We all like to believe and we all seem to hate uncertainty. We believe in many things and different people believe in different things. Many people, for example, believe in a god or an omniscient, omnipotent and all-powerful being who guides everything (the Dutch have the saying: “Believing is what you do in a church”), although this could be Yahweh, the holy trinity, Buddha, Mohammed or the flying spaghetti monster. Others — humanists — believe in and emphasize the value and agency of human beings, individually and collectively; a perspective that affirms some notion of a “human nature”. Independent of this, we certainly seem to believe in education. We want our children to have the best, and nowhere more so than at school. This is why we are constantly looking for new insights and new possibilities, in the hope that they will improve on existing practice, so that our children and young people can learn even more effectively. But the problem is that just as in religion, different people have different beliefs and there are also different “religions”, belief systems or ideologies within the field of education that sometimes simply disagree, but often fight with each other to the extent that one could speak of a holy war or crusade.

Imagine that tomorrow a new (and fictive) online tool is launched named Gomba. Gomba is a website where you can easily share simple handwritten notes. It sounds good and works well. As a result, it soon goes viral. Before you know it, everyone is Gomba crazy. Not quite the
size of Snapchat or Instagram, but not bad for a start-up. What happens next? All of a sudden we start seeing blogs with titles like “16 ways to use Gomba in the classroom” or “How Gomba will change education”.

We have to admit that we also like to get involved in this kind of thing; well, sometimes at least. But this is not always as positive as it looks. There seems to be an undercurrent to all this activity, almost a kind of panic (Bennett, Maton, & Kervin refer to it as an academic form of moral panic). In education, we have the feeling that we are finding it harder and harder to reach our public, our pupils. That is why we are so feverishly interested in anything new on the market that might help. Every new tool seems like a possible solution, although sometimes we really don’t know what the problem is or even if there is one.

But this is not just about media and resources, as was the case in the past with school television and programmed learning. It is also about our educational and pedagogic approach. In fact, it goes to the very heart of our complete vision about education.

In the meantime, we have regrettably become saddled with a multiplicity of tools, methods, approaches, theories and pseudotheories, many of which have been shown by science to be wrong or, at best, only partially effective.

The purpose of this book is to initiate a big clear-out, a kind of “spring cleaning” for teachers, schools, parents, boards of education, educational policy-makers and politicians; in short, everyone involved in the educational process. We want to present an overview of the most important myths, the virtues of which have never been proven or which — in some cases — are just nonsense. These are pseudotheories (in other times we would have called them “snake oil”) that we come across almost daily in books and newspapers, on radio and television, in popular “scientific” magazines for teachers and the general population, in training programs for teachers and — worst of all — in the classroom.

Sometimes the reality of the situation will be more nuanced. Not everything we discuss in the book is 100% a myth or completely wrong. When this is the case, we will attempt to put the theory into a proper perspective, so that you, the reader, can better understand how it works and know which elements to avoid and which to keep. For example, policy-makers like to argue that it has been scientifically proven that the size of the class has no effect on children’s learning, while teachers argue the exact opposite. In relative terms, both viewpoints may be true, but there is enough research that suggest that both sides are right only in
certain respects and in certain circumstances. It is above all noteworthy that you never hear much about the reasons why large class size seemingly makes so little or so much difference. And if you do, then they are always the same old hackneyed reasons, more often than not based upon anecdotes, one person’s experiences, how it used to be, and so on. And why do you hear so little about these reasons? Probably because they would make clear why you might prefer not to have such large classes after all.

Some of the arguments put forward in this book will hurt. We speak from experience. We can well remember the moment when we came to the conclusion that learning styles are not fixed, usually not even measurable, and consequently that they have no added value in the class. To be honest, we felt pretty stupid when we realized not only that we believed in those things but also that we had been peddling the same false myths to our own students, often with great enthusiasm and commitment. It is painful to have to admit that you were wrong. So at this point we would like to express our apologies to the generations of students on whom we inflicted these faulty theories, and also to the teachers who will now have to learn this same bitter lesson. Let’s just call it progressive insight.

The biggest problem with educational myths is that people who believe in them will often be able to find enough evidence in their day-to-day practice to support their beliefs. The reason for this is simple. It is like when you buy a new car: suddenly you see that same make of car everywhere you go, often in the same model and color. But these cars were all on the road before you bought yours; it is just that you did not notice them until now. In the same way, we are quick to recognize “indications” for the ideas we believe in. The experiences that don’t support our case we simply ignore, unconsciously or not. Michael Shermer gives three reasons:

- **patternicity**: a tendency to find meaningful patterns in random noise
- **confirmation bias**: the seeking and finding of confirmatory evidence for what we already believe
- **hindsight bias**: tailoring after-the-fact explanations to what we already know happened.

As John Hattie so astutely noted when talking about people who had trouble with his epic work *Visible learning*,

The messages [from my book] have been questioned, labeled provocative, liked, and dismissed, among other more positive reactions. The typical comments are: “the results do not mirror my experience”, “why have you not highlighted my pet method”, “you are talking about averages and I’m not average”, and “you are missing the nuances of what happens in classrooms”. (Preface, p. viii)
This is why in the pages that follow we will systematically refer to scientific sources that are based on something more than anecdotal experience, which, almost by definition, is colored. We will also offer opinions based on metastudies, when these are available. These are the studies that bring together the results of different research projects in the same field.

Because in the past we have also believed in many of the theories that will be called into doubt in the following pages, we are the very last people to criticize teachers, principals, parents and even policy-makers for also believing and preaching the same things. However, there is one aspect of this situation for which we have much less understanding: some of these myths have reappeared in recent textbooks and sometimes even in research reports. These must be eliminated. We hope that this will be one of the contributions made by this book.

It is not easy to change things in education. But it is our conviction that these myths are one of the major factors standing in the way of innovation and renewal. If you introduce something new, it is often possible to achieve initial success. But initial success is, in itself, not enough. We know of three reasons why success can be and often is achieved, although actual implementation and use will be disappointing. The first is that there is a great difference between an innovation project and an implementation of the innovation for education (the project aimed the intervention’s ultimate implementation). An innovation project is usually supported by a specific type of team leader (often the researcher), provides extra support and guidance for the teachers (in the form of training, time and money), often uses teachers who volunteer and thus are highly motivated, and so forth. An implementation usually does not have the benefit of these “extras”, and thus success in the project often does not automatically generalize to success at the institutional level. Kirschner, Stoyanov, Wopereis, and Hendriks stated that extra care and resources are needed to make the jump to scalability, generalizability, temporal flexibility and financial sustainability.

The second reason is that much of the research that confirms that an innovation works is often poor. Those carrying out the project often make the mistakes of not presenting explicit and testable goals (i.e., what constitutes success, how will it be measured, etc.; see Willingham (2012) about how to tell good science from bad), involving respondents/teachers who are not random but are chosen by someone such as the principal or
volunteer (a sure sign that they are not the “average” teacher and thus that the average teacher will not have the same mindset), and having no real control groups with which to compare the intervention (knowing that something led to learning does not ensure that it is more effective or efficient than “normal” good instruction). A good example of this last aspect is a study often cited to show that problem-based learning (PBL) works and that generation of prior knowledge is important (some go as far as citing it to show that PBL works better than instruction). One group (the intervention group) spent time generating all that they could remember about the topic to be learned while the other group (the so-called control group) generated prior knowledge about a completely different topic not relevant to what was to be learned. And . . . Abracadabra! Hey-presto! . . . the intervention achieved better learning.

The real question, however, was whether the intervention group would have learned more than a group that had spent an equal amount of time listening to a good lecture on the relevant topic, or who had seen a good instructional video, and so on. Knowing that something may have worked is not the same as knowing that the intervention is an innovation that makes learning more effective, efficient or enjoyable.

The third reason is what is referred to as the Hawthorne effect, and it is the effect you experience because you are trying something new. You are more focused, possibly more enthusiastic; perhaps your pupils are curious or even surprised. These are all explanations for the temporary positive effect. But what happens once the shine has worn off the new idea? When its novelty value has disappeared? This is when disappointment sets in, so that you often return to the “old” ways, more frustrated than ever before, and determined not to try anything new ever again!

The Hawthorne Effect Actually Has the Wrong Name

The name of this phenomenon is derived from research carried out at the Hawthorne factory of the Western Electric Company in the 1950s (Figure 1). The researchers looked at the effect of rewards and working conditions on the functioning of the factory’s employees; for example, whether they performed better in a particular kind of lighting. For many years it was assumed that the resulting positive effect came primarily from the fact that people were involved in an experiment, rather than as the result of a specific approach to environmental and other factors. Hence the effect was named after the place where this first experiment had taken
place: Hawthorne. It was only years later, when the original Hawthorne data were reanalyzed, that it was realized that the effect did not come from the fact of the experiment itself and that the positive effects could actually be attributed to the manipulation of the independent variables.

Sources

In this book, we have tried to deal with a number of theories and applications that are not correct, need to be nuanced, are uncertain or have not had a positive effect. For example, some of the cognitive theory of Piaget about how the thinking of children develops is now largely obsolete (although his thoughts on assimilation and accommodation fit nicely with schema theory), but it still has a great influence on discovery learning. Moreover, it seems that taking account of the Piaget classification in the
classroom does indeed result in a lasting learning effect. The reason for this is that we learn most effectively when we learn concretely. Most of what we remember is concrete and linked to the situation. That is why it is so difficult to apply insights that you have learned in one situation in a different situation. If you want to teach someone something new, it is therefore best to start with concrete examples, which you can gradually build up to a more abstract level as time passes. This works — and so Piaget will not have a chapter in our book.

But if Piaget is a good example of a theory that needs to be nuanced, some of the other theories we deal with in the book seem to us to be absolutely dangerous. Almost every time some new information and communications technology (ICT) application needs to be introduced into the education system, we are reminded by policy-makers and initiators that today’s young people are “digital natives” and as such have developed certain knowledge, skills and attitudes that make the new application perfectly suited to them (we will discuss this later in the book, in Section 5.3). Unfortunately, this idea has been rejected by almost every serious study that has looked into the matter, including in an educational context. Basing a policy on an incorrect assumption means that many new initiatives have the potential to go wrong almost from the start.

**SOMETIMES WE ARE LAZY**

We human beings are creatures of habit. We don’t like change; it seems so difficult. In reality, we are often just too lazy to change. This can sometimes apply to scientists as well. In our opinion, this is why some education myths are still perpetuated, even in scientific works. Here is a spectacular example, perhaps the most spectacular of all.

One of the most famous pyramids in science is the Maslow pyramid, first formulated in 1943 by Abraham Maslow. If you have ever read or heard about this pyramid, you will probably be familiar with a variant of the drawing shown in Figure 2.

Pop down to your local library and have a look in any of the many books and articles written by Maslow. What you will not find is . . . a pyramid! Maslow certainly described a hierarchy but he never framed it in the famous pyramid form. This may seem to be just a detail. Perhaps. But people continue to talk about a pyramid in five layers, even though in 1970 Maslow extended his hierarchy to seven elements, by adding “knowing and understanding” and “aesthetics”.
And is his pyramid actually right? In 1962 Maslow expressed his surprise that people had seemingly accepted his findings without question or criticism:

My motivation theory was published 20 years ago, and in all that time nobody repeated it, or tested it, or really analyzed or criticized it. They just used it, swallowed it whole, with only the most minor modifications.

To be honest, not much has changed during the past 50 years. You will still frequently come across the pyramid in educational literature, whether it is relevant or not — along with another pyramid that will be discussed later. But in the meantime, we have become wiser. And what transpires? The theory is flawed. For example, someone who has health problems can simultaneously feel the need for beauty and wisdom.

So why do we keep on using the pyramid? Because we like to keep things clear and neatly separated from each other, and the pyramid does this with its pleasingly transparent hierarchy. But in this way, the pyramid also implies that what is at the bottom is the most important, the basis, and that only very few people will ever reach the top.

The representation of the hierarchy as a pyramid is therefore a theory in itself, with its own assumptions and hypotheses. Maslow thought that
people would use his findings to conduct further experiments of their own, but that did not happen before his death in 1970. Why? Because sometimes we are too lazy to check whether something is actually right — or not. This kind of laziness can be dangerous.

After Maslow’s death in 1970, researchers did undertake a more detailed investigation, with attitude-based surveys and field studies testing out the hierarchy of needs, and what did they discover? As Gerard Hodgkinson states in an interview with the BBC on the topic, “The actual structure of motivation doesn’t fit the theory. And that led to a lot of discussion and debate, and new theories evolved as a consequence”. But still we keep on mentioning the non-existent and unproven pyramid.

THINKING IN BOXES

We are all against it but we all keep on doing it: putting people in pigeonholes. Numerous examples of this kind of “thinking in boxes” will be taken to task in the following pages. For instance, we have already mentioned learning styles, and sometimes we are quick to forget that there are both rational people with a left brain and creative spirits with a right brain, and that all of us have a whole brain!

The most fundamental of all the boxes into which we as educators put people is possibly the gender box. The available data make it easy to investigate the respective influence of boys and girls, but even here there are myths at play. For example, we will be looking at the question of whether boys and girls have different kinds of brains, and whether boys really are better at mathematics.

So what is the effect of thinking in boxes? Research by Cimpian, Mu, and Erickson suggests that it is not positive, for either boys or girls. They carried out two experiments on four- and seven-year-olds to see what the influence would be on the performance of a task, when the participating children were told that the successful completion of the task was dependent on being part of a particular social group; for example, “Boys usually do this task better than girls”. What transpired? If you announce that one of the groups (boys) is better suited to a particular task, then both groups (boys and girls) actually perform worse. It is also possible that this applies for the social group “young people” as a whole.
OUR VISION OF EDUCATION?

Our intention is not to write a book that opposes or counteracts innovation. Quite the opposite! Although we are opposed to innovation for the sake of innovation, we are fervent supporters of finding ways to help learners to learn more quickly (i.e., making the learning process more efficient) and learn more things (i.e., making the learning process more effective), and to make learning more fun (i.e., making the learning process more enjoyable) as long as reaching any one of the three is not to the detriment of the other two. We call this our 3Es: effective, efficient and enjoyable. You could say that we want to make the 3Rs (reading, writing and arithmetic) and the other topics in school more 3E! And it is our conviction that achieving these 3Es for learning will also help to make the teaching process more effective, efficient and enjoyable for the teacher.

It is a waste of time to try and divide the educational world into “more progressive” and “more traditional” tendencies, although many gurus make a lot of money and get a lot of airtime doing this. Margaret Brown published an overview of research studies that had attempted to discover whether the progressive or the traditional approach is more beneficial. Her first problem was to define what exactly is meant by these terms. But leaving this to one side, Brown found no data to suggest that it is a good thing to opt for either an extremely progressive or an extremely traditional style of education. She concluded that the antagonism between these two extremes lives largely in the minds of educational thinkers at policy level, while the most important thing for teachers in the classroom is to find the right balance between the different methods of approach.

Nor is it our intention either to confirm or to undermine specific learning or knowledge theories.

The current paradigm in the educational policy of many countries, states and districts is what is called social constructivism. This paradigm is primarily concerned with the ways in which people construct knowledge themselves (constructivism) in collaboration with others (social). Central to this philosophy (the use of the word philosophy and not pedagogy is intentional; constructivism is a philosophy which states that we all construct our own realities based upon our prior experience and is not a pedagogy) is the belief that we must place children in a learning environment where they can actively acquire knowledge for themselves. Because we all have our own subjective perception of reality, it is also crucial that children should be able to work together, so that they can arrive at a shared
truth. Group work, problem-directed education, the importance of authentic tasks and situations: these are all important elements of this social constructivist tendency.

Of course, there are other paradigms, of which behaviorism and cognitivism are probably the best known. In behaviorism, the influence of the importance of objectives is still strong. This influence is most noticeable in the use of punishments (in particular, ignoring children) and rewards. The theory is sometimes negatively associated with the so-called “drill-and-practice” method, which is still probably the best way to learn the alphabet, multiplication tables, and so on. Even so, the behaviorist approach — for example, for “maintaining order in the classroom” through a system of targeted rewards — can be very effective. Cognitive thinking has taught us the importance of differentiation, because it made us think about not only what people learn, but also how they learn it. Some of the earliest cognitive insights continue to be valid to this day, but others will be refuted later in the book.

You may already sense where we are coming from: we are fairly critical of all three of the above-mentioned theories. If we had to choose between them, we would probably align ourselves with the neocognitivists. Cognitive psychology, supported by new neuroscientific findings, is constantly providing new insights for education that can help us in concrete terms, although the neurosciences are often the spawning grounds of new myths.

Having said this, it is probable that every educational theory — either in whole or in part — will receive something of a pasting in pages that follow. People who know us will also know that we have invested much time and effort in recent years introducing new technologies and methods into the education system. That is why we are now so critical in our approach to this field.

If, when you have read the book, you want to accuse us of ill-will or vindictiveness, then honesty compels us to admit that you might have a point (here or there, at least). We must confess that occasionally during our writing we experienced the same devilish delight as the little boy who was able to shout to the entire crowd that the emperor was not wearing any clothes.

**BRASS FARTHING**

Mark Twain, speaking about religion and politics, lamented, “In religion and politics, people’s beliefs and convictions are in almost every case gotten at second-hand, and without examination, from authorities who
have not themselves examined the questions at issue, but have taken them at second-hand from other non-examiners, whose opinions about them were not worth a brass farthing”.

If we replace “religion and politics” with “education and educational policy”, we see the sorry state that we are in, and why. We hear many claims about what is wrong with education, what is needed to correct those wrongs, and why this is the case. Many of the claims, regrettably, are based on belief rather than science and have become tenacious urban legends used by instructional designers, curriculum reformers, politicians, school administrators and advisory groups, all vying for position to show how innovative and up-to-date they can be.

**CREAM CAKES**

The Woody Allen film *Sleeper* is set in the year 2173. In the film, scientists are amazed that people living at the end of the twentieth century thought that eating cream cakes was bad for your health, whereas twenty-second century technology saw only their exceptional nutritional value.

It is equally possible that someone who stumbles across this book at a virtual jumble sale in the year 2035 will smile and ask how the authors could have possibly been so naive. Since we do not have a crystal ball, we cannot predict which of our ideas will turn out to be true. But while we are all waiting to find out, it is probably advisable not to eat too many cream cakes!

**DEAR EXPERTS . . .**

This is a book for everyone involved in and concerned about education. It has not been written specifically for experts. We have deliberately chosen an easy and accessible style, with references to the professional literature being placed at the end of each section. We have done this to make the book as readable as possible. Having said that, a great deal has already been written about the different themes we explore. We do not pretend that our book is complete, but we have tried to offer readers the nuances we think are necessary to understand the important arguments that support our case, as outlined in the many books and articles we have read.

The book has been proofread by a number of researchers. Any inaccuracies or errors that remain are entirely our fault, not theirs. Naturally, we hope that the number of any such mistakes will be minimal and no worse, for example, than the absence of the full stop (period) at the end of this sentence.
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<td>The statement is untrue or almost completely untrue or there is no proof.</td>
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**A WHO’S WHO OF THE WORLD OF EDUCATION RESEARCH**

When reading this book, you will probably come across the names of all different kinds of experts and specialists who you never knew were engaged in the field of educational research. For this reason, you may find the following summary useful. Be aware, however, that this summary is far from complete: in one way or another, we are all involved in education.

- **Educational theorists:** Educational theory is the science that seeks to describe the processes of learning, teaching and development in education and the world of business. These scientists therefore contribute towards the improvement of the education system and training programs. When you read about “learning effects” later in the book, the educational theorists will usually be involved in some way.

- **Pedagogues:** Pedagogy is the science and art of education; practitioners of pedagogy are called pedagogues (translated literally from the Greek meaning “to lead the child”, originally used to denote someone who escorted a child to school). It studies how adults (parents, educators, teachers) bring up children and young people with a particular purpose in mind. More specifically for the world of education, pedagogics studies educational methods, including the objectives that are set and the manner in which those objectives can best be achieved. Pedagogues are generally more involved with the “why” of education than are the educational theorists (also see ethicists).

- Highly relevant, but also relatively rare, are the pedagogues who specialize in **comparative pedagogy**. They are experts in the comparison of educational systems in different countries or regions. At the present time, this is often done in the media, by organizations such as the Organization for Economic Cooperation and Development (OECD: Program for International Student Assessment — PISA) or International Association for the Evaluation of Educational Achievement.
(IEA: Trends in International Mathematics and Science Study — TIMSS), or educational sociologists.

- **Instructional designers:** These are experts in designing and developing learning experiences. Instructional design is, as Merrill and colleagues (1996) state, the practice of creating “instructional experiences which make the acquisition of knowledge and skill more efficient, effective, and appealing”.

- **Educational technologists:** These are experts who try to analyze, design, develop, implement and evaluate process and tools to enhance learning.

But we are not finished yet! There are also:

- **Educational sociologists** study the structures and processes that determine the educational opportunities of young people.

- **Economists** also have a voice in the discussion, since education inevitably has an economic impact. Also note that as an economic organization the Organisation for Economic Co-operation and Development (OECD) has a big influence on educational thinking through its Programme for International Student Assessment (PISA) studies.

- **Ethicists** and moral scientists belong to the branch of philosophy and engage in critical reflection about the rights and wrongs of particular courses of action. In general terms, ethics attempt to determine the criteria that will allow an assessment of right and wrong to be made, so that the motives and consequences of these actions can be evaluated.

- **Cognitive psychologists** are part of the wider branch of psychology and look at the way people learn. To do this, they focus on the physical processes involved in matters such as understanding, knowledge, memory, information recall, information processing and problem-solving. Their work plays an important role in this book.

- **Learning scientists** work in the interdisciplinary field of the learning sciences, investigating “fundamental inquiries on how people learn alone and in collaborative ways, as well as on how learning may be effectively facilitated by different social and organizational settings and new learning environment designs” (Mission Statement of the International Society of the Learning Sciences).

- **Neuroscientists** work in the field of neuroscience or any of its related subfields. Neuroscience, while very broad in nature, dealing with all aspects of the nervous system, is for education primarily limited to the study of the brain, the connections between different areas of the brain
and how these relate to learning. Techniques such as neuroimaging (magnetic resonance imaging), electroencephalography and deep brain stimulation are often used for this.

- **Research translators** are people who read research articles from scientific refereed journals and distill the wisdom from those articles into practical recommendations for practitioners. As such, they add important value because they bridge the gap between the worlds of research and practice — between groups who speak different languages.

In discussions about education, it is unrealistic to expect that scientists will ever have the final say. In the Western world, it is the politicians who make the final decisions, based on the outcomes of research and social debate. Consequently, a whole variety of other people is also involved in this discussion process, including the different policy-makers (not only politicians and the political umbrella organizations, but also the heads of universities, university colleges and other academic groups), head teachers, teachers, teachers’ representatives (including unions), publishers, parents, parent groups and — last but not least — the poor old pupils and students!

**REFERENCES**


