construction of knowledge, not just transmission of knowledge
- Understanding of content, not just memory of facts
- Mindful pedagogy, not just mindless activities
- Social constructivism, not just individual study
- Self-directed learning, not just teacher-directed tasks
- Formative assessment and self-assessment, not just summative grades
- Learning about learning itself, not just learning about a topic

Each of these signposts represents an important shift in the nature of teaching and learning in the Singapore education system.

Another difficult issue regarding the implementation of TLLM in Singapore is to reconcile it with the learning of content and examination performance. Does TLLM

PARADOX 4: TEACH LESS, LEARN MORE

By Pak Tee Ng

Excerpted from *Learning from Singapore: The Power of Paradoxes*

imply that learning content is no longer important or practice is redundant? Does TLLM imply a sacrifice of examination results? Not quite. Singapore is currently developing high technology industries, such as life sciences and biomedical engineering. This requires graduates with solid grounding in the relevant knowledge domains. The learning of content remains important! However, the current curriculum is quite crammed with content. Thus, some trimming of content is warranted. But trimming of content does not mean that students learn only skimpy outlines!

Practice is also not redundant. There is a saying that 'repetitive practice' stifles creativity. But some learning really requires frequent practice. Have you ever heard of a concert pianist who does not practice regularly? Try driving in the heart of London or New York after you have not driven for ten years and see what happens. So, TLLM does not belittle the value of practice. It is important to practice what you learn. But it is not helpful to 'over-practice' examination questions, to the detriment of a holistic learning experience.

Consider the analogy of learning Chinese martial arts. If you learn Chinese martial arts from a master, he may make you do a lot of exercises to strengthen your body before teaching you the strokes. You may not feel really excited about those repetitive exercises, but he makes you do them anyway. If you are only interested in the fanciful strokes, when it comes to a contest, your opponent will not be defeated by your snake or crane strokes. He will collapse laughing. Your strokes are fanciful but not impactful! TLLM is not form without substance. TLLM is about students learning more and better, not less and worse! So, if TLLM is really about better pedagogy and engagement, and students are learning what they ought to be learning, there is no reason why results should drop. In fact, barring an implementation dip, results should improve in the long run!

Even so, what are students expected to learn more of? Consider this example. Two chess grandmasters compete in the finals of the chess competition. Both have studied all the opening moves. Both have studied all the end games. Both have many years of experience. In a way, both have acquired all the conventional knowledge about chess. So who wins? The one who is least trapped by conventional knowledge and can make the unexpected and devastating move wins! Therefore, there are two parts to the challenge of TLLM. Students have to learn the conventional knowledge solidly. Then they have to learn not to be trapped by the conventional knowledge so that they may be adaptable and innovative. Students need to learn more of the skills

PARADOX 4: TEACH LESS, LEARN MORE

By Pak Tee Ng

Excerpted from *Learning from Singapore: The Power of Paradoxes*

that make them adaptable to a new world that this generation has not experienced, but into which they will grow for their life and work.

So there ought to be a good balance of content and thinking skills in TLLM. Teachers must have the pedagogical ability to engage students in the enjoyable aspect of learning while helping them acquire the important content of the subject and the relevant thinking skills. Teachers should not misinterpret TLLM to mean simply fun activities for students. The focus is still on learning. The potential pitfall is that while there are new activities, at a deeper level, students are still acquiring knowledge through traditional learning methods and teachers are still teaching with traditional pedagogies. The teaching-learning dynamic is unchanged, but now disguised using new activities. In a classroom, activities without pedagogy are, well, just activities without pedagogy. Activities are good, provided they are well thought through to bring about learning.

Has Singapore reached its TLLM destination? Hardly! A journey from quantity to quality is a long, continuous one. Personal habits in teaching and learning die hard! Culture takes a long time to change. The outcome so far has been mixed. Student engagement and teacher professionalism have improved, but the pressure cooker environment due to high stakes examinations and parents' expectations remains.12 However, Singapore is keeping at it faithfully and celebrating every little success. This journey is an aspiration, not a destination.

After more than a decade of TLLM, the phrase may have faded into the background. Teachers' attention is focused on newer initiatives to be implemented. But the underlying philosophy of shifting the focus from quantity to quality has not changed. So, as the education system evolves, it will continuously calibrate itself to try to achieve the best of both worlds: depth and breadth, knowledge and skills, teacher-taught and student-led learning, individual results and collective learning. Balance is imperative but the focus should be on the central thesis of 'less is more'.13

To change something as personal as one's teaching style or learning habit is challenging to say the least. Teachers and students will have to come to terms with their new identity brought about by the epistemological paradigm shift. In the new paradigm, teachers of engaged learning are designers of learning opportunities. They are no longer mere providers of information and solutions. They have to create a learning environment where students work meaningfully and collaboratively to solve problems and do authentic tasks. They facilitate learning through guidance and mentoring. In a world where students can easily search for information on the

PARADOX 4: TEACH LESS, LEARN MORE

By Pak Tee Ng

Excerpted from *Learning from Singapore: The Power of Paradoxes*

internet, teachers need to be willing to go along with their students in a journey of knowledge discovery.

In the new paradigm, students ultimately have to take ownership of their learning journey. They have to learn to plan for themselves and be independent in their learning. Certainly, a considerable degree of maturity is needed from both the students and their teachers. Students have to feel secure about not being spoon-fed. Teachers have to feel secure about letting go of their control of the entire teaching and learning process. This, as some teachers told me, is a very difficult hurdle for a Singapore teacher to cross. Teachers with many years of teaching experience in traditional pedagogy will also have to be open to experimenting with new pedagogical approaches. They have to keep abreast of the changes in the education landscape. Singapore has many platforms for teacher development, including coaching, mentoring and Professional Learning Communities (PLCs). They are very useful learning platforms. But, within these platforms, a greater effort is necessary among teachers and school leaders to challenge their own presuppositions about teaching and learning. Without critical reflection and a will to change, mentoring and sharing of practices may perpetuate outdated approaches rather than champion new ones. Thus there are two aspects of the TLLM change process: sharing of rich experiences in the field brings a system up to a certain extent. Challenging existing mindsets brings about the breakthrough. Singapore is still stronger in the former than the latter. It needs to work harder on challenging people's mindsets.

Can TLLM develop children's creativity? From my perspective, children already are creative. When they are young, they are curious. They ask a lot of questions, some which adults actually have no answers to. They are imaginative. Look at them play! Playing is highly creative. They act out what they see in movies, often in groups, and everyone wants to be the hero. They are the dramatists. They can express themselves—until they go to school. Then they lose it. They become disinterested. They become inhibited. Therefore, the challenge is to allow children's natural creativity to flourish in school through engaged learning in meaningful learning tasks in a wholesome learning environment. Children have creativity. Schools should nurture it, not kill it. This is a critical part of the TLLM challenge.

ICT IN EDUCATION

Another area of education that is closely linked to the efforts of TLLM is the use of information-communication technology (ICT) in teaching and learning. Singapore's

PARADOX 4: TEACH LESS, LEARN MORE

By Pak Tee Ng

Excerpted from *Learning from Singapore: The Power of Paradoxes*

current ICT Masterplan 4 represents a great opportunity to take TLLM further. Having implemented ICT Masterplans 1, 2 and 3 from 1997 to 2014, Singapore has established the infrastructure necessary for teaching and learning using ICT. The whole country is highly wired. The technological penetration rate is high. Wireless internet connectivity is found in every school compound. Most schools have their own Learning Management Systems (LMS). A majority of teachers and students have their own laptops or other mobile devices. The challenge is now for teachers and students to use ICT powerfully in the teaching and learning processes. Technology has the power to help teachers design curriculum that can achieve personalisation, choice, challenge, enjoyment, breadth and depth. E-discussion forums allow many students to participate in a discussion at the same time—something that cannot be achieved in a conventional classroom. ICT expands access to education and allows students to access learning materials anytime and anywhere, unconstrained by physical time and space. The MOE is currently developing an online Student Learning Space (SLS) to provide all students in the country (regardless of school) access to quality digital learning resources.

However, the focus of Singapore's efforts is not on ICT per se. Rather, the main aim is to encourage and empower teachers to discover how ICT can enable more learner-centred and engaging curriculum and pedagogies. Teaching and learning is a highly contextual process. ICT is a means of enhancing this process. It is not an end in itself. Teachers should not be using technological tools for the sake of using them, even if the tools are elaborate. Many schools are now experimenting with modular approaches, flipped classrooms and e-learning. Singapore is mindful that it is important to build the capacity among teachers for this kind of change.

ICT will become increasingly important in education, in terms of both quantity and quality of usage. Will teachers become redundant? Hardly! Paradoxically, with the rising presence of technological devices, the human teacher will be more important than ever before. In an era of social media and chat rooms, teachers have to educate students in the ethical use of technology. Teachers also have to develop the students' ability to deal with a large volume of information on the internet, and to discern misinformation from good information. This involves, on the part of the teacher, a high level of expertise in synthesizing information and facilitating student learning. Classroom teaching time will become more valuable because it will be reserved for higher order thinking, rather than didactic teaching. When virtual learning spaces become increasingly used in learning, having a physical learning space and having direct interaction with a human teacher may one day come with a premium! No

PARADOX 4: TEACH LESS, LEARN MORE

By Pak Tee Ng

Excerpted from *Learning from Singapore: The Power of Paradoxes*

matter how hard Singapore tries to promote ICT in education, it is never at the expense of the importance of skillful, committed and caring teachers.

However, there is a potential blind spot. In the fabric of the teaching and learning process, students are predominantly treated as kids in a system run by adults. This does not mean that student voice is absent in Singapore schools. In many Singapore schools, students run their own student bodies and play leadership roles in their co-curricular activities. They can give feedback to their school through various platforms. Each year, some 500 or more students from various pre-university institutions come together at the Pre-University Seminar to discuss national level issues from their perspectives. However, in the teaching and learning of content subject areas, teachers are still fully in charge. This is a sub-optimisation of human intelligence.14

Twenty-first century learners are digital natives. Some, if not many, students are more savvy with technology than their teachers. Therefore, it is imperative to recognise students as important contributors in the collective intelligence of the entire school system.15 These digital natives are tremendous sources of progressive approaches to learning. They have been exposed from the youngest ages to a great deal of digital know-how, literally at the tip of their fingers. They use various modes of virtual connectivity on a daily basis that influence their ways of learning and communication. Students should be brought more powerfully into the co-construction of the social and technological context where teaching and learning takes place. Instead of teachers asking themselves how they could use technology for their students, teachers should ask their students how technology could be wrapped around students to help them in their learning! This is an area that Singapore needs to work harder on.

Where is Singapore heading in the area of technology in education? In 2015, the National Research Foundation (NRF) of the Prime Minister's Office launched a Science of Learning Initiative, which aims to develop a scientific understanding of the effectiveness of Singapore's education methods and to develop new methods to achieve better learning outcomes.16 The initiative hopes to develop cognitive theories and neuroscience-informed technological interventions to enhance learning. 17 Brain-based research is envisaged to lead to innovation in ICT-enhanced pedagogy. Another important area is cyber wellness. The government sets up an Inter-Ministry Cyber Wellness Steering Committee (ICSC) to spearhead efforts to support cyber wellness education. Currently, intensive research is conducted to examine how

PARADOX 4: TEACH LESS, LEARN MORE

By Pak Tee Ng

Excerpted from *Learning from Singapore: The Power of Paradoxes*

positive use of the Internet and mobile technologies among young people can be encouraged and supported. Areas that are examined include cyber security and protection against cyber-crime; healthy cyber-gaming; cyber-addiction and cyber bullying; and even parenting roles, knowledge and skills for cyber wellness education for their children. These are still in early stages of development, but it is clear that Singapore has embarked on a timely and increasingly urgent change.

ENCOURAGING TLLM

But how does a country encourage curricular and pedagogical change among schools? In very practical ways indeed! The MOE supported TLLM by introducing the 'TLLM Ignite!' package in 2008 to provide funding for school initiatives in curriculum customisation, differentiated instruction, as well as inquiry-based and problem-based learning. Since 2008, this package has helped spread interesting ideas in teaching and learning which were worth exploring. By 2009, more than half of the schools in Singapore have shared their school-based curriculum innovations in various publications and platforms locally. Some schools have even shared their TLLM initiatives at international conferences.18

According to the MOE, an evaluation of the TLLM efforts across the system suggested that teachers had increased their ability to customise curriculum, as well as use a variety of pedagogies and assessment modes. By the end of 2010, some three-quarters of the schools in Singapore have tapped into resources and expertise offered by the MOE in their school-based innovations. According to some teachers, TLLM has encouraged them to be more innovative in their pedagogy, and time dedicated to lesson planning has also increased.19 Since the launch of the TLLM in 2005, a variety of programmes and school initiatives have sprouted island-wide in response to it.

Here are a few examples to give you an idea of the changes that took place in schools after the introduction of TLLM.20 At Tampines Primary School, pupils learned about social studies through drama, or story-writing through comic strips. These interesting lessons made learning a thoroughly engaging affair. These lessons were the result of the school's Practices of Effective Teaching and Engaged Learning (PoETEL) framework, launched in 2006. PoETEL is a framework for lesson planning and execution, lesson evaluation and professional development. A school-based curriculum innovation under the TLLM auspices, PoETEL has helped teachers take a more holistic view of teaching, considering five domains of Learning Outcomes, Content, Process, Intellectual Climate and Social Emotional Climate. PoETEL has

PARADOX 4: TEACH LESS, LEARN MORE

By Pak Tee Ng

Excerpted from *Learning from Singapore: The Power of Paradoxes*

brought about many positive changes in the school's lessons. Pupils became more engaged and enjoyed their lessons more. Lessons became livelier and more collaborative in nature.21

At Fuhua Primary School, pupils who were milling about in small groups around the classroom froze all of a sudden at the sound of a drumbeat. As part of a choreographed move, one group of pupils then responded to a teacher's command by swiftly enacting a scene from a story before freezing once again. The teacher gave another command and a different group of pupils delivered another part of the drama. In another class, pupils learn to give feedback to each other's presentation. All these were part of a drama programme launched in 2011. This programme originated as part of a TLLM Ignite! Project and was an integral part of the English Language curriculum designed to expose pupils to new vocabulary and cultivate their ability to listen, understand and express themselves.22

At Jurong Secondary School, part of the Secondary 1 science curriculum was redesigned in 2007 based on the Problem-Based Learning (PBL) pedagogy. Students were presented with real life problems to investigate and solve. In one case, a resident wrote a letter to the press expressing concern about the impact of human activities on the ecosystem in Jurong Lake Park. Using this as the problem, the students worked in groups to investigate the issue and present their findings and solutions. According to feedback from some students, the PBL approach was interesting, meaningful and made it easier for students to learn science. Beyond scientific knowledge, students picked up skills such as teamwork, research, presentation and independent learning. Some teachers also felt that this was an opportunity to learn new pedagogies and try them out in the classroom.23

An important point about these examples is how schools are willing to share what they have done in a system that coordinates sharing efforts to facilitate innovation diffusion. The current challenge is to examine whether some of these innovations can be harnessed for system-wide scaling up. But while Singapore can encourage experimentation and innovation in schools by very practical means of coordination, support and funding, educational change is also in the mindsets of people. Teachers in Singapore have grown accustomed to helping students achieve test scores for many years. Will their mindsets change? This is a crucial question. After more than a decade of TLLM, what do teachers now understand to be 'quality education'? I asked this question of middle leaders in school, because they were the teachers who led other teachers and taught in classrooms themselves.

PARADOX 4: TEACH LESS, LEARN MORE

By Pak Tee Ng

Excerpted from *Learning from Singapore: The Power of Paradoxes*

According to my research findings, 'quality education' to them is one that emphasises holistic development, equips students with the knowledge and skills for the future, inculcates students with the right values and imbues students with a positive learning attitude.24 For example, one of them articulated that

> quality education is an education that develops a child holistically. For example, besides doing well academically, values must also be taught. In addition, soft skills like planning and making decision for their own future should be imparted along the way. Also interpersonal skills and team working skills must be imparted to prepare them for the future.

Another said that quality education is one that

> best prepares the students for life; to meet the future challenges of being able to find their identity in a vocation that best fit their abilities and interest; being able to contribute to society; raising a family; and enjoying the fulfilment of personal and professional goals . . . The challenge today is to continue to reshape education so that our students are equipped with the skills and knowledge to help them become independent learners who can adapt and thrive easily in any environment.

Quality education can be achieved if it is delivered by quality teachers, is enabled by sound teaching and learning processes, and occurs within a conducive learning environment.25 As one participant elucidated succinctly, "Quality education is quality teaching, quality learning and quality relationship between teacher and student." The participants gave some examples of quality teaching, including the use of

- different pedagogies for different abilities students;
- guidance and feedback on how students can improve;
- high order thinking questions; and
- concept maps for students to help them see interconnectedness.

Regarding quality learning on the part of students, a few examples mentioned by the participants were

- students are motivated to learn through active participation in class;
- students demonstrate the willingness to find out how to improve their learning; and
- students ask different types of questions to clarify and to probe assumptions.

PARADOX 4: TEACH LESS, LEARN MORE

By Pak Tee Ng

Excerpted from *Learning from Singapore: The Power of Paradoxes*

Interestingly, the research participants placed emphasis on both academic achievement and learning enjoyment.26 One participant explained how there should be "a right balance between academic and non-academic achievement" and that the students ought to put in the "effort needed to attain results", but "they are not stressed by the everyday demands to achieve excellence but are given opportunities and platforms to learn a variety of subjects and skills".

The most interesting finding of the entire research project was that the participants did not refer to any measurable indicators (such as PISA results) when they thought about quality education. Instead, they referred to the softer and nobler aspects of education.27 But if quality education is about committed teachers, superior pedagogy, positive learning attitudes and high order thinking skills, this might also explain Singapore's sterling results in international tests!

IS SINGAPORE MATHEMATICS TLLM?

In early 2015, the internet was abuzz with a mathematics problem many deemed too complex for the average primary or secondary school student. This particular mathematics word problem essentially asked students to determine the exact birthdate of a fictitious girl named Cheryl. This problem, which was mistaken as a 'regular' question that the average Singapore 11-year-old student was supposed to solve, was hailed as an example of the rigour of mathematics taught in Singapore. (I understood that it was actually a question from the 2015 Singapore and Asian Schools Mathematics Olympiad contest paper for secondary school students.) A former mathematics teacher in an independent school in the UK was reported to have commented that "an average student in the UK would panic if presented with this problem and would not even attempt it because pure logic-based questions are not part of the curriculum".28 Search the internet and you can easily find similar reports elsewhere in the world. 'Singapore mathematics' is an international enigma.

A solid numeracy skills foundation has a tremendous impact on an individual's success, both in school and afterwards.29 It may arguably be the main aspect of current education reforms in the West, particularly the US and the UK, which look to Singapore's mathematics programme as a model for their own systems.30 Many countries are buying Singapore textbooks and claiming that they are more effective. According to the OECD, Singapore students possess high levels of motivation, engagement and confidence in learning, particularly in mathematics. Singapore students are highly motivated to learn mathematics and are confident about

PARADOX 4: TEACH LESS, LEARN MORE

By Pak Tee Ng

Excerpted from *Learning from Singapore: The Power of Paradoxes*

performing a range of mathematical tasks.31 Singapore outperforms the US and other participating countries from Europe in international standardised assessments. But what is it specifically about the Singapore mathematics approach that differentiates it from those of other schools systems? Is there something special about Singapore mathematics?

Let us first hear what overseas users of Singapore mathematics have to say about it. A research project in 2010 revealed a significant improvement in student performance in Massachusetts when they adopted Singapore mathematics in their state curriculum.32 In particular, Garfield Elementary School in Revere, Massachusetts, was reported as having demonstrated improvements in their student performance since implementing Singapore mathematics:33

> Three years ago, Garfield started using Singapore Math, a curriculum modeled on that country's official program and now used in about 300 school systems in the U.S. Many school systems and parents regard Singapore Math as an antidote for "reform math" programs that arose from the math council's earlier recommendations. According to preliminary results, the percentage of Garfield students failing the math portion of the fourth-grade state achievement test last year fell to 7 percent from 23 percent in 2005. Those rated advanced or proficient rose to 43 percent from 40 percent.

According to a mathematics teacher from New Jersey in another study:34

> Singapore mathematics lessons begin by engaging students in hands-on learning experiences followed by pictorial representations, which help them form a mental image of mathematical concepts. This is followed by an abstract stage, where they solve problems using numbers and symbols. This approach makes the learning of mathematics fun and meaningful, and helps students develop positive attitudes about math.

An impact study in the UK, released in February 2015, further asserted that Singapore's approach to teaching and learning mathematics indeed improved numeracy skills of primary and secondary students.35 According to researchers at the Centre for Longitudinal Studies, the Singapore approach to teaching mathematics reduced the need to repeatedly revisit material and promoted depth of understanding over memorised procedures.36

So, what is the secret? Actually, there is no secret and there is no magic. In fact, I think many mathematics teachers in Singapore will grin if you ask them the secret of

PARADOX 4: TEACH LESS, LEARN MORE

By Pak Tee Ng

Excerpted from *Learning from Singapore: The Power of Paradoxes*

'Singapore mathematics'. The way Singapore teaches mathematics is just trying to follow a basic understanding of good pedagogy, without being too dogmatic to follow a particular school of thought. Mathematics in Singapore generally builds upon the developmental theory that children need to understand concrete examples first before they can fully grasp abstract concepts. Students understand mathematical concepts better by moving from concrete to abstract.

Whenever possible and appropriate, Singapore mathematics teachers ask students to go through some activities that help them connect mathematics with real life (which is especially helpful during the foundation years). Students draw pictorial representations as a step from something concrete towards something abstract (again when appropriate). One of the techniques that Singapore is now famous for is the 'bar model' method (a pictorial method taught to primary school students to solve arithmetic word problems). This is merely a technique, a visual strategy (pictorial representation) to solving word problems. For more advanced learners (say in secondary school), it is sometimes difficult to connect everything in mathematics to real life or use pictorial representation, but this is not necessary. The more important idea is to connect their current topic with their prior learning so that mathematics makes sense to them.

In terms of teaching, the explanation and the presentation of heuristics must be clear. There must be logical scaffolds to help students develop mathematical concepts and skills systemically. The mastery of conceptual understanding and heuristics go hand in hand. However, Singapore teachers do try to practice some instructional differentiation based on learner profiles. For students who are less mathematically inclined, there is an effort to trim the material in terms of cognitive demands and instead focus on more hands-on learning tasks in the classroom. Students then practice a variety of questions so that they can really apply their knowledge. If they cannot apply their knowledge in different situations, they have not fully grasped the concepts yet. Practice is important because they need to be technically competent, so that any higher order thinking can be accompanied by the technical competence to execute the complete problem solving process.

The last point about practice is important. To be a world class table tennis player, one would need many hours of practice to achieve a very high level of competence. That competence gives the player the time and space, within a split second, to consider what to do when receiving a smash from an opponent and execute a return that can turn defence into attack! World class players always look as though

PARADOX 4: TEACH LESS, LEARN MORE

By Pak Tee Ng

Excerpted from *Learning from Singapore: The Power of Paradoxes*

they have time to think, although the entire movement takes place within a split second! How can they move so quickly yet still have the time to think? That is because they are so competent that their mental space is freed up for creativity, not execution! Consider the Masterchef competition. Even if the competitors have an appreciation of what fine cuisine should be and have a wonderful idea for their dish, if they cannot produce the dish within the time given, they are out! They must be so competent that they have time and space for creativity!

So in mathematics, when children have to solve a word problem, the problem solving part is to abstract the information and formulate a set of equations to be solved. The solving of the set of equations is the technical part. Children should have technical competence to solve the equations because they have had sufficient practice (but not over-practice). If children do not even have technical skills to solve a set of equations, their mental space will be overcrowded in figuring out both problem solving and equation solving. In fact, problem solving can be practiced up to a certain extent. Once children are familiar with solving certain types of questions, they are psychologically attuned to solving problems that are somewhat similar. The part that Singapore hopes to achieve as a quantum leap is to get children to be able to solve problems that are not familiar, and to be unafraid of them.

But one area of strength in Singapore's mathematics education is this: Singapore does try to prepare mathematics teachers to hit the ground running the moment they start teaching in school after initial teacher training. They are prepared to be able to teach across a range of mathematics topics. They are not just taught general principles, given one or two examples, and expected to apply these principles at school without further guidance. They learn the pedagogies associated with a range of topics and practice them before becoming a qualified teacher. They are further mentored in school after becoming a beginning teacher. The philosophy is a continuous cycle of learning and practicing.

Thus mathematics success in Singapore is not magic. It is pedagogy. Singapore is still trying to improve. Like many areas of learning, form and substance are equally important. Hard work and practice free up thinking space for creativity. The challenge now is to make sure that the creative space is more fully and profitably utilised.

PARADOX 4: TEACH LESS, LEARN MORE

By Pak Tee Ng

Excerpted from *Learning from Singapore: The Power of Paradoxes*

CONCLUSION

Singapore recognises that education reform has to be deep enough to change the nature of instruction and interactions in the classrooms. TLLM is not just a message for Singapore teachers but one for many others in the world. If teachers teach less but teach better, students will learn more and learn better. The challenge, which will continue for many years to come, is for teachers to improve the teaching and learning processes, and for students to become fully engaged in learning.

Children have creativity. Nurture it; don't kill it.

REFERENCES

[1] Lee, H. L. (2004, August 22). *Our Future of Opportunity and Promise*. Prime Minister Lee Hsien Loong's National Day Rally 2004 Speech at the University Cultural Centre, NUS. Speeches and Press Releases. National Archives of Singapore, Singapore. Retrieved from http://www.nas.gov.sg/archivesonline/speeches/record-details/77f762e5-115d-11e3-83d5-0050568939ad

[2] Tharman, S. (2005, March 9). Parliamentary Reply by Mr Tharman Shanmugaratnam, Minister for Education, at the Singapore Parliament. Retrieved from http://www.moe.gov.sg/media/parliamentary-replies/2005/pq09032005.htm

[3] Ng, P. T. (2005). Innovation and enterprise in Singapore schools. *Educational Research for Policy and Practice*, 3(3), 183–198.

[4] Tharman, S. (2005, September 22). *Achieving Quality: Bottom Up Initiative, top down Support*. Speech by Mr Tharman Shanmugaratnam, Minister for Education, at the MOE Work Plan Seminar 2005 at the Ngee Ann Polytechnic Convention Centre, Singapore. Retrieved from http://www.moe.gov.sg/media/speeches/2005/sp20050922.htm

5 Tharman, S. (2005, September 22). *Achieving Quality: Bottom Up Initiative, top down Support*. Speech by Mr Tharman Shanmugaratnam, Minister for Education, at the MOE Work Plan Seminar 2005 at the Ngee Ann Polytechnic Convention Centre, Singapore. Retrieved from http://www.moe.gov.sg/media/speeches/2005/sp20050922.htm

[6] Goodlad, J. I. & Klein, M. F. (1970). *Behind the Classroom Door*. Worthington, OH: Charles A. Jones; Sarason, S. (1971). *The Culture of the School and the Problem of Change*. Boston: Allyn & Bacon; Gross, N., Giacquinta, J., & Bernstein, M. (1979). *Implementing Organizational Innovations*. Berkeley, CA: McCutchan; Fullan, M. & Pomfret, A. (1997). Research on curriculum and instruction implementation. *Review of Educational Research*, 47(1), 335–397.

[7] Elmore, R. (1995). Getting to scale with good education practices. *Harvard Educational Review*, 66(1), 1–26.

[8] Ng, P. T. (2008). Educational reform in Singapore: From quantity to quality. *Educational Research for Policy and Practice*, 7(1), 5–15.

PARADOX 4: TEACH LESS, LEARN MORE

By Pak Tee Ng

Excerpted from *Learning from Singapore: The Power of Paradoxes*

[9] Ministry of Education (MOE) (2013). *Engaging Our Learners: Teach Less, Learn More*. Singapore: Ministry of Education.

[10] Ministry of Education (MOE) (2013). *Engaging Our Learners: Teach Less, Learn More*. Singapore: Ministry of Education.

[11] Ng, P. T. (2008). Educational reform in Singapore: From quantity to quality. *Educational Research for Policy and Practice*, 7(1), 5–15.

[12] Today (2012, August 24). Teach less, learn more—Have we achieved it? *Today*, p. 4.

[13] Ng, P. T. (2008). Educational reform in Singapore: From quantity to quality. *Educational Research for Policy and Practice*, 7(1), 5–15.

[14] Ng, P. T. (2010). Educational technology management approach: The case of Singapore's ICT Masterplan Three. *Human Systems Management*, 29(3), 177–187.

[15] Ng, P. T. (2010). Educational technology management approach: The case of Singapore's ICT Masterplan Three. *Human Systems Management*, 29(3), 177–187.

[16] National Research Foundation (NRF) (2015, June 4). Science of Learning Initiative Call for Proposals for Planning Grants. NRF, Prime Minister's Office, Singapore. Retrieved from http://www.nrf.gov.sg/funding-grants/science-of-learning#sthash.CCQS9jMg.dpuf

[17] National Research Foundation (NRF) (2015, June 5). National Research Foundation Science of Learning Initiative Planning Grant Guidelines for Participants. NRF, Prime Minister's Office, Singapore. Retrieved from http://www.nrf.gov.sg/docs/default-source/default-document-library/20150605_nrf-sol-planning-grants-application-guidelines.pdf?sfvrsn=0

[18] Ministry of Education (MOE). (2010, April 26). Teach Less Learn More. Parliamentary Replies. MOE, Singapore. Retrieved from http://www.moe.gov.sg/media/parliamentary-replies/2010/04/teach-less-learn-more.php

[19] Ministry of Education (MOE). (2010, April 26). Teach Less Learn More. Parliamentary Replies. MOE, Singapore. Retrieved from http://www.moe.gov.sg/media/parliamentary-replies/2010/04/teach-less-learn-more.php

[20] You can read more examples at https://www.schoolbag.sg/features/teaching-learning

[21] You can read more at https://www.schoolbag.sg/story/holistic-teaching-through-poetel#.V2YX7z9f2po

[22] You can read more at https://www.schoolbag.sg/story/learning-through-action-and-drama#.V2YYTz9f2po

[23] You can read more at https://www.schoolbag.sg/story/problem-solving-in-jurong-lake-park#.V2YYsz9f2po

[24] Ng, P. T. (2015). What is quality education? How can it be achieved? The perspectives of school middle leaders in Singapore. *Educational Assessment, Evaluation and Accountability*, 27(4), 307–322.

PARADOX 4: TEACH LESS, LEARN MORE

By Pak Tee Ng

Excerpted from *Learning from Singapore: The Power of Paradoxes*

[25] Ng, P. T. (2015). What is quality education? How can it be achieved? The perspectives of school middle leaders in Singapore. *Educational Assessment, Evaluation and Accountability*, 27(4), 307–322.

[26] Ng, P. T. (2015). What is quality education? How can it be achieved? The perspectives of school middle leaders in Singapore. *Educational Assessment, Evaluation and Accountability*, 27(4), 307–322.

[27] Ng, P. T. (2015). What is quality education? How can it be achieved? The perspectives of school middle leaders in Singapore. *Educational Assessment, Evaluation and Accountability*, 27(4), 307–322.

[28] Espinoza, J. (2015, April 14). When is Cheryl's birthday? The tricky maths problem that has everyone stumped. *The Telegraph*. Retrieved from http://www.telegraph.co.uk/education/educationnews/11534378/When-is-Cheryls-birthday-The-tricky-math-problem-that-has-everyone-stumped.html

[29] Organization for Economic Cooperation and Development (OECD) (2013). *PISA 2012 Results in Focus—What 15 Year Olds Know and What They Can Do with Qhat They Know*. Paris: PISA, OECD Publishing.

[30] Garner, R. (2015, June 18). Singapore-style teaching helps solve problem of maths failure, says new research. *The Independent*. Retrieved from http://www.independent.co.uk/news/education/education-news/singaporestyle-teaching-helps-solve-problem-of-maths-failure-says-new-research-10327085.html; Jackson, B. (2012, October 10). My view: America's students can benefit from Singapore math. *CNN Schools of Thought*. Retrieved from http://schoolsofthought.blogs.cnn.com/2012/10/10/my-view-americas-students-can-benefit-from-singapore-math/

[31] Organization for Economic Cooperation and Development (OECD) (2013). *PISA 2012 Results in Focus—What 15 Year Olds Know and What They Can Do with What They Know*. Paris: PISA, OECD Publishing.

[32] Wang-Iverson, P., Myers, P., & Lim, E. W. K. (2010). Beyond Singapore Math's textbooks—Focused and flexible support for teaching and learning. *American Educator*, Winter, 28–38.

[33] Hechinger, J. (2006, September 12). New report urges return to basics in teaching math. *The Wall Street Journal Online*. Retrieved from http://www.wsj.com/articles/SB115802278519360136

[34] Jackson, B. (2012, October 10). My view: America's students can benefit from Singapore math. *CNN Schools of Thought*. Retrieved from http://schoolsofthought.blogs.cnn.com/2012/10/10/my-view-americas-students-can-benefit-from-singapore-math/

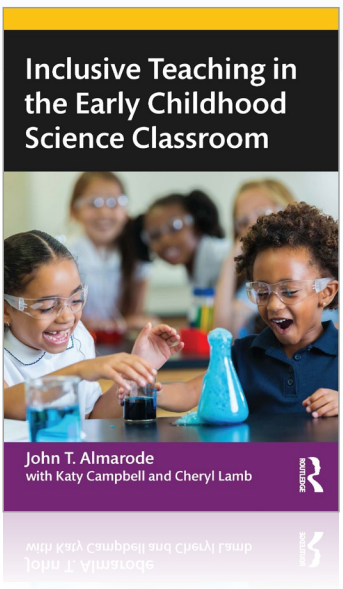
[35] Jerrim, J. & Vignoles, A. (2015, February). *Mathematics Mastery Overarching Summary Report*. London: Institute of Education, University of London.

[36] Center for Longitudinal Studies (2015, June 18). East Asian Teaching Method Leads to "Small But Welcome Improvement" in English Pupils' Maths Skills. Center for Longitudinal Studies, Institute of Education, London. Retrieved from http://www.cls.ioe.ac.uk/news.aspx?itemid=4287&itemTitle=East+Asian+teaching+method+leads+to+%E2%80%98small+but+welcome+improvement%E2%80%99+in+English+pupils%E2%80%99+maths+skills&sitesectionid=27&sitesectiontitle=News

CHAPTER

6

THE ROLE OF THE TEACHER IN INCLUSIVE EARLY CHILDHOOD SCIENCE TEACHING AND LEARNING



THE ROLE OF THE TEACHER IN INCLUSIVE EARLY CHILDHOOD SCIENCE TEACHING AND LEARNING

By John T. Almarode

Excerpted from *Inclusive Teaching in the Early Childhood Science Classroom*

As teachers of young children, we play a pivotal role in how students approach, engage, and come to understand science. This role is wrapped up in our beliefs about what science is or is not, why all young children should learn science, our beliefs or mindsets about science teaching and learning, and, lastly, what makes a "good science learner" in our schools and classrooms. In this chapter, we will unpack each of these through the lens of Ms. Campbell and her first-grade students.

Opportunities for Reflective Practices

Before reading on, what do you think the role of the teacher is in inclusive early childhood science teaching and learning?

On Tuesday morning, Katy Campbell's first-grade learners begin their day by joining her on the carpet to participate in a read-aloud. Today's book, *Moja Means One* by Muriel Feelings, not only allows her learners to get a glimpse of East African culture but also provides a context for the use of Kalimbas, an African thumb piano made of thin pieces of metal of different lengths attached to a wooden block.

While engaged in the read-aloud, Ms. Campbell strategically asks her learners text-dependent questions. For example, she asks them to think about the setting of the book. "Boys and girls, why is the setting important in understanding this book?" Or, "Who can tell me what a kalimba is?" She also incorporates text-independent questions, such as "How do you think a kalimba works?" As you might have guessed, her learners enthusiastically raise their hands to share their ideas about how a kalimba works. After Ms. Campbell uses their responses as a way to preassess her learners' understanding of sound, she introduces the day's driving question: How can we, as musicians, create a variety of sounds with our instruments? (Figure 6.1)

From there, learners gather in their science learning communities (see Fisher, Frey, & Almarode, 2020) to move through multiple learning centers that provide them with different opportunities to "create a variety of sounds with instruments."

THE ROLE OF THE TEACHER IN INCLUSIVE EARLY CHILDHOOD SCIENCE TEACHING AND LEARNING

By John T. Almarode

Excerpted from *Inclusive Teaching in the Early Childhood Science Classroom*

Center 1: Xylophones
5 different lengh metal tubes on a piece of ridged foam and a small wooden mallet form the xylophone for this rotation. Students use the mallet to explorehow the length of the tube relates to the pitch. A longer tube has a lower pitch compared to a shorter tube. Journal questiions for this rotation are: How are the bars different? How did the bars sound different?

Center 2: Kalimbas
Kalimbas are African thumb pianos made of thin pieces of metal of different lengths held onto a wooden block. When flicked with the thumb, they vibrate producing sound. Based on the length of the metal strip, different pitches of sound are created. Journal questions for this rotation are: How are the bars different? How did the bars sound different?

Center 3: Rubber Band Guitar
3 different thicknesses of rubber bands wrapped around a plastic storage container or metal loaf pan form a makeshift guitar. When plucked, the bands vibrate and produce different pitches of sound. The thicker the band, the lower the pitch. Journal questons for this rotation are: How are the bands different? How did the bands sound different?

Center 4: Cans
Students can make sounds whatever ways they want using a popsicle stick and metal can. For example, can they bang the stick on the bottom or sides of the can, run the stick up and down the ridges of the can, or rattle it around the inside of the can. The journal page for this rotation had a space for students to draw or write how they made sounds with the can.

Center 5: What Makes the Sound?
Place objects in small containers and number the bottoms. Be sure studetns cannot see what is inside the containers. Students shake the containers and guess what objects are inside. The journal page for this station had a table with pictures of the 6 objects in the canisters. Students wrote the number on the canister next to their guess of what it contained.

Figure 6.1 Descriptions of the Learning Centers That Will Engage Learners in Developing Their Answers to the Day's Driving Question.
Source: Katy Campbell, first-grade teacher, Hanover County Public Schools, Virginia.

We will return to the rest of the day's learning as we move through the chapter. But for now, let's spend just a few moments on Ms. Campbell's decision to use a driving question, as this specific aspect of her teaching will provide the context of this chapter. Driving questions engage students by focusing on the *why* of the learning behind the *what* (Pijanowski, 2018). For example, the *what* in Ms. Campbell's classroom is that moving objects exhibit different kinds of motion; objects may vibrate and produce sound. Her decision to use a driving question in her science teaching is deliberate, purposeful, and intentional. Ms. Campbell could just as easily

THE ROLE OF THE TEACHER IN INCLUSIVE EARLY CHILDHOOD SCIENCE TEACHING AND LEARNING

By John T. Almarode

Excerpted from *Inclusive Teaching in the Early Childhood Science Classroom*

have presented a traditional objective (e.g., The student will . . .) on the interactive whiteboard or written the topic on poster paper. She could also have posed what is often called an essential question that asked her learners, "What is sound?" However, using a driving question as the lead-in to today's learning reflects the context of this chapter and focuses our attention on the role of the teacher in inclusive early childhood science teaching and learning. Table 6.1 contains a side-by-side comparison of objectives, essential questions, and driving questions.

Objective	Essential Question	Driving Question
The student will understand that moving objects vibrate and produce sound.	What is sound?	How can I, as a musician, create a variety of sounds with my instruments?
The student will understand the impact of humans on the environment.	How do humans impact the environment?	How can I, as a good citizen, encourage others to take care of our environment?
The student will understand how parents help their offspring survive.	How do parents interact with their environment?	How can I, as a scientist, figure out how animals communicate with their young?
The student will understand how matter changes.	How does heating and cooling change matter?	How can I, as a chef, explain the role of the heat in preparing a meal?

Table 6.1 A Comparison of Objectives, Essential Questions, and Driving Questions in Science. Source: Pijanowski, L. (2018). Architects of deeper learning. Intentional design for high-impact instruction. Rexford, NY: International Center for Leadership in Education, Inc.

Research to Classroom Practice Tasks

Take some time and develop learning objectives, essential questions, and driving questions for a science topic or content.

Considering each of the previous examples, there is a clear difference between simply providing an objective and starting with an essential question. In both of those instances, teachers and learners could quickly drift into a quest for copious facts or the accumulation of content.

However, science is more than just facts, and we want our learners to be more than just walking encyclopedias of science trivia. Although there is a time and place for both an objective and essential question, Ms. Campbell's decision to use a driving question leverages her learners' interests and motivates their learning to include the

THE ROLE OF THE TEACHER IN INCLUSIVE EARLY CHILDHOOD SCIENCE TEACHING AND LEARNING

By John T. Almarode

Excerpted from *Inclusive Teaching in the Early Childhood Science Classroom*

content, the processes of science, and the unique ways of knowing in science (e.g., evidence).

Opportunities for Reflective Practices

What is the difference between a driving question and an essential question and objective? When is one better than the other? When might you use one over the other?

This brings us to the main focus of this chapter. What exactly is science, and what role do we as teachers play in the inclusive early childhood science teaching and learning?

Ms. Campbell's decision making around how to initially engage her learners in the concept of sound reflects her beliefs about what science is, why her learners should engage in the learning of science, and her understanding and expectations of who they are as learners. Let's look at each one of these beliefs, starting with what science is and is not.

DEFINITION OF SCIENCE

For many of our learners, and us if we are completely honest, science is viewed as a collection of facts and figures. There are nine planets. Wait, now eight planets. The parts of a plant include the roots, stem, and leaves. Living things need water, air, and nutrients. There is no such thing as centrifugal force. Returning to Ms. Campbell's classroom, these facts are easy to pull out of the day's learning, as sound, vibrations, compressions, wavelength, frequency, and amplitude are well-defined and understood terms in science. There must be more – and there is more to science than facts. Bell (2008) articulates a three-point definition of science that, when applied to our teaching and learning, moves us beyond a list of facts. He defines science as a body of knowledge, a set of processes, and a way of knowing.

The body of knowledge includes the science. For Ms. Campbell, the body of knowledge is clear. She strives for her learners to know and understand the developmentally appropriate content associated with sound, vibrations, compressions, wavelength, frequency, and amplitude. These are the laws, principles, and ideas she expects her learners to know and understand. However, she also recognizes that the body of science knowledge is built through a set of processes (see

THE ROLE OF THE TEACHER IN INCLUSIVE EARLY CHILDHOOD SCIENCE TEACHING AND LEARNING

By John T. Almarode

Excerpted from *Inclusive Teaching in the Early Childhood Science Classroom*

Table 6.2). In other words, doing science builds, or even refines, that body of knowledge.

For Ms. Campbell's learners, as indicated by the driving question, they will be engaged in the body of knowledge around science, as well as the processes associated with that knowledge. Her learners will observe, communicate, hypothesize, infer, experiment, analyze, evaluate, and model this body of knowledge during this learning experience.

Finally, the discipline of science is associated with a distinct way of knowing. The accumulation of knowledge through the application of a set of processes comes from the accumulation of empirical evidence. In general, scientists assume that we can better understand our world and that the current knowledge about how the world works is tentative and does not represent absolute truth. Thus science, as a way of knowing, involves the use of empirical evidence generated from experiments that can be replicated by other scientists to see if the body of knowledge withstands continued inquiry – not assumptions.

Observing	Inferring
Classifying and Sequencing	Experimenting
Communicating	Interpreting
Measuring	Analyzing
Predicting	Evaluating
Hypothesizing	Modeling

Table 6.3 Characteristics of Assessment-Capable Visible Science Learners.
Source: Adapted from Frey, N., Hattie, J., & Fisher, D. (2018). Developing assessment-capable visible learners. Thousand Oaks, CA: Corwin.

For young children, this is a different way of thinking. For example, when a five-year-old comes up with a hypothesis that "doggies are nice", he or she will naturally seek evidence to confirm his or her belief. This is evidenced by the learner's use of phrases like, "See, I told you doggies were nice." Or, "Let me show you my dog." However, only looking for confirming evidence will likely lead to the development of misconceptions, as the child is only focused on confirming his or her hypothesis. Not to mention the fact that the young child would likely only be allowed around "doggies that are nice." The way we know something in science is not from seeking evidence that confirms our hypotheses but attempting to verify them through replication. In other words, we use the processes of science to test and see if our hypothesis holds

THE ROLE OF THE TEACHER IN INCLUSIVE EARLY CHILDHOOD SCIENCE TEACHING AND LEARNING

By John T. Almarode

Excerpted from *Inclusive Teaching in the Early Childhood Science Classroom*

up to repeating experiments across multiple contexts and time. In our example, the child would demonstrate this way of knowing by purposefully seeking a dog that does not align with his or her hypothesis.

Opportunities for Reflective Practices

Compare and contrast this definition of science with the one you had in your own mind prior to reading this section.

In the end, the replication of scientific experiments, through the use of scientific processes, builds the current body of knowledge. Returning to Ms. Campbell's classroom and her use of a driving question, we see that her decision reflects all three aspects of science. When her first graders approach, tackle, and address the driving question, they will accomplish the following:

- Apply the processes of observing, communicating, hypothesizing, inferring, experimenting, analyzing, evaluating, and modeling
- Have multiple opportunities to verify their hypotheses through replication
- Build their body of knowledge about sound, vibrations, compressions, wavelength, frequency, and amplitude

Yes, Ms. Campbell is an exceptional teacher, and even in this brief visit to her classroom, you have likely noticed the time and attention she gives to her teaching and her students' learning. What she does each and every day is the result of her beliefs about why her learners should engage in the learning of science and her beliefs about science teaching and learning.

WHY WE TEACH, AND WHY ALL YOUNG CHILDREN SHOULD LEARN SCIENCE

Science learning provides many benefits to learners above and beyond developing their understanding of how the world works. For many of us, learning about cells, plants, animals, chemical reactions, forces, stars, and galaxies is benefit enough in our interconnected and ever-complex world. However, the teaching and learning of science provide benefits beyond the core content, skills, and understandings of the discipline. These are as follows:

- supporting the development of problem-solving skills, critical thinking, higher-order thinking, and reasoning in young children;

THE ROLE OF THE TEACHER IN INCLUSIVE EARLY CHILDHOOD SCIENCE TEACHING AND LEARNING

By John T. Almarode

Excerpted from *Inclusive Teaching in the Early Childhood Science Classroom*

- enhancing the language development in young children; and
- increasing interest and persistence in science.

Problem-Solving, Critical Thinking, Higher-Order Thinking, and Reasoning. Much attention has been given to the development of 21st-century skills or what is more commonly called the profile of a graduate (Battelle for Kids, 2020). There are many variations of these skills based on how schools around the globe assimilate them into their own visions for their learners (see Battelle for Kids, 2020). At the root of each variation of each profile are four skills, often referred to as the 4Cs: critical thinking, communication, creativity, and collaboration. Yes, our focus is on inclusive in early childhood science, but research has strongly indicated that the foundational learning with our youngest students lays the foundation for subsequent growth and development (e.g., Samarapungavan, 1992; Schulz & Bonawitz, 2007; Sodian, Zaitchik, & Carey, 1991). In other words, it is never too early to begin working on the 4Cs, and science provides the ideal context for this start.

Science teaching and learning in the inclusive early childhood classroom contributes to the building of problem-solving skills (see Rahayu & Tytler, 1999). When learners engage in the processes of science within the context of authentic interactions with scientific phenomena, they begin to develop and apply problem-solving skills (e.g., Tytler & Peterson, 2003). In addition to critical thinking, young learners develop processes of higher-order thinking and reasoning (Gelman & Brenneman, 2004; Stein & McRobbie, 1997). For teachers like Ms. Campbell, science is a valued part of the day, as well as a vehicle for scaffolding and enhancing the level of thinking in her first graders. She recognizes that the progression of thinking in her learners requires that they not only learn about higher-order thinking skills (e.g., predicting, inferring, analyzing) but also have multiple opportunities to practice these thinking skills within the context of authentic content. For first graders, the opportunity to experiment with musical instruments is a way to scaffold and support their problem-solving skills, higher-order thinking, and reasoning. Not to mention, the intentional, purposeful, and deliberate decisions of Ms. Campbell offer learners the opportunity to be creative and collaborate with their peers. In the end, science experiences from the earliest grades are essential for developing processes of thinking.

Language Development. Communication, both as one of the 4Cs and as an essential part of student learning, requires that learners effectively exchange ideas. For young children, oral language development lies at the heart of the effective exchange of ideas. Science teaching and learning enhance the vocabulary of learners by putting

THE ROLE OF THE TEACHER IN INCLUSIVE EARLY CHILDHOOD SCIENCE TEACHING AND LEARNING

By John T. Almarode

Excerpted from *Inclusive Teaching in the Early Childhood Science Classroom*

words into context and creating opportunities for learners to engage in academic discourse around science phenomena. This academic discourse will use three tiers or types of academic vocabulary (Beck, McKeown, & Kucan, 2013):

Tier 1 Vocabulary – These are words or terms that are used in everyday life and are common in spoken language. In many cases, this vocabulary is built through conversation. For Ms. Campbell, examples of Tier 1 vocabulary include notebook, book, happy, walk, animal, red, teacher, door, school, and room.

Tier 2 Vocabulary – This cluster of terms are academic vocabulary that cross multiple subject areas. For example, the processes of science (e.g., predict, infer, analyze, evaluate). Students need to know and understand these terms, as they will be part of their learning experience across all content areas and outside of the classroom.

Tier 3 Vocabulary – This set of words includes terms that are domain specific. This means that these terms mean something within the context of science, for example, and are key to understanding specific concepts in science. Examples of these words in Ms. Campbell's classroom include sound, vibrations, compressions, wavelength, frequency, and amplitude.

Through the planning, designing, and implementing of high-quality, high-impact teaching and learning in the inclusive early childhood science classroom, we foster the effective exchange of ideas through academic discourse that helps learners build their Tier 1, Tier 2, and Tier 3 vocabulary. Science provides a context for oral language development that is foundational for growth in reading and writing. As our young learners develop their writing skills, the combination of academic discourse and academic writing further enhances academic vocabulary (see Graham, Kiuhara, & MacKay, 2020).

Interest and Persistence. High-quality, high-impact teaching and learning in the inclusive early childhood science classroom is correlated with the development of interest in science-related areas. A significant collection of empirical evidence suggests that by age 15, students are less engaged in science than at earlier ages (Osborne, 2008). Prior to age 15, student interest in science is quite high with little difference between boys and girls (Murphy & Beggs, 2005). Thus the research literature points to the idea that interest in science starts early. Much of the research suggests that the development of interest in science is early and that this interest has long-range educational outcomes (Tai et al., 2006). Some studies attribute early

THE ROLE OF THE TEACHER IN INCLUSIVE EARLY CHILDHOOD SCIENCE TEACHING AND LEARNING

By John T. Almarode

Excerpted from *Inclusive Teaching in the Early Childhood Science Classroom*

interest development in science with school-based experiences (Maltese & Tai, 2010) while others do not address the source of this interest and instead just show that the interest in science develops early (Hadden & Johnstone, 1982). Regardless of the studies' perspectives on the timing of interest, by age 14, an interest in science or lack thereof is set in a majority of students (Osborne, 2008).

Let's look at specific examples that point out why we should teach science and why students should engage in science learning. In a subsequent study, Maltese and Tai (2010) used data obtained from interviews of current graduate students in physics or chemistry, along with current physical scientists. The transcripts generated from these interviews were analyzed for the timing, source, and nature of the participants' earliest interest in science. The study found that 65% of those interviewed indicated that their initial interest in science occurred before middle school. Forty percent of the scientists and graduate students mentioned that the source of their initial interest was a school-based experience. Within these school-based experiences, 24% stated that class content was the key source, 18% stated that demonstrations, laboratories, and projects were the source of primary interest, and 22% mentioned enrichment experiences in science. Maltese and Tai (2010) also noted a gender difference in their results. Specifically, female scientists and graduate students referenced school-based experiences (52%) more frequently than males, who more frequently noted individually motivated interests (57%).

What is most interesting about these results is that the data comes from practicing scientists and graduate students, people who have persisted in science-related interests and have earned or are earning an advanced degree in a science-related field. Most notable is that a large percentage of these individuals indicated early timing and school-related experiences as their primary or initial source of interest in science. Thus the lack of exposure to school-based science experiences may actually be a missed opportunity for sparking the interest of future scientists. In particular, these results suggest that females may be most influenced by this lack of early exposure, which is not surprising given the current gender gap that exists within the physical sciences.

Opportunities for Reflective Practices

In your own words, summarize why we should teach science and why young children should learn science.

THE ROLE OF THE TEACHER IN INCLUSIVE EARLY CHILDHOOD SCIENCE TEACHING AND LEARNING

By John T. Almarode

Excerpted from *Inclusive Teaching in the Early Childhood Science Classroom*

WHY WE AVOID TEACHING SCIENCE IN THE EARLY YEARS

In spite of the relatively strong case for why science is an important part of the early childhood years, there is the indication that primary classroom teachers are avoiding the teaching of science (Goodrum, Hackling, & Rennie, 2001; Osborne & Simon, 1996). For example, Harlen (1997) interviewed 33 teachers by telephone about their teaching of science during a ten-week period. This study identified six strategies used by teachers to avoid teaching science:

1. Some classroom teachers exercise outright avoidance by simply not including science as part of the learning experience for their students.
2. Many classroom teachers only taught science content that they were comfortable with, and that content may or may not be part of the expectations for that particular grade level.
3. Teachers often focused on experiments and did not include any content in the instruction.
4. Some classrooms relied on prepackaged curricula, using only lecture-based instruction to avoid questions or discussion that drifts into material with which the teacher is not comfortable.
5. Teachers used the simplest of activities to avoid things going wrong.

When we avoid teaching science in the early childhood classroom, there are implications to that decision. When we avoid teaching science content outright or only teaching content with which we are most comfortable, we obviously leave parts of the curriculum untouched that are key to subsequent content, skills, and understandings. Therefore, there is the strong possibility that the learning progressions of your youngest students are disrupted or delayed, which influences future growth and achievement. Even if learners had science on a regular basis, teaching what we thought was "neat" to know may be different from what learners "need" to know. In addition, when we rely too heavily on prepackaged materials or curricula, we rely on ready-made experiences that may or may not be appropriate for all learners in your classroom. Scripted or programmed instruction leaves little room for us to differentiate our instruction based on who our learners are and how they see themselves as learners. Along those same lines, relying solely on the textbook is often associated with an emphasis on vocabulary learning and the memorization of facts (Mastropieri & Scruggs, 1994). What activities do exist within many textbook-

THE ROLE OF THE TEACHER IN INCLUSIVE EARLY CHILDHOOD SCIENCE TEACHING AND LEARNING

By John T. Almarode

Excerpted from *Inclusive Teaching in the Early Childhood Science Classroom*

based curricula do not truly represent authentic science (Chinn & Malhotra, 2002).

The avoidance behavior of using only lectures while avoiding questions or discussion speaks to the overall quality of early science instruction rather than just the quantity. In this case, students' exposure to early science instruction may not be beneficial, even though time has been allotted for such instruction. With regard to lecturing or expository teaching, the literature supporting or refuting the use of expository teaching when compared to other methods (e.g., laboratory methods, inquiry) is often contradictory and thus not helpful. As far back as 1971, researchers were looking at the relative effectiveness of the expository method versus the laboratory method and the discovery method (Babikian, 1971). However, literature does exist on other methods for teaching elementary school science that highlights the need for a variety of approaches, such as inquiry, conceptual change, cognitive conflict, small-group interaction, and models and analogies, as well as writing or science notebooks rather than limiting science lessons to expository teaching (Barnett & Moran, 2002; Carter, Jones, & Rua, 2003; Tomkins & Tunnicliffe, 2001).

Let's take a moment and review where we have been in our understanding of the role of the teacher in planning, designing, and implementing high-quality, high-impact teaching and learning in the inclusive early childhood science classroom. Using Ms. Campbell as our example, we acknowledge that the decisions she made about her lesson on sound were driven by her understanding of what science is and is not, as well as her strong beliefs about the value of science and why this type of learning should not be avoided. Now we want to explore what Ms. Campbell believes about her learners and what makes a good learner in science.

OUR BELIEFS ABOUT SCIENCE TEACHING AND LEARNING

Opportunities for Reflective Practices

What are your beliefs about science teaching and learning? What does high-quality, high-impact teaching and learning in the inclusive early childhood science classroom look like?

How we see our learners and our beliefs about their abilities, interests, and dispositions as learners informs the decisions we make on a daily basis. The National Science Teachers Association (2014), or NSTA, explicitly state these beliefs through a

THE ROLE OF THE TEACHER IN INCLUSIVE EARLY CHILDHOOD SCIENCE TEACHING AND LEARNING

By John T. Almarode

Excerpted from *Inclusive Teaching in the Early Childhood Science Classroom*

series of declarations about the teaching and learning of science in early childhood. These beliefs, in the form of declarations, assert that teachers of young children should (adapted from the National Science Teacher Association, 2014) accomplish the following:

1. Provide experiences in science that recognize the value and importance of nurturing learners' curiosity around science content, skills, and understandings.
2. Provide a learning environment that promotes the asking of questions, the planning of investigations, and the analyzing of findings.
3. Recognize that young children are already experiencing the world and thus have prior conceptions about how the world works. These experiences should be incorporated into their learning experiences.
4. Leverage learners' interests, abilities, and dispositions through carefully selected opportunities to engage with scientific phenomena in open-ended or driving questions.
5. Engage learners in a balanced approach to science – science as a body of knowledge, a set of processes, and a way of knowing.
6. Recognize that science provides a context for developing literacy skills, the use of math skills and concepts, and the integration of social studies content.

These beliefs, or mindsets, about learners' abilities, interests, and dispositions inform the decisions we make in our early childhood classrooms. Referring back to Ms. Campbell, you can see how each aspect of her instruction, even though we have only seen a small snippet of the overall lesson, reflects these beliefs. From recognizing their curiosity to providing a context for literacy skills, embracing why we should teach science and possessing specific beliefs about our learners is key to our role in teaching and learning in the inclusive early childhood science classroom.

In the shaded box that follows, we have provided the principles NSTA has developed based on research on how students learn to guide the teaching and learning of science in the early childhood classroom.

THE ROLE OF THE TEACHER IN INCLUSIVE EARLY CHILDHOOD SCIENCE TEACHING AND LEARNING

By John T. Almarode

Excerpted from *Inclusive Teaching in the Early Childhood Science Classroom*

NSTA Position Statement on Early Childhood Science

- Children have the capacity to engage in scientific practices and develop understanding at a conceptual level.

Current research shows that young children have the capacity for conceptual learning and the ability to use the skills of reasoning and inquiry as they investigate how the world works (NRC, 2007, 2012). For example, their play with blocks, water, and sand shares some science-relevant characteristics. Young children also can learn to organize and communicate what they learn and know the difference between concrete and abstract ideas (Carey, 1985). Adults who engage children in science inquiry through the process of asking questions, investigating, and constructing explanations can provide developmentally appropriate environments that take advantage of what children do as part of their everyday life prior to entering formal school settings (NAEYC, 2013, p. 17; NRC, 2007). These skills and abilities can provide helpful starting points for developing scientific reasoning (NRC, 2007, p. 82).

- Adults play a central and important role in helping young children learn science.

Everyday life is rich with science experiences, but these experiences can best contribute to science learning when an adult prepares the environment for science exploration, focuses children's observations, and provides time to talk about what was done and seen (NAEYC, 2013, p. 18). It is important that adults support children's play and direct their attention, structure their experiences, support their learning attempts, and regulate the complexity and difficulty of levels of information (NRC, 2007, p. 3). It's equally important for adults to look for signs from children and adjust the learning experiences to support their curiosity, learning, and understanding.

- Young children need multiple and varied opportunities to engage in science exploration and discovery (NAEYC, 2013).

Young children develop science understanding best when given multiple opportunities to engage in science exploration and experiences through inquiry (Bosse, Jacobs, & Anderson 2009; Gelman, Brenneman, Macdonald, & Roman, 2010). The range of experiences gives them the basis for seeing patterns, forming theories, considering alternate explanations, and building their knowledge. For example, engaging with natural environments in an outdoor learning center can provide opportunities for

THE ROLE OF THE TEACHER IN INCLUSIVE EARLY CHILDHOOD SCIENCE TEACHING AND LEARNING

By John T. Almarode

Excerpted from *Inclusive Teaching in the Early Childhood Science Classroom*

children to examine and duplicate the habitats of animals and insects, explore how things move, investigate the flow of water, recognize different textures that exist, make predictions about things they see, and test their knowledge.

- Young children develop science skills and knowledge in both formal and informal settings.

Opportunities to explore, inquire, discover, and construct within the natural environment and with materials that are there need to be provided in formal education settings, such as preschool and early care and education programs through intentional lessons planned by knowledgeable adults. In addition, children need to have opportunities to engage in science learning in informal settings, such as at home with cooking activities and outdoor play or in the community exploring and observing the environment.

- Young children develop science skills and knowledge over time.

To effectively build science understanding, young children need opportunities for sustained engagement with materials and conversations that focus on the same set of ideas over weeks, months, and years (NRC, 2007, p. 3). For example, investigating the concept of light and shadows over several weeks indoors and out with a variety of materials and multiple activities will allow children to re-visit and re-engage over time, building on observations and predictions from day to day.

- Young children develop science skills and learning by engaging in experiential learning.

Young children engage in science activities when an adult intentionally prepares the environment and the experiences to allow children to fully engage with materials. The activities allow children to question, explore, investigate, make meaning, and construct explanations and organize knowledge by manipulating materials.

Reprinted with permission. Source: National Science Teachers Association (NSTA, 2014). NSTA Position Statement: Early Childhood Science Education.

THE ROLE OF THE TEACHER IN INCLUSIVE EARLY CHILDHOOD SCIENCE TEACHING AND LEARNING

By John T. Almarode

Excerpted from *Inclusive Teaching in the Early Childhood Science Classroom*

ALL MEANS ALL – INCLUSION IN EARLY CHILDHOOD SCIENCE

What happens, in the end, is that our decisions within the role of teaching inclusive early childhood science ensure that all of our learners have equity of access and opportunity to science content, skills, and understandings. *And by all, this means all learners, regardless of their personal or social circumstances, have the access and opportunity to achieve their personal potential*. Thus we must seek to provide an inclusive environment for all learners – an environment that actively engages all learners, welcomes and embraces every learner as an important member of the community, and provides the necessary support to each learner so that they have an equal opportunity for success (see Jimenez et al., 2012; Spooner et al., 2011).

> Early childhood inclusion embodies the values, policies, and practices that support the right of every infant and young child and his or her family, regardless of ability, to participate in a broad range of activities and contexts as full members of families, communities, and society. The desired results of inclusive experiences for children with and without disabilities and their families include a sense of belonging and membership, positive social relationships and friendships, and development and learning to reach their full potential. The defining features of inclusion that can be used to identify high quality early childhood programs and services are access, participation, and supports. (DEC/NAEYC, 2009, p. 1)

For early childhood science teaching and learning, this means that we have to provide a wide range of experiences, tasks, and centers that are accessible to every learner regardless of his or her unique identity profile. The experiences, tasks, and centers engage learners beyond compliance but with a strong sense of belonging and efficacy. And, finally, there are strategic supports in place to ensure access and participation (DEC/NAEYC, 2009).

Opportunities for Reflective Practices

What is inclusion? Describe inclusion in your own words. Compare and contrast this with what you witnessed or with your experiences in your own school.

THE ROLE OF THE TEACHER IN INCLUSIVE EARLY CHILDHOOD SCIENCE TEACHING AND LEARNING

By John T. Almarode

Excerpted from *Inclusive Teaching in the Early Childhood Science Classroom*

This moves beyond rattling off facts about the nine planets, now eight planets; the parts of a plant; the needs of living things; or centripetal force. The NSTA, along with the National Association for the Education of Young Children (NAEYC) both emphasize the continuity of growth in learning for each and every student in our classrooms (NSTA, 2014, DEC/NAEYC, 2009). Put differently, every parent, guardian, administrator, teacher leader, and teacher must strive to build lifelong learners by ensuring that the content, skills, and knowledge acquired during a single school year continues on beyond the walls of the school or classroom and beyond the academic calendar. This idea of lifelong learning is a long-sought-after goal in education (NSTA, 2014). So what does this look like? What is the outcome we are striving for in our young learners? The answer: assessment-capable visible science learners.

ASSESSMENT-CAPABLE VISIBLE SCIENCE LEARNERS

The characteristics of an assessment-capable visible science learner draw from the key findings from John Hattie's Visible Learning database (Visible Learning Meta X, 2020). The Visible Learning research allows us to gain a perspective on what works best in teaching and learning science in the early childhood classroom. The Visible Learning database is composed of more than 1,800 meta-analyses of studies that include more than 80,000 studies and 300 million students. With that many studies and so many influences on student learning in our schools and classrooms, this database focuses on meta-analyses – the combination of results from a collection of studies. In other words, a meta-analysis is a study of studies. From these studies of studies, we can calculate an effect size that represents the magnitude or relative size of the particular influence. We will come back to this database and the list of effect sizes when we look at strategies for teaching and learning. For now, it is important to understand that an effect size not only helps us to discern whether something does or does not have an influence on learning but also we can look at a particular influence and see its relative impact compared to other influences (e.g., phonics versus whole-language instruction). For the purposes of our current discussion, planning, designing, and implementing high-quality, high-impact teaching and learning in the inclusive early childhood science classroom should build and support assessment-capable visible learners (Frey, Hattie, & Fisher, 2018). As we return to Ms. Campbell's classroom one more time, we will look at an example of an assessment-capable visible learner.

Mirya is one of Ms. Campbell's learners and is quite enthusiastic about getting right to work on answering the driving question for the day: How can I, as a musician,

THE ROLE OF THE TEACHER IN INCLUSIVE EARLY CHILDHOOD SCIENCE TEACHING AND LEARNING

By John T. Almarode

Excerpted from *Inclusive Teaching in the Early Childhood Science Classroom*

create a variety of sounds with my instruments? Mirya has been diagnosed with a learning disability and has no intention of letting that slow down her passion for learning. She is an energetic first grader who enjoys science, math, or any subject she encounters. During her most recent one-on-one conference with Ms. Campbell, Mirya demonstrated a strong conceptual understanding of sound but is not quite sure about hypothesizing and inferring. This does not completely surprise Ms. Campbell, because she also needs additional support in making inferences during the literacy block. During a discussion with Ms. Campbell, Mirya is able to articulate where she is in her learning and where she is going next in her learning journey. She tells Ms. Campbell, "I read a book about sound, but I don't really know what you mean by infer. So, I need to make sure I ask for help and make sure you check my work until I get it." Mirya demonstrates two characteristics of an assessment-capable learner in science:

1. Assessment-capable visible science learners know their current level of understanding in science content, skills, and understandings.

2. Assessment-capable visible science learners know where they are going next in their science learning and are confident to take on the challenge.

As Mirya engages in her first center, she struggles a bit with the task at the kalimba center. She is not clear on how to communicate her learning in her science notebook or record her thinking into the graphic organizer provided by Ms. Campbell. Her group discusses how to get around this challenge so that they can move forward in the tasks. They quickly discuss their options. Mirya speaks up and says, "Before we ask Ms. Campbell, why don't we look at the examples on Google classroom." One of her peers speaks up and says, "I will go get the book from the story and find it in there. He uses a kalimba in the book, remember?"

- Assessment-capable visible science learners have the tools to move learning forward and know when and how to use them.

Mirya and her science learning community stop their work at one of the centers. A member of the group has pointed out that "something does not look right here. I am not sure we did this the way Ms. Campbell wants us to. We have not used any of the science terms we talked about on the carpet. Let's go back and put those in." After they made edits and revisions to their science notebooks and graphic organizers, they compared their responses among themselves and made a few additional edits before moving forward to the next center.

THE ROLE OF THE TEACHER IN INCLUSIVE EARLY CHILDHOOD SCIENCE TEACHING AND LEARNING

By John T. Almarode

Excerpted from *Inclusive Teaching in the Early Childhood Science Classroom*

- Assessment-capable visible science learners recognize that errors are learning opportunities and seek feedback.
- Assessment-capable visible science learners monitor their learning and make adjustments when necessary.

Finally, the most endearing aspect of this lesson comes when Mirya recognizes that another group is struggling with the kalimba center. She moves to provide them with help and begins to teach them about inferring.

- Assessment-capable visible science learners recognize when they have learned something and act as teachers to others.

Research to Classroom Practice Tasks

Brainstorm: What specific decisions build and support assessment-capable visible science learners?

• Assessment-capable visible science learners know their current level of understanding in science content, skills, and understandings.
• Assessment-capable visible science learners know where they are going next in their science learning and are confident to take on the challenge.
• Assessment-capable visible science learners have the tools to move learning forward and know when and how to use them.
• Assessment-capable visible science learners recognize that errors are learning opportunities and seek feedback.
• Assessment-capable visible science learners monitor their learning and make adjustments when necessary.
• Assessment-capable visible science learners recognize when they have learned something and act as teachers to others.

Table 6.3. Source: Adapted from Frey, N., Hattie, J., & Fisher, D. (2018). Developing assessment-capable visible learners. Thousand Oaks, CA: Corwin.

These six characteristics did not come to fruition on their own (Table 6.3). The actions of Mirya bring us to the end of this chapter and offer us an opportunity to tie everything together. Mirya is an assessment-capable visible learner because of the intentional, purposeful, and deliberate decisions of Ms. Campbell. Those decisions reflect her beliefs about what science is or is not, why all young children should learn

THE ROLE OF THE TEACHER IN INCLUSIVE EARLY CHILDHOOD SCIENCE TEACHING AND LEARNING

By John T. Almarode

Excerpted from *Inclusive Teaching in the Early Childhood Science Classroom*

science, and what her beliefs or mindset about science teaching and learning are. And this brings to light the role of the teacher in inclusive early childhood science teaching and learning. Where we go next addresses how Ms. Campbell decided on the body of knowledge (moving objects exhibit different kinds of motion; objects may vibrate and produce sound), the set of processes (observing, communicating, hypothesizing, inferring, experimenting, analyzing, evaluating, and modeling), and a specific aspect of a way of knowing (verify their hypotheses through replication).

Engaging the Family and Community

1) Focus on the Positive: Everyone likes to hear something positive about their children, grandchildren, or any family member for that matter. Just as we begin our journey into inclusive early childhood science teaching and learning, this is our first discussion concerning engaging the family and community. As we devote time in each chapter to ideas, approaches, and strategies for extending teaching and learning beyond the walls of your classroom, one principle should be at the forefront of each of these efforts: focus on the positive. Successful family and community engagement are built on strong family-teacher relationships. These are initiated by engaging with them for positive reasons and not just when there is a problem. For example, make contact before the year begins and within the first two weeks of school. Whether by phone or by email, have the parent/guardian share something positive about their child before the year begins. Then, during the first two weeks of school, share something positive with them.

The extra touch point or connection takes only a few moments but sets the tone for the rest of the year. This extra touch point connection increases the likelihood that our students will share future experiences from our classrooms with their parents or guardians. Plus, the parents or guardians are more likely to engage in constructive conversations if a tough conversation is necessary in the near or distant future.

2) Share School Experiences: Although we will continue to come back to the sharing of school experiences, we want to set the stage here and then go into specifics later on in the book. Before embarking on the mission of teaching and learning in the inclusive early childhood science classroom, set up a process and procedure for sharing the school experience beyond the walls of the classroom. Set aside some time for mapping out ways to encourage students to share their experiences and for parents, guardians, and other community members to share

THE ROLE OF THE TEACHER IN INCLUSIVE EARLY CHILDHOOD SCIENCE TEACHING AND LEARNING

By John T. Almarode

Excerpted from *Inclusive Teaching in the Early Childhood Science Classroom*

their experiences with our learners. Locate examples of newsletters and plan how you will use newsletters to share school experiences. How will you integrate student voice and parent/guardian voice into the newsletters?

Then, locate technology that will support the sharing of experiences. Do not try to use all of the available options (e.g., Animoto, Storybird, TikTok, Remind, WeVideo, YouTube, Flipgrid, Facebook, Twitter, or Instagram). You do not need them all. Too much or too many can be overwhelming for you, your students, and their parents or guardians. Pick one piece of technology and stick with that for the quarter, semester, or even the year. Then plan how you will use that technology to share school experiences. Again, how will you integrate student voice and parent/guardian voice?

3) **Find Common Ground:** Engaging the family and community comes down to finding common ground. As you know, engaging with anyone is easier if we have something in common (e.g., current events, travel, food). When it comes to the families of our learners, the same rule applies. However, we already have common ground in that we will be sharing their child's time this school year. Take time to get to know the families of your children. For example, set up regular opportunities for families to visit your classroom, face-to-face or remotely using Zoom, WebEx, Google Hangout, etc. This provides a forum for them to see the learning environment and hear about what their child is doing at school. What is even more powerful is when our learners lead the visits, sharing what they think is important about the classroom. Families should be visitors in our rooms, face-to-face or remotely, beyond back-to-school night. The more we interact with families, the better the chances that we will find the common ground that helps us see each other as individuals with the same end goal in mind: what's best for their child and our student.

Sometimes the best approach is to offer families the option of meeting with you in their homes – their turf so to speak. This is an excellent way to learn about the lives of students and their families.

In any of these ideas, approaches, or strategies for engaging families and community, always consider how you would respond if you were in their shoes. Understanding is one of the keys to unlocking a successful relationship with families and communities. What if this were your child? We should approach teaching and learning in the inclusive early childhood science classroom as if our own children were in the class.

THE ROLE OF THE TEACHER IN INCLUSIVE EARLY CHILDHOOD SCIENCE TEACHING AND LEARNING

By John T. Almarode

Excerpted from *Inclusive Teaching in the Early Childhood Science Classroom*

Look for the other "Engaging the Family and Community" sections in subsequent chapters. Each of these special, highlighted sections will provide practical ways to move teaching and learning beyond the walls of your classroom. Sometimes we will focus on families, sometimes the community. In some sections, we will weave the two together. Each of these sections delivers a consistent message: We are partners in teaching and learning in the inclusive early childhood science classroom.

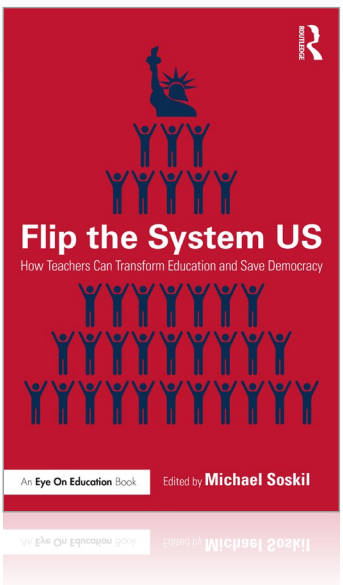
PROFESSIONAL LEARNING TASKS

1. Return to the discussion of tiered vocabulary. Develop a list of Tier 1, 2, and 3 vocabulary terms for a science topic. Using resources available to you, explore and record strategies that support the acquisition and application of Tier 3 vocabulary.
2. What does the research say about the effect of the teacher on student learning? Using resources available to you, complete a miniature literature review of empirical research that explores the influence of a teacher on a student learning in science.
3. Inclusion, culturally responsive teaching, and differentiation are common terms in education. Develop your own definitions for each of these terms. Then compare and contrast these terms.

CHAPTER

7

LESSONS FOR THE UNITED STATES FROM INTERNATIONAL EDUCATION SYSTEMS



LESSONS FOR THE UNITED STATES FROM INTERNATIONAL EDUCATION SYSTEMS

Pasi Sahlberg

Excerpted from *Flip the System US: How Teachers Can Transform Education and Save Democracy*

My grandfather was American citizen. Together with thousands of other Finns, he left for New York City in the spring of 1914 to look for something that his homeland that time couldn't offer. He settled down in New York, went to war as a member of the U.S. armed forces, and obtained an engineering degree in Brooklyn's Polytech. I grew up listening to my grandfather's stories about life in the New World, his voyages across the Atlantic, and great American education.

During my initial teacher education in Helsinki, and later when doing doctoral studies in Jyvaskyla, most of the literature I read was written by American scholars and practitioners. My readings ranged from John Dewey to Elizabeth Cohen and from Howard Gardner to Linda Darling-Hammond. They, and many others, helped me to build a strong foundation for my career later on as an educator in Finland and beyond. I often thought of how right my grandfather was in his views about America.

The United States has been an educational inspiration, not only for people like me in Finland, but for many teachers and researchers around the world. American ideas about pedagogy, assessment, curriculum, leadership, and school improvement have been important for Canadians, Dutch, Australians, Singaporeans and Chinese educators as they have built world-class education systems in their countries. As a consequence, the United States has been a role-model for other countries when they reformed their education systems to better meet the needs of modern times. Many individual scholars, activists, experts, and institutions in the United States continue to lead the way in generating forward-looking thinking and solutions in education. But as a system—or systems—the United States is no longer among the most interesting places in the world.

INNOVATION AND IMPROVEMENT

An intriguing question of whether innovation in education system level can be measured was answered by the Organisation for Economic Co-operation and Development (OECD) a few years ago in its report *Measuring Innovation in Education* (OECD, 2014). It measured the level of educational innovation in 22 countries and 6 jurisdictions, among them Indiana, Massachusetts and Minnesota.

One conclusion of the OECD's measurement of innovation between 2003 and 2011 was that "there have been large increases in innovative pedagogic practices across all countries . . . in areas such as relating lessons to real life, higher order skills, data and text interpretation and personalization of teaching" (OECD, 2014). In this comparison of the education systems' internal abilities to renew itself the U.S. did not

LESSONS FOR THE UNITED STATES FROM INTERNATIONAL EDUCATION SYSTEMS

Pasi Sahlberg

Excerpted from *Flip the System US: How Teachers Can Transform Education and Save Democracy*

do very well compared to other participating countries. Those who know that the period covered in this measurement included the most intensive push of No Child Left Behind and Race to the Top legislations would say: "Not surprising." Market-like school-to-school competition, tougher accountability measures, and an obsession with standardized testing were the core ideas through which many American politicians tried to unlock improvement within American school system.

It was surprising, however, to see the OECD's list of the top five U.S. "innovations in pedagogic practice." They were:

1 observation and description in secondary school science lessons;

2 individualized reading instruction in primary school classrooms;

3 use of answer explanation in primary mathematics;

4 relating of primary school lessons to everyday life; and

5 text interpretation in primary lessons (OECD, 2014).

Innovation in organizational policy and practice included mostly different aspects of student assessment and standardized testing. In reality, these numerous innovations rapidly led to overloading teachers' and principals' daily work, lack of proper preparation of good laws and implantation of new practices and burn-out of many in the country's public schools. What has been missing in most school reform efforts in the United States, Australia, England and several other countries is that good innovation often means reducing teachers' workload so that they have time for new ideas. Time is a critical condition to have if we want to flip the system.

The last two decades have witnessed a notable shift from reforming education by domestic innovation to transforming it by importing international ideas for improvement. A closer look at what current high-performing school systems have in common reveals that they all (some more than the others) have taken critical lessons from other countries to transform their national policies and school-level practices. Singapore sends hundreds of students to study education in U.S. universities and encourage university scholars to collaborate in teaching and research with their American colleagues. Japan, Hong Kong and South Korea have done the same. More recently, China has also benefited from education innovation in the U.S. and other western education systems. Canadians also admit that U.S. research and innovation have been instrumental in gradually moving education in Canada forward to be world-class today.

LESSONS FOR THE UNITED STATES FROM INTERNATIONAL EDUCATION SYSTEMS

Pasi Sahlberg

Excerpted from *Flip the System US: How Teachers Can Transform Education and Save Democracy*

Finland is no exception. If you want to discover the origins of the most successful practices in pedagogy, student assessment, school leadership, or school improvement in Finland, you only need to visit schools and ask teachers and principals. Most of them, including me, have studied psychology, teaching methods, curriculum theories, assessment models, and classroom management researched and designed in the U.S. in their initial teacher education programs. Primary school teacher education curricula in Finnish universities include piles of books and research articles written by American scholars and thought leaders (Hammerness et al., 2017). Professional development programs and school improvement initiatives often include invited experts from the U.S. universities to teach and work with Finnish teachers and system leaders. So common is this reliance on American educational ideas in Finland that some have come to call Finnish school system a large-scale laboratory of American education innovation (Sahlberg, 2015). The evidence shows that these innovations can work in practice.

The relatively low overall international rating of "innovation in education" in the U.S. raises an important question: Why have state or federal education authorities systematically ignored most great American educational ideas and innovation that many other countries have utilized to improve the performance of their school systems during the last decades? Of course, there are schools and districts that have understood the power and value of American expert knowledge and research. But overall, it is hard to find a school system—either a state or a district—that has systematically relied on American research knowledge in providing better public education to their children. It is interesting that, according to the OECD (2014), the U. S. exhibits only modest innovation in its education system but, at the same time, it is the world leader in generating world-class research, inventing practical solutions for school, and innovation to policy-makers, leaders and practitioners in other countries.

SHADOW AMERICAN SCHOOL SYSTEM IN FINLAND

I have hosted hundreds of politicians, administrators and teachers in Finland during their pilgrimage to find out the drivers behind Finnish education. Often, I heard these visitors surprised how similar school cultures and classroom life are to what they were in the U.S. before the 1990s. In fact, what visitors to Finnish schools and teacher education sites witness is a wide range of American educational theories and models put into large-scale practice.

Five significant American educational ideas have been instrumental in accelerating Finland's success in teaching and learning.

LESSONS FOR THE UNITED STATES FROM INTERNATIONAL EDUCATION SYSTEMS

Pasi Sahlberg

Excerpted from *Flip the System US: How Teachers Can Transform Education and Save Democracy*

1 Education for Democracy and Active Citizenship

The roots of Finland's pedagogical ideas date back to the 1860s when Uno Cygnaeus, who is sometimes referred as the father of basic education in Finland, said that in an ideal classroom, pupils speak more than the teacher. He was also a fan of practical aspects of education and insisted that both boys and girls must learn all the practical skills that people need in everyday lives. It is understandable that the pragmatic, child-centered educational thinking of John Dewey has been widely accepted among Finnish educators. Dewey's philosophy of education forms a foundation for academic, research-based teacher education in Finland and influenced also the work of the most influential Finnish scholar professor Matti Koskenniemi in the 1940s. All primary school teachers read and explore Dewey's and Koskenniemi's ideas as part of their courses leading to the master's degree today. Many Finnish schools have adopted Dewey's view of education for democracy by enhancing students' access to decision-making regarding their own lives and studying in school (Dewey, 1916). Some visitors to Finland, among them the late Seymour Sarason, have observed that the entire Finnish school system looks like John Dewey's laboratory schools in the U.S. when they were actively alive.

2 Learning Cooperatively in Small Groups

Unlike in most other countries, cooperative learning has become a pedagogical approach that is widely practiced throughout Finnish education system. Finland's new 9-year comprehensive school launched in early 1970s was built on an idea of equal education opportunity and regular small-group learning of students coming from different family backgrounds. But it was the national curriculum reform in 1994 that brought cooperative learning as it is known now to all Finnish schools. Before that, most significant researchers and trainers of cooperative learning in the United States, including David Johnson, Roger Johnson and Elizabeth Cohen, had visited Finland to train trainers and teachers on their methods of cooperative learning. Their books and articles were translated into Finnish and shared widely to schools (Johnson & Johnson, 1984). The 1994 National Curriculum included a requirement that all schools design their own curricula in a way that would enhance teaching and learning according to constructivist educational ideas (National Board of Education, 2016). Although cooperative learning is not mentioned as an obligatory pedagogical practice in schools, there are several recommendations for teachers that make cooperative learning a common approach in all schools and classrooms in the country. Cooperative learning is also an integral element of initial teacher education

LESSONS FOR THE UNITED STATES FROM INTERNATIONAL EDUCATION SYSTEMS

Pasi Sahlberg

Excerpted from *Flip the System US: How Teachers Can Transform Education and Save Democracy*

in Finland and one of the most popular topics in professional learning of teachers and school leaders in Finland.

3 Children Have Multiple Intelligences

The spirit of 1970s school reform in Finland included another idea that derives from U.S. universities and scholars: development of the whole child. The overall goal of schooling in Finland was to support a child's holistic development and growth by focusing on different aspects of talent and intelligence (see Chapter 10 of this volume, by Sean Slade). After abolishing all streaming and tracking of students in the mid-1980s, both education policies and school practices adopted the principle that all children have different kinds of intelligence and that schools must find ways to cultivate these different individual aspects in balanced ways. Howard Gardner's (1983) Theory of Multiple Intelligences became a leading idea in transferring these policy principles to school practice. Again, the 1994 National Curriculum emphasizes that school education must provide all students with opportunities to develop all aspects of their minds. As a consequence, that curriculum framework required that all schools have a balanced program, blending academic subjects with art, music, crafts, and physical education. This framework moreover mandated that all schools provide students with sufficient time for their self-directed activities. Gardner's influence has also been notable in the Finnish system by conferring a broader definition of "talent." Today, Finnish teachers believe that over 90 percent of students can learn successfully in their own classrooms if given the opportunity to evolve in a holistic manner.

4 Classroom Assessment Must Have Various Forms

Without frequent standardized and census-based testing, the Finnish education system relies on local monitoring and teacher-made student assessments. A child-centered, interaction-rich whole-child approach in the national curriculum requires that different student assessment models are used in schools. Furthermore, primary school pupils don't get any grades in their assessments before they are in fourth grade. It was natural that Finnish teachers found alternative student assessment methods attractive. And, it is ironic that many of these methods developed at U.S. universities are yet far more popular in Finland than in the United States. These include portfolio assessment, performance assessment, self-assessment and self-reflection, and assessment for learning methods. Academic teacher education programs in Finland include elements of study of educational assessment and evaluation theories and also provide all students with practical knowledge and skill of how to use alternative student assessment methods in the classroom.

LESSONS FOR THE UNITED STATES FROM INTERNATIONAL EDUCATION SYSTEMS

Pasi Sahlberg

Excerpted from *Flip the System US: How Teachers Can Transform Education and Save Democracy*

5 Teachers Leading and Learning from One Another

Another surprising aspect of Finnish education is that it lacks much of systematically created change knowledge that is normally expected to guide policymakers and education authorities in planning and implementing desired reforms in education. Research and development of system-wide educational reform and change hasn't belonged to the academic repertoire of Finnish educational research community. The number of research papers related to that field has therefore remained small compared to most other countries. Instead, Finnish education experts have relied on foreign sources of expertise and knowledge. A good example of an American innovation commonly in use in Finland is peer coaching that evolved in the 1980s and 1990s as a result of research and development work of Bruce Joyce and his colleagues (Showers & Joyce, 1996). Bruce Joyce came to Finland in the late 1980s to train trainers and education leaders on how the impact of professional development of teachers can be enhanced. Peer coaching—that is, a confidential process through which teachers work together to reflect on current practices, expand, improve, and learn new skills, exchange ideas, conduct classroom research and solve problems together in school—has been normal practice in school improvement programs and professional development in Finland since the mid-1990s.

CAN WE FLIP THE SYSTEM?

Visitors to the U.S. often wonder why research and innovation that have improved practically every successful education system today are not used more systematically in the U.S. school systems. Yet, many international educational indicators, like the recent OECD's PISA survey 2018 (OECD, 2019) or review of innovation in education a few years earlier suggest that there is a big need to change the policies and methods currently used in the U.S. But it doesn't have to be this way. As the introduction section of this book says, the need to flip the system "is inherently a call to restore the United States education system to its roots as the foundation of American democracy."

One reason approaches used by other countries are not being implemented in the U.S. may be that schools in the U.S. are so affected by bureaucracies, politics and commercialization that schools are simply doing what they must, not what they think would be necessary to do to give all children real opportunities to learn well. One great opportunity in flipping the system in the United States is to take a closer look at how more successful education systems let the teaching profession lead the design,

LESSONS FOR THE UNITED STATES FROM INTERNATIONAL EDUCATION SYSTEMS

Pasi Sahlberg

Excerpted from *Flip the System US: How Teachers Can Transform Education and Save Democracy*

implementation, and evaluation of teaching and learning in schools in collaboration with system administrators and policymakers. In Canada the teaching profession, which includes both teachers and principals, has a central role through democratic procedures in deciding the directions that school systems need to go. In Finland any successful change in education requires that teachers' perspectives are carefully included in policies and strategies. Involving the teaching profession in system level leadership leads to closer engagement of teachers and school leaders in making change happen. That, in turn, strengthens the collective ownership of both teaching and learning in schools.

A message from abroad to American colleagues is this: The United States is one of the few education systems in the world that is self-sufficient enough in terms of important ideas, knowledge, research and innovation—and financial resources—to build a high quality, equitable 21st century school system for all American children. All other countries, more or less, depend on research knowledge and practical ideas that are created and tested, but not used, in the U.S. It is hard to accept the OECD's conclusion on the state of education innovation, that the greatest American innovation in organizational policy and practice in this century is student assessment, including standardized testing. Many American teachers probably shake their heads at this. High-stakes standardized testing, combined with punitive accountability is, as Diane Ravitch (2020) explains, one of the main reasons for persistent mediocrity in outcomes and prevalent inequality in American education.

The question should not be: "How can we have more innovation in education to shake up the status quo?" The real question is: "How can we flip the system in such a way that would lead to better understanding of the potential that exists within American professional and academic communities in education?"

Perhaps the most important lesson that the United States should learn from international education systems is that the solution is here already. This would immediately mean that it is more important to see which American ideas have worked elsewhere and why, then improve them based on experiences in other systems, and finally learn how to implement these ideas with the teachers in all schools.

One thing we know by now for sure: The answer is not to have more charter schools or private ownership of public schools to improve education. The message from the most successful education systems is loud and clear: Education policies should not be determined by mythology and ideology, but rather should be guided by research

LESSONS FOR THE UNITED STATES FROM INTERNATIONAL EDUCATION SYSTEMS

Pasi Sahlberg

Excerpted from *Flip the System US: How Teachers Can Transform Education and Save Democracy*

and evidence from home and abroad. When this is done in close collaboration with the teaching profession, it also serves the purpose of restoring American education as a foundation of democracy.

REFERENCES

Dewey, J. (1916). *Democracy and education: An introduction to the philosophy of education*. New York: Macmillan.

Gardner, H. (1983). *Frames of mind: The theory of multiple intelligences*. New York: Basic Books.

Hammerness, K., Ahtiainen, R., & Sahlberg, P. (2017). *Empowered educations in Finland: How high-performing systems shape teaching quality*. San Francisco, CA: Jossey-Bass.

Johnson, D. & Johnson, R. (1984). *Circles of learning: Cooperation in the classroom*. Alexandria, VA: ASCD.

National Board of Education. (2016). *National core curriculum for basic education 2014*. Helsinki: National Board of Education.

OECD (2014). *Measuring innovation in education: A new perspective*. Paris: OECD.

OECD (2019). *PISA 2018 result: What students know and can do, vol I*. Paris: OECD.

Ravitch, D. (2020). *Slaying Goliath: The passionate resistance to privatization and the fight to save America's schools*. New York: Alfred Knopf.

Sahlberg, P. (2015). *Finnish lessons 2.0: What can the world learn from educational change in Finland*. New York: Teachers College Press.

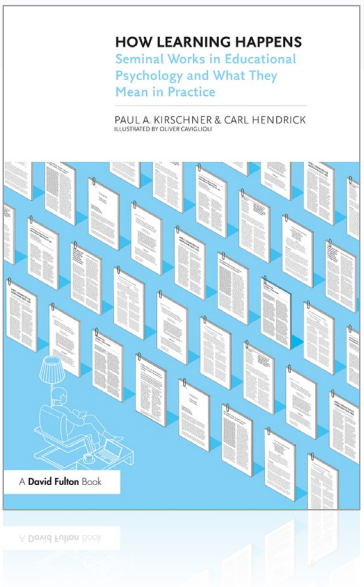
Sahlberg, P. (2018). *FinnishEd leadership: Four big, inexpensive ideas to transform education*. Thousand Oaks, CA: Corwin.

Showers, B., & Joyce, B. (1996). The evolution of peer coaching. *Educational Leadership*, 53(6), 12–16.

CHAPTER

8

THE TEN DEADLY SINS IN EDUCATION



THE TEN DEADLY SINS IN EDUCATION

Paul A. Kirschner and Carl Hendrick

Excerpted from *How Learning Happens: Seminal Works in Educational Psychology and What They Mean in Practice*

QUOTE "*This isn't right. This isn't even wrong*".[1]

This book is about a particular tradition, a tradition which focuses on how to cultivate the best conditions which foster learning. By "learning" we mean a change in long-term memory (Kirschner, Sweller, & Clarke, 2006). Any attempt to do this which ignores the cognitive architecture of the brain is unlikely to be successful and may even hinder long-term learning. For many teachers on the frontline, the advice they have been given has been based on folk wisdom, vague abstract theory and approaches that conform to Wolfgang Pauli's famous quip: "This isn't right. This isn't even wrong". One aim of this book is to empower teachers to be able to not only evaluate what they are advised to do but to provide a strong evidence base from which they can refine and reflect on their own practice and create the best conditions under which their students can flourish.

The Christian teaching, attributed to the Desert Fathers, speaks of seven cardinal or deadly sins that we need to overcome to live a virtuous life: pride, greed, lust, envy, gluttony, wrath, and sloth. In this final chapter we very briefly describe what we feel are the ten deadly sins of education. Giving in to those sins is often tempting, but if you do you'll be guilty of implementing evidence-uninformed education and flying in the face of evidence.

1. THE LEARNING PYRAMID

The learning pyramid (see Figure 8.1) is a seemingly useful model that reflects the effectiveness of different forms of teaching. According to the pyramid, pupils only remember 5% of a classroom lesson (what the teacher says), 10% of what they read, 20% of an audio-visual presentation, 30% of a demonstration, 50% of a discussion, 75% of what they do themselves and 80–90% of what they explain to others. The percentages vary in different sources, but that's not important. What is important is that it's nonsense that you shouldn't fall for.

[1] WOLFGANG PAULI WAS AN AUSTRIAN BORN PHYSICIST HE IS REPORTED TO HAVE SAID THIS AFTER READING A COLLEAGUE'S PAPER. IT IS QUOTED IN *THE SUCCESSFUL TOASTMASTER: A TREASURE CHEST OF INTRODUCTIONS, EPIGRAMS, HUMOR, AND QUOTATIONS* (1966, P. 350) BY PROCHNOW AND IN *MATHEMATICAL APOCRYPHA REDUX: MORE STORIES AND ANECDOTES OF MATHEMATICIANS AND THE MATHEMATICAL* (2005, P. 194) BY KRANTZ.

THE TEN DEADLY SINS IN EDUCATION

Paul A. Kirschner and Carl Hendrick

Excerpted from *How Learning Happens: Seminal Works in Educational Psychology and What They Mean in Practice*

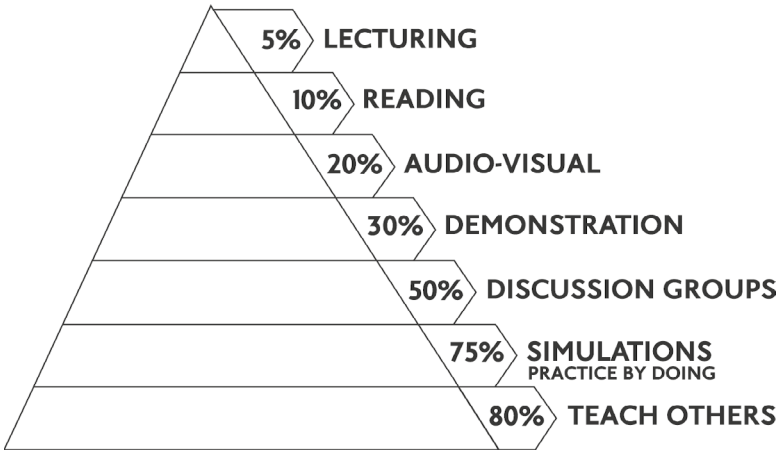


Figure 8.1 The Learning Pyramid

First, there is no basis for such percentages. Even the institution that everyone quotes (National Training Laboratories in Bethel, Maine, USA) says they don't have data to support them. Furthermore, the pyramid is simply a corruption of Edgar Dale's cone of experience (1954), in which he indicated how different media differ along a continuum from abstract (language, letters) to concrete (direct experience). Finally, even if the percentages were correct, you can't do anything with it. A teacher standing in front of the class and teaching about electricity (5%) can write the main points and principles on the whiteboard or show them in a PowerPoint® presentation (+10%), show a video clip about circuits (+20%), give a small demonstration of a battery or lamps in series and in parallel (+30%) and then discuss the results of the demonstration with the students (+50%), etc. No lesson is purely one or the other and just adding these percentages up teaches us that you could learn more than 100%!

2. LEARNING STYLES

People are all different and just as they may prefer different foods, they also may prefer different ways of learning. One prefers pictures while the other prefers words. While it sounds and even feels logical that there are children who are visual learners (learn best when information is presented as pictures, diagrams, and charts), while others are auditory (learn best in a lecture or group discussion) readers/writers (learn best through reading and writing) or kinesthetic (hands-on learners who learn best through physical experience), there's no evidence whatsoever for this. And this is just one of the 72 different learning styles (the so-called VARK) that Coffield and colleagues (2004) found when they went through the literature.

THE TEN DEADLY SINS IN EDUCATION

Paul A. Kirschner and Carl Hendrick

Excerpted from *How Learning Happens: Seminal Works in Educational Psychology and What They Mean in Practice*

Unfortunately, all that glitters is not gold. This way of looking at how children learn, and therefore how the teacher should teach, has at least three problems, as we have already described in Chapter 26, Did you hear the one about the kinaesthetic learner . . .?. First, in most studies learning styles are determined based on what people say they prefer. It's therefore about learning preferences and not learning styles. Second, there's a big difference between these and what leads to better learning. I think we all can agree that if we ask people what they prefer to eat, many if not most will say fatty things and/or salty things and/or sugary things. I think that we can also all agree that these preferences are not the constituents of a healthy diet. That you prefer it doesn't make it good for you, both in food and learning. Finally, most so-called learning styles are based on specific types: people are classified into different groups. However, there's no evidence for the existence of these groups. And this discounts the fact that even if they all did exist, if the 72 types of learning styles were simply dichotomous (e.g. concrete versus abstract thinkers), which they aren't as we saw with VARK, there would be 272 different combinations of learning styles, or 4,722,366,482,869,669,245,213,696 different combinations – more than the number of people who have ever lived on earth – so good luck tailoring your teaching to them!

But possibly the most important problem is that if we put learners in different boxes and teach accordingly (i.e. pigeonhole them), we create situations that instead of promoting learning, hinder it (see Chapter 27, When teaching kills learning).

3. CHILDREN ARE DIGITAL NATIVES AND THINK DIFFERENTLY FROM PREVIOUS GENERATIONS

We have to radically change education! We're teaching a new type of learner with specific competencies that enable them to use ICT effectively and efficiently. This new learner is the digital native. Marc Prensky introduced this term in 2001: the idea of a generation that has never lived without digital technologies and therefore has exceptional and unique characteristics that distinguish it from all previous generations with respect to thinking and learning (Prensky, 2001). He concluded that we must design and introduce new forms of education that focus on the special gifts of these digital natives. Unfortunately, he based all of this on simple personal observations of young people and not on any research.

Wim Veen and Ben Vrakking (2006) followed suit, introducing the term homo zappiëns to describe a new generation of students who learned significantly differently from their predecessors. They claim that homos zappiëns independently and without

THE TEN DEADLY SINS IN EDUCATION

Paul A. Kirschner and Carl Hendrick

Excerpted from *How Learning Happens: Seminal Works in Educational Psychology and What They Mean in Practice*

instruction develop the metacognitive skills needed for discovery learning, networked learning, experimentation, collaborative learning, active learning, self-directed learning, and problem-based learning. Based on these claims (again acquired through personal observation and not research) a growing group of people, including politicians and administrators, believe that education should respond to this. We hear things like "Let's Googlify education", "Knowledge acquisition isn't necessary", and "We need to harness the cognitive and metacognitive skills of this technology-savvy generation!"

Don't! There's no evidence that young people today have any special skills (other than very fast-moving thumbs) that would allow them to learn differently. The proponents of these ideas based this purely on their own experiences and anecdotal evidence.

4. CHILDREN CAN MULTITASK

One of the competencies that people attribute to the non-existent digital native is that of multitasking. There's much confusion about this concept. Multitasking is the ability to simultaneously perform two or more tasks that require thinking (or information processing) without a loss of speed or accuracy. To really multitask you need two or more separate processing units (think of a multicore computer with two, four, eight, or even more CPUs). The problem is that people only have one CPU, namely their brains. When it comes to automated tasks that don't require thinking, we can easily do two or more things at the same time.

What we actually do is switch between tasks (i.e. task switching). But when we switch between tasks, we lose time and we make mistakes. If we switch tasks, we (unconsciously) make a "decision" to shift our attention from one task to another. Our brain then activates a rule to end the processing of one task whereby you leave the cognitive schema that you were using, and initiates another rule to enable the processing of the other task with its concomitant schema. Switching between tasks takes time and distributing attention between these two tasks requires space in our working memory. The two tasks therefore interfere with each other. In short, we simply can't multitask. If we try to do two or more things at the same time that require thought, we do things worse and it takes more time in total than if we had done them one after the other (i.e. serially monotask).

THE TEN DEADLY SINS IN EDUCATION

Paul A. Kirschner and Carl Hendrick

Excerpted from *How Learning Happens: Seminal Works in Educational Psychology and What They Mean in Practice*

5. WITH GOOGLE, KNOWLEDGE IS NO LONGER IMPORTANT

We hear that just about all the "knowledge" we need can be found on the internet via Google or other search engines and, thus, that we no longer need to know as much as we used to, as long as we can look it up. But there are problems here, First, there's no knowledge on the internet; only information, of which a great deal is non-information or outright nonsense from questionable sources. Without a solid knowledge base we can do little with what we find on the internet. In an interview with a Dutch quality newspaper, two women who run a nutrition website propagating a healthy lifestyle stated in 2016 that eggs are the menstruation of chickens and are, therefore, bad for you. The two are registered dietitians and therefore you might conclude that this is true.[2] But mammals menstruate and chickens aren't mammals! In other words, nonsense. But how could you know that without basic knowledge of biology?

So what we read, see, and understand is determined by what we already know and not the other way around (see Chapter 6; What you know determines what you learn). Our prior knowledge and experiences determine how we see, understand, and interpret the world around us. It also determines how well we can look up, find, select, and process (or evaluate) the information available on the internet. Unfortunately, in the best case, students only have minimal prior knowledge of a subject (after all, they are students; if they already had the knowledge, they would be experts).

Related to this is the myth that knowledge has a limited expiration date (as perishable as fresh fish is sometimes said). This is nonsense too. The vast majority of what we have learned is still correct. There is a huge increase in information. But as said, without knowledge we can do little with it.

6. YOU LEARN TO SOLVE PROBLEMS BY SOLVING PROBLEMS

Problem-based learning is quite popular. One of its premises is that the best way to learn to solve problems is to solve them. Unfortunately this isn't the case (see Chapter 2; Take a load off me). To solve problems, we must first have knowledge of and skills in the domain in which we must solve that problem. We can't solve a chess problem without being able to play chess (knowing how the pieces move, what the

[2] THE DUTCH NUTRITION CENTRE WARNS THAT FOLLOWING THE ADVICE OF THESE TWO WOMEN CAN LEAD TO A WEAKENED IMMUNE SYSTEM, BONE LOSS, AND WEAKENED MUSCLES.

THE TEN DEADLY SINS IN EDUCATION

Paul A. Kirschner and Carl Hendrick

Excerpted from *How Learning Happens: Seminal Works in Educational Psychology and What They Mean in Practice*

rules are, what the common strategies and tactics are, etc.), just as we cannot solve a math problem without math knowledge. In other words, skills are domain specific.

Also, it helps enormously if we have a set of possible solution strategies plus knowledge of when we can best use each one. This is called procedural knowledge (knowing what the steps are) and is very similar to the so-called twenty-first century computational thinking skill, which means that you can analyse a problem in smaller steps so that you can solve it. But again, without knowledge you can't carry out the procedure and so you cannot acquire this domain-general twenty-first century skill.

Finally, without domain-specific and procedural knowledge, problem-solving becomes an exercise in trial and error. This is neither effective nor efficient, especially since we're constantly hitting walls because we're doing it wrong (which can be quite frustrating). And then, should we happen to solve the problem, we usually don't know why we've succeeded and it's therefore difficult to repeat and apply in other situations. And finally there's a good chance that we'll teach ourselves a wrong approach that we'll have to unlearn in the future.

7. DISCOVERY LEARNING IS THE BEST WAY TO LEARN

Jerome Bruner introduced discovery learning as a research-based instructional form in 1967 (Bruner, 1967). He assumed that it would be better for students to discover facts and the connections between them than to provide them as a teacher. But if we use such an approach with starting students, we do not take into account the limitations of their working memory (see Chapter 1, A novice is not a little expert). During discovery learning, we must always look for links between things and the principles that apply in the domain. Beginners, however, hardly have any domain knowledge and also have no systematic approach to finding it. This therefore requires a great deal of their working memory, all the more because inexperienced students are capable of connecting any and all elements in the domain through ignorance. They're faced with an explosion of combinations without knowledge to keep them under control. Moreover, this load on working memory doesn't result in more knowledge in long-term memory as it was used to discover and not to learn.

In addition, this approach is based on the idea that a child is a kind of miniature scientist. But children not only have less knowledge than a scientist (who can use discovery as a way to move forward; it's their epistemology), they also see and interpret the world differently (much more naively), think differently (concretely and not abstract) and therefore experience the world differently. That is why we shouldn't

THE TEN DEADLY SINS IN EDUCATION

Paul A. Kirschner and Carl Hendrick

Excerpted from *How Learning Happens: Seminal Works in Educational Psychology and What They Mean in Practice*

use the working method of the scientist as an educational approach for the inexperienced student!

8. MOTIVATION LEADS TO LEARNING

A frequently heard statement from parents, teachers, politicians, and even scientists is that the problem with contemporary education is that pupils find it boring and unattractive and therefore don't learn well. People often use concepts such as motivation and engagement as keys to better education and as proxies for learning; as if being hyped about or engaged with something means that you've also learned something. The idea is that the more we motivate learners, the better they'll learn. Unfortunately this isn't the case. Don't get us wrong. Of course motivation is great and motivated students will start on something sooner than if they aren't motivated, but this is no guarantee for learning. In fact, if a student starts out motivated but doesn't succeed, that motivation fades away very quickly and we're worse off than if the learner was only lukewarm to begin with.

What we know from research is this: there's neither a causal relationship (motivation does not lead to better learning and performance) nor a reciprocal relationship (in the sense that motivation leads to learning and learning leads to motivation) between motivation and learning. It's learning that leads to motivation. When we experience success, no matter how small that success is, it feeds our motivation to continue (as we saw in Chapter 8, Beliefs about intelligence can affect intelligence). For example, good maths performance has a significant positive effect on the intrinsic motivation of students for maths, but motivation for maths doesn't lead to better math performance (Garon-Carrier et al., 2016; McConney et al., 2014). And that applies to both boys and girls.

9. NON-EXISTENT GRIT

It's weird. On the one hand, we hear that learning is boring and hard and should be fun, but on the other hand, everyone is talking about grit. Grit is putting your shoulders to the wheel and noses to the grindstone. According to the creator of the term, Angela Lee Duckworth, grit is the passion and perseverance to achieve long-term goals combined with interest, practice, purpose, and hope. For her, grit is being so driven to reach your goal that you never ever give up – even in the face of adversity – and do everything you can to achieve it. In short, perseverance, dedication, efficacy, and resilience.

THE TEN DEADLY SINS IN EDUCATION

Paul A. Kirschner and Carl Hendrick

Excerpted from *How Learning Happens: Seminal Works in Educational Psychology and What They Mean in Practice*

Marcus Credé and his colleagues (2016) have shown that grit is just old wine in new bottles and is actually nothing more than perseverance. In addition, they looked at, among other things, the relationship between grit and both learning performance and remembering what was learned, and that was also disappointing. Researchers found poor correlations between grit and learning performance and grit and remembering, while there are strong correlations between, for example, learning and cognitive ability (IQ), study habits, and skills. Even perseverance alone, without all the extra trimmings from Duckworth, was more strongly correlated with learning than grit!

10. SCHOOL KILLS CREATIVITY

Ever heard of a straw man? According to Wikipedia, a straw man is a type of fallacy – reasoning that is wrong, but seems plausible – whereby the actual position of an opponent isn't refuted, but a caricature thereof. The man who claimed that schools kill creativity – Sir Ken Robinson – was guilty of this. He presented the school as a place where teachers do nothing but preach from the pulpit and where students do nothing but listen obediently and do their homework. We don't know of any such teachers or schools; do you?

Strange here is that Sir Ken defines creativity as "the process of having/coming up with original ideas that have value – usually the result of the interaction of different disciplinary ways of seeing things".[3] In other words, based on domain-specific knowledge! Without knowledge and skills which we acquire at school it's impossible – except in the case of luck – to come up with something of value. The most creative painters, even surrealists, first learned how to paint. Therefore, we suggest that you quote Keith Sawyer rather than Ken Robinson. Sawyer (Sawyer, 2012) says that "creativity is largely domain specific – that the ability to be creative in any given domain, whether physics, painting, or musical performance, is based on long years of study and mastery of a domain-specific set of cognitive structures" (pp. 11–12).

This idea that everything has to be "relevant" to children is a debased view of the profession. The notion that children can only learn things through the prism of their own interests and that to ask them to consider things outside of that is somehow

[3] WWW.TED.COM/TALKS/KEN_ROBINSON_SAYS_SCHOOLS_KILL_CREATIVITY/TRANSCRIPT?LANGUAGE=EN

THE TEN DEADLY SINS IN EDUCATION

Paul A. Kirschner and Carl Hendrick

Excerpted from *How Learning Happens: Seminal Works in Educational Psychology and What They Mean in Practice*

beating a love of learning out of them is demeaning, not just to teachers but to students themselves. Possibly the greatest thing a teacher can do is to introduce students to wondrous worlds beyond the limited borders of their own experience, to allow them to see the previously unseen and to make new and enriching connections that were hitherto unavailable to them.

TAKEAWAY

- **If you want to teach well, avoid these ten deadly sins!**

REFERENCES

BRUNER, J. S. (1967). ON KNOWING: ESSAYS FOR THE LEFT HAND. NEW YORK: ATHENEUM.

COFFIELD, F., MOSELEY, D., HALL, E., & ECCLESTONE, K. (2004). LEARNING STYLES AND PEDAGOGY IN POST-16 LEARNING. A SYSTEMATIC AND CRITICAL REVIEW. LONDON: LEARNING AND SKILLS RESEARCH CENTRE. AVAILABLE FROM WWW.RESEARCHGATE.NET/PUBLICATION/232929341_LEARNING_STYLES_AND_PEDAGOGY_IN_POST_16_EDUCATION_A_CRITICAL_AND_SYSTEMATIC_REVIEW.

CREDÉ, M., TYNAN, M. C., & HARMS, P. D. (2016). MUCH ADO ABOUT GRIT: A META-ANALYTIC SYNTHESIS OF THE GRIT LITERATURE. JOURNAL OF PERSONALITY AND SOCIAL PSYCHOLOGY. AVAILABLE FROM WWW.ACADEMIA.EDU/25397556/MUCH_ADO_ABOUT_GRIT_A_META-ANALYTIC_SYNTHESIS_OF_THE_GRIT_LITERATURE

DALE, E. (1954). AUDIO-VISUAL METHODS IN TEACHING (2ND ED. ORIGINALLY PUBLISHED 1946). NEW YORK: THE DRYDEN PRESS.

GARON-CARRIER, G., BOIVIN, M., GUAY, F., KOVAS, Y., DIONNE, G., LEMELIN, J.-P., SÉGUIN, J., VITARO, F., & TREMBLAY, R. (2016). INTRINSIC MOTIVATION AND ACHIEVEMENT IN MATHEMATICS IN ELEMENTARY SCHOOL: A LONGITUDINAL INVESTIGATION OF THEIR ASSOCIATION. CHILD DEVELOPMENT, 87 (1), 165–175. AVAILABLE FROM WWW.RESEARCHGATE.NET/PUBLICATION/282135309_INTRINSIC_MOTIVATION_AND_ACHIEVEMENT_IN_MATHEMATICS_IN_ELEMENTARY_SCHOOL_A_LONGITUDINAL_INVESTIGATION_OF_THEIR_ASSOCIATION

KIRSCHNER, P. A., SWELLER, J., & CLARK, R. E. (2006). WHY MINIMAL GUIDANCE DURING INSTRUCTION DOES NOT WORK: AN ANALYSIS OF THE FAILURE OF CONSTRUCTIVIST, DISCOVERY, PROBLEM-BASED, EXPERIENTIAL, AND INQUIRY-BASED TEACHING. EDUCATIONAL PSYCHOLOGIST, 46 (2), 75–86. DOI:10.1207/S15326985EP4102_1.

MCCONNEY, A., OLIVER, M. C., WOODS-MCCONNEY, A., SCHIBECI, R., & MAOR, D. (2014). INQUIRY, ENGAGEMENT, AND LITERACY IN SCIENCE: A RETROSPECTIVE, CROSS-NATIONAL ANALYSIS USING PISA 2006. SCIENCE EDUCATION, 98, 963–980. AVAILABLE FROM HTTP://EPRINTS.NOTTINGHAM.AC.UK/27768/1/INQUIRYENGAGEMENT%26LITERACYINSCIENCE-REVISEDMAR2014.PDF.

THE TEN DEADLY SINS IN EDUCATION

Paul A. Kirschner and Carl Hendrick

Excerpted from *How Learning Happens: Seminal Works in Educational Psychology and What They Mean in Practice*

PRENSKY, M. (2001). DIGITAL NATIVES, DIGITAL IMMIGRANTS. ON THE HORIZON. *NCB UNIVERSITY PRESS*, 9, 1–6. AVAILABLE FROM WWW.MARCPRENSKY.COM/WRITING/PRENSKY%20-%20DIGITAL%20NATIVES,%20DIGITAL%20IMMIGRANTS%20-%20PART1.PDF.

SAWYER, R. K. (2012). A CALL TO ACTION: THE CHALLENGES OF CREATIVE TEACHING AND LEARNING. *TEACHERS COLLEGE RECORD, 117* (10), 1–34. AVAILABLE FROM HTTP://KEITHSAWYER.COM/PDFS/SAWYER%202015%20TCR.PDF.

VEEN, W., & VRAKKING, B. (2006). *HOMO ZAPPIENS: GROWING UP IN A DIGITAL AGE*. LONDON: NETWORK CONTINUUM EDUCATION. THE ACCOMPANYING POWERPOINT IS AVAILABLE FROM WWW.SCRIBD.COM/DOC/2578647/WIM-VEEN – NO LONGER AVAILABLE ONLINE.

FURTHER READING AND LINKS

BLOG GRIT: TO GRIT OR NOT TO GRIT: THAT'S THE QUESTION.
AVAILABLE FROM https://3starlearningexperiences.wordpress.com/2016/07/05/to-grit-or-not-to-grit-thats-the-question/

BLOG MOTIVATION: CLOSE THE STABLE DOORS: EFFECTS OF MOTIVATION AND ENGAGEMENT ON LEARNER ACHIEVEMENT?
AVAILABLE FROM https://3starlearningexperiences.wordpress.com/2016/05/17/close-the-stable-doors-effects-of-motivation-anengagement-on-learner-achievement/

BLOG DIGITAL NATIVES: THE DISTURBING FACTS ABOUT DIGITAL NATIVES.
AVAILABLE FROM https://3starlearningexperiences.wordpress.com/2015/10/20/the-disturbing-facts-about-digital-natives/

LEARNING STYLES: IS WHAT LEARNERS SAY THAT THEY PREFER GOOD FOR THEM? [BLOG]
AVAILABLE FROM https://3starlearningexperiences.wordpress.com/2015/07/28/is-what-learners-say-that-they-prefer-good-for-them/

LEARNING PYRAMID: AN UPDATE TO THE LEARNING PYRAMID [BLOG].
AVAILABLE FROM https://theeconomyofmeaning.com/2016/07/08/an-update-to-the-learning-pyramid/

LEARNING PYRAMID: A NEW STUDY ON THE DIFFUSION OF THAT *%*§§§ LEARNING PYRAMID [BLOG].
AVAILABLE FROM https://theeconomyofmeaning.com/2015/10/19/A-NEW-STUDY-ON-THE-DIFFUSION-OF-THAT-%C2%A7%C2%A7%C2%A7-LEARNING-PYRAMID/

THE TEN DEADLY SINS IN EDUCATION

Paul A. Kirschner and Carl Hendrick

Excerpted from *How Learning Happens: Seminal Works in Educational Psychology and What They Mean in Practice*

SOME EXCELLENT PIECES ON WHY SIR KEN ROBINSON'S ARGUMENTS ARE PROBLEMATIC ARE:

AVAILABLE FROM CRISPIN WESTON: https://edtechnow.net/guest-posts/ken-robinson-rebuttal

JOE KIRBY:

https://pragmaticreform.wordpress.com/2013/10/12/what-sir-ken-got-wrong/

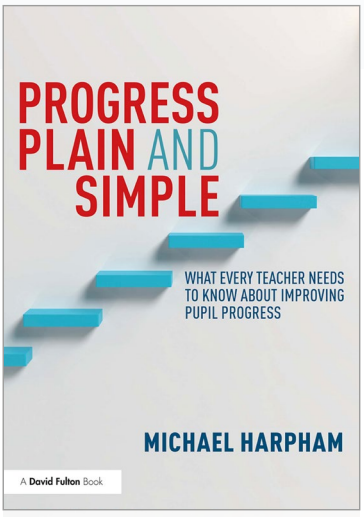
CARL HENDRICK:

https://www.tes.com/news/ken-robinson-teacher-basher-schools-must-stop-listening-his-panglossian-ideas

CHAPTER

9

PROGRESS OVER TIME: STEP-BY-STEP SUCCESS



PROGRESS OVER TIME: STEP-BY-STEP SUCCESS

Michael Harpham

Excerpted from *Progress Plain and Simple: What Every Teacher Needs To Know About Improving Pupil Progress*

Progress over time plain and simple:

Progress in learning that takes place over a key stage (a curriculum map), a year (a programme of study), a set of lessons (a scheme of work) or a lesson.

In this chapter, we will cover:

- What we mean by progress over time
- Curriculum maps, programmes of study and schemes of work
- The importance of clarity, comprehensiveness and coherence
- Tracking sheets

INTRODUCTION

Having a clearer definition of progress and a clearer understanding as to what the research says about progress, we can start to make our way towards the classroom. But just before we go in, we also need to be clear about how all of those small, incremental steps of progress in the classroom fit together in the educational journey; progress over time (Figure 9.1).

Like any journey, it is important to have a map. A visual tool to help summarise and visualise the journey from where you are at this moment in time to your destination. This summary of the journey you are taking can also give an estimation of how long the journey will take, with an idea of what you are likely to experience along the way.

As in life, so it is with learning.

PROGRESS OVER TIME: STEP-BY-STEP SUCCESS

Michael Harpham

Excerpted from *Progress Plain and Simple: What Every Teacher Needs To Know About Improving Pupil Progress*

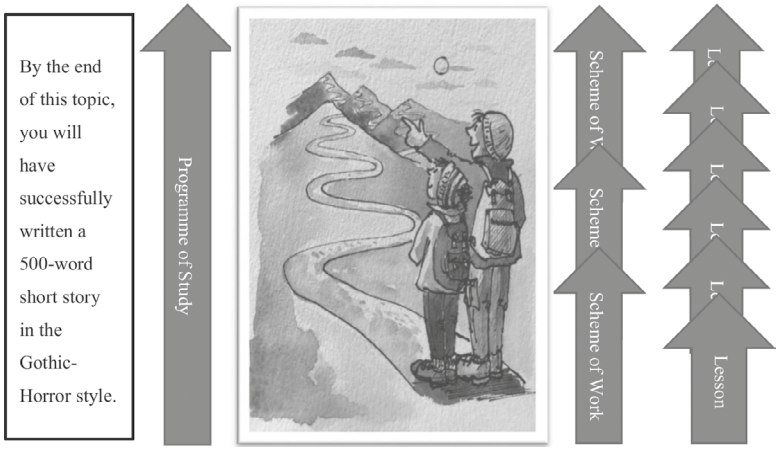


Figure 9.1 Progress over Time: Guiding Step-by-Step Success

In school, learning, the inner educational journey that takes place there, is made explicit and mapped out through a curriculum map (an overview of what is taught in every subject, in every year group, over the year), a programme of study (a more detailed guide as to what will be studied in each year group, in each subject over the year) and a scheme of work (what will be studied in each year group, in each subject, lesson-by-lesson over a half term or topic). These documents are the very foundation of learning in the classroom and as such are the bedrock of progress. In my experience, the success or failure in ensuring every child achieves their potential is rooted in the presence and application of (or lack of) these documents.

No one would ever consider setting out on a journey without a map of how to get there. Similarly, no school and no teacher can teach and ensure the pupil is making sufficient progress without these educational maps.

What follows is a brief overview of what these documents are, what they are used for and how they contribute to the successful progress of the pupil.

PROGRESS OVER A YEAR OR KEY STAGE AND ACROSS THE SCHOOL – CURRICULUM MAPS

A curriculum map enables the reader to see at a glance what topics are being taught across subjects in a particular year group at a particular time. It is particularly useful

PROGRESS OVER TIME: STEP-BY-STEP SUCCESS

Michael Harpham

Excerpted from *Progress Plain and Simple: What Every Teacher Needs To Know About Improving Pupil Progress*

to see what skills and knowledge are being taught *concurrently* in different subjects and therefore speed up progress in lessons through offering the teachers the possibility of supporting each other's lessons and reinforcing what is being learnt.

For example, in Figure 9.2, Year 8 in Art (War and Art through Cubism), Dance (Guernica) and History (The Hundred Years' War) are studying three subjects related to war at the start of the spring term. These subjects could therefore plan and ensure they reinforce shared key concepts, themes and vocabulary.

YEAR 8	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
English	*Frankenstein:* Imaginative writing	*Frankenstein:* Imaginative writing	American Literature:*Of Mice and Men*	The Tempest: persuasive writing	The Tempest: persuasive writing	Conflict Poetry
Maths	Proportional reasoning	Representations using graphs	Algebraic techniques	Developing number	Developing geometry	Reasoning with data
Science	Ecosystem processes	Metals and acids; Foods and fuels	Health and lifestyle	The periodic table; Motion and pressure	Electricity and magnetism	Adaptations and inheritance; Separation / Earth
Art	Still Life: Drawing with Watercolour	Still Life: In style of Matisse / Cezanne.	War in Art: Cubism & Picasso	War in Art: Vorticism & Camouflage	Large chalk and charcoal drawings	Working with digital photography,
Computer Science	E-Safety + Keeping data safe	Algorithms and Programming /Pseudocode	Data Representation	Outcome to produce own	Code.org E	Pashed
Dance	Slavery	Capoeira	Feelings through dance based on Guernica	Swansong	Ghost Dances	Street Dance
Drama	Othello	The Terrible Fate of Humpy Dumpty	Anne Frank	Physical Theatre	Shaun's Story	Our Day Out
DT	Drawing skills, Workshop safety	Manufacturing tools and equipment	Design briefs and specifications (Granny bag)	Drawing skills, Workshop safety	Manufacturing tools and equipment	Design briefs and specifications (Granny bag)
French	School life	School life	Leisure	Leisure	Where I live	Where I live
Geography	Population and Migration	Biomes	The North/South Divide	The North/South Divide	Coastal Environments	Global Superpowers
History	Ancient Civilisations	Ancient Civilisations	The Hundred Years' War	The Renaissance	The Slave Trade (British)	The British Empire
Music	Reggae	Fanfares	Rap	Blues	Indian Music	Performance Project
PSHE	Internet Safety & Extremism/ Radicalisation	SRE	Managing Personal Finance	Careers	Personal Development/ Behaviour	Careers & Finance
RE	What does it mean to be a Christian?	What does it mean to be a Muslim?	Importance of revelation in religions?	The problem of evil and suffering	Comparing Abrahamic faiths	Religion and the News
Spanish	How were your vacations? Using past tense	Socializing and leisure time	Talking about school	Talking about food	Making arrangements	Describing your town or village
Sport & Nutrition	Netball Badminton Athletics	Football Handball Athletics	Badminton Football Athletics	Handball Basketball Athletics	Hockey Cricket Athletics	Cricket Netball Athletics

Figure 9.2 Example of a Year 8 Curriculum Map

PROGRESS OVER TIME: STEP-BY-STEP SUCCESS

Michael Harpham

Excerpted from *Progress Plain and Simple: What Every Teacher Needs To Know About Improving Pupil Progress*

Alternatively, it may be useful to use a curriculum map to see what is being taught sequentially to build on previously learnt skills and knowledge and speed up progress as a result. For example, in Figure 9.2, Year 8 in the summer term in English are studying conflict poetry. Here, the teacher can draw on the previously learnt knowledge of the class from their lessons in Art, Dance and History which they learnt at the start of the spring term.

This not only helps potentially speed up progress in English in this topic by drawing on previous learning but also helps pupils remember and recall the information related to the other subjects.

Any curriculum map should be checked for being clear, comprehensive and coherent.

> Thus, a curriculum map is a thematic guide to the curriculum and what will be taught throughout the school. It will not tell you what will be taught lesson by lesson, nor what the learning aims and outcomes are. It is simply an overview as to what will be taught.

Clear

- Is the outcome for each topic clear?
- Are the skills and knowledge being learnt in each topic clear?

Comprehensive

- Does every subject teach everything that is required by law?
- Does every subject teach everything that is required by the exam boards?

Coherent

- Do any topics support subsequent topics for each subject (sequential coherence)?
- Do any topics support similar topics at that time in other subjects (concurrent coherence)?
- Can any topics be studied at another time of the year and be more effective (more coherent) as a result?

PROGRESS OVER TIME: STEP-BY-STEP SUCCESS

Michael Harpham

Excerpted from *Progress Plain and Simple: What Every Teacher Needs To Know About Improving Pupil Progress*

PROGRESS OVER A YEAR ACROSS A SUBJECT – PROGRAMMES OF STUDY

In order to make progress in learning, we need to know where we are progressing to. We need a destination. We need clarity over what we are going to achieve. As well as the *map* to help us *get* to our destination, we also need a *schedule*, so that we know we are going to reach our destination *on time* and with plenty of time to spare.

This is a programme of study.

A few key points about a programme of study:

- A programme of study determines the pace of the curriculum and ensures that everything that should be taught is taught.
- As far as possible, it maps out when all topics and skills are taught taking into consideration holidays and key school events.
- A programme of study is not a scheme of work. It is the foundation for a scheme of work.
- A programme of study details when a topic is to be studied. A scheme of work details what is going to be studied in detail each lesson.
- A programme of study drives the pace of progress in learning.
- The scheme of work provides the milestones for that progress.

Thus, as can be seen from an example of a Maths programme of study for the Autumn term in Year 11 (Figure 9.3), a programme of study maps the curriculum in terms of the exam specification, topics, homework and assessment against time in terms of the lessons in a week and the weeks in the school year. In this way, teachers, school leaders, governors and parents can be assured that the curriculum, if taught and learnt effectively, will be completely covered in good time.

PROGRESS OVER TIME: STEP-BY-STEP SUCCESS

Michael Harpham

Excerpted from *Progress Plain and Simple: What Every Teacher Needs To Know About Improving Pupil Progress*

PROGRAMME OF STUDY – EXAMPLE -YEAR 11						
Week	Dates	Wk A/B	Lesson	Specification Content	Unit / Topic / Paper	Independent / Homework Tasks
0	*28/08/2019*	NO TEACHING				
1	*02/09/2019*	*A*	*1*	N11	Number	*Complete exercises on N11-N12*
			2	N11	Number	
			3	N12	Number	
2	*09/09/2019*	*B*	*1*	N12	Number	*Complete exercises on N13-N14*
			2	N13	Number	
			3	N13	Number	
			4	N14	Number	
3	*15/09/2019*	*A*	*1*	N14	Number	*Complete exercises on N15-N16*
			2	N15	Number	
			3	N15	Number	
4	*23/09/2019*	*B*	*1*	N16	Number	*Revise N1-N16*
			2	N16	Number	
			3	Number Test	Number	
			4	Number Evaluation	Number	
5	*30/09/2019*	*A*	*1*	A16	Algebra	*Complete exercises on A16-A17*
			2	A16	Algebra	
			3	A17	Algebra	
6	*07/10/2019*	*B*	*1*	A17	Algebra	*Complete exercises on A17-A18*
			2	A18	Algebra	
			3	A18	Algebra	
			4	A19	Algebra	
7	*14/10/2019*	*A*	*1*	A19	Algebra	*Complete exercises on A19-A20*
			2	A20	Algebra	
			3	A20	Algebra	
HALF TERM BREAK						

Figure 9.3 Example of a Programme of Study – Autumn Half Term

Similar to a curriculum map, any programme of study should be checked for being clear, comprehensive and coherent.

Clear

- Is the outcome for each programme of study clear?
- Is the curriculum content and timing for each topic clear?
- Are the skills and knowledge being developed through the programmes of study clear?

PROGRESS OVER TIME: STEP-BY-STEP SUCCESS

Michael Harpham

Excerpted from *Progress Plain and Simple: What Every Teacher Needs To Know About Improving Pupil Progress*

- Is the curriculum being learnt in lessons, through homework and the assessment timings clear?

Comprehensive

- Is all the curriculum that is required by law being taught?
- Is all the curriculum that is required by the exam boards being taught?

Coherent

- Does each topic support subsequent topics for each year group (sequential coherence)?
- Can any topics be studied at another time of the year and be more effective (more coherent) as a result?

The programme of study then supports progress in lessons in the following ways:

1 ***Pace***: Results between topics, between pupils or between classes are more likely to be higher and consistent if there are consistent programmes of study in place in a department and in a school. It is essential that there is a centralised format of the programme of study so that there is consistency of delivery across a school.

2 ***Structured supportive learning***: Opportunities are created for the curriculum (sequential coherence) and other subjects (concurrent coherence) to support the learning taking place. As a result, progress is likely to be higher as previous learning is developed further or current learning is reinforced.

3 ***Empowering***: Ensuring a programme of study is fit for purpose and to a high standard, empowers teachers and middle leaders and provides them with the focus and significant support to help them drive their lessons and their courses more effectively, ensuring they are completed successfully.

4 ***Key to progress***: If there are issues with progress to address, the sooner the programme of study is discounted as an issue, the sooner the school can move on to explore other issues to address and resolve. Having a clear, comprehensive and coherent programme of study in place from the start removes the possibility of this being a potential issue.

5 ***Confidence in the school***: Having programmes of study in place reassures teachers, pupils, leaders, parents and governors that what should be taught is being taught.

PROGRESS OVER TIME: STEP-BY-STEP SUCCESS

Michael Harpham

Excerpted from *Progress Plain and Simple: What Every Teacher Needs To Know About Improving Pupil Progress*

PROGRESS OVER A HALF A TERM IN A SUBJECT – SCHEMES OF WORK

A scheme of work outlines the learning that takes place over a topic, usually each half term, lesson by lesson. What's often not clear in a scheme of work is its aim. How will pupils know they have successfully completed their studies in this topic? For example, "By the end of this topic, you will have successfully written a 500-word short story in the Gothic-Horror style".

This is important as it enables the pupils to see the point of the scheme of work and position it in relation to other learning that has taken place previously and is taking place currently. The end goal also helps contextualise the learning that will be taking place through the scheme of work, giving meaning to all the classwork and homework covered in the subject in the following weeks.

> A scheme of work is a series of lessons that are delivered sequentially so that each lesson stands on the shoulders and further develops the learning from previous lessons, culminating in a final test, presentation or assessment.

Each lesson has a clear goal, presented as a learning objective, set of learning outcomes or posed as a question. The scheme of work also includes the activities, assessments and homework that are needed to successfully achieve the final goal. Figure 9.4 is an example of a scheme of work.

As with the curriculum map and the programme of study, this is another opportunity for the school to ensure that the curriculum is delivered in a clear, comprehensive and coherent way.

Clear

- Is the outcome for the scheme of work clear?
- Are the skills and knowledge being developed by the scheme of work clear?
- Is the differentiation for different abilities clear?

A huge amount has been written about differentiation, beyond the scope of this juncture in the book and this book. Suffice to say that differentiation in relation to a scheme of work is the understanding that a teacher sets up a lesson not only so that every pupil can access it but also be challenged by it.

PROGRESS OVER TIME: STEP-BY-STEP SUCCESS

Michael Harpham

Excerpted from *Progress Plain and Simple: What Every Teacher Needs To Know About Improving Pupil Progress*

MUSIC	**Year 8 - Blues**	**Overall goal: Group Performance of a 12 Bar Blues Song**			**SPRING 1**
Week	**National Curriculum KS3 Strategy Skills**	**Learning Objectives / Activities**	**Resources**	**Differentiated Learning & Outcomes**	**Homework / Assessment**
1	Controlling sounds Singing Playing together Improvising Reading Practising Rehearsing Listening	Listen to / Sing "I feel good" Understand timing of words with 12 bar blues (12BB). Fit improvised fills with the words. Play a Q and A tune using the blues scale, alongside the 12 BB.	Song sheets Backing track Keyboards	Be able to play the 12BB and / or the blues scale, group / solo, one / both hands & play Q & A tune in a stylish way.	Test – 12 Bar Blues and notes of the Blues Scale.
2	Controlling sounds Composing Playing together Improvising Reading Practising Rehearsing Listening	Sing / play a Q and A tune using the blues scale, alongside the 12 BB, at least twice through, with an introduction and ending. Understand the notes of the Blues Scale, Improvisation and the chords in the 12 BB. Programme the keyboard to a suitable backing beat, with an introduction and ending.	Manuscript Backing track Keyboards	Be able to play the 12BB, blues scale, group / solo, one / both hands and one idea for a beginning and ending of a song with a suitable intro & ending.	Write out the meanings of the following words: Introduction, Coda, Fill, Improvisation, Walking Bass, Syncopation, Sharp, Flat, Question and Answer, Call and Response.
3	Controlling sounds Singing Playing together Improvising Reading Practising Rehearsing Listening	Sing "Rock Around the Clock". Understand how the words fit with 12BB. Understand how the Instrumental fits with the words. Begin work on preparing a Blues song using Improvisation, a regular tune and all the keyboard facilities. Add instrumental part.	Song sheets Backing track Keyboards	Understand what an instrumental is and know what part they are to play in their group piece, including a sustained improvisation.	Write out on Manuscript paper the twelve - bar blues, the blues scale, C major and C minor scales.
4	Controlling sounds Composing Singing Playing together Improvising Reading Practising Rehearsing Listening	Understand stages of Composition – Explore, Select, Structure, Revise. Performance – Practice, Rehearse, Perform. Continue work in groups on Blues piece. Include walking bass, tune, chords, backing beat, introduction and ending. Understand what work is needed to improve and finish the piece next lesson.	Song sheets Backing track Keyboards	Understand their part in the piece and what and when they should play, have practiced their parts and be rehearsing the whole piece.	Find out and write a biography of ONE of the following Blues musicians – John Lee Hooker, Bessie Smith or Muddy Waters.
5	Controlling sounds Composing Singing Playing together Improvising Reading Practising Rehearsing Listening	Recap Understanding of stages of Composition – Explore, Select, Structure, Revise. Performance – Practice, Rehearse, Perform. All pieces to be completed and have the required sections. – Introduction, Backing Beat, Fills, Tune, Improvisation, Walking Bass, Chords, Twelve Bar Blues, Blues Scale and an Ending..	Song sheets Backing track Keyboards	Rehearse the pieces and prepare for a performance. Play their part in time as well as have incorporated improvisation into their piece.	Prepare for final performance next lesson. Spelling test.
6	Controlling sounds Composing Singing Playing together Improvising Reading Rehearsing Listening Performing	Be able to perform their blues piece in an organised and professional way. Be able to be a good audience. Evaluation of the performance Be able to identify and discuss the strengths and areas for development of individual and class performance of their songs.	Song sheets Backing track Keyboards Video camera	Presentation and performance of Blues song. Give a strong, convincing and confident performance of their piece.	Revise all work for an end of term test.

Figure 9.4 Music Year 8 Blues Scheme of Work (Spring Term)

It should be clear in any scheme of work how the activities are differentiated, so that all pupils can access the lesson and all pupils can achieve or exceed the standard of work of which they are aiming to achieve.

PROGRESS OVER TIME: STEP-BY-STEP SUCCESS

Michael Harpham

Excerpted from *Progress Plain and Simple: What Every Teacher Needs To Know About Improving Pupil Progress*

Comprehensive

- Do the lessons and homework teach everything that is required?
- Do the lessons and homework enable every pupil to achieve at and beyond their expected ability (i.e. sufficiently differentiated)?
- Do the assessments sufficiently assess the skills and knowledge being learnt?

Coherent

- Are the lessons ordered in the most logical way (sequential coherence)?
- How does this topic support other topics and other subjects being learnt (concurrent coherence)?

For example, and just to show you what is meant by coherence, let's have a go at constructing a scheme of work. So, the topic the pupils need to learn is about castles. They need to understand the whole background to castles, why they were built where they were and what their importance was. Here are the topics:

1 Castles today – what's the difference?
2 Castles – why some survived and others didn't?
3 Great castles in history
4 Making a castle – problems and solutions
5 What makes a castle a castle?
6 Why build a castle?

In what order would you put them? What would your justification be for that order?

For example, you might have chosen to put them in order of the *chronological development* of castles (i.e. the logic behind the development of castles over time), one could structure the topics as follows:

1 What makes a castle a castle?
2 Why build a castle there?
3 Making a castle – problems and solutions
4 Great castles in history – what's the difference?
5 Castles – why some survived and others didn't?
6 Castles today

In which order did you put them? Whenever I have done this exercise with teachers or school leaders, even though there are only six topics to re-arrange, everyone has

PROGRESS OVER TIME: STEP-BY-STEP SUCCESS

Michael Harpham

Excerpted from *Progress Plain and Simple: What Every Teacher Needs To Know About Improving Pupil Progress*

come up with a different order. The point here is two-fold.

First, there is no specific formula for writing an effective scheme of work. Second, as long as there is an intellectual coherence behind the order (and there are many) and the pupils understand the meaning behind that order, will help them learn and make better progress as a result.

PROGRESS IN BOOKS

To summarise, all the above should be evident in pupils' books and files.

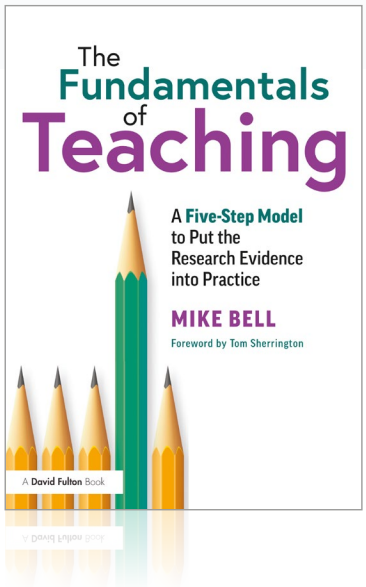
- A tracker sheet should ideally show higher test scores and harder (higher) grades being achieved over time.
- Assessment grades should be the same or higher in relation to target grades.
- Progress should be able to be seen by comparing the work completed at the start of a book (simpler, shorter, less accurate) to the work completed at the end of a book (longer, harder, more accurate).
- Progress can be shown by comparing the work completed at the start of a topic (simpler, shorter, less accurate) to that at the end of a topic (longer, harder, more accurate).

SUMMARY

- A curriculum map is a thematic guide to the curriculum and what will be taught throughout the school.
- A programme of study determines the pace of the curriculum and ensures that everything that should be taught is taught.
- A programme of study drives the *pace* of progress in learning.
- A scheme of work is a series of lessons that are delivered sequentially so that each lesson stands on the shoulders and further develops the previous lessons, culminating in a final test, presentation or assessment.
- No school and no teacher can teach and ensure the pupil is learning effectively without a scheme of work and programme of study being in place and followed.
- Books should have a completed tracker sheet, with assessment grades that are the same or higher in relation to target grades; work completed at the start of a book is simpler, shorter, less accurate compared to the work completed at the end of a book which should be longer, harder and more accurate.

CHAPTER

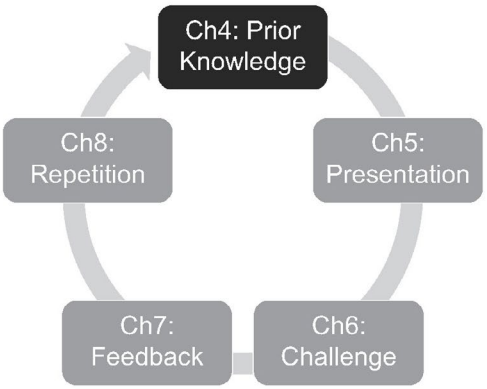
10 PRIOR KNOWLEDGE



PRIOR KNOWLEDGE

Mike Bell

Excerpted from *The Fundamentals of Teaching: A Five-Step Model to Put the Research Evidence into Practice*



PRIOR KNOWLEDGE QUIZ

True or false? (Answers on p.169)

1. Long-term memories are formed by repetitions.
2. Long-term memory and Working Memory work in similar ways.
3. Memories in the brain are similar to memories on a computer.

OVERVIEW

The evidence shows that new learning can only be built on existing, prior knowledge if it is to be understood. You will need to identify the Prior Knowledge needed for the topic you are about to teach, assess your pupils and make significant efforts to fill in the missing links.

Case study: Yr 10 Science

Mr F is teaching a middle-ability, Yr 10 science group about invitro- fertilisation (test-tube babies).

He is starting lesson 2 on the topic, but soon becomes aware of the blank faces in the room and that the students were asking the type of question which showed they had not understood most of the previous lesson.

PRIOR KNOWLEDGE

Mike Bell

Excerpted from *The Fundamentals of Teaching: A Five-Step Model to Put the Research Evidence into Practice*

> Mr F asked probing questions which revealed that none of the students knew anything about sexual reproduction in plants, a topic they had covered in Yr 8. Without the basic ideas of male and female sex cells joining, multiplying etc. there was little chance they could understand the human, test-tube example.

We look at Prior Knowledge from formal education and from everyday life and include the idea of vocabulary as Prior Knowledge which may need to be repaired if your students are to access your lesson.

TYPES OF PRIOR KNOWLEDGE

There are two types of Prior Knowledge.

In-topic Prior Knowledge

The first is the in-topic knowledge you hope the student has retained from earlier lessons on the topic or earlier learning on the subject. If your topic will be covered in 12 lessons, then, in lesson 3, Prior Knowledge includes the material covered in lessons 1 and 2.

This Prior Knowledge is easier to identify because, as the teacher, you will be aware of the material you have covered.

Pre-topic Prior Knowledge

The second, harder type of Prior Knowledge is the knowledge you are assuming the student has when you start to teach the topic. This is not at all easy to know.

In the previous chapter we gave the case study of the teacher who discovers that his students have missing knowledge about the sexual reproduction of plants involving the making of seeds which is preventing them understanding his lesson on test-tube babies. As the plant lessons were several years earlier, he could not know if they had failed to learn about sexual reproduction in plants.

Just as difficult is your students' relevant prior knowledge when you are starting a subject such as Economics, Sociology, Plumbing etc. where there has been no formal learning before the course. In this case, the only option is to link to everyday knowledge.

In comparing the methods in the Five Steps with common classroom practice it is clear that Prior Knowledge is perhaps the most important part of the Learning Cycle as it is the least understood and the least addressed.

PRIOR KNOWLEDGE

Mike Bell

Excerpted from *The Fundamentals of Teaching: A Five-Step Model to Put the Research Evidence into Practice*

This means that for you to make the most impact on your students' learning, you need to address this issue as a priority.

FROM OUR EVIDENCE SOURCES

Evidence for the importance of Prior Knowledge is contained in several references in the five main research reviews we have used:

- Hattie: *Prior Achievement*
- Hattie and EEF: *Mastery Learning*
- IAE: *Obtain High Success Rate*.

The majority of the evidence relates to ensuring that the current learning is secured before moving on. However, the same evidence applies to Prior Knowledge since the new learning in this lesson becomes the Prior Knowledge for later lessons.

The relevant sections in Hattie's work are titled 'Prior Achievement', but the implications are the same. Hattie's calculation shows this as having an effect-size (ES) of 0.65, which is high. There is a very good link (correlation) between the student's achievement on the current topic and their achievement prior to the topic.

Mastery of an early part of a topic becomes the secure Prior Knowledge for a later part. While 'Mastery Learning' is usually associated with work at the end of the topic to check that the topic material is well learned, it equally applies to our assessment of Prior Knowledge before a topic starts.

The Education Endowment Foundation (EEF) defines Mastery Learning as follows:

> Traditional teaching keeps time spent on a topic constant and allows pupils' 'mastery' of curriculum content to vary. Mastery learning keeps learning outcomes constant but varies the time needed for pupils to become proficient or competent at these objectives.
>
> Mastery learning breaks subject matter and learning content into units with clearly specified objectives which are pursued until they are achieved. Learners work through each block of content in a series of sequential steps and must demonstrate a high level of success on tests, typically about 80%, before progressing to the next unit. Those who do not reach the required level are provided with additional tuition, peer support, small group discussions, or homework, so that they can reach the expected level. (EEF Toolkit)

PRIOR KNOWLEDGE

Mike Bell

Excerpted from *The Fundamentals of Teaching: A Five-Step Model to Put the Research Evidence into Practice*

The purpose of Mastery is to ensure that the learning has taken place before moving on precisely because new learning has to be linked to Prior Knowledge.

Rosenshine also reports the evidence in a similar way, but using the term 'Obtain high success rate'. Obtaining an 80% pass-rate before moving on has been shown to significantly improve learning.

Again and again in the evidence we see the effectiveness of methods, which aim to ensure that the learning has taken place before we move on: spaced practice, one to-one tuition, quizzes and homework are all methods found in the reviews to ensure that the foundation for the next learning has happened.

EVIDENCE FROM SUPPORTING SOURCES

There are further significant references in the supporting material:

The Coalition for Psychology in Schools and Education Principle 2 states: 'What students already know affects their learning'.

> *Students come to classrooms with knowledge based on their everyday experiences, social interactions, intuitions, and what they have been taught in other settings and in the past. This prior knowledge affects how they will incorporate new learning because what students already know interacts with the material being learned. Accordingly, learning consists of either adding to existing student knowledge, known as conceptual growth, or transforming or revising student knowledge, known as conceptual change.* (CPSE 2015)

Principle 1 from the Institute for Teaching (IfT) is: 'What do students already know?' They offer a helpful analogy:

> *Learning new knowledge is like adding bricks when building a wall. If bricks are missing lower down the wall, the foundations are insecure and the wall will collapse. (IfT 2018)*

Neuroscience for Teachers explains that because memories are connections in the brain:

> *When you plan and organise learning activities, make sure there is plenty of opportunity for the children to make connections between the ideas and knowledge you have presented and other concepts they have learned.* (Churches 2017)

PRIOR KNOWLEDGE

Mike Bell

Excerpted from *The Fundamentals of Teaching: A Five-Step Model to Put the Research Evidence into Practice*

With all these sources, we can be confident that time spent on Prior Knowledge will be time well spent towards raising achievement.

SPOTTING MISSING PRIOR KNOWLEDGE IN YOUR CLASSROOM

Here are some suggestions for ways to spot missing Prior Knowledge in your classroom:

- You have explained the same thing more than once and the student still does not understand.
- The student asks you a question which seems unconnected with the topic.
- Several students ask you the same question and your answer contains something you assumed they already knew.

EXAMPLES OF MISSING PRIOR KNOWLEDGE

Here is a case study from a real classroom of a teacher who has noticed that their student's lack of progress is a Prior Knowledge problem (rather than ability, effort etc.).

Case study: Yr 10 Science

Mr B is tutoring a 16-year-old female student who is struggling with her science. She is scoring D and E grades in GCSE assessments but wants B grade for entry to A-level courses.

Mr B is initially sceptical, but soon discovers that she was quite able and, indeed, understands some quite difficult ideas in chemistry and physics.

Making little progress with Chemistry, Mr B starts one session with a list of basic Chemistry words: atom, element, compound, mixture, crystal, bond, etc. Suddenly the problem reveals itself; she was unsure of the meaning of nearly all these words!

Over the summer break they ignore course material and concentrate only on basics; learning about atoms, compounds, elements, etc. The following term the student has a Chemistry assessment. As they had been working on Prior Knowledge, they have not be in revising the material for the test, so she is almost embarrassed by coming top of the class.

PRIOR KNOWLEDGE

Mike Bell

Excerpted from *The Fundamentals of Teaching: A Five-Step Model to Put the Research Evidence into Practice*

Once the Prior Knowledge was in place, her brain simply reconnected all the difficult material she had learned by rote earlier and her 'understanding' blossomed.

She gets her B grade.

BRAIN-BASED EXPLANATION

We know that memories are links. In the example of the student with missing Chemistry knowledge, the better understanding she develops can be represented (much simplified) by the diagram of links in Figure 10.1. This is sometimes referred to as a 'schema'.

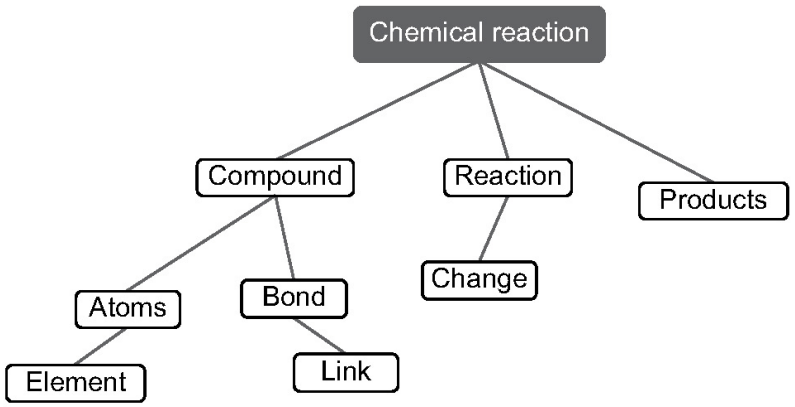


Figure 10.1

In Figure 10.2 we see the effect of trying to learn new material with and without secure Prior Knowledge. The white dots and lines represent the new material, while the black ones represent the Prior Knowledge. In the left diagram the links to Prior Knowledge (dashed grey lines) cannot be made as the Prior Knowledge is partly missing. Although it is possible to learn the material, it will not make sense, and so may simply be rote, or inflexible learning.

PRIOR KNOWLEDGE

Mike Bell

Excerpted from *The Fundamentals of Teaching: A Five-Step Model to Put the Research Evidence into Practice*

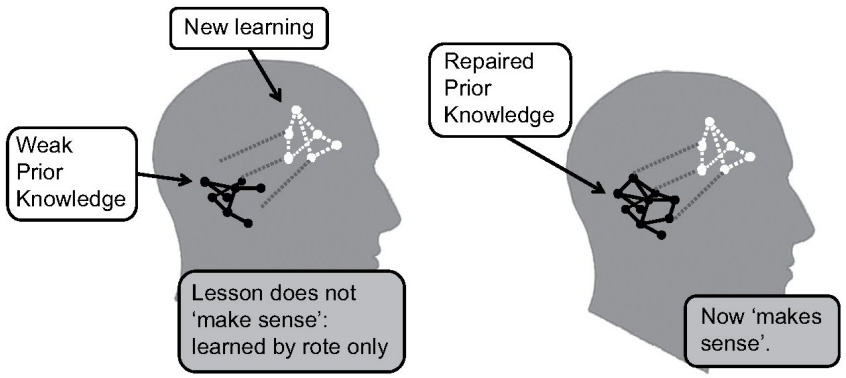


Figure 10.2

Once the vital, missing Prior Knowledge has been learned (as on the right diagram), the rote learning now makes sense and is integrated into the student's schema for chemical reactions. She now 'understands' it.

ASSESSING PRIOR KNOWLEDGE

Knowing what your students need to know before they start your course is by no means easy. This is sometimes called the 'curse of knowledge'. Because we are familiar with the material, it is difficult for us to see the learning through the eyes of the learner.

Some teachers are lucky. The course materials contain some suitable material.

Ms V told us:

> We use a textbook which very helpfully says 'What you have learnt before' at the start of a new topic. I check the key points and make up some multiple choice questions to test knowledge and understanding of these areas. Hinge Point-style questions are really useful here.
>
> I also use examiners' reports to highlight common misconceptions and always highlight these when teaching.

Developing your own initial, Prior Knowledge assessment

If Prior Knowledge is as essential as the research suggests it is (that, literally, no-one can learn anything if they cannot link it to something they already know), then it is

PRIOR KNOWLEDGE

Mike Bell

Excerpted from *The Fundamentals of Teaching: A Five-Step Model to Put the Research Evidence into Practice*

worth putting time and effort into developing the pre-assessment material. Because it is hard to identify the Prior Knowledge just by 'thinking about' it, you probably need something more systematic.

The best ways to develop the materials for this is to work collaboratively with other teachers of that topic.

- Brainstorm: ask the group 'What knowledge (including vocabulary) do the students need to access this topic?'
- Logic: Look at the new material and ask yourself what they will need to know.
- Listen to students' questions and note down any which are often asked.

Students are always asking questions about things they do not understand. If only one or two students ask a question which shows they have not understood something, then explain it to them (or ask them further questions to try to understand where exactly they have not understood). If, however, you hear the same question again and again, or if you realise this question comes up every time you start this topic, then this reveals a Prior Knowledge problem.

FILLING IN MISSING PRIOR KNOWLEDGE

This will often require that you change the way the topic is taught. Unless you do a Prior Knowledge assessment and repair process already, you need to invent one and give time to implement it.

Case study: Yr 3 Maths

Mr N is teaching Maths to Yr 3. The objective is for students to be able to tell the time to the nearest 5 mins, but, when assessed, many students make mistakes, mixing up 'quarter to' and 'quarter past', for example.

Mr N revisits the topic, but this time focusses just on 'past' times until those are secure before moving on to 'to' times. Later he reassesses the class and many more students show understanding.

Case study: English as a Second Language

Mr A is helping a Romanian student who has weak English on how to make nouns plurals. He finds the student is struggling because she does not know the words themselves! Mr A gets her to empty her pencil case. They spend the

PRIOR KNOWLEDGE

Mike Bell

Excerpted from *The Fundamentals of Teaching: A Five-Step Model to Put the Research Evidence into Practice*

session learning the words 'pen', 'pencil', etc. *and* the plurals.

Do I have time for this?

When we first hear this, our immediate response may be that such a process was impossible as we hardly have time to cover the course material anyway.

However, when we see the high effect-size of applying the evidence we realise that, even if we took several lessons to cover Prior Knowledge, we actually end up with more time, as the students simply learn faster! As with the student in the Case study above with missing GCSE Chemistry Prior Knowledge, sometimes filling in Prior Knowledge allows a whole lot of learning which the student cannot 'make sense' of, to become linked and so become accessible as new learning.

Sometimes doing a Prior Knowledge assessment saves you time. Sometimes the students are more advanced than you thought.

Case study

Mr H is teaching an able Yr 8 group about 'Earth and Space'. In the first lesson he notices several high-level questions from the students. He decides to do an assessment using the topic revision questions usually used before the end-of-topic test. The students score between 60% and 90%! Mr H identifies the questions which most students got wrong and focusses on that material. The topic takes 5 lessons rather than the usual 12.

Sometimes we are aware the student already knows the material, but we spend time on it anyway!

Case study

Ms T is a staff trainer at a Further Education college. She is observing a gym instructor taking a student through the various machines in the gym, using them to see what she already knows.

Despite finding that she is fluent on all the machines, he proceeds to teach her about each machine again. When challenged by Ms T afterwards, the instructor defends the re-teaching: 'Well, it was on my session plan, so I needed to do that'.

Make use of your assessment; don't stick to your plan

As the lists show, there is no one way to teach well. The lists of effective methods we

PRIOR KNOWLEDGE

Mike Bell

Excerpted from *The Fundamentals of Teaching: A Five-Step Model to Put the Research Evidence into Practice*

use here were created from experiments where a particular method is tried out on students. Another approach would be to look in the classrooms of highly successful teachers and see if there are common factors. Unfortunately, when this has been tried, no general patterns emerged as there are so many ways to be successful.

One common feature stood out, however: successful teachers rarely stuck to their lesson plan! While less effective teachers may 'plough on', the most successful teachers continuously monitor the learning of their students and adjust the teaching accordingly. It's a bit like a ship's captain, who knows the destination, but monitors their position, and adjusts their course to respond to wind and tide.

Repairing Prior Knowledge and the Learning Cycle

Although 'Filling missing knowledge' is just one step in the Learning Cycle, it needs to be approached by applying the whole Learning Cycle. The material needs to be presented in the most effective ways, we need to set the students tasks which challenge them, they need feedback to make an improvement and they need repetition over time.

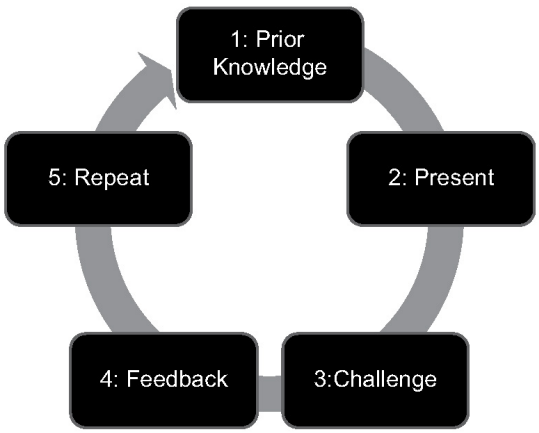


Figure 10.3

These vital steps are spelled out in the coming chapters.

Evidence for repairing missing knowledge

Looking back to the five research reviews we are using as evidence sources, we see a range of techniques which can be used to help repair Prior Knowledge.

PRIOR KNOWLEDGE

Mike Bell

Excerpted from *The Fundamentals of Teaching: A Five-Step Model to Put the Research Evidence into Practice*

The EEF list includes:

- One-to-one tuition
- Peer tutoring
- Small-group tuition.

The interesting connection between these three is the size of the group. Unless you have identified a widespread missing Prior Knowledge with your class (which means you can do the repair work with the whole group), smaller groups work best.

The research shows that, while one-to-one tuition has the highest effect-size, it is also the most expensive. However, we get very similar results with a group of three students and the value of the small group only starts to diminish significantly when the group is above five.

As we will see again in Section 3, on using Teaching Assistants effectively, the best use of your resources is not to have someone sit with the pupil in the lesson, it is to give them small-group or individual tuition outside the classroom with someone trained to assess and repair that type of Prior Knowledge.

WHEN SHOULD I USE THIS METHOD IN MY CLASSROOM?

By definition, Prior Knowledge needs to be assessed before you start teaching the new material. You also need to give time for any repair exercises you identify.

Putting these methods into action

- Choose a topic you will be teaching shortly afterwards.
- Using the textbook or course outline, identify the main learning for the topic.
- Put yourself in the place of the learner and ask 'What would I need to know to understand this new material?'
- Get a group of teachers together who have taught (or are about to teach) this topic and ask them the same question. (Often a dialogue produces better results than just thinking in isolation.)
- Ask yourself and the other teachers to remember things which students often get wrong or questions they often ask.
- Design a pre-topic assessment for your group. Give the assessment to the class as far in advance as possible. This gives time for you to plan the 'repair' process.

PRIOR KNOWLEDGE

Mike Bell

Excerpted from *The Fundamentals of Teaching: A Five-Step Model to Put the Research Evidence into Practice*

- Plan 'repair' lessons for the whole class if widespread Prior Knowledge is missing or small-group interventions for individuals if the proportion is smaller.
- While you are teaching the topic, note down areas where students regularly fail to learn or questions which are often asked. Add this to your Prior Knowledge file for the next time you teach this topic.

Of course, you will never be able to meet all the needs of all the students. Some will have good Prior Knowledge and be bored while you go over it for the others. Some may need more support than you are able to offer. However, overall, the learning on the topic will be enhanced significantly. The evidence shows we can be confident that your time and effort will be worth it.

Vocabulary as Prior Knowledge

Case study

Ms C is teaching a boy who is struggling with the text. The boy explains that he does not know the meaning of a certain word in the paragraph they are using. Ms C explains the meaning, but then asks him to highlight all the words in the paragraph of which he did not know the meaning. She comes back a few minutes later and is shocked to see he had highlighted the majority of the non-simple words.

It is not just with low-achieving students that there can be problems. This case study concerns high-achieving A-level students.

Case study: A-level English

Mr R is teaching Shakespeare's play *Othello* to A-level students. He finds he cannot rely on them to read and understand the language. There is so much vocabulary they do not know, and so many words which have multiple meanings. He gets the students to read the text and then underline the words they do not know or are confused by.

He then clarifies the word-meanings before moving onto the text itself.

As teachers, we are often aware of the need for our students to know the meaning of the keywords and technical terms they have learned in previous lessons. However, we are less aware of the need to ensure they understand the ordinary vocabulary we are using.

PRIOR KNOWLEDGE

Mike Bell

Excerpted from *The Fundamentals of Teaching: A Five-Step Model to Put the Research Evidence into Practice*

Teachers who try this exercise with their students (at any level) report experiences similar to those of the teacher in the Case study above: they are generally amazed at how many ordinary words their students do not know.

Let's look again at an earlier paragraph as heard by a student with limited vocabulary.

> As teachers, we are often xxxxxx of the need for our students to know the meaning of the keywords and xxxxxxxx they have learned in previous lessons. However, we are less xxxxxx of the need to xxxxxx they understand the ordinary xxxxxxxxx we are using.

The sentence makes no sense to them.

> *Case study: Yr 7 Science*
>
> Mr D is teaching a Yr 7 class. In the first unit test, a boy who he had rated as in the top third of ability (from his classroom interactions) was scoring in the bottom third. When this happens again, he looks more closely at the test papers. Mr D sees that the boy's answers are quite high-level – it's just they are not answers to the actual question! He discusses this with the student and discovers that he did not know the meanings of some ordinary words (his technical word knowledge was good) and so had, without realising it, guessed what the question meant.
>
> The boy's mother tells Mr D that the boy loves sport, but does little reading. Mr D decides to work with the parent and gives her a list of the most common words in English. The boy and his mother go through the lists, deleting all the words he already knows. Over the next months they practice the unknown words (often on the way to and from sports fixtures). By the end of the academic year the boy is scoring much higher, as he is now answering the actual question!

Assessing your students' vocabulary

One way to check vocabulary for the topic you are teaching is to give your students a text from the topic. This could be the textbook or something you have written yourself for use in this topic. Ask them to highlight the words they do not know/understand. Then identify the most common unknown words and teach them directly, using homework and repeated, spaced testing to secure the words in long-term memory. There are a variety of ways to assess vocabulary, of which a few are listed here. (This book aims to give the big picture of 'what works' in education, so we do not go into detail about vocabulary). There are also several excellent resources available.

PRIOR KNOWLEDGE

Mike Bell

Excerpted from *The Fundamentals of Teaching: A Five-Step Model to Put the Research Evidence into Practice*

QUIZ TO CHECK UNDERSTANDING

True or false? (Answers on p. 169)

1. New learning does not need to be linked to Prior Knowledge.
2. Missing Prior Knowledge is a serious impediment to learning.
3. Vocabulary is Prior Knowledge for all learning, so vocabulary checks and repair are vital.
4. Phonics is Prior Knowledge for reading.
5. You do not have time to repair Prior Knowledge.

REFERENCE LIST AND FURTHER READING

GENERAL PRIOR KNOWLEDGE

Ceri Dean. (2012) *Classroom Instruction That Works*. Ch 4: Cues, questions and Advance Organisers.

Institute for Educational Sciences. (2007) *Organizing Instruction and Study to Improve Student Learning*. Recommendation 5a: Use pre-questions to introduce a new topic.

Barak Rosenshine. (2012) *Principles of Instruction*. Principle 1: Daily review.

VOCABULARY

Isabel L. Beck. (2013) *Bringing Words to Life*. Guilford Press.

Alex Quigley. (2018) *Closing the Vocabulary Gap*. Routledge.

METHODS FOR FILLING IN MISSING KNOWLEDGE

Education Endowment Foundation. *Toolkit*: One-to-one tuition; Peer tutoring; Small group tuition.

PRIOR KNOWLEDGE

Mike Bell

Excerpted from *The Fundamentals of Teaching: A Five-Step Model to Put the Research Evidence into Practice*

Answers to quizzes in chapter 10.

PRIOR KNOWLEDGE QUIZ

1. Long-term memories are formed by repetitions.

   True. One visit is not sufficient.

2. Long-Term Memory and Working Memory work in similar ways.

   False. Working memories last a few seconds and do not permanently change the brain.

3. Memories in the brain are similar to memories on a computer.

   False. Computers store all the data and can 'remember' perfectly. Brains create links to prior knowledge

QUIZ TO CHECK UNDERSTANDING

1. New learning does not need to be linked to prior knowledge.

   False.

2. Missing Prior Knowledge is a serious impediment to learning.

   True. It is better to spend time filling in missing knowledge, rather than focussing only on the new material.

3. Vocabulary is Prior Knowledge for all learning, so vocabulary checks and repair are vital.

   True.

4. Phonics is Prior Knowledge for reading.

   Generally true. Weak phonics is often a component in poor read-ing skills.

5. You do not have time to repair Prior Knowledge.

   False. You will save time in the long run as the learning will be quicker.