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Dennis Sale

Creative Teaching

An Evidence-Based Approach

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To my daughters Adele and Lydia

Preface

To be playful and serious at the same time is possible, and it defines the ideal mental condition

—John Dewey

This book is written primarily for professional educators who want to teach more creatively. However, it will have value and interest for parents and other readers wanting to know more about how humans learn, the key factors affecting this process and how the practices of good teaching actually work, and why some practices do not work so well. The approach taken is evidence-based as this is the most valid and useful way for improving teaching quality that results in maximizing learning opportunities and attainment levels for learners. A fundamental assumption is that as we better understand how different aspects of human psychological functioning impact the learning process, including how creativity works, we can design learning experiences that result in better attainment opportunities for learners.

In writing this book, which inevitably requires the inclusion of an extensive review of the vast research literature on human learning and behaviour, I have also woven into the narrative a more informal style than is typical of work in this genre. This partly reflects my Cockney descent from growing up in London's East End, but it is also a deliberate evidence-based ploy, as humour and storytelling help to make life, including reading scientific texts, more interesting. In writing, as in teaching, if you do not get attention and generate interest, there is little of value in doing the activity in the first place.

Creative teachers, by definition, must be expert teachers in that they are able to create learning experiences that are the most effective and efficient for enhancing attainment opportunities. This is a given as all good teaching must seek to maximize attainment levels for the students involved. However, creative teachers have the added capability of what I refer to as *Creative Teaching Competence*. This enables them to create instructional strategies in novel and useful ways (creativity must involve these components) that further enhance attention and engagement,

therefore making the learning experience more interesting and meaningful to the particular learner groups. This is not always easy to do and even the most creative of teachers cannot guarantee to do this expertly on every occasion they teach. However, and remember, even the very best soccer players (and many earn more money in a year than some teachers earn in a lifetime) do not excel in every match they play, so be realistic in what you seek to achieve. What I can assure you of, though, is that this is what makes teaching such a challenging and worthwhile profession. You will rarely be bored, continually involved in meaningful learning, and in helping people (your students) to make better choices to attain important learning goals. And guess what?—It can also be good fun.

Creative teaching competence, as will be explained, illustrated and developed in this book, is not significantly different from becoming competent in any area of human capability. The reason is quite simple as all expertise is the product of the same *Core Principles of Learning*. These core principles of learning are derived from our best current understanding of how humans learn and are related to specific, though interrelated, aspects of the overall learning process. While humans may differ in many ways, such as physiology, personality configurations and cultural variations, we all learn in essentially the same way. There is no such thing as learning styles. People have preferences in terms of the context of their learning, which may include aspects of the physical environment, time of day or even having some music playing. However, these are personal preferences, not systemic neurological structures determining our learning configurations. Without acquiring relevant content knowledge, making the right connections and building understanding through good thinking and, where necessary, developing expertise through appropriate practice, we are unlikely to do particularly well in the learning stakes. There is, of course, much more to learning than this quick summary, otherwise the preface would be the book—if only! To explore the human learning process fully, as it pertains to effective learning and the practices of teaching, you will need a careful perusal of the various chapters in this book.

To be a creative teacher and achieve expertise at the highest level takes time, and there is much to learn, but that is true in every professional field. However, it is much easier to achieve a particular goal (e.g. creative teaching) when you have a clear sense of what it looks like, sounds like and feels like. It further helps if you know where to look for it. This is what I have attempted to do through a synthesis of what constitutes the best evidence relating to human learning and the practices of teaching, and most importantly, how to use this to be the best teaching practitioner one can be—a Creative Teacher.

Therefore, I hope you find the book an interesting read, apart from being a practical and useful resource for your professional development. I have tried to incorporate the essence of another quote I like in this context, one by Charles Mingus:

> Making the simple complicated is commonplace; making the complicated simple, awesomely simple, that's creativity.

Acknowledgments

To write a book on creative teaching has been my most challenging writing project to date. The main contributors to my work are the thousands of teaching professionals, from all educational and training sectors, many countries and cultural contexts, who have allowed me to observe and appraise their teaching. Without this rich and varied source of primary data, it would not have been possible to validly and sufficiently model, make sense of and eventually understand the underpinning syntax of creative teaching. Indirectly and without knowing, you have made this book possible for me to write. Wherever you are now, a big thanks from me.

As Senior Education Advisor at Singapore Polytechnic, and working for the Ministry of Education in Singapore, I have had the valued opportunity to work in a dynamic and challenging educational landscape, committed to continually enhancing the quality of its teaching force. I am grateful to have been in a position to learn so much.

I would also like to specifically thank the following:

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Bill Powell and Ochan Kusuma-Powell, veteran international educators, authors of numerous books and presently passionately involved in Next Frontier Inclusion, a collaborative network of schools supporting inclusive of children with learning challenges. Their feedback was invaluable in framing the style and direction of this book.

Allen Koh, Raquel Gochioco and Kirsty Le Pelley, good professionals and friends of mine, who have provided essential feedback and support throughout this challenging endeavour.

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About the Author

Dennis Sale is presently Senior Education Advisor at Singapore Polytechnic. He has previously worked across all sectors of the British educational system. Over the past 20 years, Dennis has been extensively involved in training, coaching and assessing teaching professionals in a variety of vocational and cultural contexts. His specialist areas include Creative Teaching, Curriculum Development and Blended Learning. He has invented highly effective and practical models in these areas, provided a wide range of consultancies for both public and private sector organizations, and conducted numerous workshops in many countries. He is also widely noted to be a dynamic and creative presenter, blending practical relevance with situated humour.

Abstract

Creative Teaching: *An Evidence-Based Approach* provides a total pedagogic framework to enable motivated teaching and training professionals to teach more creatively. Drawing on extensive and diverse research findings relating to human learning, it provides a critical synthesis of what is really useful and practical for teaching effectively and creatively. The book identifies fundamental universal *Core Principles of Learning*, which provide evidence-based guiding heuristics (rules of thumb) for planning learning and conducting teaching. These represent a foundational *Pedagogic Literacy* that is essential for effective teaching in any context. It then tackles the challenge of providing a practical model of what creative teaching actually entails and how it works both at the level of psychological functioning and in the actual contexts of teaching. The various chapters explain, model and illustrate how key pedagogic resources, including the wide range of information–communication technologies, can significantly enhance important aspects of the learning process and learner attainment through creative learning design and teaching. This book also encompasses a range of innovative practices for enhancing teaching quality in mainstream teaching and training contexts. These include an explicit practical model of good thinking (critical, creative and metacognitive) and a comprehensive design framework for implementing blended learning. Finally, while maintaining focus on the findings of science in relation to human learning, I have deliberately written the book in a more informal narrative style than is typical of work in this genre. The intention is to make it an interesting read to accommodate those who like the full evidence base as well as others whose specific interest is to understand what works and why.

Keywords Creative teaching · Creative teaching competence · Pedagogic literacy · Blended learning · Professional development

Chapter 1
Making Sense of Teaching

Teaching is the only major occupation of man for which we have not yet developed tools that make an average person capable of competence and performance. In teaching we rely on the 'naturals', the ones who somehow know how to teach.
Peter Drucker (1999)

1.1 What I Learned at School: The Good, the Bad and the Ugly

The title of the book 'Fifteen Thousand Hours' by Rutter et al. (1982) is based on the approximate number of hours a pupil spends in school. So, what did I learn in my 15,000 h? Well, I certainly acquired two really useful skill-sets, football and boxing. I still play football, albeit not in my favoured utility midfield role; rather now as a languid right back, protected by a much younger and faster midfielder in front of me. What makes football such a good learning experience and useful skill-set to learn? Travel practically anywhere in the world and you will easily find footballers, who play in teams either in organized leagues or social set ups. They love the game and the 'crack' (I think this term has Irish origins, 'craic'—loosely means fun; apologies if I'm wrong). The essential point is that this offers the opportunity for immediate membership and friendship in the local community. When I arrived in Singapore in 1995 as a retired footballer, I was persuaded to play in the staff team (without much difficulty) and eventually became the player-manager for over a decade. I also coached a local team for several years. Most of these players were young Singaporeans and I was fortunate to see many go off to, and return from, university. We still meet up once a year, play the occasional social game, and eat at a local restaurant. A wonderful experience for a retired footballer of some 5 years prior to moving to Singapore.

To play football, at whatever level, also requires the ability to function as a team-player, which is a much muted so-called twenty-first century skill in the educational

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and business literature. In fact it's a necessary skill of human survival per se—didn't the cave-dwellers need it? I agree with Schank (2011) when he argued:

> Twenty-first century skills are no different from 1st century skills. (p. 207)

The same can be argued for good communication skills, which are important in football and essential in all aspects of human life today. It may have been less sophisticated in the caves, but it's been a key factor in our survival. Our collective inability to utilize such a basic human capability in the present global context may well be our journey into hubris.

Of course, participation in other sporting activities could also have developed these skill-sets and provided opportunities for membership in local communities in far-away places. That's why we have long promoted holistic education in schools. However, you may be asking, can the same level of argument be made for the educational value of boxing. Well, at school I also learned carpentry and metal-work, while the girls simultaneously learned needlework and cookery. This would not be tolerated in today's context. To be honest, many of us (the boys) secretly would have chosen the cookery option, as at least the product of the activity had some usefulness, it could be eaten—usually cake of some kind. Hence, context is important and boxing had a very useful aspect to my life in East London in the 1950s and 1960s. Bullying was not uncommon at school during my school-years, and most pupils who were bullied would not reveal this either to parents or teachers. It was just part of everyday life at school. Revealing that one was being bullied, was as likely to increase the possibility of further bullying as a result of 'telling tales', as alleviating it. I learned very quickly that being able to box meant keeping my school lunchbox and being able to eat its contents, which is pretty important in terms of any hierarchy of needs. Bullies at school typically bully easier targets, not those who are coached by ex-professional 'booth' fighters (those who fought bare fisted in the fairgrounds of the 1930s and 1940s). I am also serious in arguing that I did learn to be resilient, self-disciplined and respecting of others from boxing—really. I never bullied anyone and often intervened when I saw this cowardly act, and would still do so today. Life at university was, quite frankly, easy, after the experience of getting up at 5am, doing what seemed an eternity of a run, often swimming across a freezing cold lake, followed by 100+ sits ups—and how I hated that relentless skipping. A 9 a.m. start at university, 4–5 h of lectures a day, and studying something you're actually interested in was nothing compared to facing the 'tough boys' in the boxing ring and on the streets of Hoxton. Could I deal with exam stress and put in a hard shift, both at university and now at work? No sweat.

Sadly, the formal curriculum at school was a pretty tedious experience. Weeks were spent learning about a plethora of irrelevances; I can still recall in biology class learning about spirogyra, a hermaphroditic pond weed. As an East London youth in the 1960s, was I really interested in or have any use for such knowledge? Similarly, in music, I was occasionally caned for messing about while being taught (but failing to learn) scales in music and how to play the flute. On Top of the Pops (a weekly music show in Britain in the 1960s), the Beatles and Rolling Stones played guitars and sang pop music. There was no connection between the music I

enjoyed out of school and what we did in music class. This was the typical learning experience in school. We never really thought about what we were learning or why, it was just school and we went there from Monday until Friday.

Certainly, there were things I learned about teaching and teachers. Most significantly, the teachers were not alike, far from it. The 1966 film "The Good, the Bad and the Ugly", which starred one of my favourite actors, Clint Eastwood, comes readily to mind when thinking about my teachers. Let's lump the bad and the ugly together and this was my maths teacher for 'O' level. Unintelligible on all counts, the lesson may have been in a Malagasy dialect. I sat the 'O' level mathematics exam in June 1968 and achieved the undistinguished grade of 9 (6 being the lowest passing grade at that time). You may be wondering what a grade 9 actually means in the context of mathematical competence? Well, if my Jack Russell would have sat the same exam, he could not have fared worse. Jack (what else would you call a Jack Russell) is a clever dog, but still hasn't worked out how to open the fridge door and get to his chicken meal autonomously.

Fortunately, in the following academic year, I had a change in maths teacher, Mr. Edrich, and he represented an example of 'the good'. What this meant is that we could actually understand what he was saying. He also recognized that we were far from confident or competent in maths, which was not rocket science to ascertain. However, instead of communicating any negativity towards us, he worked hard to slow down the pace of teaching and tried through countless examples to help us to understand and eventually do those basic factorization procedures. Gradually, I made some sense of how simultaneous and quadratic equations worked, a basic understanding was emerging and I could increasingly solve the questions set. However, it was not a sufficiently deep understanding as I re-sat the maths 'O' level in the November series and still failed it—but only just, a grade 7. The happy ending was that in the following June exam series in 1969, I passed very comfortably with a grade 3. If I am honest, I don't think I ever achieved a deep understanding of this type of maths, but passing it was crucial, as without it I could not have got a place at university on a BSc. Programme. It was a very high stakes exam. Mr. Edrich will never know his specific and positive impact on my life, and this is the norm for many teachers. Unfortunately I did not get round to thanking him at that time, as it's only retrospectively, and much later, that I came to fully realize how important such teachers are. The famous England footballer and TV pundit, Jimmy Greaves, often used to refer to the foibles of football outcomes as "It's a funny ol' game." This applies to many aspects of human life, and teaching certainly fits the description well.

Here's one more story, and it shows how both situation and serendipity can poignantly play out in shaping one's life and, in the mix there was a good teacher, and what a difference this made for me. Card playing was not part of the formal curriculum, even in an East London comprehensive school in the late 1960s, however, that's what we were doing in the last week of term (in fact most of the year in some classes). After all, who cared? Certainly not most of the teachers! We were on our way out to the world of work and fortunately, at that time, gaining employment was not a difficult task in the 1960s in London, England—it was

indeed the "Affluent Society", so aptly described by Kenneth Galbraith (1958). I had already secured a job as a trainee civil engineering technician, so all that mattered was killing time and having some fun in the last few days at school. However, all of a sudden our game was interrupted by the class teacher (Mr. Remmington, as I clearly recall) who asked what game we were playing. He then asked me specifically what I was going to actually work as upon leaving the school. I replied that I was going to be a civil engineering technician. In response, he asked what this involved and what would I actually be doing as a civil engineering technician. An easy question for me at that time, "I will be designing houses". At that point, I remember a somewhat paused silence, and then he asked what I was intending to do for the rest of my final week at school, which seemed a strange question at the time. I resisted the obvious answer of "Trying to win the card games"—albeit the most truthful response I could have made. He then asked if I would be prepared to talk to a friend of his, who was an architect at one of the local borough councils. He went on to add that it might be more useful to me than just playing cards. Although not quite sure where this was going, I agreed and left it at that. It was not until later on in the day that Mr. Remmington actually sought me out and provided the details of where to go and who I was meeting. This involved travelling to a local Town Hall the following day, and meeting the deputy borough architect, who was a friend or relative of Mr. Remmington. Mr. Remmington had clearly made some effort here to provide a stimulus for my thinking, which from his professional stance was a good decision. It all makes perfect sense to me know. The key learning point, and it was a big one, was that architects design houses (and other buildings), not civil engineering technicians. He also showed me what civil engineering technicians do, which turned out to be not as attractive as I first thought at that time. It had the desired result that perhaps Mr. Remmington had anticipated, in that it got me thinking. As a result, that evening over dinner, I mentioned to my parents that I may not want to be a civil engineering technician and was considering being an architect, and this would involve staying on at school for 2 more years and studying for 'A' levels. My mother was a little shocked as she was expecting me to go to work as all my friends were already in the workplace and earning money. My father, on the other hand, lit up and said something akin to "What a great idea!" He recalled how he was offered a scholarship to go to architectural college, but alas the second-world war broke out and he spent many years fighting in it, and towards it's summation he married a young Italian woman and, on returning to England, had to get a job to earn money in order to live. Studying at university or wherever, was not an option for him at that time. However, he had always wanted to be an architect, and had no reservations in supporting his only son in such a positive career choice. This was perhaps also helped by the fact that I was an only child and both my parents worked. In the context of East London in the 1960s we were relatively well off in comparison to many of my schoolmates. At the end of my school life, I did not pursue a career in architecture but did become one of a very small cohort of pupils from Edith Cavell Secondary School who went to university. Hence, school was indeed a combination of the good, the bad and the ugly, but I did learn a lot, though not that much from the formal curriculum.

In my 35 plus years as a teaching professional, similar experiences emerge and play out in terms of different perceptions of teacher's abilities. As a classroom teacher, there were many instances of parents asking me something akin to, "Is there any way I can avoid my daughter Linda being taught by Mr. Lee next term? Everybody knows he's dead boring and students can't understand what he's on about." Parents certainly know that teachers vary greatly in competence (however defined) and that their children's performance is not just a reflection of their fixed innate capability in this subject, but varies considerably depending on who teaches them. Similarly, as a parent, it was very apparent that both my daughters' enjoyment and grades clearly reflected, in no small part, the experiences certain teachers created for them over the duration of the course programme. On one occasion for a subject that my youngest daughter needed to pass at a certain grade, I ended up paying for private tuition, on top of already paying expensive ex-patriot private school fees. In the previous year she was meeting the attainment targets comfortably and enjoyed the subject. However, in this particular year, she found the teacher less friendly, not easy to follow and the experience generally dull. Her interest waned and her grades fell significantly. Whatever one's views on educational equity, and I favour providing as much equality of opportunity as possible for all, by not paying for this extra tuition from a different (maybe better) teacher could have resulted in an outcome similar to my first two attempts at the 'O' level maths exam, back in the 1960s. I was lucky I had Mr. Edrich to teach me that darn maths, and he was not on extra salary.

It is not surprising, therefore, that an increasing body of research shows the massive impact that teachers have on student attainment. Izumi and Evers (2002), from an overview of research on the impact of teachers on student achievement, summarized:

> …nothing is as important to learning as the quality of a student's teacher. The difference between a good teacher and a bad teacher is so great that fifth-grade students who have poor teachers in grades three to five score roughly 50 *percentile points* below similar groups of students who are fortunate enough to have effective teachers. (ix)

At school level, Rowe and Rowe (1993) argued:

> On the basis of our findings to date it could be argued that effective schools are only effective to the extent that they have effective teachers. (p. 15)

Petty (2009) fully contextualized the importance of good teachers in real life terms when he wrote:

> Good teachers touch people's lives for ever. If you teach well, some of your students will only succeed because of your excellent teaching. They then might go on to get more advanced qualifications and skills, again just because of your expert teaching. Then they might get a career, indeed a whole life, built on your excellent teaching. No other profession is that consequential and enabling. (v)

My experiences as a pupil at school, and as a teacher in many educational sectors and contexts, provided enough face-validity to convince me of the massive impact that teachers have on attainment and life chances. I have experienced the good, the

bad and the ugly, and I don't particularly feel good about the bad and the ugly. We now have a strong evidence-base to fully validate the high impact of teachers on attainment and we should not shirk the responsibility of enhancing the quality of teaching more extensively, wherever possible. It is shocking, though perhaps not that surprising, that there has been a lack of clarity on what constitutes highly effective creative teaching and how this can be systematically incorporated into professional development programmes. The basis of highly effective teaching, let alone creative teaching, has long been debated in the educational literature. For example, Ornstein (1995) from reviewing the literature, suggested that "…few facts concerning teacher effectiveness have been established" (p. 77). In the following sections I will make the case that much has changed in terms of our understanding of teaching effectiveness since these reviews (and it's not that long ago), however much of its practice still seems rooted in confusion. To understand this better, let's take a short tour into the nether regions of 'Educational Jurassic Park.'

1.2 A Short Tour into Educational Jurassic Park

Much of the confusion about what *is* or *should be* good teaching can be explained in some large part by Sallis and Hingley's (1991) assertion that "…education is a creature of fashion" (p. 9). I like this analogy as it is so grounded in my experience of fashion. While I have relatively little interest in fashion now, my teenage years were spent in the 1960s, the era of great musical bands, full employment, a real sense of optimism about the future and, of course, the famous fashion icon, the mini-skirt. This was the world as I knew it, and this was ladies fashion as I experienced it, and it seemed an objective reality of what was natural. I was of course unaware of such notions as 'socially constructed realities' (Berger and Luckman 1967). Reality was exactly as I perceived it, what else could it be? Equally, I never considered what it might have been like for the ladies wearing such attire in the winter months. However, one evening, my mother was showing me pictures of her when she was young, and the thing I noticed was the long skirts she wore. I vividly remember commenting that this seemed strange and I was glad evolution has moved on from then. It never dawned on me that fashion was the product of a deliberate industry ploy that systematically creates, manages and periodically *changes* images of desirable attire. After all it must do this, once the marketed item is saturated—how many pairs of flair bottom trousers can you fit in a typical male wardrobe? In defence of my lack of understanding of such matters, I don't think many 14-year olds of those times were versed in such sociological imagination either. It's no big deal that fashion in clothes is manipulated to ensure that new revenue is generated and novelty is added to an aspect of human experience. However, I am less comfortable when this applies to a profession—teaching; but this seems to be very much the case. For example, over a number of decades, we have seen shifts from 'traditional' to 'progressive' education and then

'back to basics', as well as, more recently, the teacher's role allegedly changing from 'sage on the stage' to 'guide on the side.'

A really negative consequence of this contested nature and periodic radical reframing of what constitutes good teaching is that it does little to convince anybody that teaching is truly a profession with well constituted bases of professional knowledge; as is the case of medicine or engineering. This is not to say that the medical profession or other well established professions have not gone through similar epochs of fads masquerading as practice, as Thomas's (1979) depiction of the medical profession before the drive towards evidence-based practice clearly portrayed:

> It is hard to conceive of a less scientific enterprise among human endeavours. Virtually anything that could be thought up for treatment was tried out at one time or another, and, once tried, lasted decades or even centuries before being given up. It was, in retrospect, the most frivolous and irresponsible kind of experimentation, based on nothing but trial and error, and usually resulting in precisely that sequence. (p. 159)

One would probably be both shocked and frightened if, on a visit to a modern medical centre, the doctor produced a saw, some leeches and asked you to drink a large dose of alcohol. We now see increasing sophistication of practice through a whole range of complex technology infra-structure. This is not to argue that all is well in the medical professional and there are probably still some 'dodgy' practices. However, it feels like the profession, in most modern societies, is largely driven by established and rigorous standards of research and validation. This seems to be relatively lacking in the context of education. Indeed, one may argue that this is visibly apparent as many classrooms look pretty similar to what they were decades or even centuries past. However, the major reason for the slower acceleration towards an accepted high professionalism in teaching is that much of practice is still largely driven by dominant paradigms or perspectives in psychology and pedagogy, rather than a solid empirical base. Paradigms are ways of looking at things in the world (e.g., meaning of life, human conduct, educational aims and practice) and contain certain premises and methodologies relating to those particular domains of reality. These, in turn, shape how we perceive and orientate ourselves to such realities. Kuhn (1996) famously noted that when socialized into a paradigm it becomes a prerequisite to perception itself:

> What a man sees depends both upon what he looks at and also upon what his previous visual-conceptual experience has taught him to see. (p. 113)

World religions are other notable examples of a paradigm in that they typically contain explicit assumptions about the nature of reality (e.g., a belief in a metaphysical being, absolute codes of conduct, building a relationship with that being) which shape the thinking and behavioural aspects of adherents to specific faiths. In education, much has been similar, though lacking adherence to a metaphysical being, only the occasional psychological guru, which may have very similar impacts in practice. Prominent paradigms in education have included 'behaviourism', 'cognitivism' and, probably the most dominant one in terms of 'current

vogue', 'constructivism'. These paradigms do offer insights relating to aspects of the learning process and provide some useful overall framing for approaching teaching. However, they are far from constituting a comprehensive evidence-based framework that has a strong predictive value in terms of enhancing student attainment. Certainly, the danger of limiting practice to one paradigm is well captured by Pratt (2002):

> Perspectives are neither good nor bad. They are simply philosophical orientations to knowledge, learning and the role and responsibility of being a teacher. Therefore, it is important to remember that each of these perspectives represents a legitimate view of teaching when enacted appropriately. Conversely, each holds the potential for poor teaching. (p. 14)

Anderson et al. (1998) are more explicit in identifying the problem when they argued that:

> What is needed more than a philosophy of education is a science of education. Modern attempts at educational improvement point back to theorists (Piaget, Vygotsky, and Dewey) whose theories are vague by current psychological standards and lack the strong connection to empirical evidence that has become standard in the field. (p. 237)

Mayer (2004) is most blunt in advocating the necessity of making the kind of changes in approach to practice that have occurred in other more established professions. He argued that we must:

> …move educational reform efforts from the fuzzy and unproductive world of ideology - which sometimes hides under the various banners of constructivism – to the sharp and productive world of theory-based research on how people learn. (p. 18)

Finally, the problem appears systemic, both in terms of policy and practices, and shapes the socialization of new recruits into the profession, which is the hallmark of a paradigm. Stone's (2000) criticism of some teacher education programmes further illustrates the continuation of paradigms rather than evidence-based practice in the training of teachers:

> What teachers are told, however, is that student differences are important and if their teaching is truly creative, energetic and engaging, they will succeed in individualising and bringing forth the best from all students. In effect teachers are being taught to make diagnoses that heighten their awareness of differences without advancing their ability to teach. (p. 43)

In consequence, this has created much confusion for many teaching professionals as to what is good pedagogy (indeed, what is pedagogy) and what are truly useful knowledge-bases from which we can design teaching strategies with a high predictive value in terms of meeting desired learning outcomes. It is very unlikely that many in the teaching profession believe that this is the result of limited available literature on teaching and how to teach, just as there is no shortage of writings on other topics of educational relevance, such as parenting. However, the confusion does not seem to abate. Hattie (1999), for example, stated:

> A glance at the journals on most shelves of most libraries, my colleagues' shelves, and on web pages would indicate that the state of knowledge in the discipline is healthy. The worldwide picture is certainly one of plenty. (p. 1)

However, in the same address he argued that:

1. Teachers/researchers have models of learning that are rarely externally elaborated or asked for
2. Teachers/researchers seek evidence to buttress their models of learning and thus rarely seek to refute them or introduce major changes.

> We all seek positive evidence in that which we love. Teachers/researchers, like lovers, are often blind. (p. 2)

As a result, to quote Hattie again in this context, this results in:

> …a school community peopled with teachers with self-fulfilling prophecies, all believing they are doing a good job, and with models of learning rarely based on any other evidence than that "it works for me". As well, we have an educational research community peopled with academics chasing their pet theory, promoting their own methodology while passing each other in corridors, and rarely asking for negative evidence, and pushing with passion that "if only the teachers would do this, or know that". Both educational communities work behind closed doors, coming out to discuss kids, curricula, accountability, and each other, but rarely discussing the fundamental tenets about their teaching that leads to **positive impacts on student learning**. (p. 2)

A particularly notable example, that fully illustrates the above analysis, is that of *Learning Styles* which has shaped the thinking and practices of many teachers worldwide. Over the years, I have had many heated debates on this topic and always refused to conduct workshops or seminars on learning styles, as I felt it was, at best, an ephemeral entity in the learning and attainment stakes. From an evidence-based point of view, it now seems little more than 'folk psychology', and I can take some solace in that. As Hattie (2009) summarized:

> One of the more fruitless pursuits is labelling students with 'learning styles'. This modern fad for learning styles, not to be confused with the more worthwhile notion of multiple learning strategies, assumes that different students have differing preferences for particular ways of learning (Pashler, McDaniel, Rohrer, & Bjork, 2009; Riener & Willingham, 2010). Often, the claim is that when teaching is aligned with the preferred or dominant learning style (for example, auditory, visual, tactile, or kinesthetic) then achievement is enhanced. While there can be many advantages by teaching content using many different methods (visual, spoken, movement), this must not be confused with thinking that students have differential strengths in thinking in these styles. (p. 89)

1.3 Moving Out of Educational Jurassic Park

Much is changing as far as teaching is concerned and it may, as Petty (2009) argued, be ready to:

> …embark on a revolution, and like medicine, abandon both custom and practice, and fashions and fads, to become evidence-based (cover page).

In terms of paradigms, there is a significant shift towards a more evidence-based approach to learning and teaching. One may argue that this is simply another paradigm shift and may not constitute a more valid or verifiable base of knowledge from which to design and enact the practices we call teaching. Indeed, this is very much the standpoint of more radical forms of constructivism. For example, Lincoln (1990) pointed out:

> The constructivist paradigm…has as its central focus not the abstraction (reduction) or the approximation (modelling) of a single reality but the presentation of multiple, holistic, competing, and often conflicting realities of multiple stakeholders and research participants (including the inquirers). (p. 73)

Invariably, one cannot escape the essential subjectivity of experience, and suggestions of a value free science are untenable. However, I feel it is necessary to retain at least a critical operational notion of objectivity as a 'regulatory ideal'; otherwise there is little point in conducting inquiry, whether it be about good teaching or good football, or whatever. As Phillips (1990) argued:

> If we abandon such notions, it is not sensible to make inquiries at all. For if sloppy inquiry is as acceptable as a careful one, and if an inquiry that is careless about evidence is as acceptable as an inquiry that has taken pains to be precise and unbiased, then there is no need to inquire… (p. 43)

In this context, to argue that there are no better nor worse ways in which to design student learning experiences is both absurd and dangerous. As Ramsden (1992) wrote:

> It is a folly to suggest that there are no better or worse ways of teaching, no general attributes that distinguish good teaching from bad. (p. 87)

It is now firmly established that there is a strong evidence-base relating to how best to design and facilitate the various practices we call *teaching* that can significantly enhance student learning opportunities and attainment levels. This change is an inevitable result of our increasing knowledge relating to how humans learn, what teaching methods and practices work best and why, and an unpacking of what the best teaching practitioners actually do and how. Much of this significant research on learning has already been documented in the literature (e.g., Bransford et al. 1999; Marzano 2007; Mayer and Alexander 2010; Hattie and Yates 2014). Collectively, the research evidence is now providing us with a heightened pedagogic understanding of the various facets of highly effective teaching and, when this is used creatively in context, it will optimize attainment for a wider range of student groups.

In most basic terms we can now start to talk about professional practices in teaching from a more validated empirical base, much as we have long done for the more established professions (e.g., medicine and engineering). Indeed, even two decades ago, Marzano (1992) argued:

> …over the past 3 decades, we have amassed enough research and theory about learning to derive a truly research based-model of Instruction. (p. 2)

More recently, Darling-Hammond and Bransford (2005), from surveying the research findings, concluded that:

> There are systematic and principled aspects of effective teaching, and there is a base of verifiable evidence of knowledge that supports that work in the sense that it is like engineering or medicine. (p. 12)

There is no doubt that our understanding of how humans learn is rapidly increasing, especially as the fields of cognitive and social neuroscience provide further insights into brain functioning at the neurological level, and how this plays out in terms of human cognition and behaviour relating to learning. Equally, and fully consonant with this heightened understanding of human learning, is the accumulation of extensive and rigorous research activity, which is uncovering from a strong empirical base which teaching methods tend to work best and on what basis. Perhaps most publicized in this area is the work of Hattie (e.g., 2009, 2012), though many others have been providing significant contributions over recent years (e.g., Bransford et al. 1999; Marzano 2007; Mayer and Alexander 2010; Petty 2009). Mansell (2008) referred to Hattie's seminal work on the effectiveness of different teaching methods and strategies as:

> … perhaps education's equivalent to the search for the Holy Grail - or the answer to life, the universe and everything.

There is little doubt that Hattie's work is a definitive landmark in educational research, perhaps providing a key push in the movement away from more ideological-based paradigms towards evidence-based practice in teaching. Hattie synthesized over 800 meta-analyses of the influences on learning and most significantly, he was interested not just in what factors impacted learning, but the extent of their impact - referred to as *Effect-Size*. Effect size is a way to measure the effectiveness of a particular intervention to ascertain a measure of both the *improvement* (gain) in learner achievement for a group of learners and the *variation* of learner performances expressed on a standardised scale. By taking into account both *improvement* and *variation* it provides information to which interventions are worth having.

Hattie firstly identified the typical effect sizes of schooling without specific interventions, for example, what gains in attainment are we likely to expect over a one-year academic cycle? Typically, for students moving from one year to the next, the average effect size across all students is 0.40. Hence, for Hattie, effect sizes above 0.4 are of particular interest. As a baseline an effect size of 1.0 is massive and is typically associated with:

Table 1.1 Examples of effect sizes in learner attainment from Hattie's meta-analysis

Influence	Mean effect size
Feedback Students getting feedback or their work from the teacher, their peers or some other sources. Note: Some feedback has more effect than others. For example, peer assessment is 0.63 and self-assessment is 0.54	0.73
Meta-cognitive strategies Students can systematically think about (plan, monitor and evaluate) their own thinking and affective processes (e.g., beliefs, emotions, dispositions) to develop effective learning to learn capability and self-regulation	0.69
Challenging goals Students having a clear frame on, and see purpose in, what they are learning, as well as experience realistic challenge in meeting goal expectations	0.56
Advance organizers Giving students an overview (in an appropriate format and level of understanding) of what is to be learned in advance of the lesson, to help make meaningful connections between their prior knowledge and the new material to be presented	0.41

- Advancing the learner's achievement by one year
- Improving the rate of learning by 50 %
- A two grade leap in GCSE grades

Table 1.1: Examples of effect sizes in learner attainment from Hattie's Meta-analysis shows some high impact methods on student attainment, as demonstrated by their effect size.

However, as Hattie notes, it is important to balance effect size with the level of difficulty of interventions. For example, providing 'advance organizers' (summaries in advance of the teaching) have an effect size of 0.37, which is pretty average, but they only take up a few minutes at the beginning of the lesson, and potentially offer the equivalent of moving up a year in terms of a students achievement.

He goes on to make relative comparisons of intervention use, which enables us to go beyond identifying the effect sizes for particular innovations (deliberative intervention involving strategy/method use for a group of students), and ascertain whether the effects of a particular innovation were better for students than what they would achieve if they had received alternative innovations.

Of particular significance is the fact that it is not just the effect size of one intervention that is important, but how a number of effective methods can be strategically and creatively combined to produce powerful instructional strategies that significantly impact student attainment. As Hattie (2009) pointed out:

> …some effect sizes are 'Russian dolls' containing more than one strategy. For example, 'Feedback' requires that the student has been given a goal, and completed an activity for which the feedback is to be given; 'whole-class interactive teaching' is a strategy that includes 'advance organisers' and feedback and reviews. (p. 62)

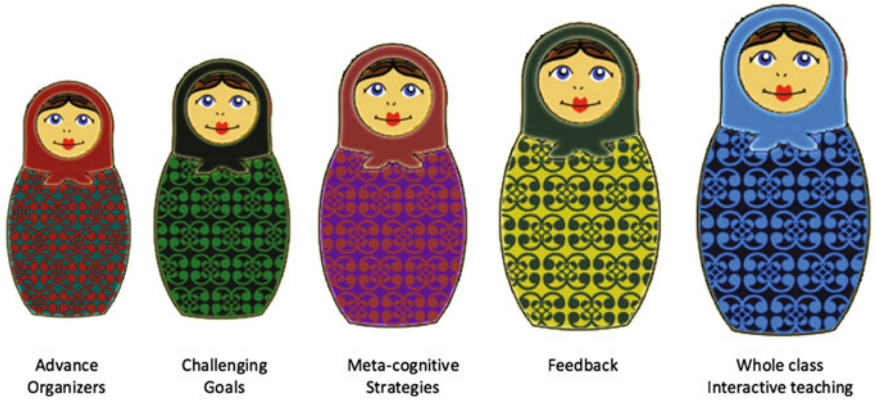

Fig. 1.1 Illustration of Hattie's Russian Doll analogy

For readers not familiar with 'Russian Dolls', they are a set of different sized dolls, usually around 5, and they fit one inside another from the smallest to the biggest. Figure 1.1: Illustration of Hattie's Russian Doll analogy provides a visual example of high effect method combination.

The Russian Doll analogy provides an easy to remember generic advance organizer for planning lessons as it should easily evoke the key question of what strategy or method combination is likely to be most effective for the particular student group. However, as will be explored in subsequent chapters, some methods may have better overall impact on student attainment but in learning, as in all aspects of life, too much of a good thing often leads to habituation and boredom, and subsequently loses its impact. Also, in designing the overall instructional strategy we must take into account the learner profile (especially prior competence and motivational status), the learning outcomes to be attained, and the available resource facilities that can be accessed.

The interested reader can refer to Hattie's original works (e.g., Hattie 2009, 2012) for the extensive detailed coverage of the research methodology employed and the full range of effect sizes for different instructional methods and learning strategies.

1.4 Summary: Moving from Mystery to Heuristics

In summary to this introductory chapter, I offer an analogy between recent developments in knowledge bases relating to how humans learn and the effectiveness of different teaching methods with Martin's (2009) depiction of the "knowledge funnel" (Fig. 1.2: Martin's Knowledge Funnel). In developing understanding of the nature and working of things in the world, he depicts a process in which phenomena can move from being a 'mystery' (experienced in some way but not understood) to

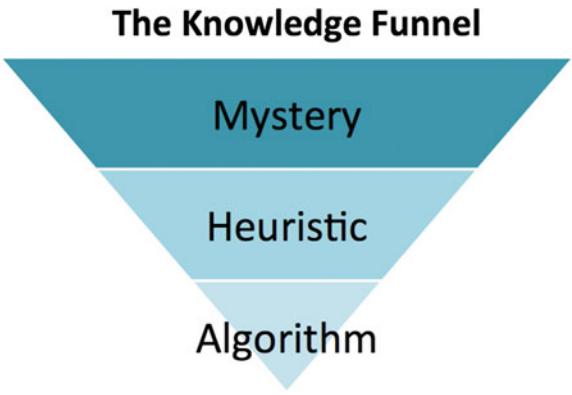

Fig. 1.2 Martin's knowledge funnel

a 'heuristic' (understandable in good part) and finally to 'algorithmic' (fully understood, predictable and controllable). In terms of Martin's knowledge funnel, I am suggesting that, as far as teaching is concerned, we have moved a long away from it constituting a mystery to one of clearly identifiable and understandable heuristics.

Heuristics, according to Martin are particularly important in understanding aspects of reality as they:

> …represent an incomplete yet distinctly advanced understanding of what was previously a mystery. But that understanding is unequally distributed. Some people remain stuck in the world of mystery, while others master its heuristics. The beauty of heuristics is that they guide us toward a solution by way of organized exploration of possibilities. (p. 12)

It is to be noted that heuristics in this context retains the more generic notion of 'rules of thumb' that enables people to solve problems and make judgments quickly and efficiently but extends the concept to include existing (but as to yet, incomplete) knowledge about phenomena in the world. In this way good heuristics should enable teaching professionals to be able to design learning experiences effectively and efficiently from a sound pedagogic base but, as the term denotes, *not* with certainty of outcome in all situations. How this works in practice will be explained and illustrated in the forthcoming chapters. It constitutes a significant shift towards a more substantive evidence-based profession, and reflects very strikingly Perkins' (1992) description of the 'unequal distribution of knowledge' concerning what we know about learning and teaching and what actually happens in many classrooms:

> …we do not have a knowledge gap—we have a monumental *use-of-knowledge* gap. (p. 2)

The key purposes of this book are to firstly consolidate a perspective on the 'science of learning' or what is increasingly being referred to as *Evidence-Based Teaching* (e.g., Petty 2009). This introductory chapter has demonstrated that teachers make the really big difference in terms of student learning and attainment, and we now understand much more specifically what they do that makes this difference and how it actually works at the level of classroom practices. Chapter 2

provides a comprehensive synthesis of the extensive research bases relating to human learning and how these impact, or should impact, the way we plan and conduct the practices we call *Teaching*. This constitutes a solid evidence-based pedagogic framework, what I refer to as *Pedagogic Literacy*. It represents the core foundational knowledge and understandings that all teaching professionals should possess as the basis for designing instructional strategies and the conduct of teaching, irrespective of context. Yes, context is always important and the best teaching is always situated to the context of the learners and the learning environment, but it starts from essential *Core Principles of Learning*. In terms of Martin's Knowledge Funnel, these can be seen as the Heuristics of highly effective and creative teaching. This is no longer a Mystery.

Secondly, to take on the challenge of demystifying *Creative Teaching Competence*, and therefore reduce the mystery of what constitutes creative teaching and how it works at the level of design, enactment, and the subjective experience of learners. In Chaps. 3 and 4, creativity is unpacked in terms of the underpinning psychological functioning, what is a realistic framing of creativity as viable everyday teaching activity, and what constitutes creative behaviour as actual teaching practices? In Chap. 5, building on the *Creative Teaching Framework* established from previous chapters, the affordances of information communication technologies (ICTs) are analysed and evaluated in terms of their potential as creative learning tools. Certainly Educational Jurassic Park has been the venue for much of what has occurred regarding the implementation of technology for supporting teaching and learning. It will be demonstrated that when used from an evidence-based approach, ICTs have high potential for creative teachers to significantly enhance learning opportunities and attainment levels for an increasingly diverse range of learners. This is a major way forward for designing highly productive differentiated instruction. Chapter 6 focuses on the implications of an evidence-based approach for the professional learning of teachers. What does *not* work and what does work in terms of professional development for teachers are specifically identified, and the key challenges are presented. While we know what is most likely to enhance teaching quality that results in enhanced student attainment, such professional learning comes at a cost in terms of time and resources. Both individuals and institutions have to make right choices.

In many ways, this book represents a convergence on differing conceptions of teaching as 'art', 'craft' or 'science' in the research literature (e.g., Eisner 1995). We may be finally moving towards a situation in which there is both increasing understanding and capability to develop the practices and 'tools' of effective teaching, which Drucker suggested were only previously known by "the naturals, the ones who somehow know how to teach".

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Chapter 2
The Heuristics of Effective Teaching

2.1 Establishing a Useful Frame on Pedagogy: The Core Principles of Learning

Pedagogy is a much used term by educationalists and other personnel in the learning industry when talking about matters of curriculum, teaching and learning. No matter how many curriculum-related meetings I participate in, I am still amused by the plethora of terminology that surface in this area (e.g., pedagogical approach, pedagogic practices, pedagogical content knowledge and, more recently, signature pedagogies). However, what is equally apparent is that for many there is still a high level of conceptual confusion. This was recently highlighted by being asked specifically by a course manager, "Is there one pedagogy or many and, if so, how are they best categorized?" This can be explained as just another consequence of periodic radical reframing of what constitutes good teaching, as outlined in Chap. 1. It is not surprising that people are confused, because there *is* confusion. This chapter will seek to reduce some of the confusion and, more importantly, offer a pedagogical framework that is firmly grounded in the increasing evidence bases relating to how humans learn and what teaching methods actually work best and why.

Historically the term pedagogy seems to have been derived from the Greek words *paid*, meaning "child" and *agogus* meaning "leader of." This essentially frames pedagogy as referring primarily to the teaching of children. Mortimore (1999), in a comprehensive review of the literature on pedagogy, noted that approaches to pedagogy have gone through various phases, focusing on such aspects as 'teaching styles', 'paradigms of learning', 'models and methods of teaching' and 'the context of teaching'. He, not surprisingly, concluded that:

> Pedagogy has been seen by many within and outside the teaching profession as a somewhat vague concept. (p. 228)

D. Sale, *Creative Teaching*, Cognitive Science and Technology,
DOI 10.1007/978-981-287-534-1_2

More recent definitions (The Free Dictionary 2014) have dropped the reference to child and applied it more generically to "the principles, practice, or profession of teaching" or "the activities of educating or instructing." Pedagogy has also been contrasted with the term *andragogy* (Knowles 1984), which focuses on the teaching of adult learners. Invariably, this in itself has led to further confusion: do adults learn differently from children and should they be taught differently and in what ways, how?

Certainly there are significant differences in the level of prior experience of adults, as compared to children. Adults also choose what they learn and this is typically consciously directed to meet work or personal learning goals. Kids at school are largely told what to learn, at least in the earlier years. However, whilst there are important motivational and life experience differences for adults, it is questionable whether the underlying learning process is structurally different from that of children who have attained the stage of formal operational thought (Piaget 2001), typically around 12–15 years of age. At this stage of brain maturation, children are able to reason logically and use a range of thinking skills (e.g., analyze, compare and contrast, make inferences and interpretations, evaluate). In some ways, this has similarities with the notion of different learning styles, which was popular in the educational literature for a couple of decades. As outlined in Chap. 1, research has far from validated such theories and, in particular, their usefulness in terms of pedagogically useful applications. I agree with Schank (1997) who argued that:

> Contrary to common belief, people don't have different learning styles. They do, however, have different personalities. The distinction is important, because we need to be clear that everybody learns in the same way. (p. 48)

A similar inference and interpretation is made by Goulston (2009), who argued that:

> While our lives and our problems are very different, our brains work in similar ways. (p. 3)

While philosophical discussions on how best to frame pedagogy will inevitably continue and this is important in critical educational discourse, it has limited usefulness for busy teaching professionals seeking practical guidance on how best to design highly effective learning experiences and conduct their teaching practices skilfully. As indicated in the previous chapter, we are now in a position to frame a more cohesive evidence-based pedagogy that can provide the essential validated professional knowledge base for guiding practice. The present scenario is analogous to completing a large complicated jig-saw puzzle, and we don't have all the pieces (some are clearly missing). However, we have enough pieces and the intelligence to construct a sufficiently useful picture of what effective and creative teaching entails, and what is required for successful enactment in practice. It is useful to have strong empirical evidence that teachers make the most significant difference (positive or otherwise) in terms of student attainment levels and student's lives. However, it is even more essential to go much further and be able to evolve valid and practical pedagogic models of how the most effective teachers actually do this at the level of

experience design. It is only from an evidence-based approach can we produce professional development programmes which have high predictability in terms of improving teaching practices and student attainment levels. Similarly, Hattie's (2009) summary of differential teacher proficiency is salient in this context:

> Not all teachers are effective, not all teachers are experts, and not all teachers have powerful effects on students. The important consideration is the extent to which they do have an influence on student achievements, and what it is that makes the most difference. (p. 34)

As outlined in Chap. 1, much has been learned about the effectiveness of different methods of teaching and strategies of learning and their impact on student attainment. The big questions now centre on what makes such methods and strategies work better and how they operate in terms of productively structuring the subjective experience of learners. To put it in most simple terms, what specifically goes on inside students' heads and how does this enhance their learning processes, resulting in better attainment? The more we frame better evidence-based answers to these questions, the more we move towards a *pedagogy* that is practically useful in terms of how we teach, and all that this entails.

In the following sections of this chapter, through an extensive synthesis of a wide range of knowledge bases relating to human learning, I outline and illustrate certain key heuristics or *Core Principles of Learning* that underpin highly effective teaching. Together they constitute a pedagogic framework from which teaching professionals can thoughtfully plan learning experiences from a more evidence-based perspective. The framework does not claim to be exhaustive or summative as new knowledge and insights will continually enhance our understanding of human learning and the implications for how we teach. However, from much validation in practice across a wide range of educational sectors and cultural contexts, I see them as contributing to a much needed ***Pedagogic Literacy***.

Furthermore, while each Core Principle of Learning focuses attention on a key area or process relating to how humans learn and the specific implications for planning instruction, they are not discrete or separate in that they should be considered independently of each other. In fact, they are mutually supporting, interdependent and potentially highly synergistic. As Stigler and Hiebert (1999) highlighted:

> Teaching is a *system*. It is not a loose mixture of individual features thrown together by the teacher. It works more like a machine, with the parts operating together and reinforcing one another, driving the vehicle forward. (p. 75)

2.1.1 Core Principle 1: Motivational Strategies Are Incorporated into the Design of Learning Experiences

Motivation initiates, directs and maintains all human behaviour. It is inseparable from learning in that without some motivational base, limited attention and effort

will be given to that area of human activity. Indeed, as Sylwester (1998) pointed out:

> It's biologically impossible to learn anything that you're not paying attention to; the attentional mechanism drives the whole learning and memory process. (p. 6)

In a similar vein, Csikszentmihalyi (1990) argued:

> The shape and content of life depends on how attention has been used….Attention is the most important tool in the task of improving the quality of experience. (p. 33)

Motivation and attention are very much connected in the world of the classroom, as in all areas of human activity. When learners are motivated, they are much more likely to give a higher level of attention than in situations when motivation is poor. They are also more likely to put effort into the learning process, especially when difficulties are encountered. As a result, and this is fairly obvious, motivation and effort over time, especially if supported by a good teacher, typically results in better learning outcomes. This provides the basis for further motivation, as well as enhancing confidence. Over time increased mastery is likely to be achieved and, many years down the line, even expertise.

However, while motivation is recognized as fundamental to learning, there is much debate about how it works and, more significantly, how we as teachers can harness such human energy in the pursuit of educationally desired learning goals. The literature is rich in terms of theories and models of human motivation (e.g., Maslow 1962; Herzberg 1966; Deci and Ryan 2002; Dweck 2006), but I have some empathy with the frame of the management guru Peter Drucker (1999) who made the challenging assertion that:

> We know nothing about motivation. All we can do is write books about it.

Indeed, this may seem to have a fair measure of face validity at least in terms of widespread practice in educational institutions, as Levin (2008) concluded:

> …boredom and lack of engagement remain endemic in schools around the world, and seemingly unmotivated students are a main complaint of teachers. (p. 99)

Certainly, whatever the underpinning bases of human motivation entail, especially in the context of the school environment, there seems to be a real problem which has not been sufficiently addressed to date. For example, Wagner (2010) made the point that:

> In countless focus groups I've conducted with high school students, "boring classes"-which include so-called advanced classes – are among the main complaints about school. (p. 114)

What then can we really establish as an evidence-based frame on human motivation, as compared to what we might like to believe it is? On many occasions I have heard teachers being told by various sources that they should ignite the passion for learning in every child. A nice ideal and it should be a goal we seek to attain. However, it's a bit like saying doctors should be able to cure all diseases and

sickness, and this may be a goal that many seek. I would particularly like that, especially if they can reverse the ageing process also. However, it's not the world as I know it. The evidence would also support this, as people are still getting sick and dying. Referring back to motivating students—is it really possible to ignite a passion for learning in all? Well, I'm going to play my 'get out of jail' card (this is a card used in the game of Monopoly to enable your moving counter icon to immediately get out of jail when it unfortunately, through the throw of the die, lands on a space that denotes 'Go to jail'). I really don't know the answer to the question, and I'm not sure there is one. It is similar to asking the question of whether or not people are born basically *good* or *neutral* in terms of dispositions, or are some simply badly wired to be difficult or even dangerous? The nature-nurture argument is far from settled, as Pinker (2002) documents in The Blank Slate: The Modern Denial of Human Nature.

However, while we might like algorithmic answers to our big questions, whether it's how best to motivate our students or other areas of life that are meaningful to us, in reality we may have to settle for a well framed evidence-based set of useful heuristics; otherwise we may simply go with personal preference, albeit more philosophical than empirical. In most basic terms, from my experience, I would not dispute the English Philosopher Jeremy Bentham's (1789) framing of human motivation in terms of:

> Nature has placed mankind under the governance of two sovereign masters, pain and pleasure.

Invariably, what is pleasure to one person may be pain for another, but little in my life has seriously questioned the underlying premises. Indeed, such a perspective, with some additional components (e.g., novelty) has been supported from the field of cognitive neuroscience (e.g., Cloninger 1997). In educational contexts, few would disagree that students who perceive classroom learning as painful and boring are unlikely to contribute much, except to absenteeism rates and disruptive behaviour. The converse is also true. When students experience the learning as personally interesting, or place value on the qualification to be obtained from successful completion of a programme, they are more likely to participate meaningfully in the learning activities. For many adult learners, there are clear goals associated with their learning. These may have both extrinsic and intrinsic components. Extrinsic motivation typically refers to the motivation coming from external factors to the activity (e.g., money, status or power, rather than the specific work activity). In contrast, intrinsic motivation is where motivation is derived from doing the task itself (e.g., passion for teaching). For example, having conducted more than 100 teacher education programmes, it was apparent that many participants had joined the programmes largely for purposes of accreditation (e.g., no certificate, no job). However, even for such extrinsically motivated persons many did, over the duration of the programme, find intrinsic interest which resulted in added value to their overall learning experience.

Where there are strong extrinsic motivators, it is always likely that learners will try to maintain a level of attention to achieve success on the programme (typically

certification). Even for non-adult learners, grades and passing the examinations are strong extrinsic motivating anchors. However, for many pupils, there may be limited extrinsic motivators (e.g., passing exams for the school subjects does not get them a desired job) as well as little or no intrinsic interest in school subjects. This makes teaching such students highly challenging and potentially frustrating. It is in this situation that the competence and creativity of teachers is really challenged. Have you been there? If so, I need to say no more. You will also know what a really significant difference you can make.

Motivation is influenced by a wide range of interacting factors, such as cultural values, personal beliefs, perceived usefulness and interest in the learning or what it will lead to. In the absence of strong external motivators, interest is fundamental to motivation. We actively seek to do stuff we like. It's as simple as that. Whitehead (1967) puts a nice spin on this:

> There can be no mental development without interest. Interest is the *sine qua non* for attention and apprehension. You may endeavour to excite interest by means of birch rods, or you may coax it by the incitement of pleasurable activity. But without interest there will be no progress. (p. 37)

Students who believe that the learning experience may result in satisfying some aspect of personal need (whether consciously or subconsciously) are more likely to participate meaningfully in the learning process. Equally important in the motivation stakes is to what extent students actually believe they are able to achieve their desired goals. Schunk and Zimmerman (2008) found that:

> The self-efficacy beliefs that students hold when they approach new tasks and activities serve as filters through which new information is processed. (p. 118)

For example, Bandura (1997) observed that students who believed they were capable of meeting desired goals (self-efficacy) were much more likely to take on the required learning tasks, put in the necessary effort and achieve success, than those who lacked self-efficacy. In contrast, students who believe that they lack the capability or intelligence to achieve goals are much less likely to put in the necessary effort, especially when the learning gets tough. However, as we know, new learning is often tough and this is especially the case when one is a novice in that skill area. Without a strong belief that the desired learning is attainable, the perseverance to continue in this situation can quickly wane, with a likely outcome of rapidly terminating attention and effort for this particular learning activity. Hence, limiting beliefs about one's capability can easily become a major systemic barrier for future learning, as they often result in a self-fulfilling prophecy. Merton (1948) developed the notion of 'Self-Fulfilling Prophecy' and its implications for person perception and subsequent behaviour, aptly captured by W.I. Thomas (sometimes referred to as the Thomas theorem), "If men define situations as real, they are real in their consequences." Merton points out that:

> The first part of the theorem provides an unceasing reminder that men respond not only to the objective features of a situation, but also, and at times primarily, to the meaning this

> situation has for them. And once they have assigned some meaning to the situation, their consequent behaviour and some of the consequences of that behaviour are determined by the ascribed meaning. (p. 194)

He goes on to suggest that:

> The self-fulfilling prophecy is, in the beginning, a *false* definition of the situation evoking a new behaviour which makes the original false conception come *true*. The specious validity of the self-fulfilling prophecy perpetuates a reign of error. For the prophet will cite the actual course of events as proof that he was right from the beginning. (p. 195)

In most basic terms, our thinking and consequent behaviour is largely based on the 'pictures in our heads' and if they are *poor* pictures, the consequences may turn out just that way also. Fortunately, they are changeable based on new experience which is hardly surprising, if we think back to what we believed to be true as children. Do you really still believe in the 'tooth fairy', Santa Claus, or the bogeyman under the bed? As Adler (1996) cleverly noted:

> We forget that beliefs are no more than perceptions, usually with a limited sell by date, yet we act as though they were concrete realities. (p. 145)

For example, in this context, Dweck's (2006) extensive research on students' beliefs (mind-sets) relating to intelligence has profound implications in terms of motivation, how students subsequently approach their learning and for how teachers teach (see Fig. 2.1: Comparison of Fixed and Growth Mind-sets). In summary, she contrasted two fundamentally different mind-sets, relating to how students approach learning, a *Fixed mind-set* and a *Growth mind-set.* Students who possessed a fixed-mind-set tended to see intelligence as a stable genetic quotient, and as a consequence you are either smart or you are not. In contrast, students who possessed a growth mind-set saw intelligence as a more fluid entity, reflecting effort and hard work, and a capability that can be developed and enhanced. To quote Dweck, a growth mind-set:

> … is based on the belief that your basic qualities are things you can cultivate through your efforts. Although people may differ in every which way – in their initial talents and

Fixed Mindset (Intelligence is static)	**Growth Mindset** (Intelligence can be developed)
Leads to a desire to look smart and therefore a tendency to: • Avoid challenges • Get defensive and give up when faced with obstacles • See effort as something less able people need, and not for the smart • Ignore useful negative feedback • Feel threatened by the success of others	**Leads to a desire to learn and therefore a tendency to:** • Embrace challenges • Persist in the face of setbacks • See effort as the path to mastery • Learn from criticisim • Find lessons and inspiration in the success of others
As a result, they may plateau earlier and achieve less than their full potential	**As a result, they reach ever-higher levels of achievement**

Fig. 2.1 Comparison of fixed and growth mind-sets

Fig. 2.2 Beliefs as a filter on reality

> aptitudes, or temperaments – everyone can change and grow through application and experience. (p. 7)

It is not difficult to understand how beliefs profoundly affect the way people approach their learning and the subsequent impact on attainment levels. Beliefs act as major neurological filters that determine how we perceive external reality (Fig. 2.2: Beliefs as a Filter on Reality). In this way they provide the inner maps we use to make sense of the world around us. When we have a belief about something in our world, we act as though it is true. It is what is in our Inner Personal Map of Reality that determines our perception, emotional responses and orientation to people and things in the External World. While the External World is only knowable through our senses and therefore can never be fully ascertained in purely objective terms (whatever this is), our challenge as evidence-based teaching practitioners is to build increasingly more useful Internal Maps of how best to facilitate learning and attainment for *our students* (part of our External World) and improve the quality of their Inner Personal Maps of Reality through the ways we teach and interact with them. How this works, in specific teaching contexts, will be illustrated further in this and subsequent chapters.

What is of particular significance in this context is that it is not just a question of student's beliefs, and their subsequent impact on perception and behaviour, but also that of the teachers. Furthermore, as the impact of teachers is the single most important factor in influencing student attainment, how they communicate their beliefs about learning capability to students will impact significantly on how students frame themselves as learners. The impact of teacher expectations on learning and attainment has a long and rich history in the educational literature. A landmark study was that of Rosenthal and Jacobson (1968) who set out to empirically demonstrate, in an educational context, that one person's expectation of another's behaviour could come to serve as a self-fulfilling prophecy. In basic terms they hypothesized that if teachers had high expectations of certain pupil's progress, this, in itself, could contribute to their actual progress. They conducted an experiment at a public elementary school (referred to as 'Oak School') in which only the prophecy is varied experimentally, uncontaminated by other variables. Prior to the commencement of the experiment proper, all children in the school, grades (years) 1–6, were given the "Harvard Test of Inflected Acquisition", a standardised, relatively nonverbal test of intelligence. At the end of the summer of 1964, the classes having been pre-tested, 20 % of the children were selected by means of random numbers

and designated as academic "spurters"—referred to as "special" children by the authors. Teachers, when given the lists of names in their class, were told only that they might find it of interest to learn which of their children were about to bloom. All children were retested after one semester, after a full academic year, and after two academic years. The overall findings of the experiment, after one year, showed that the "control" children gained over 8 IQ points, while the experimental group —"special" children—gained over 12 IQ points. However, it was in the first and second grades that the effects of teachers' prophecies appeared most dramatic. In these grades 19 % of the control group children gained 20 IQ points or more, but of the special children, 47 % gained that much. The authors concluded that:

> When teachers expected that certain children would show greater intellectual development, those children did show greater intellectual development. (p. 82)

While there has been criticism of a number of aspects of Rosenthal and Jacobson's research design (e.g., Thorndike 1968; Snow 1969), their attempt to provide a rigorous experimental design to empirically test the hypothesis that teacher expectations did significantly impact student attainment levels opened up the debate on how these effects are socially produced through classroom interactions between teachers and students. Much is now known on how this works, with many subtle processes operating subconsciously. These will be identified and explored in terms of how they can be used in practice to enhance attainment in subsequent chapter sections. Certainly teacher's beliefs and expectations do significantly impact student learning and attainment, as Hattie (2009) concluded:

> There are differences in attainment gains relating to whether teachers believe that achievement is difficult to change because it is fixed and innate, compared to teachers who believe that attainment is changeable (the latter leading to higher gains). (p. 92)

Similarly, Marzano's (2007) research is of particular interest in terms of explaining how different aspects of human psychological functioning interact in terms of influencing individual's motivation to learn. His new taxonomy focuses on three internal systems, all of which are important for learning. These are summarized below:

- **The Self-system**—This relates to the set of beliefs (and related feelings) the student holds about his or her capabilities, the meaning attributed to the task in hand, along with the perceived likelihood of success
- **The Meta-cognitive system**—This relates to the higher level self-regulation of the student in terms of being able to monitor and evaluate his or her own thinking process (e.g., setting goals, monitoring progress towards these goals and adapting to difficulties)
- **The Cognitive system**—This is the system that reasons, and thinks in specific ways (e.g., analyses, compares and contrasts, makes inferences and interpretations, evaluates) with the information at its disposal, to achieve the desired goals.

When faced with the option of participating in a new learning project or activity, it is the Self-system which initially decides (whether consciously or

subconsciously) to give attention and then activates the Meta-cognitive and Cognitive systems to provide structure and direction for the appropriate learning strategies and skills to acquire necessary knowledge, build understanding and skills to move progressively to goal attainment. He found that teaching strategies that activated the Self-system had greatest effect on student learning, the Metacognitive system the next most effect, and the Cognitive system least, though it is still substantial. What this means is that it is the Self-system that activates the Meta-cognitive system, which actives the Cognitive system, which creates learning. In the ideal situation for effective learning we would like to get all systems fully 'up and running' towards meeting the demands of the desired learning goal. What we now can be reasonably sure of is that without a desire to meet a task's outcomes, belief in one's capabilities to attain the necessary knowledge and skill components and a perception of likely success, there is likely to be little effort to commit to task requirements. Quite simply, unless the Self-system is firmly activated, the other important systems are not likely to be working at anywhere near optimal levels.

There are a number of important implications for teaching deriving from this Core Principle of Learning. While motivation is something fundamental to human existence and its importance runs across all areas of human activity, there is still much debate concerning how best to motivate students in educational institutions. Hence, it is a fundamental overall consideration in planning the learning experience and how we teach, though we must always recognize that much can vary depending on the student groups we teach. On one end of the spectrum, we may have groups of learners who are intrinsically motivated and want to learn as much as they can from what we are offering. However, this does not mean that we can leave this out of our planning considerations. Even the most intrinsically motivated students can be de-motivated in the face of boring teachers, and this is probably an experience that most of us will have experienced at some time. In contrast, at the other end of the spectrum, we may have students who initially display little or no intrinsic motivation for school learning but, over a period of time with good teaching, can develop interest through new perceived meaning and usefulness in what is being learned, and increasingly become more motivated and successful learners.

First and foremost, the design of learning experiences must involve much more than the actual subject knowledge involved, but also ways to generate and sustain learner interest. As Wlodkowski (1999) argued:

> …if something can be learned, it can be learned in a motivating manner…every instructional plan also needs to be a motivational plan. (p. 24)

There are many ways to do this and, in its heightened form, this is a key competence of creative teachers. How this works will be explored in detail in Chaps. 4 and 5.

Secondly, as motivation is very much bound up with perception and beliefs, it is important to encourage and sustain a Growth mind-set among students, especially among those who have not experienced much mastery or success in their studies. Students need to have a direct experience that, with effort on their part and the support of teachers, meaningful and successful learning is a likely outcome. There

is another of those old sayings, "Seeing is believing", which suggests that students need to see how things work in order to change perception and behaviour. However, is this really enough for creating significant change in key beliefs? Seeing can be a major factor in bringing about change, but it is also often rationalized away by many people, resulting in the existing belief still being the 'status quo' as far as perception is concerned. What is needed is a more sustained total learning experience in which students set and achieve a meaningful learning goal, go through the learning process supported by a good teacher who facilitates their understanding of what is going on in terms of their thinking and behaviour and how this achieves success in meeting the goal. It's really important that students understand the key processes and attitudes of mind that support successful learning. This involves making the process of teaching and learning visible for learners, and helping to build the necessary understanding of what they need to do and how, should they want to learn effectively. As Hattie (2009) strongly argued:

> One of the important understandings that teachers need to have about each student is his or her ways of thinking. By this it is not intended to delve into learning styles (visual, kinesthetic, etc.), for the effectiveness of which there is zero supporting evidence, but to understand a student's strategies for thinking, so that he or she can be helped to advance his or her thinking. (p. 42)

The importance of good thinking is considered in detail in Core Principle 5: *Good thinking promotes the building of understanding*. In the present context, students having compelling and sustained experiences of increasing levels of mastery are much more likely to change limiting beliefs to more evidence-based frames on learning. This works, at the psychological level, by creating a type of cognitive dissonance (Festinger 1957) that leads to a reframing of this aspect of reality. For example, when people have an experience that is significantly at variance with previously held beliefs, this creates inner conflict as these disparate cognitions are inconsistent and there is a human need to resolve this in some way to restore equilibrium—to 'settle the mind'—so to speak. In these situations of inner conflict, a number of outcomes can occur has a result. Often, especially if the new perception is idiosyncratic or not particularly intense, it will be quickly rationalized away and the established belief is fully or largely retained as the main filtering structure on reality (e.g., the status quo is maintained). If it is more intense and impactful across the senses, it may result in either a complete reframe of that aspect of reality (e.g., a paradigm shift) or a new frame, which somehow accommodates both the existing belief and the new perception. As a 9-year old, I had such an experience of the latter. Living in Hoxton, in East London in the 1960s provided me with plenty of opportunities for football, but limited ones for fishing, which I also liked as a child. Most of the rivers and canals in the local vicinity were heavily polluted at that time, and fish were far from plentiful or desirable to catch in these environments. However, fortunately I had an aunt and uncle who lived in the more ecological balanced environment of Bath, a somewhat sleepy and rural city at that time. Most importantly, it had great fishing opportunities as the river Avon passed through the city centre. Previously my visits were usually accompanied by my parents but on this occasion, for the first time, they allowed me to make the train journey on my

own, sending me off from Paddington station in London to Bath Spa, where my aunt (her name is Ida) picked me up. On my first morning at their house, as Ida came into the bedroom to wake me up, she put her hand under the blanket and quickly pulled out an egg and said "Dennis you have laid an egg." Somewhat surprised I examined the egg (as a 9-year old might) and noticed something strange about it. It had no 'little lion' printed on it. All eggs I had seen prior had a small lion emblem printed on them (this was of course the company brand but I did not know about these things); this was the first time I had noticed an egg that had no little lion on it. Of course I was not stupid enough to think that I was a chicken, based on this one experience. On the following morning Ida again came into the bedroom to wake me up, but I was already fully awake and prepared to see how she did this bit of 'magic'. I watched her carefully, and sure enough she produced 'magically' 2 eggs this time (both with no little lion on either of them) from under the bedclothes. I could not work out how she did this, and during the day I remember feeling somewhat confused. I still firmly believed that I was not a chicken, and that chickens lay eggs and not humans. However, after this happened again the following day, I felt totally confused. Now, here's the punchline, I solved the cognitive dissonance by retaining my belief that I was not a chicken, but was able to take on the specific ability to lay chicken eggs—some nice cognitive work for a 9 year old! I was comfortable with this and my mind was then able to focus on the more important task of catching fish. However, the story did not end there, and it's worth finishing it for those who like to see the 'funny side' of life. On my arrival back to London at Paddington station, where my mother was waiting patiently for her son, she was not at all impressed when I immediately spurted out, "Mum, mum, you don't have to buy eggs anymore as I'm laying them." On arrival back home she immediately called Ida and it was very apparent that even though they were speaking in a Neapolitan accent (both grew up in the suburbs around Naples) my mother was not pleased. I understood very little of the content but still recognized something like, "What have you done to Dennis, he thinks he can lay eggs?" It ended with Ida telling me that it was all a trick and she planted the eggs while I was sleeping. Not exactly high end magic, but it worked on a 9-year old who had no knowledge of free range eggs.

In the context of education, the same scenario is likely to play out for a student who is experiencing new perceptions of 'I am developing a good understanding of this subject' but this is conflicting with an existing belief of 'I'm not bright enough to learn this subject'. There will be the same conscious and unconscious processes of conflict resolution. In most cases, certainly in my experience, if the sensory experience of the new perception is sufficiently strong and consistent over time, it will eventually replace previous limiting beliefs and lead to the necessary reframing of the basis of intelligence, as summarized above. For many years, I worked in educational institutions in which a majority of students had little belief in their intellectual capabilities, and perhaps even less in the usefulness of teachers to do much to help them. In this situation, the priority is to bring about some reframing in their perception of themselves as learners, and this can only be achieved ultimately through their achieving mastery in learning tasks meaningful to them. However, one must first get some positive reframing by them on you as a person, not a wider construct on teachers per se. In working with students who had generally negative

frames on schooling and teachers for many years, I learned that there is little benefit in trying to convince them of the value of paying attention and learning academic stuff. Also, there is even less benefit in showing annoyance or losing one's cool over their lack of interest towards any kind of academic learning. This only reinforces their existing perceptions and may even add some pleasure or novelty to the situation for them—not for you. Unless you can get their attention and build some rapport, it's going to be a tough time as Michelle Pfieffer learned in 'Dangerous Minds', 1995, an American drama film in which she faced a very challenging class, but eventually got their attention and this made the difference. You can watch the film to find out how.

This heuristic of effective teaching is fundamental to all aspects of planning learning experiences and the practices of teaching. It is also the area in which much creativity can be generated and applied as it offers almost limitless possibilities in terms of how teachers can maximize attention and variation in the learning process. This will be explored and illustrated further in Chaps. 4 and 5. Without motivational strategies we are left with dry content, which may just as well be accessed without any reference to professional teaching activity. Certainly, with increasing e-learning capability and, in today's classrooms where teachers are competing for student attention with 'other' activities available on their laptops, the ability to create intrinsically motivating learning experiences may no longer be a 'nice to have' creative teaching competence for the few who can do this. Instead, it will more likely become a necessary capability for the mainstream teaching force, and may become the essential differentiator in terms of teacher proficiency levels. This is a particularly challenging aspect of creative teaching in that, as Zig Zagler (2014) famously stated:

> People often say motivation doesn't last. Well neither does bathing – that's why we recommend it daily

Finally, on the subject of enhancing student motivation, don't forget yourself in this endeavour. As professional educators, while we are paid to do this challenging work, there is no harm, in fact, massive benefit, in enjoying the experience. There is little pleasure or novelty, and certainly considerable pain in teaching groups of unmotivated learners. However, when we have learners who show interest in what we are teaching (not necessary all the time), positively interact with us as human beings, and are successful in the attainment stakes, it is a highly rewarding experience, and it's why many of us do this job. As Levin (2008) summarized;

> Greater engagement is a vehicle that improves students' work and makes teachers' lives easier as well.
>
> …increased student motivation is very positive for teachers' experience of their work. (p. 99)

2.1.2 Core Principle 2: Learning Goals, Objectives and Proficiency Expectations Are Clearly Visible to Learners

I fail to recall much by the way of consciously ever considering any learning goals over my 15,000 h at school, beyond getting a regular place in the school football team. Even for this desirable goal, I had little idea of what I specifically needed to do to achieve it—except to be good at football. The physical education teacher never helped me to understand my limitations as a footballer and what I might do to enhance specific skill areas. Indeed my school life lacked an explicit structure for learning beyond the fact that I was supposed to be there. Truancy was taken seriously and one would be severely punished if caught playing truant (e.g., caning plus possible suspension). In terms of the subjects I studied (the word really does not fit well), I had little notion of what I should be learning in terms of specific outcomes and to what level of proficiency. When the exams came round I tried to memorize what I had written down in class. As a consequence, I had no benchmarks for my performance. It was a surprise and a delight when I passed those 'O' and 'A' levels.

A similar lack of direction flowed throughout my school life, even for the one time I had 'The Careers Interview'—seriously I can only recall one. There was no exploration of career possibilities, simply something like, "You should be able to get a job with the post office … and don't worry as long as you believe in God all will be ok." That was the reality for me. From Chap. 1 you may have noted that one teacher, Mr Remmington, did make a difference to my decision making, which resulted in me staying on at school for 'A' levels, with the intention of becoming an architect. I suddenly had a goal, and to my credit, I did achieve the necessary qualifications to pursue this end. However, as with holiday romances, without reinforcement, their prominence in terms of conscious attention starts to recede over time and typically abates. For whatever reason by the time I had received my 'A' level results, this particular goal seemed to have lost its potency, and I had no real sense of direction again. As for many young men in my situation in this context, attention was primarily focused on how to get some money to participate in the customary activities of my working peers. After all, my school-friends had long since left school and were going out to local pubs and clubs with money in their pockets. And there was a real motivational base to this—girls. For the next 6 months I worked as a labourer on a building site for the scaffolding crew. Scaffolders were a tough bunch of guys, and they had to be to carry those 22 foot poles—which were cast iron in those days. Anyway, the money was good, and my boxing background meant I could match the scaffolders in the practices of pole carrying.

Somewhere around this time my father, obviously concerned about where his only son (in fact only child) was going in life, called me in for a 'father and son conversation'. These were not frequent, so I still have fairly good recall of the main content of this conversation. Most significant was him pointing out that while scaffolding paid well now, I would be earning very much the same amount in real

terms in 20 years-time and may not find it such a physically relishing challenge as the years pass by. Also, he pointed out that with my 'O' and 'A' levels I should have plenty of choices. The problem was, I did not know what I wanted, well not in occupational terms anyway. Being an architect, like my earlier framing of being a civil engineering technician, was largely idiosyncratic—just as many small boys wanted to drive a fire-truck in yesteryear.

In response, I went to the local careers office, where I must say, personnel were helpful. I had many interviews, including at accountancy and legal firms, so my options were good. Not sure which way to go, I was eventually introduced into the idea of going to university, something I had no meaningful frame on whatever. I had never met anyone who had gone to university and my only prior knowledge in this area was a weekly TV quiz show *University Challenge* in which different universities competed for some prize or other. It soon became apparent, however, that there were some attractive aspects to going to university, not least government grants, long holiday periods and opportunities to develop my footballing skills. The only missing piece of this jigsaw was that one had to study a subject. Nothing came to mind for me. Motivated to some extent to pursue this option, I browsed through a number of university prospectuses and—hey presto, psychology. In all honesty, I did not know much about psychology but I guessed it was a bit like sociology, which was one of my 'A' level subjects. Sociology was also my favourite school subject, again made interesting by the teacher.

In summary, serendipity rather than any thoughtful sense of direction shaped my learning and career to this point. Studying psychology was a life changing experience in that I discovered that one's learning is very much within one's own control. Invariably, the constraints of finance, time and commitments may reduce the timing of one's career choices, but successful learning is very much in one's hands. However, successful learning involves in no small part knowing what it is that you want to learn and for what life goals. It also requires a strategy, and not least a fair bit of effort, which in turn is aided by a belief system that sees attainment as a product of these processes, not a predestined neurological state. There is a saying in football circles that, "You are only as good as your last game." That makes perfect sense. I have noticed, over many years of watching professional football, how fickle football fans are. When a player has had a few poor games there are often sounds of derision when his name is read out on the team sheet. Three weeks prior, the same player was greeted with great applause. A similar frame plays out in life. I was once a grade 9 'O' level student in maths. I could still have been that; but I am not and I know what changed that reality and how it works. Hopefully, that has made me a better teacher. Poor thinking, limiting beliefs and lack of competence are not existentially fixed states for the mainstream population of learners, but if no change is effected they become stable and *the reality* for the people concerned. Learning is about change, and productive change can be greatly helped by others, but these others need to be good models. For example, in the case of thinking, as Dilts (1980) illustrates:

> Effective thinking strategies can be modelled and utilized by any individual who wishes to do so. (p. 193)

The key point to this heuristic for the purposes of effective teaching and enhancing learner attainment, is that learners require structure in their learning, and this starts with having a meaningful goal. While students are ultimately responsible for their own learning, helping them to frame clear and meaningful goals, as well as what is involved in meeting them, is fundamental to providing structure, direction and motivation to their learning. As Ramsden (1992) pointed out:

> It is indisputable that, from the students' perspective, clear standards and goals are a vitally important element of an effective educational experience. Lack of clarity on these points is almost always associated with negative evaluations, learning difficulties and poor performance. (p. 127)

There is a strong evidence base supporting the importance of establishing clear, meaningful and challenging goals for learners, For example, Marzano et al. (2007) found an effect size of 0.97 for Specifying Goals, and Hattie (2009) found an effect size of 0.56 for Challenging Goals. The more we are able to articulate learning goals, be specific about what is to be learned—make it visible (what it looks like, sounds like and feels like)—the more likely learners are to achieve these outcomes. Of course, it helps even more if the learners themselves are motivated and committed to achieve such outcomes. As Hattie (2009) highlighted:

> …effective teachers set appropriately challenging goals and then structure situations so that students can reach these goals. If teachers can encourage students to share commitment to these challenging goals, and if they provide feedback on how to be successful in learning as one is working to achieve the goals, then goals are more likely to be attained. (p. 165)

Similarly, Schank (2011) reinforces the really important outcome of student buy in:

> Teaching works best when you teach students who agree that they really want to learn whatever it is you have to teach. (p. 43)

There is often a need for creative teaching to facilitate such high level student buy in across divergent student groups, as this involves a major perceptual shift for many students in terms of motivation and learning approaches. However, if this can be attained, the focus can then be largely on the how of learning effectively rather than frequently revisiting the why. What constitutes challenging is of course subjective in part, but most importantly we are seeking the best contextualization to the learner profile. Providing goals that are easy to attain results in little value on the learning stakes. The idea of giving students such goals to ensure they get plenty of positive feedback regarding their successful attainment, to promote their self-esteem, is naïve at best. Students know that they are being 'dumbed down', and will quickly not be duped by such token positive self-regard. Similarly, if the goals are not realistically achievable in terms of student's prior knowledge (e.g., level of conceptual understanding; skill-sets), and in the time frames defined, this will create frustration and stress which is detrimental to learning and attainment. While it is

sometimes challenging for the teacher to establish meaningful and challenging goals for students, it is time well spent, as Hattie (2009) concluded:

> Educating students to have high, challenging, appropriate expectations is among the most powerful influence in enhancing student achievement. (p. 60)

It is very important therefore to be able to, as far as is possible, ascertain their prior learning before setting goals. This is covered in some detail in Core Principle 3: *Learners prior knowledge is activated and connected to new learning*. Once the student profile is ascertained in terms of prior knowledge, always recognizing that there will be variation in almost any student group (and this should be accommodated for whenever possible), there are many ways to represent appropriate goals to learners. What is most important is that students are provided with as clear as possible a definition of what the goal entails, the level of proficiency of the performance activities and products that are required to be produced in meeting the goal, and any other key information that provides essential structure to making it as tangible as possible. This can involve providing examples of what good performance and product outcomes look like, sound like and feel like. For example, when teaching professionals are seeking to attain a goal that involves being able to use specific instructional techniques (e.g., using questions to promote critical thinking in a facilitation session) I will often show different video exemplars of what this looks like in a sample of teaching contexts related to their field of practice, and invite questions for purposes of clarification. A noted effective way of supporting this in the context of a lesson is through the provision of what is referred to as an *advance organizer*, which is a summary of what is to be learned in the coming lesson. This is presented at the beginning of the lesson, providing an organizing frame for the content which is to follow and a means for students to monitor personal learning in meeting the stated objectives related to the overall learning goal. The more these organizers connect to the desired goal the better is the guide for learning. It's a bit like using a road map. A very accurate one can make the journey easy; the converse is also true. Apart from providing clarity and structure to the learning process, advance organizers help students to see purpose in the learning and further reinforce the meaningfulness and motivation of successful goal attainment.

2.1.3 Core Principle 3: Learners Prior Knowledge Is Activated and Connected to New Learning

When I arrived in Singapore in 1995, and took up my appointment at Singapore Polytechnic, I was asked by a colleague, on my first morning at work, if I had been able to access my email. Immediately, a sense of anxiety became apparent as I posed the question to myself, "How do I do this?" I had never used email before or even accessed the internet. The internet was at best a very fuzzy concept in my head. It became no less fuzzy after a few days when I was a participant in a one-day

training programme on using the internet. At the end of the workshop, I was even more confused and could not even recognize or open the internet browser, Netscape. Yes, I started to feel a bit silly, but this was not a concern, as I knew exactly where I was in the learning stakes—a complete novice. In this learning situation, I was very aware of my limited prior knowledge of email and the internet. Furthermore, as a novice, it's natural to experience feelings of uncertainty, even dependency, and performance will be erratic at best. That's the profile of a novice in an unfamiliar learning situation, irrespective of whether one has great expertise in other fields. Aside, I am also very much a novice as a guitar player and on the one occasion I did a public performance, fortunately in a minor venue, even my basic chord playing went out of synchronization. I have never played publicly since.

Looking back on that one-day internet training programme highlights the difficulties faced by any learner who is confronted with a learning situation in which there is little prior knowledge to connect to and where the instruction is far too fast to build any useful understanding of what is being taught. I went back to my office tired, confused, and with no useful understanding or competence to use the internet. However, what I did know was that this was a typical and almost inevitable result given the learning context and most importantly, I knew how to deal with it effectively.

Learners come to any new learning situation (whether it be the classroom or elsewhere) with preconceptions about how the world works based on their life experiences. Within this framing, they may have developed some generalized beliefs about themselves as learners, as outlined earlier in terms of Fixed or Growth mind-sets. They may also have had some experience (which may or may not have been favourable) with a particular subject or area of learning. As described, previously, after my grade 9 maths 'O' level result and the preceding learning experience, I did not feel competent or confident in learning mathematics. The problem is that prior learning may have created a whole host of misconceptions and motivational dispositions that lead people to avoid any further attempts at learning in a particular area. This takes on an added significance in that all learning, whether accurate or otherwise, exists as relatively permanent structures in our neural architecture. I was fortunate in that my final 'O' level maths teacher, Mr. Edrich was able to challenge and disrupt my existing knowledge and beliefs relating to learning mathematics. For many, they become stuck in an abyss of misconceptions and perceived limited capability. The important point is that new learning cannot avoid being connected to prior learning. As Shulman (1991) pointed out:

> All new knowledge gains its form and meaning through its connection with pre-existing knowledge and its influence on the organization and reorganization of prior knowledge. (p. 10)

Prior knowledge then is the lens through which students will perceive and react to new information provided in a learning event. If prior learning is inaccurate, incongruent or limited, it is likely to interfere with the meaningful integration of the new knowledge presented. This provides real challenges for teachers. Ausubel et al. (1978) went as far as arguing that:

> If I had to reduce all of educational psychology to just one principle, I would say this: the most important single factor influencing learning is what the learner already knows. Ascertain this and teach him accordingly. (p. 163)

Making student's prior knowledge explicit helps not only to deal with misconceptions and facilitate better linking of new knowledge to existing knowledge structures, but also saves an enormous amount of time in terms of duplicated learning (e.g., Nuthall 2005), boredom for students, as well as frustration for teachers. Finding out what students already know, understand and can do is fundamental to teaching in any context. Hattie (2012) argued that:

> …we must know what students already know, know how they think, and then aim to progress all students towards the success criteria of the lesson. (p. 44)

There is then the challenge of designing ways to connect new knowledge to the particular learners being taught. This requires both a good understanding of the subject matter content and the students being taught, as well as some creativity in order to design the most appropriate instructional strategy to best facilitate such connectivity. Wlodkowski (2008), using the language of cognitive neuroscience, suggests that this involves the following:

> …begin with what they already know and biologically assemble them with the new knowledge or skill by connecting the established networks and the new networks. (p. 13)

This heuristic has an effect size of 0.41 (Hattie 2009) and in combination with clear goals and effective advanced organizers, provides a strong foundation for subsequent learning, and can be seen as significant components of a highly effective "Russian Doll" instructional strategy, to reiterate this metaphor introduced in Chap. 1. Once students have clarity of purpose in the learning goals, a sense of direction for meeting them, appraised their existing knowledge and dealt with any restrictive misconceptions, they are in a much better position to tackle new concepts effectively. Of course this is an ideal scenario and it is unlikely to happen so nicely for all students in all situations. However, it is a much better strategy than going straight into the new content delivery, for all the reasons outlined above.

The activation of students prior knowledge can be done in a number of ways, but all involve eliciting specific feedback concerning what they actually know, understand and can do (and to what level of proficiency) in relation to new learning goals and specific outcomes. This can be done through written and oral pre-tests, and by way of open discussion with students to explore more fully their mental models and ways they are thinking about the topic area to be covered. It is important to recognize that students are unlikely to be particularly clear on things they don't know and may not be able to effectively make this explicit. For this reason it is particularly important to create a psychological climate in which students feel very comfortable in sharing their learning concerns and are not afraid of admitting to 'not knowing'. This is explored in some detail in Core Principle 9: *A psychological climate is created which is both success-orientated and fun*.

2.1.4 Core Principle 4: Content Is Organized Around Key Concepts and Principles that Are Fundamental to Understanding the Structure of a Subject

Understanding is about making personal meaning of knowledge and seeing how it is used in real world applications and problem-solving. When learners have developed a good understanding of a topic, they will have acquired an organized and accurate representation of the key concepts in their minds (often referred to as 'schemata'). Once attained, understanding will facilitate effective and efficient retrieval of the relevant knowledge of the topic from long-term memory, easy explanation of what the topic is about, its key components, areas of contention, as well as its thoughtful application in real world problem-solving. Furthermore, with good understanding of something, whether it's the working of mechanical systems or, in the context of this book, pedagogy, it's then possible to use this knowledge effectively across the domain field, what is referred to as *transfer* of learning. Transfer facilitates accurate diagnosis of problem situations and the capability to create solutions with a high degree of outcome prediction, because it means that the person fully understands the knowledge bases involved. For myself, I have little understanding of mechanical systems; hence I am unable to fix anything mechanical. My Jack Russell dog occasionally sits on the remote control devices that operate the television and related systems, often resulting in picture loss on the television. It typically ends up with me ringing the technical support helpline. I don't know what most of the various buttons on the different remote control devices mean, what aspect of the system behaviour they control, or their relationships to each other. In a situation of picture loss, unless it is patently obvious what has happened (e.g., the on button is now off), my understanding is so limited I am effectively taking part in a lottery where there is a low probability of success; my chances of hitting the appropriate buttons on the relevant remote control devices in the correct sequences are not good.

In the literature much is written about the nature of knowledge, types of knowledge and how knowledge and cognitive processes interact to build understanding by philosophers, educationalists, and cognitive scientists. The study of the nature, form and structure of knowledge is a recognized discipline, typically referred to as epistemology. We will avoid an extensive coverage of this area as much of the different terminology conflates and may, in this context, add more confusion rather than insight into how core concepts and principles help students to understand the key structure of a topic, and what makes this particularly important to learning and attainment. One area of general agreement among writers on the types of knowledge, which provides a useful understanding of what knowledge entails, is the categorization of knowledge into *Declarative Knowledge* and *Procedural Knowledge*, as summarized below:

Declarative Knowledge: As the term implies, it refers to knowledge that can be clearly stated as facts, concepts, generalizations or principles within a content

knowledge field. For example, once acquired, we might be able to clearly assess that a learner *knows* or *understands*:

- the concept of democracy
- the defining attributes of a dog
- the conventions of punctuation
- Cristiano Ronaldo plays football for Real Madrid (at the time of writing)

Procedural Knowledge: This refers to knowing how to do something, typically involving performing a process or demonstrating a skill. For example, once acquired, we might be able to clearly assess that a learner *is able to*:

- add and subtract
- write a paragraph
- juggle
- set up an experiment
- read music
- search a database

In many practical tasks both types of knowledge are involved, as to do something typically involves knowing something about it. For example, while the amount of declarative knowledge involved in being able to play football is not extensive, no amount of skill in procedural terms would be useful if one did not know what goal to score into. Invariably, there is much variation in terms of both the quantity of knowledge components and level of complexity involved in knowledge acquisition and deployment when procedural. For example, to acquire a single piece of factual knowledge such as England won the soccer world cup in 1966 is very straightforward. Around 5 repetitions should put it firmly into long-term memory. How memory works and its crucial role in effective learning is outlined in detail in Core Principle 7: *Learning design takes into account the working of memory systems*. In some exceptional circumstances a little idiosyncratic knowledge may be amazingly useful to a particular individual, as was so powerfully illustrated in the 2008 film 'Slumdog Millionaire'. The film featured a young man (Jamal) from the slums of Mumbai who appears on the Indian version of 'Who wants to be a millionaire?' and answers all the questions correctly, but aroused suspicions that he must have cheated. However, in the film, Jamal recounts in flashback how he knows the answer to each question, each one linked to a key event in his life. His learning of these specific bits of factual knowledge happened idiosyncratically, but through great serendipity resulted in the illusion of him being highly knowledgeable, which ran counter to his slum living existence. In reality, we are very unlikely to get such highly favourable results from limited knowledge bases. The building of accurate organized mental models (deep understanding) of complex phenomena in the world requires much internal cognitive work on the part of the learner to negotiate and assimilate the vast knowledge bases involved. One does not need much knowledge (declarative or procedural) to ascertain why one's pencil is not working and how to fix it. However, this is unlikely to be the case in a situation of aircraft failure, unless of course you happen to be an expert aircraft

engineer. What this cognitive work is and how it works is the focus of Core Principle 5: *Good thinking promotes the building of understanding*.

Understanding is something students can achieve themselves only through the acquisition of relevant knowledge, actively making appropriate connections between the knowledge components (e.g., declarative and procedural) to build an accurate schemata of the intended learning goal. The rote memorization of knowledge, while fundamentally important in effective learning, will not in itself result in understanding as this requires the learner to actively make the mental connections and create accurate internal representations. This involves what we refer to as 'thinking'. However, thinking without knowledge is pretty limited—try thinking about nothing. As Resnick (1989) summarized:

> Study after study shows that people who know more about a topic reason more profoundly about that topic than people who know little about it. (p. 4)

There should be little surprise here, after all, "knowledge is power"—right? It is power to do things that have perceived value, whether at work, or any other area of life. What is deemed the most valued knowledge bases is one of valuation, and this reflects many aspects of stakeholder interest and societal context. However, what is important is the clear recognition that the acquisition, organization and integration of relevant knowledge bases are foundational for better learning and attainment. Berliner's (1987) description of the benefits of comprehensive and well organized schemata (the basis of good understanding) in a particular field or domain is particularly informative in this context:

> Individuals possessing rich, relatively complete schemas about certain phenomena need very little personal experience to learn easily, quickly, and retain well information pertaining to those phenomena. A well-developed schemata allows very efficient learning from verbal and written discourse on a topic about which much is known. (p. 61)

Similarly, as Pugh and Bergin (2006) point out:

> …for students to access and apply their learning they need to possess deep-level, connected knowledge structures. That is, their knowledge needs to be conceptually deep, cohesive, and connected to other key ideas, relevant prior knowledge, multiple representations, and everyday experiences. (p. 148)

There is much we can do as teaching professionals to facilitate understanding. You will note that the three preceding Core Principles of Learning (motivational strategies, clear goals, and activating prior knowledge) all contribute in some significant way to facilitating the process of building understanding. Through a careful analysis of the learning goals, the specific outcomes and proficiency standards that we seek to achieve with our students, it is possible to identify the key declarative and procedural knowledge (especially core concepts and principles) that underpin understanding of the key structure of the topic areas we are teaching. Bruner (1966) identified what are essentially key evidence-based principles underpinning the importance of good structure in enhancing learning:

> The first is that understanding fundamentals makes a subject more comprehensible. (p. 23)
> The second point relates to human memory. Perhaps the most basic thing that can be said about human memory, after a century of extensive research, is that unless detail is placed in a structured pattern, it is rapidly forgotten. (p. 24)

> Third, understanding of fundamental principles and ideas…appears to be the main road to adequate "transfer of training." To understand something as a specific instance of a more general case – which is what understanding of a more fundamental principle of structure means – is to have learned not only a specific thing but also a model for understanding other things like one may encounter. (p. 25)

Bruner advocated a *Spiral Curriculum* in which the key concepts and principles are revisited over time to further clarify and extend the knowledge base in terms of adding new related knowledge, enhancing integration and further refining until the students mental schemata has the most accurate and appropriate mental representation, what he refers to as "the full formal apparatus that goes with them", (p. 13). He is famously noted for asserting that:

> We begin with the hypothesis that any subject can be taught effectively in some intellectually honest form to any child at any age of development. (p. 33)

For example, in this chapter, *evidence-based practice* and *heuristics*, in the form of the Core Principles of Learning, are some of the key concepts and principles fundamental to the structure of creative teaching. Once these are understood, the more specific factual content relating to how the Core principles of Learning enhance aspects of the learning process will become increasingly easier to accommodate into a meaningful mental schemata. Over time, with thoughtful application, the knowledge base becomes more refined, elaborated and practically useful. In the wider context of this book, as the key structure becomes increasingly understandable in terms of how to enhance the practice of teaching from an evidence based approach, the more abstract notion of 'Pedagogic Literacy' starts to become a meaningful and useful proposition (he says, hopefully). Just as clear and meaningful learning goals and advance organizers provide structure to what is to be learned, this heuristic focuses our attention to the most appropriate selection of knowledge components and their best organizational structuring and sequencing for facilitating the learning experience to maximize attainment opportunities for learners. While the mind has a natural tendency to organize information into meaning wholes, as Gestalt psychology established in the early 20th century (e.g., Koffka 1915; Kohler 1929), this is greatly aided and enhanced when there is a clear and logical structure in the presentation of knowledge in the first place. As Hattie and Yates (2014) pointed out:

> The mind does not relate well to unstructured data. We find it extremely taxing to learn random lists or when coping with unrelated materials. We need to learn the organization, structure, and meaning in whatever we learn. *Meaningfulness*, or relatedness, stems directly from prior knowledge. We benefit enormously from being shown how to group information, how to locate patterns, how to use order, and how to schematise and summarise. (p. 115)

Furthermore, it has long been recognized that different subject areas, by their very nature, lend themselves to different teaching and learning approaches in terms of effective student learning. For example, Shulman (1991) argues that teachers require 'pedagogic content knowledge', which is the ability to fully understand how their particular disciplines are most effectively taught. This involves not only the identification of core concepts and principles essential for building understanding, but also key areas where misconceptions and areas of difficulty are likely to be encountered by students. In this way, the instructional strategy can be systematically tailored to incorporate effective methods that are specifically contextualized to the nature of the discipline and how practitioners in the field actually conduct their practices in real world contexts. The importance of applying not just pedagogical knowledge to the ways we teach but also supplementing this with pedagogical content knowledge is nicely captured by Shulman when he argued:

> When was the last time you saw a problem set in the study of Hamlet? Or in Asian History? Can you have guided practice in a poem? Or for evolutionary theory? I would argue that we have, reflected in the differences among the disciples, different ways of knowing that are tied to different ways of teaching. (p. 5)

This heuristic challenges teachers to know their subjects especially well in order to be able to identify the most appropriate method combinations to effectively teach the key concepts and principles that are fundamental to understanding in the specific context of their subject topic areas. In a similar vein, McTighe and Wiggins (1998) refer to the importance of focusing content on the 'big ideas' and 'essential questions' that are central to making sense of a topic area and its importance within the wider subject context. The big ideas relate to the more fundamental and enduring understandings relating to a topic areas, as they

- Provide a conceptual "lens" for any student
- Provide breadth of meaning by connecting and organizing many facts, concepts and skills; serving as a lynchpin for understanding
- Point to key knowledge at the heart of expert understanding of the subject
- Require "uncoverage" because its meaning or value is rarely obvious to the learner, is counterintuitive or prone to misunderstanding
- Have great transfer value; applying to many other inquiries and issues over time —"horizontally" (across subjects) and "vertically" (through the years in later courses) in the curriculum and out of school. (p. 69)

Big ideas provide an excellent vehicle for helping students to understand both the key structure of a topic area as well as its relevance to real life contexts. As the authors argue, they provide:

> …a conceptual tool for sharpening thinking, connecting discrepant pieces of knowledge, and equipping learners for transferable applications. (p. 70)

Essential questions are core to the subject and will stimulate thought, provoke inquiry, and spark more questions relating to the essential core structure of the topic area, further enhancing understanding. As the authors summarized:

> The best questions point to and highlight the big ideas. They serve as doorways through which learners explore the key concepts, themes, theories, issues, and problems that reside within the content, perhaps as yet unseen: it is through the process of actively "interrogating" the content through provocative questions that students deepen their understanding. (p. 106)

McTighe and Wiggins argue that a question is 'essential' if it is able to:

1. Cause genuine and relevant inquiry into the big ideas and core content
2. Provoke deep thought, lively discussion, new understandings and more questions
3. Require learners to consider alternatives, weigh evidence, support ideas, etc.
4. Help makes connections with prior learning and personal experiences
5. Naturally recur, creating opportunities for transfer to other situations and subjects.

Furthermore, as knowledge is increasing almost exponentially, and it is not possible to keep adding more and more subject content in the curriculum, the selection of the most relevant content knowledge for developing key understandings fundamental to the structure of topic areas becomes an essential pedagogic consideration. Willingham (2009) cleverly framed this *essential question* in terms of, "What knowledge yields the greatest cognitive benefit" (p. 36). In more laymen's terms, as the maxim goes, "More is not better, better is better" and this applies particularly well to the selection of subject content in preparing to teach. Equally, research (e.g., Hattie and Yates 2014, p. 7) strongly suggests that we will invest effort more strongly when we have already built some useful foundation of knowledge (e.g., understanding), in contrast to when there is nothing to build on. Being able to quickly help students achieve a basic understanding of what a topic entails and its relevance to their learning goals not only helps the cognitive aspects of the learning process, but also the affective domain of emotions and feelings in that this is more likely to generate and maintain a better motivational base for a more sustained learning experience. This explains why we are often reluctant to take on tasks in which we feel we have very little understanding or competence and perceive a big gap between where we are and where we need to be in the learning stakes. Sadly, this often results in a person giving up in an area of learning that he/she had initial interest in pursuing. I nearly did this with maths, but was fortunate to have a good teacher 'to pull me out of the pit'—so to speak, which made the difference.

2.1.5 Core Principle 5: Good Thinking Promotes the Building of Understanding

In Chap. 1, I mentioned that thinking was not something I learned from my 15,000 h at school. Well my teachers can be easily forgiven, if Wagner's (2010) conclusion is correct:

> In schools, critical thinking has long been a buzz phrase. Educators pay lip service to its importance, but few can tell me what they mean by the phrase or how they teach and test it… (p. 16)

> For the most part, teachers haven't been trained to teach students how to think. (xxiv)

There is often an assumption that thinking is simply common sense. Well, even if it is, and I don't think it is, it's not that common. In most basic terms thinking is goal directed cognitive activity, which seems to occur not just at a conscious level (e.g., "I must think this through"), but also subconsciously and unconsciously. The outcome of good thinking is typically a heightened, or at least improved, understanding of something. Certainly, thinking is essential to building understanding as it involves the making of connections in the brain, and this is learning at the neural level. In most basic terms, as Willingham (2009) summarized:

> Thinking occurs when you combine information (from the environment and long-term memory) in new ways…That combining happens in working memory. (p. 11)

He goes on to argue:

> …learning to think clearly and knowing how to assess the value of new evidence that one has found, must be the main goal of any school system. (p. 110)

There is, despite differences in perspective and terminology in the literature, strong agreement that thinking is crucial to the quality of human learning. As Paul (1993) summarized:

> Thought is the key to knowledge. Knowledge is discovered by thinking, analyzed by thinking, organized by thinking, transformed by thinking, assessed by thinking, and, most importantly, acquired by thinking. (vii)

Petty (2009) puts this into a very practical context when he argued that:

> It is no exaggeration to say that almost every aspect of private and public life is driven by our ability (or inability) to use these thinking skills effectively, and to 'think straight'. (p. 325)

However, while good thinking may be beneficial in the learning stakes, there are those who do not see the human mind as particularly well developed for such activity, as Willingham (2009) concluded:

> Humans don't think very often because our brains are designed not for thought but for the avoidance of thought. (p. 4)

Hattie and Yates (2014) offer the following analysis:

> The ability to think well, to learn efficiently, and solve problems successfully are attributes that do not figure in most descriptions of natural human adroitness. While a few of us seem to want to develop good thinking skills (however defined) – it does not seem to be typical – …humans naturally assimilate the vast bulk of their knowledge through direct social influence processes that do not make great demands on thinking capabilities. (p. 7)

There is indeed an interesting paradox as far as thinking is concerned. On the one hand, as Jensen (1996) argued:

> The best thing we can do, from the point of view of the brain, is to teach our learners how to think. (p. 163)

On the other hand, the human brain for a significant proportion of the population does not seem to want to do this too willingly. Kahneman (2012) provides a powerful insight here, which has extensive implications in educational contexts and how we teach. He argues that thinking can be conceptualized in terms of two systems; System 1 and System 2. These are, of course, metaphors, but they convey something that instantly has strong face validity:

System 1 is a fast reflexive system that identifies the familiar, especially threatening elements in a situation and quickly activates automatic response patterns. This system is the most essential for survival and is the default system. It typically works well in familiar everyday life where most situations and problems are familiar and we have long established patterned responses to them. However, this system also results in rapid stereotypical/prejudicial judgements and action. It is the price we pay for this powerful survival system.

System 2 is a slow, analytic, reflective system that explores the more objective factual elements of a situation, compares them with previously learned elements, and then responds. However, this requires self-control, effort and time, which is essentially tiring. As Kahneman summarizes:

> System 1 is impulsive and intuitive; System 2 is capable of reasoning, and it is cautious, but at least for some people it is also lazy. (p. 48)

The development of good thinking, then, has much in terms of similarity with other desirable outcomes sought by people. For example, few people actually enjoy going on a diet or working long hours of overtime. However, there is benefit to weight loss when obese and extra money is very useful and often essential for some. The same can be said for developing good thinking, as far as effective learning is concerned. We clearly recognize the longer term benefits, but the shorter term cognitive strain is often likely to short cut our perseverance to do this well in many situations.

If good thinking is hampered by it being a tiring activity and some of us have 'lazy' brains, this is further compounded by the impact of beliefs and emotions on our capability for rational cognitive activity. Marcus (2009), from a cognitive neuroscience perspective, highlights how our belief systems further provide challenges to the brains functioning as a good 'thinking machine':

> Our beliefs are contaminated by the tricks of memory, by emotion, and by the vagaries of a perceptual system that really ought to be fully separate – not to mention a logic and inference system that is as yet, in the early twenty-first century, far from fully hatched. (p. 67)

Similarly, Pinker's (2002) description of how the mind works illustrates why rational thought is far from a natural activity for humans:

> Behaviour…comes from an internal struggle among mental modules with differing agendas and goals. (p. 40)

Csikszentmihalyi (1990) goes as far as to argue that, "Contrary to what we tend to assume, the normal state of the mind is chaos" (p. 119).

It is therefore not that surprising that good thinking is more than just *common sense*, or we may need to accept that common sense is a much rarer capability than is typically assumed. However, despite the many barriers to good thinking, it can be effectively modelled, understood, and improved. As Perkins et al. (1995) pointed out, "People can learn to think and act intelligently" (p. 18). However, there is little point in asking students to engage in good thinking if they have no accurate and useful prior knowledge of what this means. In the absence of useful knowledge in this area, as for any area of new learning, a whole host of misconceptions are likely to come into play, and we know what this eventually leads to—a confused and frustrated learner.

There are many models of thinking in the literature (e.g., Marzano et al. 1988; Swartz and Parks 1994; Perkins 1985) and the keen reader can find much of interest. Having spent many years researching this elusive human quality, I have evolved a model of thinking (Sale 2014) based on extensive modelling of how professionals, across a wide range of fields, actually solve problems in their working contexts. It must be recognized at the outset that accurate conceptualization of internal cognitive processes is inherently problematic and invariably unreliable, especially across subject domains. However, without some valid practical frame on what these elusive but desirable skills are, and how they work in terms of the wider context of internal mental activity, there is little chance of the effective teaching and assessment of them. As Schank (2011) pointed out:

> The real issue is how learning actually takes place in the mind. (p. 3)

The task of framing what constitutes good thinking, how this works as an internal process, and what other factors influence its application in real world problem solving is a challenging one. However, research suggests that while there is variation in how humans experience phenomena in the world—based on prior experience, belief systems and selective perception, etc., our common human apparatus and need orientation typically results in shared ways of experiencing the world. As Marton (1981) summarized:

> …we have repeatedly found that phenomena, aspects of reality, are experienced (or conceptualized) in a relatively limited number of qualitatively different ways. (p. 181)

What this means, for example, is that while psychologists may solve problems is some qualitatively differently ways from engineers, both at the individual and collective level, there is much of similarity in the types of cognitive activity involved. For example, they will need to analyse situations (cases), make comparison and contrast with similar cases, build up inferences and interpretations from ongoing perceptions and data accumulation, generate possible solutions and decide action based on chosen criteria. Around this swirl of cognitive activity, there will be an overall monitoring of what is going on, typically referred to as metacognition. The summary model is depicted in Fig. 2.3: Sale Model of Types of Thinking, and the typical cognitive heuristics involved are outlined in Table 2.1: Cognitive

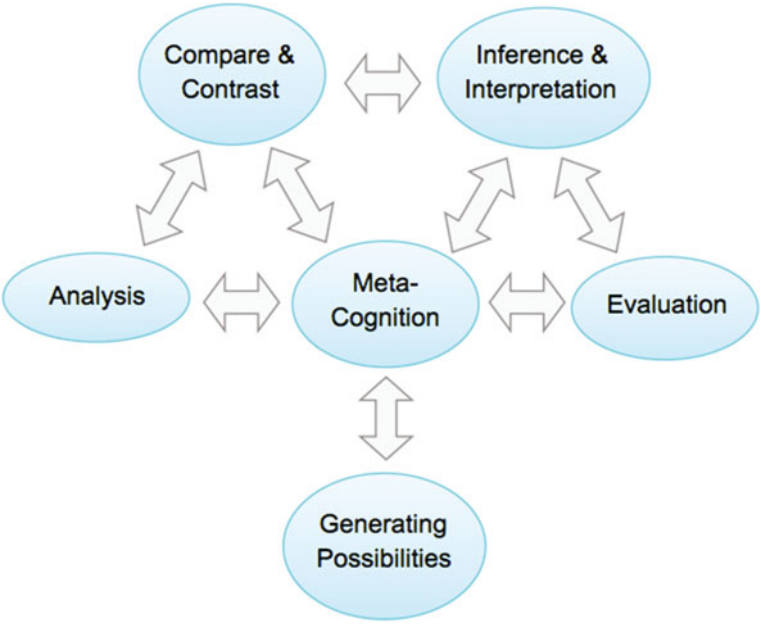

Fig. 2.3 Sale model of types of thinking

Heuristics of Types of Thinking. Note that the cognitive heuristics for each type of thinking are the essential framing questions that have to be negotiated in making sense of information and building understanding.

In this model, analysis, compare and contrast, inference and interpretation and evaluation are typically employed during critical thinking; whereas generating possibilities, as the term implies, is predominantly employed in creative thinking. Metacognition refers to the awareness of and ability to monitor and control one's cognitive and affective processes in order to enhance thinking and learning. This executive function seems unique to humans, and makes self-reflection and self-regulation possible. What this means, at the practical level, is that individuals who have developed a strong metacognitive capability are able to be much more focused and systematic in their approach to learning, indeed life, than those lacking in this area. They are able to run a quality assurance check on what they know, don't know, need to find out, as well as ensure that they are employing the necessary specific types of thinking to ensure that understanding of what they need to learn is being attained. Similarly, they are able to be more conscious of how their own belief systems, emotional and personality dispositions may be affecting their learning and performance, whether this is for the good or otherwise. Persons with strong metacognitive capabilities are more able, as compared to persons less competent in this area, to specifically identify and apply the most effective learning-to-learn strategies and skills to support their learning goals, as well as manage

Table 2.1 Cognitive heuristics of types of thinking

Generating possibilities
• Generate many possibilities
• Generate different types of possibilities
• Generate novel possibilities
Compare and contrast
• Identify what is similar between things (e.g., objects/options/ideas)
• Identify what is different between things
• Identify and consider what is important about both the similarities and differences
• Identify a range of situations when the different features are applicable
Analysis
• Identify relationship of the parts to a whole in system/structure/model
• Identify functions of each part
• Identify consequences to the whole, if a part was missing or malfunctioning
• Identify what collections of parts form important sub-systems of the whole
• Identify if and how certain parts have a synergistic effect (for open systems)
Inference and Interpretation
• Identify intentions and assumptions in data
• Separate fact from opinion in data
• Identify key points, connections, and contradictions in data
• Make meaning of the data/information available
• Establish a best picture to make predictions
Evaluation
• Decide on what is to be evaluated
• Identify appropriate criteria from which evaluation can be made
• Prioritize the importance of the criteria
• Apply the criteria and make decision
Meta-Cognition
• Recognize the ability and usefulness of thinking in an organized manner
• Actively think about the ways in which we are thinking
• Monitor and evaluate how effective we are thinking
• Identify and manage beliefs and emotions which may hinder the quality of thinking
• Identify and utilize strategies to improve the quality of thinking

aspects of self that are less congruent with goal attainment. For example, extroverts tend to become bored more easily than introverts, and as a result may find adhering to an organized and sustained study programme quite difficult. However, by being consciously aware of this and its potentially negative consequences (e.g., not passing an high stakes exam; forgetting an important work deadline) such persons can create, monitor and evaluate a personal motivational and self-management strategy to mitigate the chances of likely failure. It is to be noted that while metacognitive capabilities have a high effect size of 0.69 (Hattie 2009) which is

hardly surprising, they are inevitably subject to the same principles of cognitive strain and inherent laziness documented by Kahneman earlier. For example, on many occasions, students have asked me what they need to do in order to attain high grades. I typically respond with a comment such as, "Know what you need to know, know it, and know that you know it." In fact, this is pretty much on the button, and it's far from rocket science. However, to get to this state of competence, there are a few things that need to be done that many people don't particularly like. Yes, one is good thinking, and another is hard work and persistence in doing something that may not be that pleasurable. Rohn's (2014) reflections are poignant in this context:

> Average people look for ways of getting away with it; successful people look for ways of getting on with it.
>
> Success lies in the opposite direction of the normal pull.

Good metacognitive capability is the basis of students becoming self-regulated learners and this represents a key educational aim. Once learners have developed such capabilities, they have the foundational base for more autonomous or independent learning, as well as possessing the essential understanding and necessary skills to be increasingly effective as lifelong learners. Effective metacognitive activity on the part of the learner will typically involve:

- Ensuring that clarity of learning in terms of goals is achieved
- Being able to estimate what can be learned in given timescales, based on what needs to be learned and what is already known
- Planning a successful learning strategy (e.g., what, how, when, where)
- Knowing what strategies help to achieve what aspects of the learning process (e.g., retention of facts, understanding, skill development)
- Reviewing and evaluating one's progress and making appropriate changes in strategy when necessary (this is an iterative process).

In practice, these types of thinking run as overlapping and intertwined programmes, moving from foreground to background as the focus of framing a problem changes and new questions emerge. Certainly, when creativity is sought, generating possibilities is at the mind's forefront, but other types of thinking will weave in and out of consciousness and, typically run continuously in the subconscious mind. However, the good thinker will periodically take a conscious metacognitive view and attempt to make sense of (understand) what is actually going on in his/her mind, check various aspects of cognitive and affective processes (e.g., the types of thinking; impact of beliefs and emotions) and make adjustments when necessary. Good thinking then is the ability to navigate this 'perpetual cognitive and affective swirl', and to be able to employ the various heuristics of these types of thinking in a fluid, efficient and highly synergistic manner. This is perhaps the reason that good thinking is quite rare in many situations, and why we really need to teach it to our students.

It is in this context that some writers in the field see good thinking not just in terms of cognitive processes and heuristics but also in terms of the development of intellectual traits and standards. For example, Paul et al. (2006) identify the following traits as central to acquiring a high level of expertise in critical thinking:

- Intellectual humility—sensitivity to one's own biases and the limitations of knowing
- Intellectual courage—prepared to question own beliefs and those of others, even if unpopular with dominant perspectives and people
- Intellectual empathy—awareness of the need to actively entertain different views from one's own
- Intellectual integrity—holding oneself to the same intellectual standards of others (no double standards)
- Intellectual perseverance—working through intellectual complexities despite frustration
- Confidence in reason—recognizing that humankind's interests are best served by giving free play to reason
- Intellectual autonomy—thinking for oneself in relation to standards of rationality and not uncritically accepting the judgements of others
- Fair-mindedness—conscious of the need to treat all viewpoints alike and not be influenced by vested interests.

Such dispositions are certainly desirable, but the extent to which some are more integral to deep seated personality traits is open to question, as well as is our capability to facilitate their successful development in formal educational contexts. However, they represent desired values and dispositions for learning and, as teaching professionals, we do our best to facilitate such outcomes, albeit being a difficult task.

This is one of the most challenging heuristics to apply successfully for all the reasons identified above, and it may explain in no small part Wagner's conclusion at the onset of this section. Teaching thinking is indeed challenging, but it is without a doubt necessary. In a world of increasing complexity, global volatility, almost unlimited (but questionably useful) information genres and sources, good thinking is now most needed. We are being incredibly naive if we assume that effective thinking and self-regulation will naturally occur for most students, simply by encouraging or telling them to do so. Without sufficient foundational knowledge and skill in good thinking, as well as an understanding on how emotions, beliefs and other vagaries of the human mind influence such capability, many will lack the necessary understanding and competence to self-regulate effectively. As Hattie and Yates (2014) summarized:

> There is skill in knowing when to think, what to attend to, and when to stop thinking to save cognitive resources. We need to know when to think fast and when to think slowly. (xvii)

In helping students to develop the full range of thinking skills (i.e. metacognitive, critical and creative thinking) it is firstly essential to be very clear about what these entail, as summarized previously in Fig. 2.3 and Table 2.1. This enables the

framing of clear learning goals and specific outcomes that cue the different types of thinking. For example, in a unit or module on Environmental Science where a key learning goal is that students develop a key understanding of how to Manage Pollution, some specific learning outcomes could include:

- Analyse the causes of the main types of pollution
- Compare and contrast different types of pollution in a range of contexts
- Make inferences and interpretations concerning the effects of pollution in different situations
- Evaluate the effectiveness of existing pollution policies
- Generate possible ways for reducing pollutants in a range of contexts.

Having framed the learning goals and key outcomes, other Core Principles of Learning are to be applied in designing the overall instructional strategy. For example, it would be particularly important to activate students prior knowledge relating to how they are presently thinking, in order to ascertain and make visible their present knowledge components, misconceptions, and significant gaps in understanding. As Ritchhart et al. (2011) spelled out:

> We need to make thinking visible because it provides us with the information we as teachers need to plan opportunities that will take students' learning to the next level and enable continued engagement with the ideas being explored.
>
> It is only when we understand what our students are thinking, feeling, and attending to that we can use that knowledge to further engage and support them in the process of understanding. Thus making students' thinking visible becomes an ongoing component of effective teaching. (p. 27)

In order for students to be able to fill in significant knowledge gaps, clear up existing misconceptions and kick start a process towards better understanding in this important area, it is necessary to introduce a structured teaching approach that facilitates this important part of the learning process. This can be done in a variety of ways, but most effectively through Whole Class Interactive Teaching (Hattie 2009). This is far from a one-way transmission or 'teacher talk' approach to teaching, but a structured learning process involving a range of active learning methods (e.g., advance organizers, question and answer, tailored application activities and, of course, plenty of ongoing feedback). In this process, it's really important to ensure that good thinking is clearly and explicitly modelled through a range of relevant examples to the subject topic. As Sheppard et al. (2009) recognized:

> …teachers have to make their own intellectual processes (their performances) visible. This means that the teacher-expert has to make visible to learners the otherwise invisible processes of thinking that underlie complex cognitive operations …
>
> Teachers have to articulate and demonstrate rather than assume the thought processes they want students to learn. (p. 188)

In the process of helping students to build sufficient understanding of what constitutes good thinking and how to develop this capability, some key instructional strategies are particularly useful. For example, making thinking visible (both

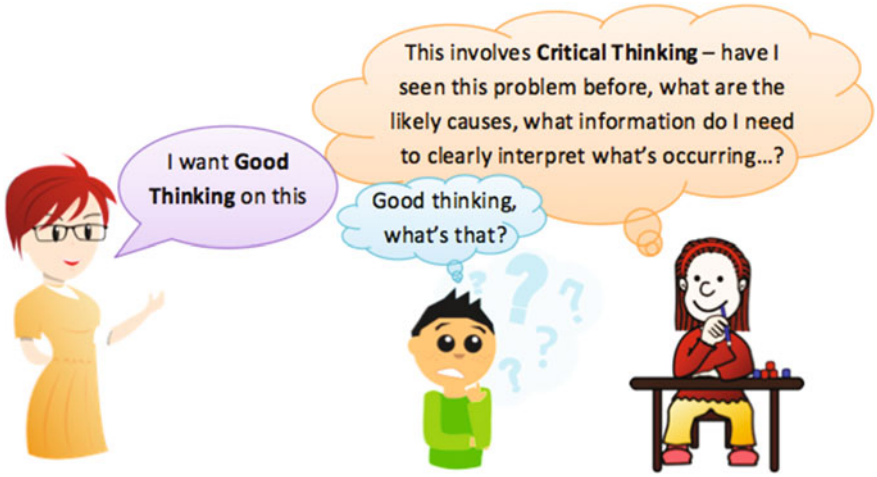

Fig. 2.4 Mental models of thinking

student thinking and teacher thinking) is essential, but this must be done consistently and sufficiently for it to become cemented in long term memory and established as an everyday practice when good thinking is required. In order to facilitate this effectively, the key terminology relating to the various heuristics of the types of thinking need to become part of the language of learning (to consolidate a language of thinking). For example, I often hear teachers, who I assume are seeking to encourage student thinking, use terms like "What are your comments on this" or "Lets discuss this"—even "I want good thinking on this". Taking the latter example first, this assumes that students actually have a mental model (schemata) of what constitutes thinking. However, in reality this may vary widely (e.g., Fig. 2.4 Mental Models of Thinking). If they have no prior useful mental model, then they are either totally blank or in the process of just commenting, which typically results in statements like, "Its ok", or "I don't like it much", which has little underpinning thoughtful analytical or evaluative base to it. In contrast, when students understand the different types of thinking, and the cognitive heuristics involved, they can respond thoughtfully (no pun intended) to their teacher's systematic use of language to specifically cue these types of thinking. This provides the essential modelling and practice to develop competence over time. For example, a possible teacher question in a situation of comparing two solutions to a problem situation might be something like, "Comment on these two proposed solutions". However, to provide the essential structuring to cue and develop the desired thinking process, a better questioning approach would involve something along the lines of, "Let's compare and contrast these two solutions…identify what is similar and different in each… what is significant about the differences in the solutions…what's important about these differences …how do these differences impact the problem situation we are trying to address, etc.?".

Fig. 2.5 Draft performance task incorporating types of thinking

Through the use of appropriate cuing questions, in which the types of thinking are naturally infused into the content of the topic, students will quickly become familiar with the 'language of thinking'. For example, when asked to evaluate options, whatever the subject context, they will have already internalized that this requires the deriving of relevant criteria to be used in evaluation, the likely prioritizing of these criteria in terms of relative importance in making the decision, and finally to apply the criteria, based on the available information, to the option or range of options. To further build understanding and actual application or competence, it is essential to provide appropriate practice through specific performance-based learning tasks that incorporate the types of thinking to be developed. As Wasserman (1993) clearly identified:

> Central to a pedagogy that seeks to promote the development of good thinking is the systematic use of well-constructed and managed learning tasks that reflect real world activity and involve the use of specific types of thinking. (p. 20)

A draft learning task that incorporates the key types of thinking is summarized in Fig. 2.5: Draft Performance Task Incorporating Types of Thinking. The more detailed process of activity design to infuse types of thinking and other process skills with content knowledge and skills is outlined in Chap. 4.

The explicit teaching of what metacognition involves and the range of metacognitive strategies that are useful in supporting the learning process is particularly important. The same evidence-based approach is necessary, utilizing relevant Core Principles of Learning as appropriate to the situated context. Again, activating prior knowledge is the initial starting point. Invariably the term metacognition is unlikely to be familiar for many students. In this situation it is necessary to make them aware of this distinctive human capability and demonstrate clearly from personal experience and other examples how metacognition works and what makes it so important to learning, attainment and personal success. A useful strategy is to ask students to think about what they have done in the past which they may now have some regrets about (there is no need for them to recall this publicly, for obvious reasons), but to model in their own minds the situation, their thinking and the

actions taken at the time, and the consequences they experienced. They are then asked what they have learned since that experience and how they now, in retrospect, look at it differently and may now choose to respond with a different strategy. This activity makes students very aware that they can actually think about their thinking, and identify different ways of looking at things in their world (i.e. reframing).

Also, when students are involved in a sustained learning activity (e.g., project work) structured metacognitive practice can be periodically included where they are required to appraise the quality of their thinking and the learning strategies they are using to deal with the challenges being encountered. Once students understand the range of learning benefits (e.g., better planning, monitoring and evaluation of learning) from heightening metacognitive capability, a range of other related learning-to-learn strategies and skills can then by systematically infused into specific learning activities over time. In this way students can build their competence and confidence as independent and self-directive learners, which is a very desirable long-term educational outcome. Metacognition should also be facilitated through other 'Teachable Moments'. In this context, these are situations in which students may have not been doing the necessary metacognitive work and there is clearly a need for it in the present learning situation (e.g., students have hit a block in their learning; it is apparent that their thinking has become disjointed or fuzzy).

2.1.6 Core Principle 6: Instructional Methods and Presentation Mediums Engage the Range of Human Senses

> Against boredom even gods struggle in vain.
>
> (Friedrich Nietzsche 2014)

In Core Principle 1, the notion of motivation being driven by pleasure, pain avoidance and novelty was introduced. Pleasure and pain avoidance are very obvious in terms of their motivational origins and impact, but how does novelty work and what is its significance in terms of the design and practices of teaching? When I first arrived in Singapore, I took an instant liking for a local delicacy, 'chilli crab'—you must try it if you come to Singapore. In fact I had this, and other local dishes, almost every night. Indeed, on one occasion, I remember an elderly Chinese lady at the local hawker centre (that's a Singaporean term for food court) saying to me, "Why you always have chilli crab, lah, why not spring roll?"—or something similar to that. Well, the answer at that point in time was easy, "I like chilli crab." However, one night, and it was inevitable in retrospect, the chilli crab was served up in its typical form, but my response was not the usual positive one. Suddenly, its appeal seemed to have vanished completely. The chilli crab was no different, but my perception had somehow changed and with this my whole orientation to it was

different. Invariably, based on my East London values, I ate it; after all it's not right to leave good food—a punishable offence by parents in my younger years, if caught. In psychological terms, I was becoming *habituated* to chilli crab and its appeal had greatly diminished. I had become bored with it. Sadly, as humans, we have an inherent tendency for this to happen, even for things and people we really like. I have not eaten chilli crab in many years. When teachers ask me what is the best teaching method, I tend to recite a variant of the chilli crab story as an advance organizer. Yes, some methods are more effective than others, but the overuse of any one method inevitably results in habituation and students will get bored. I can recall academic faculty at a previous educational institution attending a workshop on Project-based Learning. Many came back excited and wanting to use it in their teaching. Well, imagine the students on a Monday morning, when for the first time they get to choose aspects of their learning and be more actively involved in the learning process, it's a novelty. However, by Friday afternoon, when they have amassed several projects, the enthusiasm for such pedagogy has long receded. Too much of the same thing gets boring, and as Willingham (2009) concluded, "Change grabs attention, as you no doubt know" (p. 17). This is often why we go on holiday —even though it often ends up stressful, especially when taking young children who keep saying, "I wish we could go home". If the Gods struggle in vain, what chance for us mere mortals with this existential nemesis?

Hence, in terms of learning and teaching, the creation of appropriate variation in the modes and mediums of delivery, which stimulate the range of senses, is highly significant for enhancing the learning experience for students. Mental activity is stimulated through our five senses, with the visual sense probably the most dominant. The relative dominance of our vision system may well be the result of our evolution, as Mlodinow (2012) captures so interestingly:

> …an animal that sees better eats better and avoids danger better, and hence lives longer. As a result, evolution has arranged it so that about a third of your brain is devoted to processing vision… (p. 35)

In many situations the greater the combination of our senses that are appropriately stimulated in a planned learning event, the more potentially effective the experience is likely to be in terms of gaining better attention and facilitating the desired learning outcomes. For example, it is estimated that when we see and hear something, this doubles the sensory impact as compared to just hearing it. Direct experience will increase the impact further and, teaching it, will enhance it further still. This should not be surprising as the act of teaching, if conducted properly, will involve much by way of preparation. Most specifically, it will involve developing a strong understanding of the key content areas, especially those concepts and principles that are fundamental to understanding the key structure of the topic area. It will also involve identifying areas of potential difficulty and where the main misconceptions are likely to be experienced by learners. Finally, there will a systematic structuring and sequencing of how best to present this content in the most effective and efficient method combination. In my experience, by actually assessing how well someone has learned takes this process even further. When assessing

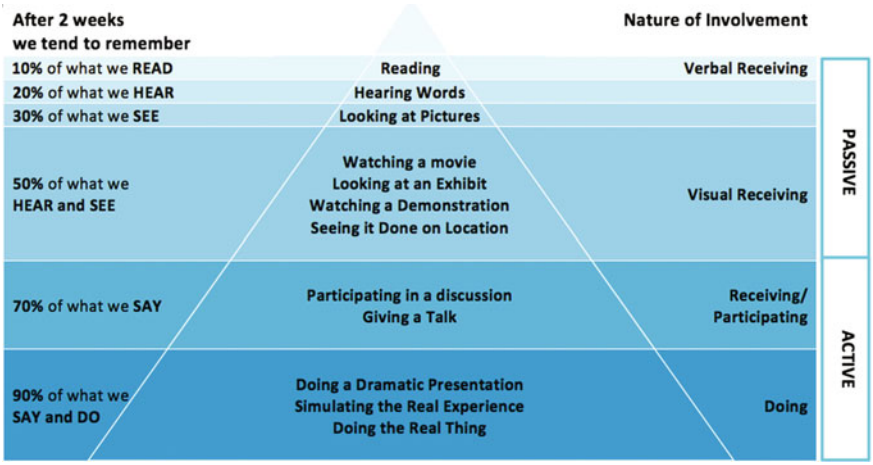

Fig. 2.6 Edgar Dales' 'cone of learning'

students, one must firstly be able to validly ascertain whether or not and to what extent the key learning components (e.g., the desired learning outcomes) have been met in the performance evidence to ensure accurate judgement of performance. In making assessment decisions, especially of a summative nature (e.g., when one is making a final assessment decision or ascribing a grade), the assessor is claiming to know learners in some fundamental way that often has significant impact on their access to future educational channels and employment opportunities. Secondly, as assessment (formative) is a key aspect of the learning processes, this requires assessors to accurately diagnose students' specific areas of weakness and then provide tailored feedback to help them strategize effective future learning strategies. The area of assessment and the importance of feedback are addressed in some detail in Core Principle 10: *Assessment practices are integrated into the learning design to promote desired learning outcomes and provide quality feedback.*

Edgar Dales' famous 'Cone of Learning' (Fig. 2.6: Edgar Dales 'Cone of Learning') is often shown to illustrate how different senses and activities affect the learning process. The percentages have a limited empirical base and are quite arbitrary; however it provides a generalized illustration on how different combinations of sensory input may affect the type and quality of learning.

The use of audio-visual aids is common practice in seeking to enhance student learning through different sensory modalities, and it is certainly the case that the human mind responds positively to multi-media (Hattie and Yates 2014). The cinema, of course, exploits this to its fullest impact. Our brain is set up well to integrate information from different source inputs, especially from different modalities. Strong learning occurs when words and images are combined, and these effects become especially strong when the words and images are made meaningful through accessing prior knowledge. Good visual representations work because:

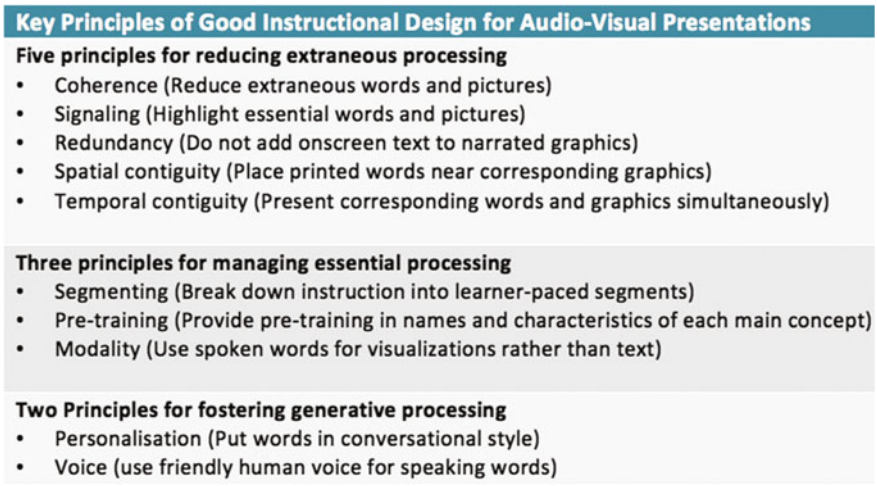

Fig. 2.7 Key principles of good instructional design for audio-visual presentations

- Recall is almost always visually triggered; hence visual representation acts as a cue triggering the full memory
- Only structured information can go into Long Term Memory, so this helps the transmission from Working Memory into Long Term Memory and subsequent recall
- They facilitate the ability of learners to see the relationship of a whole to its various parts, which fosters understanding.

However, it is important not to over use audio-visual aids or to create too much variation in modes and mediums of presentation. I have seen many teachers using audio visual aids and varied presentation formats, all with good intentions to enhance the learning experience, but only to create confusion for students. There is now much evidence-based research on how best to present visual material to facilitate effective learning. For example, Mayer and Alexander (2011) summarized a number of key principles that specifically impact the effectiveness of multi-media on learning (see Fig. 2.7: Key Principles of Good Instructional Design for Audio-Visual Presentations).

As Mayer makes clear:

> These practical implications are examples of *evidence-based practice* – basing instructional methods on research evidence rather than on conventional wisdom, opinion, speculation, fads, or doctrine. (p. 441)

This heuristic is not difficult to understand in terms of how it can enhance student attention and attainment as it has strong face validity. For example, we have all both experienced boredom and how it affects our attention and disrupts learning, as well as being stimulated by high impact multi-media movies. I remember being amazed by the film 'Avatar' because of the multi-media effects, even though the

story had some ridiculous concepts such as helicopter gunships, resembling what are used today, on a planet in another solar system many light years away—really? However, today's multi-media and internet rich resource pool is a double edged sword. On the one hand, it offers the creative teacher much in the way of capability for building networks of integrated resources, differentiating the learning experience and creating instructional strategies that provide better attainment opportunities for an increasingly wider cohort of learners. On the other hand, we must bear in mind that today's learners, so familiar with the internet and its diverse entertainment and communication options, will not simply give attention to 'bells and whistles' multi-media. The ability to design creative content and effective instructional strategies may be even more necessary today than in yesteryear.

2.1.7 *Core Principle 7: Learning Design Takes into Account the Working of Memory Systems*

Human memory is a little bit like having a Maserati sports car, but only being allowed to use the first gear, except on special occasions. A Maserati will hit a top speed of 185 miles per hour, but certainly not in first gear. Our memory has two main systems, long-term memory (LTM) and working memory (WM). These are depicted in Fig. 2.8: Summary of Memory Systems. Our LTM seems to have unlimited storage capability. It's not that our brain gets bigger as we learn more; rather it becomes denser in terms of neural connectedness, though we can never live long enough to actually test its full capability. However, before information can be stored in LTM, it must firstly pass through WM, which has very limited immediate capability when processing new information. The 'magic' 7 (able to process around 7 plus or minus 2 bits of information at one go) was originally documented by Miller (1956), for what was then referred to as short term memory. However, more

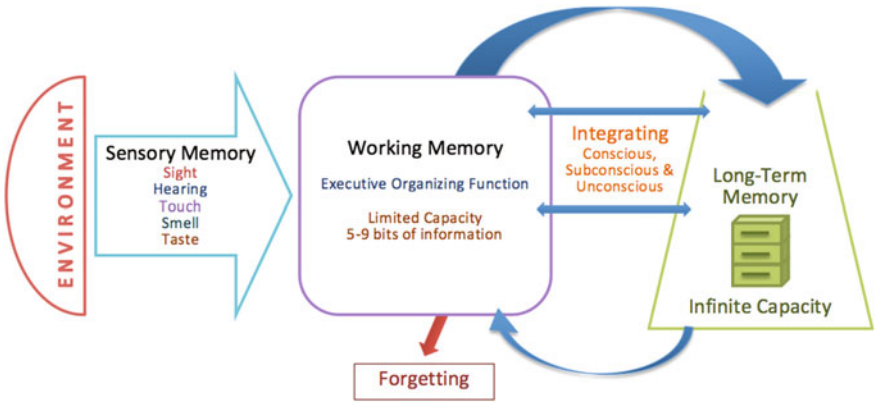

Fig. 2.8 Summary of memory systems

recent research (Van Merrienboer and Sweller 2005) suggests that in everyday situational use, this tends to be only 2–4 elements at a time. WM also needs quick rehearsal for information to be effectively captured and processed otherwise it is typically lost (forgotten) after only a few seconds. The limited capacity of working memory poses problems for learning, as Clark and Lyons (2005) point out:

> …it is in working memory that active mental work, including learning, takes place. Working memory is the site of conscious thought and processing. (p. 48)

Similarly, Ormrod (2011) summarizes the importance of this key memory system:

> Working memory is the component of our memory system in which we hold attended-to information for a short time while we try to make sense of it. More generally, it's where our thinking occurs. For example, working memory is where we think about the content of a lecture, try to decipher a confusing textbook passage, or solve a problem. Whatever our consciousness is, this is probably where it is housed. (p. 55)

You may also remember from Core Principle 5 that the human mind is, for many of us, inherently lazy in that System 2 thinking typically is draining on our cognitive resources and results in what is often referred to as 'ego-depletion' (Kahneman 2012). Quite simply, excessive cognitive activity, like excessive physical activity, is not the norm for most people—one must choose to develop these capabilities. It is also the case that, at a conscious processing level, the brain is relatively slow as a processing system, especially when compared to computer technology. If you have any doubt, do this simple exercise:

> How many capital letters in the English alphabet are curved?

If you already know the answer, it would be immediate; otherwise it would probably have taken you some 25–30 s to get the correct answer (11). However, type in Jack Russell terrier on your PC and you will get 4,250,000 hits (Well, at 1.50 pm, Singapore time, June 1, 2014). Given the limitations of WM, a largely lazy thinking system and slow processing speed, we start to get a somewhat limiting picture of human learning capability. Hattie and Yates (2014) make the point which many of us don't want to face up to, when they highlighted:

> Notions such as instant experts, superfast learning, speed reading, and other magic-like programs, amount to faddish quackery in violation of known and validated principles of human learning. If only it was that simple. (p. 113)

However, the picture is not as bleak as it seems, as there are ways in which we can use our memory akin to driving the Maserati in 4th gear. This becomes possible, even easy, once we have acquired vast knowledge, understanding and expertise in a particular field. Such capability is fully encoded as highly integrated neural networks (e.g., cognitive schemata) in LTM. WM has no limitations when dealing with such information retrieved from LTM, as it dramatically alters the functionality of what is taking place within the memory systems. The two systems effectively merge into one fluent dynamic entity working towards meeting the conscious goal of desired information retrieval and solving the problem in hand.

Furthermore, over time this process becomes increasingly automated, and as Hattie and Yates (2014) summarized:

> When your knowledge becomes so automatic that you can access it quickly, with virtually no effort, then the WM system is said to be bypassed through the automaticity stage – a most desirable place to be. (p. 147)

This enhanced memory capability explains why a person very fluent in a language can always find the words they want to use and assemble them in complex sentences instantaneously. Contrast this with the novice trying to learn the days of the week in a new language. It took me more than an hour to learn (as in encode sufficiently in LTM for later effective retrieval) the days of the week in Mandarin, and that was quite good.

It has been popular in educational circles to downplay the importance of rote learning and memorization. After all we want flexible adaptive and creative thinkers today—right? Yes, but such high level human capability is largely based on what we have acquired in our LTM system. Basically, if there is not much information in there, and it's not particularly well organized and connected, there is little chance of creative or even useful outcomes. This could not have been levelled at the neural arrangements of Einstein or Da Vinci, and it may have been a definitive factor in their *genius* capabilities. It is not surprising that Kirschner et al. (2006) concluded that:

> …long term memory is now viewed as the central dominant structure of human cognition. Everything we see, hear and think about is critically dependent on and influenced by our long-term memory. (pp. 3–4)

Research clearly shows that a major factor that differentiates experts from novices is that expert problem-solvers are able to draw on the vast knowledge bases in their LTM and quickly select the best approach and procedures for solving a given problem. As Kirschner et al. further argued:

> We are skillful in an area because our long-term memory contains huge amounts of information concerning that area. That information permits us to quickly recognize the characteristics of a situation and indicates to us, often unconsciously, what to do and how to do it. (p. 4)

This essentially means that the more you have effectively learned and appropriately organized in LTM, makes subsequent learning in that area or field more effective. As Willingham (2009) noted:

> …having factual knowledge in long term memory makes it easier to acquire still more factual knowledge. (p. 34)

> One of the main factors that contributes to successful thought is the amount and quality of information in long term memory. (p. 17)

This goes very much against the prevalent view among many educationalists that we should not be encouraging rote learning, but instead focusing on building understanding through the development of thinking. As documented earlier, understanding is important and the development of good thinking is essential to

achieving this. However, this is a bit like having a Maserati, knowing how to drive it, but not having any petrol to put in the tank. Csikszentmihalyi (1990) was correct in arguing that, "It is a mistake to assume that creativity and rote learning are incompatible" (p. 123). Memory and thinking are equally important in the development of understanding, share interdependent functionality in the learning stakes and there may be little point in viewing them as distinctly different processes. It is the construction of elaborate mental schemas in LTM that provides the conscious mind, operating in working memory, with room to think when solving problems. Repetition and review are vehicles enabling knowledge to be stored in reliable retrievable units which, over time, accelerate mental growth through conceptual mastery and deeper understanding. As Willingham argued (2009):

> As far as anybody knows, the only way to develop mental facility is to repeat the target process again again again. (p. 87)

There is an elegant simplicity here; mastery of knowledge bases, good neural interconnectedness and plenty of varied retrievals of such knowledge, actually reduces the need to activate slow deliberate thinking processes—System 2 thinking. Hence, when solving known problems, the solutions are readily retrievable as memory algorithms or at least solid heuristics from LTM. That's the beauty of top level expertise, and why persons possessing such capability typically get paid so much more than mainstream professional folk. I like the story about the expert chemical engineer who was called into a plant emergency where the on-site engineers could not identify why a reactor was not starting up, and where losses could run into many thousands of dollars a day if not rectified. The expert engineer walked around the plant, looked at various part of the system, made certain adjustments to various parameters in the units, and within a couple of hours had the reactor working as it should. Later she billed the company $20,000. The company, not challenging the cost, given the alternative scenario, did ask the consultant engineer for a breakdown of the bill. The reply went something like this, "$1000 for the call out, $19,000 for what's in my head".

This heuristic has many implications for how we teach. Perhaps most apparent is the need to chunk up information into manageable learning structures to prevent cognitive overload on WM. This must take careful account of the prior learning of our students, as its level of integration, completeness and ease of access for retrieval will impact very significantly on our pace and focus when teaching. For example, when students are presented with new information and have very limited prior knowledge or a number of misconceptions in that area, they will be particularly vulnerable to cognitive overload in WM. In this situation they will struggle to process it meaningfully, feel confused, and fail to assimilate it meaningfully in LTM. Cognitive load (and overload) has been distinguished into two main, interrelated, components: intrinsic cognitive load and extraneous cognitive load (e.g., Van Merrienboer and Sweller 2005). Essentially intrinsic cognitive load is related to the task complexity itself and the ability of WM to deal with it. For the novice, a complex learning task will create cognitive overload, simply trying to make sense of it. Extraneous cognitive load refers to introducing information into the learning

situation that is not relevant to the learning (e.g., unnecessary text, graphic or colour change) or being poorly organized. This can be significantly reduced by good instruction design. As the authors emphasize, "There is no substitute for evidence-based instructional design" (p. 173). In contrast to the novice learner, when teaching students who have a high level of knowledge and expertise in an area, we can present information much quicker and in more elaborated forms, as they already have highly developed mental schemata in that knowledge field. In terms of analogy, this is why I can read (and usually make good sense of) several psychology journal papers in a day, but cannot retrieve the television picture when my dog sits on the remote control device and scrambles the channels.

Students need time to rehearse new information in their minds and consolidate it appropriately into existing mental schematas, which is facilitated through application activities that generate appropriate types of thinking (e.g., analysis, compare and contrast, inference and interpretation and evaluation), as this facilitates understanding. The wise teacher will provide this structure for students, and adjusts the pace of instruction accordingly. Consolidation of learned material in LTM is further reinforced through providing systematic reviews stimulating the retrieval of key information from LTM and bringing it to conscious attention in WM (Fig. 2.9: Retention of Information With and Without Reviews). Students, and the teacher, can then do a quality check on what has been learned, remediate lost elements, clarify overall understanding, as well as reinforce desired learning. This very act of conscious retrieval from LTM to WM fires related neural structures, which result in the secretion of myelin, an enzyme-based substance that forms an insulating sheath around the axon in a neuron. In basic terms, this further strengthens the learning

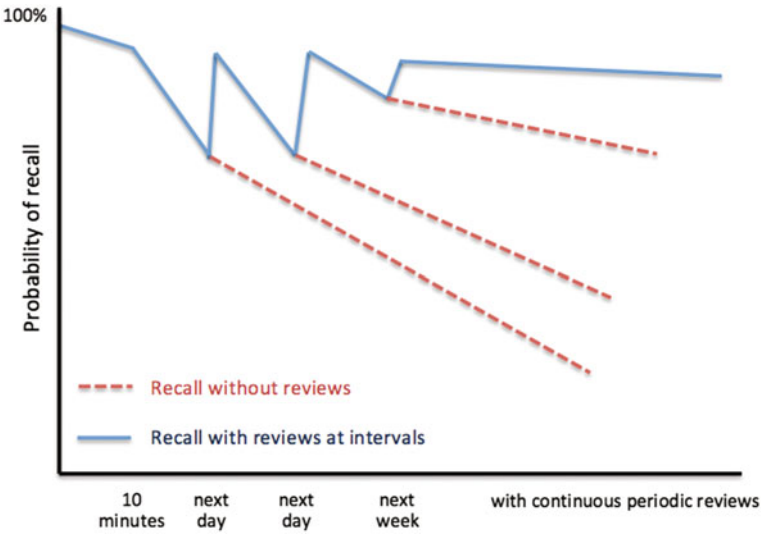

Fig. 2.9 Retention of information with and without reviews

bond in LTM. Talking to oneself, when memorizing for an exam, as long as it is about the 'right stuff', is far from madness, it is a good learning strategy.

Another aspect of how memory systems work, which has important implications for the design of learning and teaching practices, concerns the way in which information is selected and organized when presented to learners. It is well documented that apart from the limited capability of WM to deal with incoming information, the attentional and information processing of it is not uniform. The Serial Position Curve (Murdock 1962) demonstrated that when presented with a list of 16 items to memorize, people typically memorize more at the beginning and at the end, tending to forget what was in the middle. These information acquisition biases have been labelled the Primacy Effect (the tendency for the first items presented in a series to be remembered more easily as compared to most other items) and the Recency Effect (the tendency for the most recently presented items to be remembered more easily as compared to most other items). Another important effect is what is referred to as the von Restorff Effect (the tendency to remember distinct or novel items more easily as compared to most other items), named after the psychologist von Restorff (1933) who discovered it (see Fig. 2.10: Serial Position Curve, incorporating the von Restorff Effect). Even a quick break in a session can represent a change in the stimulus situation and has benefits in attentional and memory processing—"A change is as good as a rest"; another of those old folk sayings that has acquired validity from cognitive neuroscience. Hence, from a practical teaching point of view, the early part of the lesson is where a key impact can be made, both in terms of teaching the main concepts and building rapport. The best motivational speakers know this well, and exploit it to the limit. Similarly, the end of the lesson is also important as it facilitates retention of the key points in summary, as well as linkages

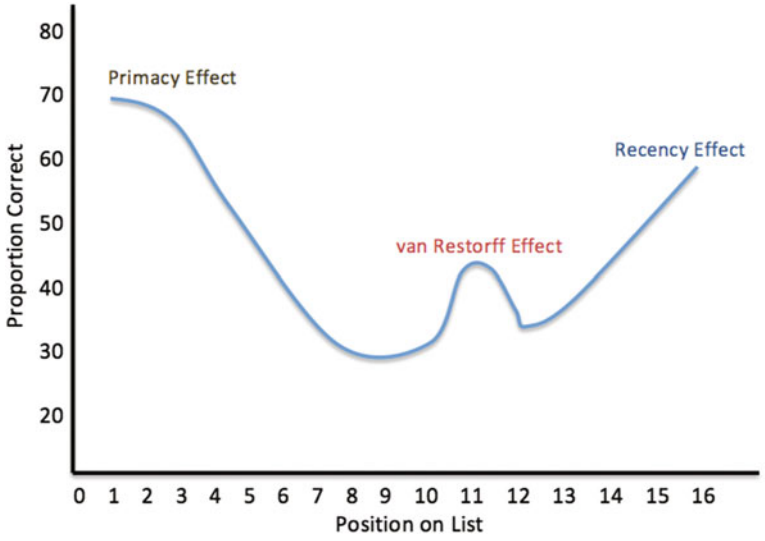

Fig. 2.10 Serial position curve, incorporating the von Restorff effect

with other resources and possibly a short advance organizer for the following lesson. Also, irrespective of what has happened in the lesson prior (e.g., students did not do particularly well on a test), it can be used to finish on an upbeat and positive note, lifting the psychological state of the students. This is similar to ending an interview with a firm handshake and positive eye contact. As we will explore in Chap. 4, specific non-verbal behaviours can also be very influential in influencing the perception and subsequent behaviour of others, albeit largely unconsciously. Finally, in this context, the creative teacher, through well designed changes in method and activity, can trick the brain into paying much more attention than it would customarily give over a given time duration. A creative application of a von Restorff Effect, will put the 'icing on the cake', metaphorically speaking.

Many teachers have long recognized the importance of presenting information in manageable chunks and then structuring activities that give students time to make sense (digesting) of it through discussion or other forms of application. Over time they do periodic recap and review to increase the chances of effective transfer and retention in LTM, as well as remediate gaps in learning. We are developing a more precise science that underpins how this works and can now confidently predict that when utilized thoughtfully in practice, there is likely to be significant gains in student attainment. We can all remember the teachers who bored us. There are a number of behaviours that can contribute to boredom in the classroom; many are violations of memory processing. Teachers who consistently use practices that conflict with the working of human memory will experience frustration with the gaps in many students' learning. The frustration and consequences will invariably be greater for the students themselves.

2.1.8 Core Principle 8: The Development of Expertise Requires Deliberate Practice

Most Saturday mornings I have an interesting experience. I usually go into the gym at my apartment block in Singapore and do around 30 min of high intensity weight training. It's not difficult to explain my behaviour in terms of Bentham's pleasure and pain reduction parameters. The gym work helps keep my weight, blood pressure and cholesterol levels down—definitely pain reducers. Also, I am able to continue getting into my existing wardrobe of clothes and, whatever people might say to the contrary, you generally get treated better if you look better, which I would rate as pleasurable and novel at my age.

Let's get back to the real significance of the gym story. Whilst doing my weight training programme, I occasionally look out of the window at the people playing tennis. I have noted that several players never seem to get any better even after a few years, playing the same novice game every week. They are unable to serve, do not adopt proper body positions when striking the ball and don't even seem to focus attention on the ball when they hit it, and I'm not a professional tennis coach.

The notion that learning inevitably improves over time and that experience is central to such improvement is not founded. Yes, time on task is important and so is experience. However, it is more about what is done when on task that really makes the big difference in the experience. For example, why is it that some people, who have many years of experience, still display limited competence, whereas relative newcomers achieve good competence in a comparatively short time? The conclusion of Berliner (1987) offers insight into such questions:

> …experience will probably only instruct those who have the motivation to excel in what they do and the metacognitive skills to learn from their experience…we believe that individuals with that kind of motivation to learn and in possession of a set of strategies for learning from experience are literally transformed by their experience. (p. 61)

It is certainly the case that motivation is a key factor in effective learning. However, it's also about being clear about learning goals and having the strategies and resources to achieve them. Furthermore, in skill development, one must put in a lot of actual *doing*, and much of this is what is typically called practice. Of course we know practice is important. I like the quote from the legendary golfer Gary Player (1962), who once said, "The more I practice, the luckier I get." However, we are increasingly aware that it is not just practice per se, but how the practice is organized and the way feedback is utilized. Colvin (2008) noted that exceptional performers were not necessarily the most talented in terms of their earlier biographies, but had certain attributes and practices that distinguished their expertise over time. Of most importance was what is now referred to as *Deliberate Practice*. According to Colvin, Deliberate Practice is characterized by a number of key elements:

- The activity (practice) is carefully designed to improve specific aspects of the performance, often with a teacher's help
- It requires much repetition
- Feedback on results is continually available
- It is highly demanding mentally (whether a physical or mental task)
- It isn't much fun (in the main; but may be for some).

It is important that there are clear and realistic improvement targets for the particular learner. This involves stretching the individual beyond an existing performance level to a recognizably improved level in some aspect, but a level that is achievable with effort and coaching from a teacher. As outlined in Core Principle 2, it is important to have as much clarity—visibility—of the learning goal, objectives and proficiency level as possible. In this way motivation is maintained as the learner will have a perceived experience of a higher mastery in at least some aspect of the performance, which further reinforces belief and sustains effort in continuing this learning strategy. To reiterate the point, "Nothing breeds success like success." It is often noted in professional sport that when a player finally wins that elusive major tournament, more seem to quickly follow. Andy Murray winning the men's tennis tournament at the Olympics, the US open, and then Wimbledon, is perhaps an

illustrative recent example. Prior to that, he had failed to win a major tournament, losing in 4 finals.

Of key importance is the role played by expert teachers in helping the learner identify what specific aspects of the performance to improve, structure the practice programme accordingly and provide ongoing quality feedback to maintain focus on the skill development. Again, to use the Andy Murray example, the appointment of Ivan Lendl in this role may have been more than coincidental in his attainment of two major titles within one year. Lendl himself had gone through the experience of losing his first 4 finals in major tournaments but eventually went on to win 8 singles titles in such events. Certainly he had learned something important and this may have helped in coaching Andy Murray. It seems that even the very best in the world still desire and need an expert teacher. It is necessary to emphasize that while deliberate practice is fundamental to effective and efficient learning, it is not a short cut to expertise or even competence (however defined), as Colvin noted:

> If the activities that lead to greatness were easy and fun, then everybody would do them, and they would not distinguish the best from the rest. (p. 72)

What is particularly interesting is that in the process of developing expertise, not only is there an enhancement in understanding and skill, but significant changes in neurology and sensory acuity relating to the field of expertise. Many years of intensive deliberate practice changes the body and the brain, enabling great performers to perceive more, to know more and to remember more than most people. Colvin particularly noted the following key attributes of great performers:

> They all possess large, highly developed, intricate mental models of their domains. (p. 122)

> …observe themselves closely… monitor what is happening in their own minds, and ask how it's going. Researchers call this metacognition …top performers do this more systematically than others do; it's an established part of their routine. (p. 118)

This enables them to:

- add and make sense of new knowledge more quickly and in more qualitatively useful ways
- distinguish relevant information from irrelevant information
- predict what will happen next in a domain specific situation.

Perhaps, what is most significant is the relative ease in terms of cognitive load and strain that they have to expand in doing most tasks in their field. As Kahneman (2012) explained:

> As you become skilled in a task, its demands for energy diminishes. Studies of the brain have shown that the pattern of activity associated with an action changes as skill increases, with fewer brain regions involved. (p. 35)

Expertise then enables a better understanding of a situation, and facilitates heightened perception of what is most relevant for the task at hand. This enables the expert to do many things quickly and automatically, releasing time to be more

situationally responsive and potentially creative. In the context of teaching, Turner-Bisset (2001) identified such capabilities in expert teachers:

> Expert teachers are able to read and process the complex mass of information which any classroom provides, much more rapidly and meaningfully.
>
> …expert teachers use a repetoire of strategies, selecting the most appropriate for use in a particular context and adapting it if necessary for a group of learners. (p. 69)

Hattie (2012) from extensive research supports this heightened capability of expert teachers as well as providing insight into how they are likely to be more creative:

> Experts possess knowledge that is more integrated, in that they combine the introduction of new subject knowledge with students' prior knowledge; they can relate current lesson content to other subjects in the curriculum; and make lessons uniquely their own by changing, combining, and adding to the lessons according to their students' needs and their own teaching goals. (p. 28)

This heuristic focuses attention on the important role of deliberate practice in skill development and attainment. From an evidence-based perspective, we are now able to be much more precise and specific in terms of what types of practice and how best to structure and manage practice to enhance attainment. The saying that "Practice makes perfect" is not quite right, though well intended. Simply getting students to practice and spend more time on task may have limited value in optimizing attainment without the systematic structuring of the practice activity, calibrated to the learner's proficiency level, and with expert feedback. Practice on its own may simply lead to consistent proficiency at *not* doing an activity well, as Berliner noted above, and I observe from the gym window. It is *deliberate practice* that over time is most likely to lead to higher proficiency levels and eventually expertise. However, deliberate practice is very much intertwined with the building of dense and well integrated mental schemata in LTM and the ability to use metacognitive capabilities at heightened levels. As emphasized earlier, each Core Principle of Learning, while focusing on a specific aspect of the learning process, is ultimately part of a dynamic and synergistic system in which specific areas of learning capability become mutually supporting in enhancing human attainment.

In applying this Core Principle of Learning in practical teaching it is important to ensure that the process of using deliberate practice is adhered to as best as is practically feasible. Invariably, in working with large classes it is harder to be as precise in diagnosis, task structuring and giving the time for ongoing feedback, as in the case of purely individualized coaching. However, by making the process of deliberate practice visible and meaningful to students, it is possible with some thoughtful application of collaborative learning and peer coaching—creative teaching—provide better opportunities for enhancing learning and attainment in this area.

2.1.9 Core Principle 9: A Psychological Climate Is Created Which Is Both Success-Orientated and Fun

In Visible Learning (Hattie 2009), the importance of the climate of the classroom was noted as among the more critical factors in promoting learning, with teacher-student relationships, the major determiner of such climates, with an effect size of 0.73.

We are all very clear on what constitutes a physical climate, and its various features. It was a typical everyday conversation in England, especially when in a lift with a stranger. How many times have I heard the comment, "Looks like rain shortly". One of my reasons for leaving the UK was quite simply the climate. I did not like the long winter months, which seemed to last the most part of the year. I prefer the perpetual summer weather in Singapore, and what an easy job weather forecasting is here: "26–33 °C with some chance of rain in the afternoon" is a 90 % correct call on most days. In the UK, as I remember it some 20 years back, weather forecasting was a combination of thoughtful roulette and serendipity, at best.

Now defining a psychological climate is a bit like defining thinking, as we can't actually see, touch or smell it. However, when it is very good or very bad, we can certainly *feel* it. People typically use terms like, "The atmosphere is terrible in there", or "Everything's cool here." Essentially, it's about the nature and types of interactions that are going on—or not going on—between people in a given social and geographical context (in educational contexts it's typically a classroom) and their impact on perception, feeling and subsequent behaviour. The ability to create and facilitate a positive psychological climate in a range of informal interpersonal situations is a great skill set to have. If you have such capability, it's likely that you will always be high on the invite list for socially orientated parties, as you have the skill of creating lively conversational content which helps folk to relax and feel comfortable. Classrooms are no different from most social interaction situations in that there are human actors (teachers and students) involved in interpersonal communication over time for a purpose (e.g., teaching and learning), and some kind of psychological climate will inevitably result. Furthermore, there is no doubt that certain types of psychological climates are much more conducive to learning and attainment than others, which may have adverse effects. Research suggests that a number of key factors are very important for promoting a positive psychological climate. First and foremost, as Hattie and Yates (2014) summarized, this entails the teacher exhibiting attributes that:

> …promote positive and open human communication. Students value being treated with (a) fairness, (b) dignity, and (c) individual respect. These threefold aspects have emerged strongly in all studies in which students are interviewed and surveyed as to what they expect of their teachers. (p. 26)

Similarly, Ornstein and Behar (1995), from research, concluded that:

> . …the most effective teachers endow their students with a "you can do it" attitude, with good feelings about themselves, which are indirectly and eventually related to cognitive achievement. (p. 86)

Very much in the context of this Core Principle, Jensen (1996) found that:

> Learners in positive, joyful environments are likely to experience better learning, memory and feelings of self-esteem. (p. 98)

However the really important questions concern what are the specific things that teachers can do, and how best to do these, in order to create and sustain a psychological climate that results in the students perceiving and feeling that they are being treated with 'fairness', 'dignity' 'individual respect', developing a 'you can do it attitude' and experiencing some sense of joy in participating in the classroom learning activities?

It is easy, though somewhat limited, to address these questions in terms of intent or generalizations. For example, we might say, "Show respect", "Be enthusiastic in how you teach" or "Display passion about learning". This is in many ways similar to going on a first date and having little idea on what to say or do, and being told by a friend to "Be interesting". Such statements are, in both of the above contexts, valid and will make sense to both the cognitive neuroscientist and the layperson alike—but there is something significantly missing. It is interestingly and annoyingly (for me anyway) captured in the saying "Everything is easy when you can do it." Being interesting certainly was not the case for me on my first ever proper date with a girl as a 17 year old. Getting ready to meet Geraldine (that was her real name—it will give her a chuckle if she ever reads this book) at a local cinema on a Saturday night, I suddenly posed myself the essential question, "What do I talk to her about?" Instantaneously, I became anxious, which quickly escalated to panic (we have all been there, and we know what this does for good thinking and confidence). In delving into my LTM system it was not long before I realized that all I ever talked about was football, boxing and fishing with my friends who were all boys. I had no idea at all on what to talk to a girl about, a real lack of prior knowledge containing, in retrospect, mainly misconceptions. The inevitable happened and the date was a disaster. I had nothing to say, was visibly uncomfortable all night, and this clearly contributed to her feeling equally uncomfortable. At the end of the film, the encounter quickly ended with a statement from me like, "How do you get home?" I had a reply something like, "I get the bus from over there." Geraldine never contacted me again, and that's not too difficult to explain. That was my first date and my last for a while; I was afraid to go through that again. If there was an 'O' level in conversational literacy with females, another grade 9 was an absolute certainty for yours truly, at that time. My Jack Russell dog would have fared better, and you will know why shortly.

At university, in the first year of my psychology undergraduate programme, I learned something really useful from a fellow student. I noted that he had an attractive girlfriend and he wasn't Chris Hemsworth. I once asked him about this, a kind of "How do you do this?" type of question. His reply was initially strange, "You need a nice looking friendly dog and walk around the local park." This made no sense to me, until he explained further, "If you do this, girls will notice the dog and want to pet it." I was still no clearer at the time, but you will have probably worked this out by now. As my fellow classmate pointed out you talk about the

dog, mention that you are going for a coffee and would she like to come and have a drink with you. It's just then a matter of generating mutually interesting content for conversation. You might be ready to ask, "How do you do this?", and that was my immediate question to him. Summarizing his response in more technical terms, which all seems so easy now, it's about generating content that the other person is interested in talking about, then showing that you are interested in the responses made (whatever this entails), which is done initially by asking the person what is of interest to him or her. Invariably, as we know, highly impactful interpersonal communication is not just about the verbal content, but also (and probably more importantly) the tone and pitch of voice and the accompanying body language components (e.g., posture, eye contact, gestures). Furthermore these all need to be appropriately calibrated to create *the total communication experience*. However, when one is confident, and this typically comes from one's own self-efficacy and perceived mastery, the communication package comes nicely into place and flows. We should not be surprised as this is simply the result of good learning for these skill-sets. Good understanding plus deliberate practice over time will get one to this desirable state. The converse is equally true. In most basic terms, to be effective at something, having intent is only an initial motivator, you must know how to do it well, and be able to do it at the behavioural level. Ultimately perception and judgements about other people, accurate or otherwise, is the product of their behaviour, and of course, our pre-existing beliefs. Molden (2001) makes the summative point most explicitly:

> It is our behaviour that directly connects to results, even though our thinking may be responsible for generating the behaviour. (p. 59)

In a number of teaching situations, I have seen novice teachers tremble at the front of a classroom, even run out in fear and despair when faced with challenging students or sometimes from forgetting the details of their teaching plan. Quite simply they don't know what to do next and lack the strategies in their long-term memories that might be effective. In contrast, highly competent and creative professionals when confronted with a challenging group of students or even noticing boredom developing on some of the students faces, while never complacent, can typically and smoothly change the teaching strategy in situ (re-create the pedagogy situationally). In most cases, such action results in regaining attention, settling the group down and changing the psychological climate to one that is more positive and task focused. To a novice teacher or outsider this may seem almost like magic, as creativity in any domain often feels a bit like that. However, as for most things (including magic), once they are made explicit at the behavioural and cognitive levels, it all seems rather obvious and logical.

Of course, understanding is not competence, deliberate practice is needed in skill acquisition, but it certainly helps if one knows very clearly what is involved in the learning process. What I have been describing may seem somewhat behaviouristic and contrived, and that is partly true. However, customer service professionals don't learn how to speak, smile and use their voice in certain specific ways just to

fill up training hours on their staff development plans. As Mlodinow (2012) summarized:

> The gestures we make, the position in which hold our bodies, the expressions we wear on our faces, and the nonverbal qualities of our speech, all contribute to how others see us. (p. 110)

He goes as far as to argue that:

> The pitch, timbre, volume of your voice, the speed with which you speak, and even the ways you *modulate* pitch and volume, are highly influential factors in how convincing you are, and how people judge your state of mind and your character. (p. 132)

It's therefore not surprising that politicians and other high profile media people employ communication specialists and psychologists to create certain positive appearances to influence the public at large. They do this because it works in large part with many people, and there is an underlying set of reasons why it works. For many years, I mentored and coached 'underperforming' teachers. These were academic faculty who received below 3.25 on a rating scale (where a score of 5 was 'very good' and a score of 1 was 'very poor') from student feedback for 2 semesters on the formal end of semester online questionnaire. Over the years this highlighted how, in a communication encounter, the relationship between a communicator's intention and the perception and meaning by others can be so incongruent. Many of these teachers also had very negative qualitative comments relating to such things as "shows little interest", "no care and concern" etc. In conversation with them, some were very disturbed by such student responses, and could not explain on what basis and how they might have been perceived in such negative light. They seemed unaware that such perceptions originate from specific behavioural aspects of person presentation.

Essentially, the psychological climate is largely shaped based on how the teacher actually behaves on an everyday basis with the student group. Hattie and Yates (2014) summary of what specific behaviours are positive in this respect are noteworthy, but quite obvious when made explicit:

> The key aspects, as described by a significant body of research involve the teacher's positive open gestures when dealing with the class, physically moving around the room, relaxed body orientation, frequent use of smiles, direct eye contact, and using a variety of friendly and encouraging vocal tones, especially when dealing with an individual student. (p. 28)

They go on to point out:

> The human brain is hard wired to instantly apprehend emotional states in other people …while some cultural differences are found …The notion that humans everywhere share a common basis in being able to recognize emotions in others embodies considerable truth. (p. 266)

Mlodinow (2012, p. 118) quotes research by Ekmann and Friesen (1971) who showed people in an isolated Neolithic culture in New Guinea pictures of American faces displaying a range of typical emotions. These primitive people had never been exposed to outside cultures, used no written language, were still using stone implements, and very few had seen a photograph let alone television or films.

However, when they were shown American faces of basic emotions, they were as able, as people from the 21 literature countries who participated in the research, at recognizing happiness, fear, anger, disgust, sadness and surprise in the faces of the emoting Americans.

Certainly, from my experience of facilitating many workshops in a wide range of cultural contexts, I would also make the case for there being much similarity in terms of people's perception and comprehension of what constitutes good human conduct, a positive psychological climate, as well as the way they learn. Several years ago, I was attending a conference in which one of the keynote speakers was emphasizing how people from different cultures learned very differently, and that we should be thinking of culturally relative pedagogies. In listening, I was reflecting on my own experiences and feeling a bit confused and somewhat annoyed. Yes, of course there are cultural differences, and pedagogy must take into account relevant culturally determined situated factors for a number of obvious reasons. However, in large part, the main specific cultural factors relate more to specific social norms and custom, rather than pedagogic or fundamental interpersonal communication practices. For example, I am mindful of touch, even handshakes in certain cultural contexts, as well as the humour I use. I also notice that in different cultural and ethnic contexts, one must modify the level of informality accordingly. For example, I tend to be more informal quicker in the Philippines than other countries, as participants seem to respond well to this. In certain countries I tend to retain formality longer as I feel that the early display of humour may be detrimental to a perception of high professional credibility. However, my experience is that, irrespective of cultural context, learners will become more informal and appreciate some humour, once they feel comfortable and perceive high credibility in terms of what is on offer in the learning stakes. Culture has impact here, but it may be less than personality configurations. In terms of how people learn, I find little difference, and that's because we share the same brain structure and we learn structurally in the same way. In most basic terms, learners must acquire knowledge through memory processing, make meaning of it (build understanding) through thinking, and acquire skill by doing. In this context there is motivation and beliefs that will come into play, but the essential principles of human conduct and learning seem largely universal, based on my experience. I am convinced that highly competent and creative teachers will be positively impactful anywhere, not with everyone all the time—that's impossible. Equally, very poor teachers will be similarly experienced in negative ways, wherever, in most cases. What is often of noticeable difference is how learners across cultures and contexts actually respond to the variety of teachers they experience. The best are generally always appreciated. However, how the worse teachers fair may vary significantly depending on cultural contexts. In some cultures, it seems that few learners will disrupt or react negatively even in the face of poor teaching, as there is a deep respect for the profession of teaching. They probably remain just internally bored or upset, depending on whether or not the

teacher is just incompetent technically or socially, or both. The latter is a sorry state to experience. In summary, Sale and Mukerji (2006) were delighted to report:

> …in our experiences of co-facilitation over several years, we were initially surprised but ultimately delighted to find that there appears to be a number of generic principles and practices that facilitate rapport and effective learning irrespective of cultural and ethnic contexts. (abstract)

Fun or humour was certainly not a significant feature of my school experience, well not in classroom time. It seemed that learning was a very serious business and anything resembling a joke was a prelude to classroom disruption. As a Cockney from East London, I have always felt that humour was one of the most important aspects of human experience, and this is now supported through a wide range of research (e.g., Garner 2006; Lei et al. 2010). Most significantly, the world famous psychologist, de Bono (2003), frequently refers to humour as "…by far the most significant activity of the human brain" (p. 12). Humour for de Bono is very much related to creativity as it involves the disruption of the brains natural tendency to self-organize on the basis of already existing neural pathways, which will typically restrict truly creative thinking or *Lateral Thinking* in his terminology. As he points out:

> Humour not only indicates the nature of the system but also shows how perceptions set up in one way can suddenly be reconfigured in another way. This is the essence of creativity. (p. 12)

Humour makes us feel better, and this has a positive effect on our psychological state. Of course, humour must be used thoughtfully and in context. However, far from limiting the learning experience, humour is now seen to have a wide range of positive impacts on aspects of the learning process, such as:

- Refreshing the brain
- Creating mental images that retain learning
- Reinforcing desired behaviour and making classroom management easier
- Developing positive attitudes
- Promoting creativity
- Contributing to the enjoyment of teaching

Furthermore, humour seems to have a role in learning more generally. Earlywine (2010) summarized:

> Funny instructors get higher ratings perhaps because humour affects immediacy – the sense that an instructor is present and attentive with students…
>
> …a full semester of instruction that includes relevant jokes that illustrate key concepts lead to better scores in final exams. (p. 138)

The use of humour in terms of creatively enhancing the learning experience and student attainment will be explored in detail in Chap. 4.

This Core Principle of Learning has much similarity with Core Principle 1: *Motivational strategies are incorporated into the design of learning experiences*, as

it applies across all aspects of teaching. The nature of the teacher's interactions with students will largely shape the psychological climate of the classroom, and as Rogers (1983) described:

> …the facilitation of significant learning rests upon certain attitudinal qualities that exist in the personal relationship between the facilitator and the learner. (p. 121)

Many of the important components that underpin the shaping of this relationship have been outlined and illustrated in this chapter and some key areas will be developed further in subsequent chapters. Most significantly as a teacher, shaping the psychological climate is in large part your responsibility, and it can be challenging in many situations. However, as Hattie and Yates (2014) argued:

> As their teacher you are an inevitable coach in interpersonal mannerisms. Hence a deep understanding of how these social processes operate will prove of inherent value in your professional work. (p. 269)

2.1.10 Core Principle 10: Assessment Practices Are Integrated into the Learning Design to Promote Desired Learning Outcomes and Provide Quality Feedback

At school I don't recall the word 'assessment' being used, and certainly not 'learning outcomes' or 'feedback'. We had to sit end of year exams and we were given homework each week, which was marked by teachers. On receiving homework back, we got a graded mark often with a '+' or '−' sign next to it, and a short comment such as, "fairly good", "could do better", etc. I also never recall giving this much thought in terms of what I might have done well and what I had not done well, and certainly not what I needed to do in order to improve and how. It was done and out of the way and that was that. I attach no blame to the teachers as that was assessment practice in those times and context. Assessment was largely seen in terms of summative grading and not as a key facilitating aspect of the learning process. The question, in the present context, is what do we now know about assessment practices that are evidence–based in terms of providing an important heuristic for significantly improving student learning and attainment?

Firstly it is now clearly recognized that assessment is not simply a means to measure learning that has already occurred, but is a major facilitator in the learning process itself. As Boud (1988) illustrated:

> There have been a number of notable studies over the years which have demonstrated that assessment methods and requirements probably have a greater influence on how and what students learn than any other single factor. This influence may well be of greater significance than the impact of teaching or learning materials. (p. 35)

In my experience, whether teaching pupils in the mainstream school context, or on Master's degree courses, learners typically focus on what is assessed. I have taught many students on Master's degree programmes who have been very explicit about what their main priority is, and that was passing and getting a good grade. To do this they want to know what to learn and how to apply it to meet these goals. I am not saying there is no intrinsic motivation in their overall approach, but assessment largely drives the learning process. For higher education programmes, there is emphasis on complex understanding and application, which inevitably pushes students towards engaging in good thinking. However, this is not always seen as a pleasurable activity, even for Master's degree students. Many like it when you model the answers for them, and why would they not, as many do the programme after a long day's work and are already suffering from cognitive strain. Similarly in school, if assessment is mainly focused on memorizing large bodies of factual content knowledge, then that's what most motivated students will do. Teachers talking about learning for passion and the importance of becoming self-directed lifelong learners will mean little when the marks on test papers suggest otherwise.

Assessment serves many purposes for different stakeholders (e.g., selection, maintaining standards, identifying and diagnosing learning difficulties, enhancing teaching). Most significant, in this context, is the important role that formative assessment (e.g., where learning is focused on supporting the learning process) plays in influencing student attainment, especially through the process of ongoing two-feedback. This is in contrast to summative assessment (e.g., where a terminal assessment decision is made and the learner either passes or fails or is graded accordingly). The high impact of feedback on attainment (e.g., the average effect size of 0.79, which is twice the average effect of all other schooling effects) is well documented by Hattie (2009). However, it is only relatively recently that this has been subjected to detailed scrutiny in terms of its impact and how it works on specific aspects of the learning process.

There are a number of interrelated aspects that contribute to the high impact potential of feedback on learning. As prior learning is always the entry point for new learning, new learning must find some anchor point in prior learning otherwise it is essentially a foreign language. This is equally true for feedback. As feedback represents new learning, it must be able to connect meaningfully to existing learning for it to be effective in building understanding. For example, if students are unclear about what they are supposed to be learning, even good feedback may not make much sense. Hence, good feedback is very much an ongoing dialogue between teacher and learners (as well as between learners) to identify gaps in knowledge, understanding and skills, as well as directing the necessary action to resolve these gaps.

It's not surprising that quality feedback has such high impact in terms of effect size on student attainment, as it connects to so many aspects of the learning process. However, to maximize the positive impact of feedback on attainment a number of conditions need to be effectively met. Sadler (1989) summarized these as follows:

- What good performance is (i.e. the learner must possess a concept for the goal or standard being aimed for)
- How current performance relates to good performance (for this, students must be able to compare current and good performance)
- How to act to close the gap between current and good performance.

The manner and types of questions asked during feedback sessions is also very important. A friendly supportive manner is essential to create a level of rapport in which learners feel comfortable in providing feedback to the teacher. Once established, teachers can then ask students focused questions in order to ascertain what they know and understand, identify specific gaps in knowledge and understanding, as well as misconceptions, thus enabling learning to become more visible to both.

Furthermore, effective teachers, just as they adjust their communication style to different student personalities, also adjust their provision of feedback accordingly based on specific student need. For example, Hattie and Yates (2014) suggest that novices require more specific task related corrective feedback, to be gradually replaced with more process feedback as they become increasingly proficient and self-regulated in their learning. What this means is that, initially feedback will focus on detecting errors in what students are doing on a task, and help to reduce and eventually eliminate these errors. Such feedback will include showing students what went wrong, examples of correct performance and ways to improve on these particular types of learning tasks. Process feedback is more focused on how the students are tackling the tasks given, such as their thinking (e.g., analysing, comparing and contrasting, evaluating) and the learning strategies they are using. In providing feedback it is often the case that both aspects are needed and this is where the teacher's judgement and skilful action are most impactful. As students become increasingly proficient, feedback is usually more focused on their abilities to monitor and evaluate their own learning, both at cognitive and affective levels (e.g., metacognition). Questions of how much feedback and the frequency of feedback, as with all aspects of differentiated instruction, will depend on the situation and learners' readiness. As Hattie (2012) summarized:

> The key is the focus on decisions that teachers and students make during the lesson, so most of all the aim is to inform the teacher of student judgements about the key decisions: 'Should I relearn…Practice again…To what?' and so on. (p. 143)

There is now increasing coverage in the literature on 'assessment for learning' or formative assessment, and how assessment methods, from an evidence-based approach, can be used to maximize the use of feedback for enhancing student attainment (e.g., Petty 2009). The strategic use of ongoing formative assessment is an essential part of the overall assessment strategy and, as Perkins (1992) suggests, once considered thoughtfully:

> Teaching, learning, and assessment merge into one seamless enterprise. (p. 176)

Core Principle 3: *Learners' prior knowledge is activated and connected to new learning* is in one large part an exercise in formative assessment, focusing on

eliciting important feedback data relating to what students already know, don't know and what areas are still 'fuzzy' requiring further exploration through good questioning. Furthermore, feedback is not something that occurs only between the teacher and individual students but can, and should be, an ongoing collaborative process with students as active participants. One method that I have found particularly useful is that of peer assessment for a number of reasons, as Petty (2009) fully summarized:

1. Students come to understand the nature of good work more deeply, as they must use this understanding to judge a peers work. This helps them understand their goals as learners, for example how marks are gained and lost. These goals are learned from concrete to abstract; this is the most powerful way to learn.
2. They learn other ways of approaching a task than the approach they used.
3. They become more reflective about their own learning and gain understanding by discussing disagreements. For example, if students realize they did one calculation wrong because they confused a sine with a tangent that is very helpful.
4. Students can do more work than you can mark.
5. Students tend to take pride in work that will be peer assessed: they are more likely to complete it and to write more neatly than if you assess it.
6. Students accept criticisms from each other that they would ignore if given by you! For example 'Your writing is really hard to read.'
7. Students greatly enjoy this method, and both 'helpers' and 'helped' learn if they support each other constructively. (The standard of discussion is commonly higher than you expect!)
8. It helps to develop the skills required for self-assessment. (p. 63)

Also, feedback from students is invaluable in helping teachers appraise the effectiveness of their own teaching strategies. Unfortunately many fail to take advantage of this easy-to-use approach to monitoring the effectiveness of their teaching on an ongoing basis, and are often dismayed and surprised when they receive negative feedback at the end of a course programme. Teachers who are in regular dialogue with their students concerning learning and collaboratively finding ways to enhance attainment are rarely surprised by the findings of programme evaluation exercises, and their feedback is likely to be very positive. The very act of seeking feedback from students concerning what aspects of the instructional process are most useful (and least useful) in supporting their learning, is supportive of learning in two particularly powerful ways. Firstly, from a technical point of view it enables the teacher to identify what is working well, what is not working well, and helps to understand students' learning at specific times and therefore make thoughtful situated modifications in instructional strategy. Secondly, and equally important, this will have a strong subconscious affective impact in terms of communicating interest and care and concern for their learning. As a teacher, this will certainly contribute to enhancing the perception that you are both 'well organized' and a 'nice person', the two major organizing constructs of student's conception of a good teacher, according to Willingham (2009). This will be explained and illustrated

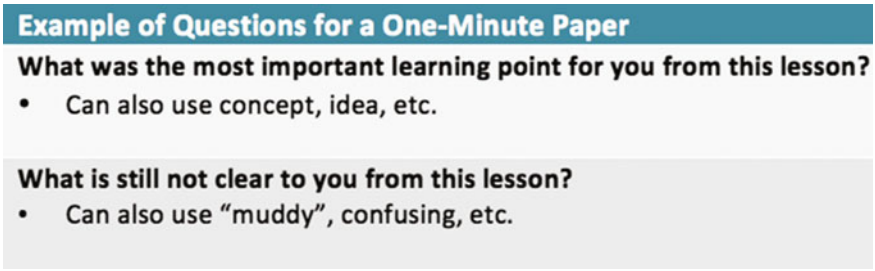

Fig. 2.11 Example of a one-minute paper

in Chap. 4. Obtaining feedback on one's teaching is not difficult or time-consuming. It can be done very informally as part of the everyday dialogue of instruction. For example, I make it a routine practice of making it clear and explicit to students that they must let me know if they are experiencing difficulty in understanding a particular concept, or if am going too fast or too slow, etc. With new groups I usually initiate this with some humour by referring to my East London accent, which does not use the letter H, and they may need to check what I'm saying occasionally and 'pull me in a bit' if I am drifting into local East London diction. A particularly useful and easy to use method for obtaining key student feedback is what is often referred to as a 'One-Minute Paper' (Fig. 2.11: Example of a One-Minute Paper). This is a simple feedback questionnaire of only two question areas, one identifying a key positive aspect of the lesson and the other one identifying a possible negative or limited aspect of the lesson. It can be framed in various ways, as well as modified in terms of focus or terminology. Essentially it explicitly communicates your intention to take into account their experience and identify what seems to be working well and also what may not be working well, from their perspective. Perhaps most importantly this opens up an ongoing dialogue and conversation with students on their learning, enabling better diagnosis of what the areas of difficulty are and how best to situated the instructional approach for them. Good feedback, when used effectively is another of those "Russian Dolls" (Hattie 2009) and it supports learning, both for students and the teacher.

The importance of this heuristic is fundamental to the whole instructional process as ultimately we are seeking to develop in our students the capability to become self-directed learners; that is be able to plan, monitor and evaluate their own learning. As Hattie (2012) concluded:

> …all students should be educated in ways that develop their capability to assess their own learning. (p. 141)

2.2 Using the Core Principles Thoughtfully: The Fly Fishing Analogy

For the uninitiated, fly fishing involves a fairly sophisticated fishing technique in which an artificial fly is cast to catch trout. However, whether or not the fisherperson catches trout, involves much more than this. Choosing the strategy, type of fly, identifying the species of trout in the location, interpreting the impact of weather conditions are some of the critical considerations in catching trout. The expert fisherperson negotiates these almost intuitively and catches fish regularly. Suffice to say, as a novice fly-fisherman, I caught few trout and never reached any great heights of expertise.

Fly fishing is a useful analogy when applying the core principles of learning in that both involve solid knowledge bases relating to the design and conduct of the respective activities. Similarly, they are also mediated by the situated context in which they are enacted in that both the fly fisherperson and the teacher have to deal with the here and now environmental situation. For the fly-fisherperson, there is a need to carefully consider such factors as the nature of the water locality (e.g., river, lake or sea), type of trout inhabitants in the locality, season of year and prevailing weather conditions. For the teacher key considerations include the nature and composition of the student group (e.g., prior knowledge and competence levels, motivational status), classroom resources and time of the day. Based on their knowledge and their framing of the particular situated context, they select methods and resources, and create strategies to try to produce good results—whether defined in terms of 'trout caught' or 'students taught'.

In teaching, while the core principles of learning are enduring heuristics in the design of the learning experience and the conduct of teaching, their relative importance as focal points in the design and teaching process is typically mediated by such situated factors. For example, if I am aware that a learning group has many students who have a generally low intrinsic motivational level for the subject, I will give more thought concerning how best to incorporate appropriate motivational strategies and work on creating a positive psychological climate as the central consideration. In this situation, I may 'sacrifice' cognitive considerations for better motivational or affective outcomes, at least in the short term. However, I would maintain a strong focus on avoiding cognitive overload and developing some mastery of key skills as priority pedagogic features. In contrast, when teaching fee-paying students on higher degree programmes motivating them may not be such a central concern, though they typically appreciate it anyway. This thoughtful and situated application of the Core Principles of Learning has been well captured by Darling-Hammond and Bransford (2005):

> …teachers not only need to understand basic principles of learning but must also know how to use them judiciously to meet diverse learning goals in contexts where students differ in their needs. (p. 78)

2.3 Summary

This chapter has outlined and illustrated key heuristics—Core Principles of Learning—for planning and conducting the practices of teaching. They are underpinned by current and established knowledge relating to human learning and research on what methods are most effective. The extent to which cognitive scientific principles (e.g., Core Principles of Learning) can be said to constitute an essential ***Pedagogy Literacy*** for the planning and facilitation of learning may rest on how other literacies are framed and on what basis. The term literacy has been typically used in the context of language acquisition and use. For example, persons who cannot read, speak or write effectively are sometimes referred to as 'lacking in literacy'. When such competences are severely lacking, the term illiteracy is often used. How lacking one must be in these areas to meet the criteria of illiterate is a value judgement to some extent and reflects the proficiency standards used. Whatever the standard, I certainly meet such labelling in terms of my fluency in foreign languages. As a Brit I am somewhat ashamed, in my travels, to have to explain that the only language I have any acceptable literacy in is English. More recently, the term literacy has been applied to a wide range of domain areas (e.g., computer literacy, media literacy, political literacy). This is similar in many ways to the proliferation of different intelligences (e.g., emotional intelligence, social intelligence, cultural intelligence). Whether different literacies or intelligences merit such grand description is open to debate, but there are clearly valued areas of human capability implicit in these designations. In the present context, *Pedagogic Literacy* would meet such criteria. Willingham's (2009) summary illustrates this in practice:

> Principles of physics do not prescribe for a civil engineer exactly how to build a bridge, but they do let him predict how it is likely to perform if he builds it. Similarly, cognitive scientific principles do not prescribe how to teach, but they can help you predict how much your students are likely to learn. If you follow these principles, you maximize the chances that your students will flourish. (p. 165)

Indeed, once teachers have a strong pedagogic literacy as well as the technical knowledge and skills to use a range of instructional methods thoughtfully and skilfully, they are in a position to evaluate the impact of their teaching on student learning and attainment from an evidence-based approach. It is then possible to achieve what Hattie (2009) emphasized as fundamental to improvement:

> The ultimate requirement is for teachers to develop the skill of evaluating the effect that they have on their students. (p. 36)

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Chapter 3
The Syntax of Creative Teaching

3.1 Understanding Creativity in the Context of Teaching

In the previous chapter, the Core Principles of Learning were suggested as a foundational base for an emerging evidence-based Pedagogic Literacy. Their thoughtful application in practice can provide a useful framework for the design of highly effective learning experiences. Furthermore, these heuristics do not focus solely on the learner's cognitive or intellectual development but fully incorporate the influence of social and emotional aspects of human experience and their holistic impact on psychological functioning and orientation to learning. Learning is, as suggested by Kolb (1995):

> …not the special province of a single specialized realm of human functioning such as cognition or perception. It involves the integrated functioning of the total organism—thinking, feeling, perceiving and behaving. (p. 148)

However, while the Core Principles of Learning provide evidence-based heuristics for the design of learning experiences and actual teaching, they do not dictate the form or structure of any specific learning experience. This is always mediated by a whole host of situated factors, as portrayed in the 'fly fishing analogy' (e.g. learning outcomes, subject content, student competence, resource access). Hence, as stated earlier, teaching can never be (nor would we want it to be) a procedural activity, governed by a finite range of algorithmic teacher behaviours. It is by nature an act of situated design. Design in teaching is akin to design in all fields, in that it must involve aspects of structured process, based on heuristics, as well as openness to new forms within the context of the given fields. For example, a hand-phone by definition must have certain features to enable the process of communication between people, but the shape, colour, additional features and aspects of functionality are variables that can be 'played with' to generate novelty and aesthetic appeal. Maintaining the status quo function with perceived added features and functionality is what enables competitive advantage and typically encompasses some creativity within these parameters. Design, in any field of application, is by

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nature both a systematic and creative process, aptly captured by Beetham and Sharpe's (2007) definition:

> …a systematic approach with rules based on evidence, and a set of contextualized practices that are constantly adapting to circumstances. It is a skillful, creative activity that can be improved on with reflection and scholarship. (p. 6)

In this chapter, building on the key heuristics outlined in Chap. 2 and using the process and features of good design as the basis for modelling teaching, a frame on creative teaching, is outlined and explained. The intention is to move us in some useful practical way along the funnel of knowledge, from mystery to heuristics, in terms of what creative teachers actually do and how they do it. It will also address some questions that I have been asked many times over the years, which essentially can be summarized as:

- Is creative teaching different from effective teaching?
- Is creative teaching better than effective teaching?

You may already have an opinion on this or may be framing one as you reflect on these questions. You may also be thinking of the well-worn discussion of whether or not, or to what extent, teaching is art or science.

There is little doubt that our increased understanding of human psychological functioning is providing a strong evidence base for the practices of teaching. In that sense, we can certainly talk about a science of teaching. However, we should also recognize the importance of artistry (however defined) in teaching, as Eisner (1995) so boldly asserted:

> …artistry in teaching represents the apotheosis of educational performance and rather than try to diminish or replace it with rule-governed prescriptions, we ought to offer it a seat of honour. (p. 96)

Art and creativity have much in common, and are sometimes seen as synonymous. Indeed art by its very nature is always seeking new forms and genres, and the most valued in financial terms are often those exhibits that are deemed 'creative'. However, in the context of teaching, while recognition has long been there, creativity has proved elusive from the point of view of clarification and workings. As Schon (1987) notes:

> …outstanding practitioners are not said to have more professional knowledge than others but more "wisdom", "talent", "intuition", or "artistry". (p. 13)

In the following sections, I will explore the notion that the art of teaching can also be understood in terms of an evidence-base relating to aspects of human psychological functioning, which can be modelled, learned and enhanced like other forms of creative behaviour. The key assumption is that this applies for all forms of art, and *works* as a result of its impact on human sensation and perception, creating positive aesthetic and affective responses (both conscious and unconscious). The dichotomy of science and art in relation to teaching may cease to be a useful one; we may simply talk about creative teaching.

3.2 Teaching as a Systematic Approach with Rules Based on Evidence

In the context of teaching, key heuristics such as the Core Principles of Learning provide the systematic approach with rules based on evidence. When planning the design of any learning experience (e.g., module, workshop) these heuristics should be at the forefront of planning decisions. For example, in planning a professional development workshop, I will typically generate and address the following kinds of questions:

- What are the learning goals and key outcomes for this learning group?
- What prior knowledge do these learners already have, and what activities might best capture their present understanding of these areas of learning?
- What activities, stories, examples, artifacts do I have that will generate interest and engagement around the key areas of learning?
- What are the key concepts that need to be negotiated in order to facilitate understanding, and how is this best organized and managed with this group of learners?
- What essential questions connected with this topic might get them thinking in critical or creative ways in relation to areas of interest or problem solving?
- What presentation mediums and resources do I have that will generate and maintain interest?
- How do I organize the learning sequences to avoid cognitive overload, facilitate the 'digesting' and meaning-making of the content in order to enable effective transfer into long term memory?
- How best can I make the learning experience active and experiential for supporting application-based learning outcomes?
- What specific skills need to be developed and how might effective deliberate practice be organized?
- How best do I present myself to this group of learners to encourage the building of rapport, positive interpersonal interactions and a 'can do' feeling for the tasks in hand?
- Are there areas where feedback is likely to be most critical for effective learning; and what strategies will I employ to maximize efficiency?

Now, let me confess, the process will not always be as explicit or meticulous as the above description depicts. Furthermore, as with all learning over time, especially with expertise, it becomes a largely unconscious competence. The key point is that there is a systematic process in design; it is far from ad hoc.

3.3 Teaching as a Set of Contextualized Practices Constantly Adapting to Circumstances

In teaching, practices can relate to a number of things. At a technical level, and typically for competency-based teacher education programmes, practices are often seen in terms of specific functional competencies such as:

- Produce a module document
- Write clear and appropriate learning outcomes
- Produce learning resources
- Use a range of instructional methods
- Design differentiated learning activities
- Produce a scheme of assessment
- Conduct assessment
- Produce an online module

Such functional competencies are fundamental to effective teaching, as they comprise—metaphorically speaking—the 'tool box' and underpinning knowledge relating to key technical practices. However, I have conducted numerous teaching observations in which the designated competencies were technically met, but I did not find the actual learning experience for students particularly interesting, let alone exciting. It was just ok. The reason is that practices cannot just be seen solely in technical terms but also in the way teachers conduct themselves, interact with learners and personally shape the learning experience to engage, motivate and, on the best occasions, inspire them. As Andrews et al. (1996) pointed out:

> …the hallmark of excellent teaching is more than adequate content expertise and effective technical performance. (p. 82)

This is similarly echoed by Bain (2004), who emphasized that:

> …the best teaching can be found not in particular practices or rules but in the attitudes of the teachers. (p. 78)

Andrews et al. (1996) develop this further in their description of excellent teachers:

> …excellent teachers seem to want to facilitate a meaning approach (deep) to learning rather than a reproducing (surface) approach. Moreover, they tend to engage in instructional processes that are congruent with their preferred approach and have values and beliefs, and characteristics (for example, honesty, integrity, genuineness and respect for self, students, material and the process of teaching) that are considered foundational to a meaning approach to teaching. (p. 101)

While considerations of human conduct may be contested in certain situations, there is strong evidence of core universal principles that transcend cultural norms and rituals. Nucci (2001) from extensive research of the literature noted:

> …the domain of morality is structured around issues that are universal and nonarbitrary. The core of human morality is a concern for fairness and human welfare. Thus there is a basic core of morality around which educators can construct their educational practices without imposing arbitrary standards or retreating into value relativism. (p. 19)

The practices of teaching, therefore, involve both a range of technical functional competencies as well as 'social and emotional' competencies, underpinned by core principles of human conduct. The social and emotional aspects of life are embedded in all human encounters, and teaching is no exception. Furthermore, while this provides a systematic approach to the overall design of learning experiences, it will always require thoughtful contextualization and adaptation to the particular learning group and context, as outlined in Chap. 2. This also applies to the use of specific practices. For example, teachers often debate the merits or otherwise of different teaching methods. It is as though some are looking for a pedagogic 'silver bullet', an approach or strategy that will engage and motivate all students and meet the desired learning outcomes. Such a wish is akin to alchemy. There are many reasons for the necessity to contextualize and adapt methods, including their appropriateness to outcomes and learners, the basic human desire for novelty and variation, and even the situated mood of the class at a particular time. Teaching methods are essentially structures that deal with the delivery of content in order to help students acquire knowledge, build understanding and develop skills and competence. As is now well documented, some methods are more effective than others in terms of their effect sizes on student attainment, and this should be a key consideration in method selection. However, most methods can have benefits in terms of student learning when used skilfully and appropriately in context. The relative merit of different instructional methods has been well captured in an analogy by Bransford et al. (1999):

> Asking which teaching method/technique is best is analogous to asking what tool is best—a hammer, a screwdriver, a knife, or pliers. In teaching, as in carpentry, the selection of tools depends on the task at hand and the materials one is working with. (p. 22)

Equally the most powerful methods, in terms of their potential for enhancing student attainment, may be ineffective when employed by less competent practitioners, just as the best tools are often wasted on the novice DIY (do-it-yourself) person—as I have learned from personal experience.

Similarly, while universal human conduct principles such as equity, fairness, respect, concern for the person are fundamental to the practices of teaching, the actual style and the content of human interaction often requires much contextualization and adaptation. Even simple greetings, which are pretty much universal, need careful contextualization across cultural and ethnic groups. A kiss on the cheek when being introduced to a lady may be expected in France, but it would be highly risky in Singapore. Fortunately, we are not confronted with such decision-making in class on an everyday basis.

3.4 Teaching as Skillful Creative Activity

When people are considered to be skillful in an area, the inference is that they can perform a range of specific activities in a highly effective and efficient manner. For example, to say that the soccer player Ronaldo is a very skillful player means that he is considered highly proficient or expert in employing such skills as controlling the ball, passing, heading, shooting and dribbling when playing football. However, while such skills are essential for a high level of performance in an activity, they are not the only components in determining a person's actual performance in a real life situation. Other attributes, such as aptitude, personality traits, and attitudinal components also play an important part in determining performance. For this reason the term competency is often used (Fig. 3.1: Generic Competency Pyramid), as it attempts to capture the wider configuration of attributes that actually contribute to performance in real work contexts.

In terms of competence in teaching, key practices (as outlined in the previous section) are often framed in terms of broad competency standards. These comprise a number of units of competence, which contain more specific subsumed elements of competence. For each element of competence, key underpinning knowledge and performance criteria are stated as the necessary requirement for meeting the competence. There is also guidance on the range and context in which the competency is to be demonstrated and what constitutes valid and sufficient evidence sources for making the decision that a person has met the competence. Figure 3.2: Singapore Workforce Skills Qualification Competency-Based System illustrates the generic structure.

An example of a broad competency unit is 'Develop and Conduct Competency-Based Assessment', which includes competency elements such as:

1. Prepare an assessment plan
2. Develop competency-based assessment tools

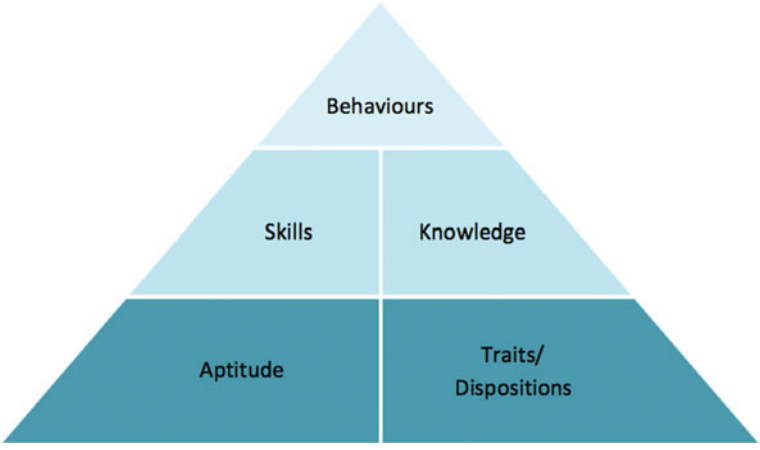

Fig. 3.1 Generic competency pyramid

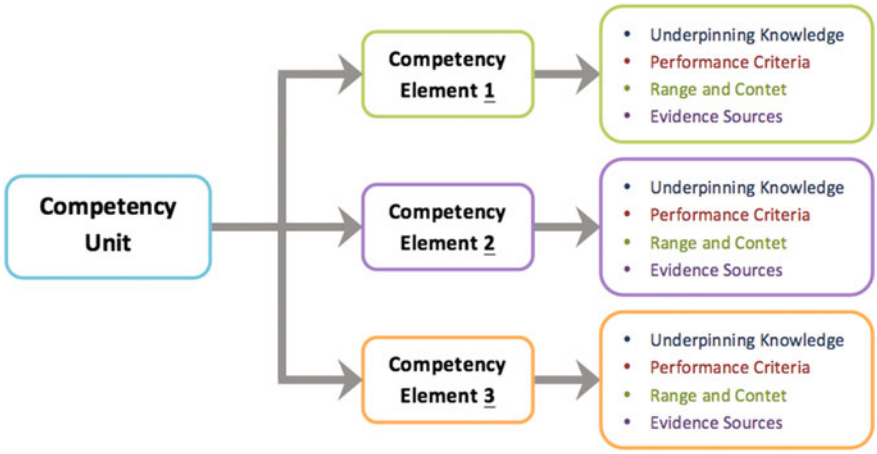

Fig. 3.2 Singapore workforce skills qualification competency-based system

6. Carry out Conduct of Assessment	**6.1** Use assessment plan and tools to carry out the conduct of assessment
	6.2 Use evidence gathered to decide if the relevant criteria are met and make assessment decision
	6.3 Deal with limitations of evidence required, where necessary
	6.4 Comply with the Code of Practice for Assessors when conducting assessment and making assessment decisions
	6.5 Record assessment outcomes promptly and accurately in accordance with assessment system, policies and procedures
	6.6 Provide clear and constructive feedback to candidate regarding assessment decision and advice on how performance gaps can be overcome
	6.7 Review assessment plan and process and provide feedback to appropriate personnel for modification, if required

Fig. 3.3 Performance criteria for 'carry out conduct of assessment'

3. Validate assessment plan
4. Prepare for conduct of assessment
5. Prepare candidate for assessment
6. Carry out conduct of assessment

An example of the performance criteria for element 6 is shown in Fig. 3.3: Performance criteria for 'Carry out conduct of assessment'

A competency-based framework attempts to provide clear systematic guidance as to what is involved in specific functional areas of competence, the competency units and elements, as well as what is required in order to show competency in practice at the defined proficiency levels. Such standards define what an effective practitioner must be able to do, and establishes the mainstream definition of being competent in this vocational field. Differentiating levels of proficiency and ultimately expertise are based on similar framing parameters. The work of Hatano and Inagaki (1986) is of particular interest in terms of differentiating performance at the highest level of competence, which is expertise. They distinguish between two broad categories of expertise, "routine expertise" and "adaptive expertise". Routine expertise is characterized by a high level of technical proficiency across the typical range of real world problem solving contexts. However, as problems become less familiar or novel, the performance of routine experts can dip significantly. In contrast adaptive experts can reframe problems in different ways, modify or invent strategies and combine skills to deal much more effectively in solving such problems. They offer a number of factors that encourage adaptive expertise in the context of education which, as we will see later, are particularly significant in developing creative teaching. These include:

- the extent to which the situation has flexibility of options, rather than rigid procedures, to enable exploration of new approaches
- the degree to which people can tackle problems with a degree of playfulness and acceptance of some risk in terms of it not working out in practice
- an organizational culture that encourages better practice from professionals as a key goal. For example, Hatano & Inagaki note:

> …they are invited to try new versions of the procedural skill, even at the cost of efficiency. (p. 270)

It would seem, therefore, that even at a high level of competence, there is significant qualitative variation in the performance of professionals, especially when having to solve less familiar problems requiring a greater flexibility in the application of knowledge. Furthermore, there appears to be certain conditions that are particularly conducive to more creative applications of expertise. To explore this more fully, it is first necessary to derive an operationally useful frame on what is creativity, and then specifically model how this actually *works*—the underpinning syntax—in terms of the design and facilitation of learning experiences. For me the search for understanding the syntax of creative teaching had what may seem to be humble origins. However, this is often the case even for world changing acts of creativity, for example, Louis Pasteur's initial work leading to the discovery of penicillin was on what made beer go sour. A significant part of my role a decade or so back was to mentor and coach 'underperforming' lecturers (as defined by student feedback scores of less than 3.25 on a 1–5 Likert rating scale, where 5 represents 'very good' performance and 1 'very poor' performance, for two consecutive semesters). This was an interesting challenge for a number of reasons, but most important for me was to try to help academic colleagues find meaning and

enjoyment in their teaching. Also, if things are not working well for the teacher, student learning is also likely to be compromised in terms of attainment and motivation. For some of the faculty it was clear that the initial concern was their feedback scores, and that's not too difficult to understand. Being on the 'under-performing academic faculty' list and having to sit in my office and talk about the practices and nuances of teaching was not high in their 'pleasure' stakes. There was much I learned from this experience, but two key things are particularly memorable and have relevance for what was to happen further down the line. Firstly, most of them did improve their feedback scores over time, and that's not too difficult to explain. However, their perception and understanding of this improvement was unexpected in that they initially saw the improvement primarily in terms of the students changing their behavior. For example, one reported, "The students are behaving better now." Yes they were, but the point is, what has led to such changes? In most cases, eventually, the 'penny dropped'—to use an old English saying (yes, I know I do this a fair bit). There was the sudden realization that how one conducts oneself, how one teaches—the structuring of the experience—is what affects students' perception, which ultimately shapes their behaviour (whether consciously or unconsciously). Student behaviour is far from a fixed entity but the outcome of much interpersonal dynamics.

The other thing that struck me was the relative ease in which I was able to identify and explain the reasons why faculty obtained the low ratings received, even from one observation. In retrospect, many violated several of the Core Principles of Learning documented in Chap. 2. It was therefore, not particularly difficult to model and understand the underlying syntax of highly *ineffective* teaching. Over time, the inevitable question invariably arose, "Would it be useful to model what highly effective (and creative) teachers do, how they do it, and what's the rationale and pedagogy structuring their strategies?" Remember the story of my first date? You may have forgotten it; I have spent decades trying to forget it. However, a similar principle applies in that everything is easy when you know how to do it; and everything seems like the 'Mars Mission' when you can't. That's why I try to keep Jack off the TV remote controls. It may save me hours of waiting on the phone for technical service so that someone can tell me in a few seconds which buttons to press in order to get the TV working again.

To pursue the initial research questions further, I was able to recruit a sample of 24 teaching professionals who had achieved exceptionally high student feedback scores (4.6 and above), for consecutive semesters. They also had a number of student qualitative comments pertaining to them as being "interesting", "creative", "entertaining", etc. I'm not arguing for great validity or representativeness in terms of sample choice, but it was a good starting point and seemed practically useful. The methodology involved the collaborative participation of the faculty who took on the role of "co-participants" (a term borrowed from Lincoln 1990, p. 78) in that they were professionally interested in the research and what it might produce. They were prepared to subject their teaching practices to analysis through observation, video-recording and post observation dialogue in order to make sense of what they did in lessons, how they did it and on what basis.

The use of concepts and techniques from the field of neurolinguistic programming (NLP) were an essential part of the research design as NLP is concerned with modelling effective abilities, and making sense of how they work in order for others to be able to learn them effectively. For example, O'Connor and Seymour (1995) referred to NLP as "a way of studying how people excel in any field and teaching these patterns to others" (p. 1).

I was interested in both modelling their behaviour as they created the learning experience in the classroom, as well as their underpinning thinking relating to what they actually did and on what basis. We may or may not like it but it is our behaviour, as noted earlier, that has the strongest impact on student perception and subsequent orientation to what we offer in class. Students cannot read teachers' minds or intentions (nor can psychologists come to that) but they can certainly read (accurately or otherwise) their behaviour. However, modelling the behavioural components of what shapes an experience is not the only important consideration for useful understanding of how the experience works. I also wanted to model faculty's thinking about their teaching (e.g., implicit cognitive strategies, rationale and beliefs about teaching). From a NLP perspective, understanding what they did that got good results, and how this actually works, might be useful for helping other teaching professionals who seek to achieve similar results. The outcomes of this research, to summarize at this point, provided the stimulus to explore more extensively how what seemed to work well *actually* worked and eventually frame creative teaching in some practical way that could be understood, modelled and learned by any motivated teaching professional who sought to enhance their capability in this area.

You may recall from Chap. 1 that even the defining of effective teaching has proved contentious and problematic over the decades, so what chance is there of achieving an adequate definition of creative teaching? I can only offer a frame on this and let's initially recognize fully that we have little choice but to live with a fair measure (whatever that is) of subjectivity in making sense of the world. For example, we have beauty contests and there are judges, contestants, decisions made and winners identified. Well how does that work when supposedly, "Beauty is in the eye of the beholder"? Well it is and it isn't—right? Yes, beauty is subjective, but there's a lot of common agreement, explicit or otherwise, about what its key features are, at least at a heuristic level; and that's why I have yet to win one.

Creativity is one of today's global buzzwords, and would figure high on any list of so-called 21st century skills. Furthermore, if it is such a necessary attribute, so essential in the worlds of engineering, business and medicine, it should also be similarly valued in education—*and teaching is the core activity of education*. It is important, therefore, to make the best sense we can on what creativity actually entails in the context of teaching, and the ways in which it can be utilized at the level of practice. As a basic assumption it would seem logical to approach creativity in teaching as analogous to *creativity* in any domain, as it involves combining existing knowledge in some new form to get a useful result. As Amabile (1996) suggested:

> A product or response will be judged creative to the extent to that (a) it is both a novel and appropriate, useful, correct or valuable response to the task at hand, and (b) the task is heuristic rather than algorithmic. (p. 35)

In any attempt to define creativity there are inevitable questions about what constitutes novel, in whose eyes, by what criteria, and to what extent? Furthermore, the notion of useful, correct or valuable also involves subjectivity. Rap music may meet certain criteria of novel, but in no way does it feel useful or valuable to me.

However, because something is difficult to define in precise and uncontested terms should not detract one from working towards useful heuristics and their practical application, as outlined earlier. Most things at some point in time were a mystery but eventually move down the knowledge funnel (Martin 2009) as a result of systematic inquiry and evidence-based practice. AIDS is a case in point. Before the discovery of HIV in 1981, AIDS was a mystery. Today, the disease process is well understood and in terms of treatment it is clearly moving down the domain of heuristics as new retroviral drugs are increasingly prolonging life expectancy. Hopefully, it may one day be firmly in the domain of algorithms, in that is it preventable through vaccination and curable through painless treatment.

If novelty, in some form and at some level, is foundational to creativity, then effective teaching may not entail creativity. For example, a teaching professional applying the Core Principles of Learning, selecting high effect methods and using them thoughtfully to the situated context may be teaching very effectively, even perhaps a "routine expert" in Hatano and Inagaki's (1986) terms, but does not meet Amabile's definition above or that of an "adaptive expert". To frame creativity in the context of teaching, it is firstly necessary to identify in realistic and specific terms what this might entail in both the design and facilitation of learning experiences. For example:

- What specifically can be considered novel and useful in the context and practices of teaching?
- What are the processes and activities that can generate novel resources for incorporation into the design and facilitation of learning experiences?

Firstly, creativity, like wealth and beauty, are value laden and relative. When I travel to some countries, in certain locations I get a sense that some people think I am very wealthy in financial terms. However, in certain social circles in Singapore (and this is not specific to Singapore) I could feel relatively impoverished, as I don't actually own the condominium I live in and only have one modest car. In making sense of creativity the same framing applies, in that novelty and usefulness is relative and one of degree. Fasco's (2006) *creativity continuum* in which creativity can extend between two poles: *Big C* for 'extreme forms of originality' (e.g., Nobel-prize winners in science) and *Little c* for 'everyday creativity' (e.g., adding butter to coffee to make it tastier), has usefulness in framing creativity for practical purposes. For example, if creativity is framed primarily in *Big C* terms, then notions of developing a better *creative competence* for any professional group (teachers included) becomes a very tall order indeed. In contrast, if we see creativity in terms of such a continuum,

then we enter a completely different arena for conceptualizing creative teaching, one that is both challenging and realistically achievable for any motivated teaching professional, as will be explored and illustrated in Chaps. 4 and 5.

Secondly, it is important to understand how the creative process works, especially the underpinning thinking processes, as these are fundamental to producing creative outcomes. There is certainly an extensive research literature base on all aspects of creativity and many factors have been identified as contributing to such outcomes, including biology, biography and the systematic use of creative techniques and tools. Changing biology is difficult, and past biography is exactly that, hence a focus on the creative thinking process and how the brain works may be the best avenue for enhancing creative capability in practical ways.

I like travelling to different countries and have been fortunate to work and participate in a wide range of cultural contexts. I have also seen most of the acclaimed tourist sites, especially in Asia. However, what I find most interesting is talking to people in local eating places, sharing stories and finding mutually meaningful humour. For me, stories provide the key narrative to understanding the human condition and building rapport with people, irrespective of culture and location. How the creative process works can also be framed in terms of stories, as each creative act has a story to tell. One story that comes readily to mind and it fully fits a *Big C* categorization is that of Percy Shaw and his invention in 1933 of the *cat's eye*, a road stud for lighting the way along roads in the dark. While there are a number of stories on what led to him inventing the cat's eye, a popular version (one that I like anyway) is that on a foggy night in 1933, when he was driving back to his home in the Boothtown area of Halifax from nearby Bradford, he hit a perilous stretch of road with a sheer drop down a hillside to the right of the road. It was very dark and Percy could not see where the road ended and the hillside began, until suddenly he spotted, in the darkness, the reflections of his car headlamps in the eyes of a cat sitting by the road. It is then that he is said to have hit upon the idea of replicating the reflection of a cat's eyes to guide drivers along dark and dangerous roads.

The main purpose of this story is to illustrate some important aspects of creativity. Firstly, once invented, a creative act often seems so simple and logical. How many people before Percy Shaw had, on a dark foggy night, noticed the reflective power of cat's eyes to light, but failed to make the internal neural connections to create a new perception which may have generated the idea of a reflective road-stud? As de Bono (2003) emphasized: "…every valuable creative idea must always be logical in hindsight." (p. 24)

Secondly, it's not a process of 'thinking out of the box', which is actually impossible, I think. Rather it is more useful to think of the process as changes in internal connections and representations in the box, which is, of course, the human brain. Typically the brain will process information through established learned neural networks, and that makes good sense as life would be chaotic without a high degree of perceptual consistency. As de Bono (1992) summarized:

> What it all amounts to is a system in which incoming information sets up a sequence of activity. In time this sequence of activity becomes a sort of preferred path or pattern. (p. 17)

> So whenever we look at the world we are only too ready to see the world in terms of our existing patterns… (p. 18)

For many people, everyday life is a fairly ordered series of activities in which existing neural networks fire in relation to well-known and predictable stimulus events, which further reinforce those connections. There is little need for creativity, or the likelihood of it occurring. An interesting question is whether or not continually enhancing ones knowledge will eventually result in creativity. Such activity will certainly increase neural density and elaboration in long term memory and the notion would seem to have face validity in that many big C people fit this description. Leonardo Da Vinci, for example, was no sloth on the knowledge stakes, frequently referred to as a *polymath* (i.e., a person whose expertise runs across a number of subject domains and professional fields).

However, creativity involves more than having rich knowledge bases and expertise. Many experts are not noted in the creativity ratings. Hence, while expert knowledge bases may enhance the likelihood of a new perception that results in a creative outcome, it is far from guaranteed. Other factors are invariably important, such as personality, other neurological features, belief systems, effort, and without doubt, some luck. For example, as with successful learning generally, what may be of particular significance is the desire and belief in one's creative capability, and the persistence to keep going with a problem scenario until a creative perception occurs. As Einstein (2015) is famously quoted:

> It's not that I'm so smart, it's just that I stay with problems longer.

Furthermore, unless situations dictate or there is a process of continuous deliberation to break up or at least challenge existing perceptions, additional information will still largely be processed within the existing neural organization. For Creativity to occur, it is necessary to be able to perceive some aspect of reality in a different light, and that requires some internal neural restructuring of existing knowledge. As Mauzy and Harriman (2003) describe:

> …breaking and making connections is where the fundamental action of the creative process takes place, and what's known in the fields of psychology and brain physiology lines up with this. (p. 22)

As a result, de Bono (2003) is correct in arguing that:

> We need creativity in order to break free from the temporary structures that have been set up by a particular sequence of experience. (p. 27)

This can be facilitated by deliberative interventions in which existing neural pathways ("main track") are disrupted and new ones created ("side track"), especially through what he refers to as the techniques of provocation:

> They are methods of helping us to escape from the main track in order to increase our chances of getting to the side track. That is also the basis of the expression *lateral thinking*.

> The 'lateral' refers to moving sideways across the pattern instead of moving along them as in normal thinking. (p. 24)

> The purpose of this is to take us out of the normal perceptual pattern and to place our minds in an unstable position from which we can then "move" to a new idea. (p. 71)

de Bono challenges the view that the brain is naturally creative. He acknowledges that:

> New ideas may be produced by an unusual coming together of events. New ideas may be produced by a chance provocation provided by nature… (p. 67)

In terms of explaining Percy Shaw's creative act of generating the idea of the 'cat's eye', the notion of 'an unusual coming together' and 'chance provocation provided by nature' seems to fit nicely. Who knows, if the cat had not been there, on that dark night, would the new perception have emerged? How methods of provocation can relate to producing creative instructional strategies for teaching (i.e. developing creative teaching competence) will be explored in subsequent chapters. The important point to emphasize here is that novel perceptions must inevitably have, as their basis, the elaboration and restructuring of neural configurations. Creativity is essentially just another aspect of the generic process of learning, but with a different cognitive spin (so to speak); the building of more differentiated frames on reality. As de Bono makes fully explicit:

> In my view learning creative thinking is no different from learning mathematics and any sport. (p.57)

A similar analogy can be applied to the naturally funny people in life, whether professional comedians or otherwise. Do such people have funnier experiences than those lacking humour, or do they deliberatively look for the funny side of experience, provoking new ways of experiencing everyday reality, hence creating the conditions in which funny outcomes are more likely? In East London (well when I lived there some 30 years ago), there was a type of humour which was referred to as 'selling a dummy'. This involved making a silly statement in jest, and waiting to see the response of others. For example, if a person talks perhaps too positively about someone else (e.g., they are very talented, kind, generous), a listener (who is trying to sell a dummy) may respond by saying, "Well, she must have *some* good points as well". If this results in the speaker, taking this seriously and responding with some mild annoyance, he/she has been 'sold a dummy'. Now, what's really clever is if the person who was being sold the dummy initially does not fall for it, and sells a dummy back, this is a 'double dummy' and that's a very witty thing to be able to do. Can you do this?

As a Cockney from East London, I think I know the answer to the question posed in the last paragraph. If you look at things in the same way and do the same things in the same situations, you will typically (unless there is a chance provocation) get the same results. To get different results, it is necessary to do something differently. Hence, it is not surprising that people who desire and persevere in deliberately connecting things that may not initially seem to be naturally connected,

and look for new ways of perceiving aspects of reality, are most likely to produce creative outcomes, whether in engineering design, teaching, or in making people laugh.

Finally, in terms of fostering creative outcomes, there appears to be recognizable phases, mind-sets and activities that can be systematically employed to stimulate and enhance creativity. For example, Petty (1997) described the creative process as consisting of six interrelated phases: inspiration, clarification, distillation, perspiration, evaluation and incubation (p. 15). He also highlighted:

> One of the main difficulties for creative people is that the different phases require radically different, even opposite 'mind-sets', each of which is difficult to sustain without deliberate effort. (p. 19)

Most significant in the context of this chapter is moving the focus of one's mind through the different stages, from generating new possibilities and applying more critical thinking frames (e.g., analysis, comparison and contrast, inference and interpretation, evaluation) until the idea reaches fruition and practical application. This is in many ways the result of good thinking, (e.g., as documented in some detail in Chap. 2), which not only involves managing the thinking process (cognition) but the whole swirl of beliefs, emotions (affective processes) and other vagaries of the human mind. Perspiration, which is massive effort over time by another name, is an expected necessity in most cases, especially for coming up with something particularly novel and useful (e.g., a big C creativity outcome) as this is far from easy as we all know. Edison (2015) made the point most bluntly:

> Genius is one percent inspiration and 99 % perspiration.

Of particular interest is the phase Petty (1997) referred to as 'incubation'. Creativity, in terms of creative outcomes, cannot be summoned up at will over a designated period of time (e.g., let's be creative in the next 3 h). We may focus our minds on various phases in the process, but incubation has its own patterns of behaviour and they are outside of our conscious control. As Petty pointed out:

> Many brilliant ideas have occurred in the bath or in traffic jams. If you are able to stop work on a project for a few days, perhaps to work on other things, this will give your subconscious mind time to work on any problems encountered, and will also distance you from your ideas so that you are better able to evaluate them. (p. 18)

Claxton's (1998) analysis of the interplay between our fast conscious mind (which has some similarities to Kahneman's, 2011, description of "System 1 Thinking", outlined in Chap. 2) and a slower more fluid 'undermind' of "unconscious awareness" (p. 101) which acts as an "intelligent unconscious" (p. 133) is particularly interesting in this context. It sees creative ideas as being slowly and unconsciously brewed in the neural re-configurations of long term memory and when sufficiently structured, flashing from the unconscious mind into conscious thought. In others words, while we are not consciously seeking a creative solution our mind slows down, becomes more relaxed and uninhibited, enabling it to do such creative work in its own way, and eventually switching on that elusive new

perception on reality. Claxton (1998) may have captured this internal process accurately:

> Interesting intuitions occur as a result of thinking that is low focus, capable of making associations between ideas that may be structurally remote from each other in the brainscape. (p. 148)

He went on to summarize the wider process of creative thinking:

> The creative mind possesses a dynamic, integrated balance between deliberation and contemplation. It is able to swing flexibly between its focused, analytical, articulated mode of conscious thought, and its diffused, synthetic mode of intuition. (p. 96)

The above analysis on how creativity works in terms of psychological and neurological functioning, and factors that may promote its development and capability, helps to similarly frame creative teaching from a more evidence-based perspective. Firstly, using Amabile's (1996) definition earlier, I offer the following broad operational definition of creative teaching:

> Creative teaching occurs when a teacher combines existing knowledge in some novel form to get useful or valuable results in terms of facilitating student learning and attainment. This may be either planned before the act of teaching, or *invented* as a response to the demands of the here and now learning situation.

Secondly, in terms of Fasco's (2006) *creativity continuum*, we are realistically looking more towards *Little c*. However, while it may be *Little c* in that it may go unnoticed except by those directly influenced, the cumulative impact of such teaching over time will significantly impact the perception, beliefs and actions of students towards better learning experiences and attainment. It might only be *Little c* in the world stage, but *Big C* for those students who actually get inspired to learn, attain better grades and achieve goals that are meaningful to them. It changes ***their*** lives.

Thirdly, ensuring a high level of competence with the longer term aim of developing "adaptive experts" rather than "routine experts", as defined by Hatano and Inagaki (1986), provides a clear viable goal for framing the creative teacher. Creative teaching is, therefore, different from effective teaching, but both involve a high level of pedagogic literacy and proficiency in terms of technical competence in the practices of teaching, as outlined earlier in the chapter. However, creative teachers have the added capability of combining existing knowledge to produce novel and useful learning experiences as well as being able to reinvent their pedagogic strategies in situ, to meet changing demands in different learning contexts. They are able to see more flexible connections between the technical skills they possess and the range of resources that can be accessed and weaved together to create a better situated strategy for supporting learning at that point in time. Hattie's concept of "Russian Dolls" (2009) has relevance in this context as it captures the ability to combine a number of high effect methods into a highly effective instructional strategy. Creative teachers are more able to make connections between methods, activities and resources that may not always seem to be logically connected, but in practice make highly significant impacts on aspects of the learning process. This is lateral thinking in operation, and it will often involve teachers

consciously provoking themselves to create new ways of teaching a difficult concept or process.

Some teachers often complain that their students are bored in certain lessons and don't show any interest in learning. This is a legitimate complaint but often, from my experience, they still continue to teach using the same instructional strategy for those topics over and over again, and the inevitable happens—the results are usually the same. Creative teachers in such situations do things differently and most importantly what they do *differently* tends to works better. Over time, from an evidence-based approach with deliberate lateral thinking, they get better and quicker at coming up with more interesting and effective lessons. They are developing *Creative Teaching Competence*.

3.5 Teaching Can Be Improved with Reflection and Scholarship

The notion of reflective practice has long been a buzzword in teacher education in terms of how teachers can go about improving aspects of their practice. However, reflection like *thinking* is a very general term and asking somebody to do good thinking (or reflection) is making some very big assumptions about prior learning. If teachers are as confused on what constitutes critical thinking, as Wagner (2010) suggested in Chap. 2, we may similarly question the extent and quality of their critical thinking when reflecting on aspects of professional practice.

However, let's not ascribe blame to teachers for gaps in knowledge relating to current research on human learning or even a lack of application of evidence-based practices. Our earlier tour into Educational Jurassic Park in Chap. 1 provides ample explanation for teachers' reticence to buy into new initiatives. Furthermore, given their busy schedules and the increasing plethora of demands placed on them, it's a wonder that many are able to function as effectively as they do.

Scholarship, which involves research and sustained interaction with ongoing developments and new knowledge relating to a field, is foundational to improvement in any professional arena. In fact, reflection, when underpinned by good thinking and scholarship go 'hand and glove' in enhancing understanding and improving aspects of practice. How teachers can *thoughtfully* use an evidence-based approach to improve teaching, both at individual and collective levels, will be outlined and illustrated in Chap. 6.

3.6 Summary

This chapter, using the process and features of good design and building on the pedagogic framework outlined in Chap. 2, has sought to unpack what constitutes creativity in teaching, the key underlying processes and how they work in terms of

producing creative outcomes. We no longer need to view creative teaching as some mystical or ephemeral activity, limited to a few exceptionally talented people. The creative process can be understood and modelled in large part and therefore, it can be learned by others wishing to achieve such competence. Furthermore, I tend to agree with Dilts (1980) who argued that:

> When the confusions and complexities of life experiences are examined, sorted and untangled, what remains is a set of behavioural elements and rules that aren't too difficult to understand at all. (p. 5)

Producing creative outcomes invariably involves hard work and perseverance—and let's fully recognize this. Winget (2007) wasn't joking when he entitled his book, "It's Called Work for a Reason!" However, creative teaching is perhaps the most meaningful and useful activity that can go on in educational institutions. After all, enhancing student learning and attainment is the core business of all educational institutions, and what's better than creative teachers to help to bring this about? We will see how this works at the level of experience design in the next chapter.

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Chapter 4
Developing Creative Teaching Competence: The SHAPE of Creative Teachers

4.1 The Magic of Expertise

A few months ago my wife persuaded me to accompany her to see the magician David Blaine perform a live show in Singapore. I rarely go to such events, and have never before seen a world renowned magician perform live. I don't believe in magic in the metaphysical sense but can appreciate the illusion of the experience. David Blaine did not disappoint on this count. However, I was a bit disappointed not to have been selected to participate in one of his magic segments, not for reasons of 'being on stage' but to get that close up view of how he does things. As a psychologist, who should possess a good level of sensory acuity in terms of observation skills (he says hopefully), I thought I might be able to work out how he performed the particular piece of 'magic', at least in theory. Even though I did not get this opportunity of a close up view, I was impressed with David's expertise—it was surely magic for us mere novices. I can, in contrast, remember my father doing card tricks and other bits of magic such as separating his thumb in two when I was a kid. It seemed quite awesome when I was five years old, but by eight years old I had worked it all out. The card tricks had a planned sequence (arranged beforehand) and the separating thumb was actually the thumb of the other hand, disguised by two fingers.

How might we explain the apparent magic of such expertise? The answer lies in the earlier discussion of Core Principle 8: *The development of expertise requires deliberate practice* in Chap. 2. David has developed a level of expertise in his magic acts which have now become part of his physiology (cognitively, affectively, and in terms of neural wiring) that makes him *different* from the rest of us. It's amazing, but it's not magic. For example, in his final act in Singapore, David immersed himself in a tank of water for over 10 min. I would have died within a minute, but in 2012 Stig Severinsen (2014) was awarded the record of "Longest time breath held voluntarily (male)" by Guinness World Records for holding his breath for 22 min. This makes David's performance almost routine for such experts.

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Stig has a doctorate in medicine and actually started experimenting with holding his breath as a child at the bottom of his parents' pool. Hence, while his performance is exceptional and world class, it is explainable. Experts can do things far better than the general population because they are different in significant ways and, therefore, it feels like magic to the rest of us.

4.2 Weaving Creative Russian Dolls

Willingham (2009), in reviewing researchers' analysis of feedback questionnaires to figure out which professors get good ratings and why, noted that one of the interesting findings is that most of the question items are redundant. He suggests that:

> A two-item survey would be almost as useful as a thirty-item survey because all the questions really boil down to two: Does the professor seem like a nice person, and is the class well organized…Although they don't realize they are doing so, students treat each of the thirty items as variants of these two questions. (p. 50)

While academics may break up the components of highly effective teaching into a wide range of sub-components or constructs, this is not how students perceive and apprehend the experience of their teachers; rather their perception is based on more holistic generic constructs such as *personality* and *organization*. As Willingham summarized:

> When we think of a good teacher, we tend to focus on personality and on the way the teacher presents himself or herself. But that's only half of good teaching. The jokes, the stories, and the warm manner all generate goodwill and get students to pay attention. But then how do we make sure they think about meaning? That is where the second property of being a good teacher comes in - organizing the ideas in the lesson plan in a coherent way so that students will understand and remember. (p. 51)

Furthermore, it is highly likely that this evaluation process by students will be based on unconscious as well as conscious processing. Students are likely to relate the experience of their teachers to key aspects of motivation—pleasure, pain avoidance and novelty in relation to their need orientation. From this they will derive varying degrees of meaning, which will then translate into ratings for the teachers being evaluated. The disorganized and dull, even mean, teacher, is going to fair badly in most cases. The interesting question becomes, "*What are the components of the experience that lead many students towards perceptions of a very well organized and nice teacher*?"

Firstly, let's look at the planning of a learning experience, model the key components and the basis of the decisions we make. The desired outcome is always to enable the learners to effectively and efficiently meet the learning goals and maximize their attainment levels. We would also like it to be an interesting experience for them and contribute to their overall holistic education as a person (however defined). In planning any learning experience, I like the analogy of

'weaving' which while typically considered the production of a fabric pattern from different coloured yarns, is also defined (2012) as "…make (a complex story or pattern) from a number of interconnected elements". Teachers plan their lessons, but in doing this, as in life planning, some do it far better than others in terms of desired results. The Japanese, in particular, have worked hard at the planning aspect of good teaching. For example, Stigler and Hiebert (1999) document how teachers in Japan participate collaboratively in the planning of lessons; an activity referred to as *Lesson Study* (*jugyou kenkyuu*). Groups of teachers meet regularly to work on the design, implementation, evaluation, and improvement of a specific lesson over time. In this process they observe each other teach, obtain feedback from students and seek to develop the most effective and efficient lesson for the particular topic area. At the technical level, from an evidence-based approach, this involves initially identifying the best evidence-based methods, activities and resources and creating an instructional strategy calibrated to the learning outcomes and what is known about the learner's profile. It will also take account of facility access in terms of learning spaces (e.g., classrooms, laboratories, studios and other relevant equipment). I often use the analogy of cooking an exotic (however defined) meal. In preparation, one must firstly obtain all the necessary ingredients in terms of quality and proportions, as well as ensure that all required cooking facilities and utensils are available. In reality there's no perfect recipe, as people's tastes vary, as do student compositions.

However, while some methods may have higher effect sizes, it may not always be the best decision to use them in all contexts. For example, while the evidence (e.g., Hattie 2009) shows that "Whole Class Interactive Teaching" (Direct Instruction) has a high effect size of 0.81, as compared to Problem-Based Learning (PBL) with only 0.06, there may seem little reason to use the latter over the former. Indeed, Hattie and Yates (2014) noted that inquiry (which is a key feature of PBL) can be motivating for students but make the evidence-based argument that:

> …there is little basis to suggest that personal discovery within itself assists a person to actually learn. In fact, additional load imposed by the need to explore and find things out can detract from our capacity to assimilate the information uncovered…The discovery learning process demands a high level of non-productive mental effort, which could be more profitably directed to genuine knowledge building. (p. 78)

While I would agree with Hattie and Yates in terms of their analysis of the limitations of more discovery-based approaches, there are situations in which a PBL approach might offer a better method option than direct instruction. Firstly, as we know, even our favourite activities typically lose their impact and appeal if over indulged in. The tendency for habituation and boredom are built into our very nature, as the Chilli Crab story I related in Chap. 2 illustrated. I have used this story in many cultural contexts and it always seems to resonate well in terms of intended metaphor, which suggests a fair degree of universality in perception for this aspect of human experience. Secondly, there is always the situated context (e.g., learning outcomes, learner competence and resource availability). Hence, variation of method is essential and rational planning of anything to do with humans only goes

so far. Furthermore, for students who have attained a solid understanding of a topic and have developed sufficient competence in underpinning skills essential for conducting collaborative inquiry (e.g., appropriate thinking and learning strategies, as well as team-working and communication skills) such an approach may actually be very useful in terms of both motivation and attainment in key areas of learning. Hence, evidence comes in many forms, and there is still much judgement to be used in creative learning design and application, but that's true at any high level of professional decision making.

Similarly, while the Core Principles of Learning have universality in terms of how humans learn, learners come to the learning event with different biographies, personality traits and prior knowledge which will influence their perception and initial motivational status. Therefore, in planning the learning experiences, it is really useful to ascertain as much as possible about the learners, both collectively and individually. Invariably it is not possible to do this as thoroughly as one might like, as it can be time-consuming. Equally, one must be cautious in making inferences and interpretations from prior information about learners from secondary sources (e.g., attainment reports, other teachers' framing) as objective or fixed. Often I have found that prior descriptions have been quite different and even at variance to what I actually experienced. Teachers construct their own realities, through their teaching practices and human interactions with groups of students, as do the students themselves. I once inherited a class of students where their prior teacher referred to them as, "That bunch of animals". For the first two weeks, I could understand the basis of that teacher's framing. The students showed no interest in anything I tried to do, with many using a range of negative responses to try to 'wind me up'. It was obvious that many of them did not like school or teachers. In this situation, there's little point in trying to persuade them verbally to see meaning in any aspect of the formal curriculum when they clearly do not. Furthermore, in my experience, there's no point in doing anything that might be perceived as confrontational as this will go nowhere useful for all concerned. In such situations my response, based on a strategy that has worked previously on most occasions, starts with not showing fear or stress (of course, more easily said than done) and maintaining a positive stance towards them. What this means at the behavioural level is maintaining a friendly voice tone, smile and calibrated body language. This will typically, over time, result in even the more vociferous of the students losing interest in the activity of 'winding up teacher'. At the psychological level a type of cognitive dissonance (Festinger 1957) will come into play. Cognitive dissonance theory suggests that we have an inner drive to seek consistency in our beliefs, perceptions and attitudes, and will experience inner conflict in situations where two cognitions are inconsistent. For example, if students believe that teachers are not particularly interested in them, but are then consistently presented with one who clearly seems to be showing genuine interest, such dissonance may occur. In this situation, students may either retain the existing belief (e.g., through rationalization or denial of the new experience) or change the belief in some way. However, it is often not so clear-cut in terms of perceptual change, and I would not expect students to suddenly completely reframe and start liking teachers. I am only

realistically looking for a slight shift in perception towards 'Dennis is ok, for a teacher'. Once this has been attained, I am usually able to engage in some informal non-confrontational chat with them and gradually build a workable rapport. This is how most relationships develop over time, and it is as much an unconscious as a conscious process. The key outcome is that the reality of this situated context (e.g., negative confrontational student responses) will change for the better. I remember hearing stories about how some people survived the horrors of concentration camps by 'being nice' (at the behavioural level) to the guards. It seems that it may be harder to kill someone who gives you a friendly word and a well calibrated smile. Whatever one's views on this as a survival strategy, if it sometimes works in such situations, what can the genuine behaviour achieve in most classrooms?

Having achieved a level of rapport, defined in terms of a friendly banter with at least a few individual students (this usually has a contagion effect over time), I am then in a position to explore areas of possible interest and collaboratively identify school-based activities that have at least a minimal buy-in from their perspective. This is what happened with this particular class. By the end of the year they were actually quite responsive to learning and fun to teach. At the beginning of each session, I had to run the gauntlet of jokes for several minutes, but they would always settle down enough to do some 'useful schoolwork'. The main significance of this story is that at the beginning of the following semester something really interesting happened. I was not timetabled for these students, another teaching faculty was. I approached this colleague and asked if I could take them on, and he could choose any one of my classes in exchange. He was somewhat surprised, but readily agreed. On arrival in class on their first session, the students were surprised to see me, though visibly pleased. When I explained I had exchanged another class to teach them, one actually stated that this had never happened before in their school life. Over the next two years they choose to do a City & Guilds qualification in Communication Skills (with all passing and many getting distinctions) and the 'O' level English Language (in which around 50 % passed). Even the principal of the institution was very surprised by such results and congratulated me. In fact, when I have been asked, "What was you most significant achievement as a teacher", I often tell this story. After establishing a positive learning relationship with these students, and seeing them develop a real sense of personal belief as able learners, this fully reinforced my perception of the potential value of teaching and the impact it can have on student attainment. It also taught me that it was damn hard work.

Creativity in lesson planning, in most basic terms, is the ability to combine methods, activities and resources in novel and useful ways that can significantly heighten an aspect(s) of the learning process. It can also involve creativity in terms of the situated use of good interpersonal skills and being able to shape learners' perception, beliefs and behaviour over time. Yes, this sounds challenging, and it can be exactly that. However, it's now part of the job in an increasing number of professional contexts. Often some of the methods, activities and resources may seem to have little connectivity in themselves, but when creatively combined and contextualized to the subject content, they make the learning of key concepts almost easy and fun. As an analogy, from the field of environmental engineering, one may

ask, "What has a mirror got to do with solving a problem of tenants complaining about long elevator waiting times"? There seems no immediate connection. However, there is a well-told elevator story (2014) involving a multi-storey office building in New York, where many occupants complained about the slowness of elevators at peak hours. Several of the tenants threatened to break their leases and move out of the building because of this. In response, the management authorized a study to determine what would be the best solution. The study revealed that because of the age of the building no engineering solution could be justified economically. The engineers said that management would just have to live with the problem permanently. However, a young psychologist who took on the challenge of solving this problem reframed it differently and concluded that the complaints were as much a consequence of boredom as slowness. Therefore, he took the problem to be one of giving those waiting something to occupy their time pleasantly. He suggested installing mirrors in the elevator boarding areas so that those waiting could look at each other or themselves without appearing to do so. The management took up his suggestion. The installation of mirrors was made quickly and at a relatively low cost. The complaints about waiting stopped. Today, mirrors in elevator lobbies and even on elevators in tall buildings are commonplace.

In the context of teaching, here's an example of making creative connections between what would appear to be unconnected aspects of reality to produce an effective learning experience for a group of students. Many years ago, mentoring and coaching a teacher who had received consistently low feedback scores, I remember him lamenting on how students found his teaching of Newton's Second Law of Motion particularly boring and difficult to grasp. He agreed to me observing his lesson on this topic, which began with a typical technical verbatim definition of the law, which went something like this:

> Newton's second law of motion can be formally stated as follows: The acceleration of an object as produced by a net force is directly proportional to the magnitude of the net force, in the same direction as the net force, and inversely proportional to the mass of the object.

The definition was then followed by around 40 min of exposition and the writing of formulae on the whiteboard. I was confused and bored, but no more than the students, based on my observations. In our post lesson discussion, he reconfirmed his disappointment with the outcome but could not see how it was possible to make this topic area more interesting or meaningful for students to learn effectively. Having explored with him exactly what Newton's Second Law of Motion entailed, we designed the following strategy as a way of getting good attention, creating an advance organizer for the technical content to follow, and demonstrate the law in a very practical way for the students. In summary, this involved showing a picture of the famous footballer, David Beckham, then a Manchester United player, taking his trademark free kick. As football is very popular in Singapore and Beckham is considered to be particularly good looking, this seemed both a good Primacy and von Restorff Effect combined to get good initial attention from both the male and female students, albeit for different reasons. The students were then asked to

consider the following two scenarios and the impact they might have in terms of the acceleration of the football once struck by David:

Scenario 1 One of the opposition players changes the football before the free kick has been taken with a ball that is 20 % heavier than the original ball

Scenario 2 The ball remains the same, but David has been doing extra fitness training and can now strike the ball with around 10 % more power

I'm sure you have worked this out, so I don't need to bore you with my limited display of physics jargon. While this may not be a perfect analogy for Newton's Second Law of Motion, it was sufficient to get good student attention, create some interest in what was going on in this lesson, and make the psychological climate a bit more fun than usual. The strategy also included a lively and humorous presentation style in which the scenarios were simulated by the teacher (e.g., putting a real football down and asking the students if he looked like David Beckham). As the teacher concerned lacked certain skill in terms of voice and gesture it was necessary to provide some measure of coaching here prior to the teaching session. In summary, the strategy worked in that student attention was very high and they quickly saw the relationship between mass, force and acceleration. Also, it lifted the mood of the class in an afternoon session noted for low student attention. From this basis, the teacher then made connections between the free kick analogy and other real engineering contexts, inviting and answering questions, before proceeding with the mathematical formula. He also chunked up the session and conducted short quizzes and activities to check understanding and provide feedback. This was *creative teaching* (remember *Little c*) as it was novel and produced useful results in terms of student learning. How many teachers have previously introduced Newton's Second Law of Motion through a simulation of David Beckham's free kick? Some may have, but that would have been creative teaching also. The connections are not readily apparent until you see them, as is the case with visual illusions, such as the famous 'old' and 'young' woman visual illusion. This is an example of lateral thinking in the context of teaching, as one is unlikely to automatically connect a David Beckham free kick with Isaac Newton's Second Law of Motion. As outlined in previous chapters, creativity, as for good thinking generally, is not necessarily something the human brain likes doing naturally. For this reason, we need to provoke it into 'disruptive action' and make conscious effort to think laterally. Over time, as outlined in Chap. 3, our slower more fluid unconscious processes will do the rest, and it will become a competence (*creative teaching competence*), like other areas of human capability.

The lesson incorporated a number of Core Principles of Learning (e.g., motivational strategy, focus on key concepts, good thinking, psychological climate) and it also had a creative spin, which made the experience more attention grabbing and impactful (e.g., David Beckham was a fairly powerful von Restorff Effect in this situated context). Also, when attempting creative activities in class with students, it communicates an important latent message that you are genuinely interested in their learning and this is fundamental in determining their perceptions of you as person.

The teacher in question went on to receive significant improvements in terms of feedback over the coming two semesters. Invariably, this was not based on one session but his realization that good teaching is much more than positive intentions in a teacher's mind, but the actual behavioural performances in class over time. Most importantly, he was keen to improve his teaching and obtain better results, both in terms of student learning and, of course, his feedback scores. Of particular significance was his reframing of himself as a teacher, which was the result of the direct experience of feedback from students. As he taught better and responded to them more positively, they were more responsive and positive towards him, and good rapport was developed over time. As Bandler and Grinder (1990) famously wrote:

> The meaning of your communication is the response you get. (p. 61)

Creative teaching can also occur in the here and now teaching situation in response to the teacher's perception and subsequent reframing of the learning situation. No matter how well we try to plan an effective (evidence-based) instructional strategy, there are occasions when the methods or activities do not work out as expected. We may have made some incorrect inferences and interpretations about the prior knowledge of the student group, not delivered the lesson activities as well as we can, or it may simply be that some of the students are 'not in a good mood' on that occasion, for whatever reasons. This is not uncommon. Human consciousness may well be as Apter (2001) starkly described:

> …everyday life, as it is experienced, is a tangled web of changing desires, perceptions, feelings, and emotions that filter in and out of awareness in a perceptual swirl. (p. 33)

Even the weather can influence people's behaviour. Mlodinow (2012) quoted research by Cunningham (1979) in which waitresses in a shopping centre in Chicago kept track of their tips and the weather over thirteen randomly chosen spring days. Customers were probably unaware that the weather influenced them, but when it was sunny outside, they were significantly more generous. It is therefore not surprising that student attention and behaviour can vary so much, even with the same teachers. Hence, don't take it too personally, it things don't always work out well, sometimes they just don't.

In situations where the planned strategy is clearly not working the teacher, faced with little by way of positive response, may actually be at his/her most creative. As the saying goes, "Necessity is the mother of invention". For example, several years ago I was teaching an elective module on learning strategies and skills at 2 pm on a Wednesday afternoon. These electives were compulsory though students could choose which ones they took. However, they were noted to be challenging in terms of getting student attention and participation as students did not receive much by way of credits and many thought this constituted unnecessary work. In my first lesson, before I had even spoken a word, I quickly noticed the look of disinterest on the faces of many students. It was apparent that if I just went ahead with the planned lesson, there might be little value to their learning and a tedious experience for all, including myself. I was acutely aware of the need to change the students' perception of the situation and was seeking a strategy. Here's the summary story in

context. Firstly, of note, the students were Singaporeans. In Singapore, education is highly valued and very well-funded, which means that all students have good access to learning opportunities. A few years prior, I was involved in a consultancy project in Kolkata, India. What's the connection you might ask? While working there I usually went for a walk after breakfast, just for some short exercise and mentally revising what I needed to do that day. On one occasion I was approached by a teenage boy of around 13 years of age who asked me if I was a businessman. Intrigued, I asked him why he was interested in that. In summary, he pointed out that he was living on the streets, wanted to avoid getting into trouble and was looking for an opportunity to get a job and learn some useful skills. He thought I might be able to find him employment. Somewhat sadly, I explained that I was not a businessman and could not provide him with any employment opportunities (though I wish I could have done this). He left and that was that. My only significant reflection at that time was that he did not ask me for any money.

Going back to the classroom situation in Singapore, a strategy flitted into my mind. I walked around and looked at the students, one and all, and told them that they were so lucky. One immediately perked up and said, "Why are we lucky?" I replied, "Well, you are young, healthy and Singaporean". They, of course could not dispute the first two assertions, but there was a quick response to the third, "What's so lucky about being Singaporean?" I told them the Kolkata story and, while walking around the classroom with a fairly serious expression on my face, made very quick eye contact with all students. On completion of the story, I asked them to discuss in pairs what made them different from the boy in Kolkata. I used a verbal emphasis on the word *different* by slightly raising tone and slowing pace. It was not long before they identified their situation of excellent learning opportunities and good job prospects, which were lacking for the boy in Kolkata. I then said something like, "Ok, well let's not waste our time being negative" and started the lesson. To my surprise, they settled down and the lesson seemed to progress quite well, especially in the context of the earlier scenario. I subsequently gave this little thought, but was quite astonished by the response of the students at the beginning of the next session. On my arrival I was greeted by the students with words akin to, "It's ok, Cher (Singaporean slang for Teacher) we get the message, no need to tell us the Kolkata story again". They were quite good fun to teach for the next 14 weeks and many gave feedback that they had learned some useful stuff out of the elective. Was the story that impactful, or was I just lucky? Sure, I exploited what is often referred to as a 'teachable moment'; a situated unplanned activity that I grasped as an opportunity to create an impactful learning experience for the group at that specific time. In this case, the learning purpose was to change the present negative attitude into one more conducive to learning, and to do this I needed to get some reframing of their present situation, by changing their perception of it. In terms of lucky, who knows? On another day, I may not have thought about this Kolkata story and I would have had to deal with the situation in a different way, which may or may not have been as successful. However, without the story encoded in my long-term memory, it could never have been part of my instructional strategy, albeit constructed in situ. Hence, creativity requires both resources in

long-term memory as well as the creative competency to be able to see new combinations of methods, activities and resources to structure a novel and effective instructional strategy for a particular group of learners. This is fully consistent with de Bono's description of 'Lateral Thinking' outlined in Chap. 3 and it's exactly how creative teaching competence works. We can, therefore, understand the underpinning syntax, model the heuristics involved and, with effort and deliberate practice over time, develop such ability. It follows exactly the same learning structure as the development of expertise in any other area.

4.3 The Components of Creative Russian Dolls

Earlier in this chapter, reference was made to the importance of being organized as a key component of teaching as perceived by students. Good planning based on the Core Principles of Learning and evidence-based methods constitutes the pedagogic foundation for highly effective teaching. However, this is not necessarily creative teaching competence, as creative teaching must include flexibility for the teacher to weave novel and useful features, even to an already well-conceived lesson plan. It is also important to note that even *Little c* creativity cannot be called up on request or guaranteed in a given situation, even for the very best in any professional field of practice. Essentially, this reflects the significant difference in expertise, as we noted earlier, between routine and adaptive experts (Hatano and Inagaki 1986). While adaptive experts cannot guarantee creative outcomes in any given situation, they are able to do this, over time, much more often than the rest of the professional field. In the following sections, I outline some specific ways in which teaching professionals can add creativity into their lesson planning and everyday teaching, captured in the acronym SHAPE (Stories, Humour, Activities, Presentation Style and Examples). This acronym provides a useful metaphor as **SHAPE** is so much a part of our everyday vocabulary in terms of the qualitative description of things. For example, when a person has attained a high level of physical fitness, which is clearly visible in terms of muscle tone, etc., we might actually say to the person that he or she is in "good shape". The converse is also true at the level of perception, though we are highly unlikely to actually say this to the person. In the context of creative teaching, SHAPE was just something that came into my conscious mind as a result of much thinking about what creative teachers (based on students' qualitative feedback on these teachers) actually did at the behavioural level in their classrooms. There was so many references to 'stories', 'humour', 'interesting activities', 'personality of the teacher' and 'good examples' in the students' qualitative responses about teachers that were perceived as creative or interesting. Note, these same teachers also got responses very much in tune with Willingham's (2009) description of the teacher as 'being a nice person'. Once framed in the wider context of an evidence-based approach to teaching, SHAPE seemed so simple a notion for a metaphor on creative teaching. In retrospect, for most of the least effective and dullest of teaching observations I have been involved with, the description of 'poor SHAPE' fits the

overall experience very accurately. Although, unlikely to figure on a formal evaluation form for teachers, a teaching session with no stories, no humour, no engaging activity, poor presentation style and no examples, is most likely to be a drab and ineffective affair by any criteria.

4.3.1 Stories

Human history is a collection of stories of how we have attempted to make sense of the world around us, find solutions to a whole range of existential problems and even explain the nature of our very existence. As Schank (2011) argued:

> Human beings understand stories because stories resonate with them. Characters have dilemmas that readers or viewers themselves have had. Stories appeal to emotions rather than logic, and emotions are at the heart of our pre-7-year old unconscious selves. (p. 42)

When there are no more stories to tell, we may be in that perfect world where thinking is redundant and there are no problems to solve. At the personal level we communicate our experience through the stories we tell: they reflect who we are, the sense we have made of our experiences and they become a stimulus for other people's perception and the quality of attention they are likely to give us.

Watch the very best speakers in any field and there is typically a story in their presentation, invariably a very poignant one. From the perspective of enhancing a learning experience, stories connect powerfully with others as they immediately associate with their own experiences, especially at the emotional level. From an evidence-based perspective, as the cognitive neuroscientist Willingham (2009) suggested:

> The human mind seems exquisitely tuned to understand and remember stories – so much so that psychologists sometimes refer to stories as "psychologically privileged," meaning that they are treated differently in memory than other types of material. (p. 51)

Learners may forgot the factual content of our lessons but stories that are embedded with meaning, especially when it connects to their own experiences, needs and interests, are committed easily to memory and provide a key anchor for recall. Stories can also be transformative in that they connect with people emotionally and are a key means to enhancing positive beliefs. As noted previously, beliefs are no more than perceptions that have been around a long time, but they are real to the believer. There is often little point in telling students that they are smart, when they clearly believe they are not. Changing limiting beliefs most readily occurs when people are confronted with evidence, over time, that consistently contradicts the belief, and which is perceived as real and meaningful. This is where stories can provide an effective means for initiating alternative ways of looking at the world (i.e., reframing). Reframing refers to looking at things in different contexts and, in doing so, give them different meanings. For example, in certain contexts if I feel it may have relevance and meaningful learning impact for students,

I have deliberately used personal stories relating to my own experiences at school (you will have noted this from Chap. 1). Has this led to some students actually significantly reframing aspects of their belief systems and then going on to make the necessary behavioural changes (e.g., put in personal effort, acquire key knowledge and skills, develop metacognitive capabilities, persist when things get tough and seek good feedback) and, as a result, becoming more successful (however defined)? Typically, as teachers, unlike plastic surgeons, we rarely know how impactful we have been in some transformative way on our students lives. For plastic surgeons, given that all as gone as planned, there is likely to be immediate grateful feedback from the patients concerned. However, for teachers, significant personal change in students is usually difficult to ascertain as it often takes time to develop and by then they have probably long left our tutorage. I am perhaps fortunate to have experienced one very striking example that occurred from a chance encounter. Some 15 years ago, I had just completed a consultancy assignment in Hong Kong and was sitting in the airport lounge waiting to catch the flight back to Singapore, when I heard someone call my name. Looking round, I recognized a student I had taught previously in the UK but had not seen since he graduated as an electrician from a further education college many years earlier. He clearly recognized me in this far away location, which was pleasing as it meant I had not aged that much. We had a drink at the airport, and I discovered that since leaving the college he had completed a degree in electrical engineering and established a successful company. However, what was significant was his reference to my influence on him in terms of affecting his beliefs about himself through the stories I told of my experiences in growing up in a tough East London community. I was quite surprised at the time by his perception of my impact on his thinking and behaviour, but on reflection, it's not that surprising given the way the mind works. Perhaps, even such a chance encounter, in a globalized world is also not so surprising. However, generally, and perhaps sadly, teaching is perhaps, as was once described to me, "The second most private act". How many people have been significantly influenced by good teachers, as Petty (2009) described in Chap. 1? Most of those teachers will never know and will remain 'unsung heroes'. Equally, many may not care about such acclaim. That's because they chose to teach and they know what this means.

Also it is important to bear in mind that stories do not need to be highly exceptional in terms of the human experience they communicate. They simply need to be authentic, relate to what is being taught and be meaningful to the learners involved. For example, I remember a teacher using a personal story to communicate the experience of dealing with a 'no' in the context of working as a salesperson. This was a business studies lesson focusing on selling. One of the big challenges that salespeople face in dealing with constant 'no's' in relation to their offers of products or services, is a loss of personal feelings of esteem and confidence. His story involved asking a girl for a date over the phone (in the days of rotary dial phones). As he told the story, he modelled the dialling of each number, showing his nervousness visibly. He explained his fear about her saying no and made the powerful point that unless you ask in the first place, you already have a 'no' and if you get a 'no', then you have the simple choice—persist or give up. The story had a

Stories	
What are the different ways in which stories can be used to creatively enhance student learning?	• Provide interesting and effective advance organizers for a new topic area or key concept; • Create emotional anchors for enhancing learning impact and building rapport; • Model good attitudes and dispositions, as stories will evoke mirror neurons which have strong subconscious impact on perception and, in the longer term, beliefs
What is important in telling stories?	• A clear and lively presentation style; • Timing and emphasis of key learning point(s) in the story; • Relevance to the specific topic to be learned and/or to the process of learning; • Involve students where possible in terms of eye contact, posture and gestures; • Draw out and analyse the relevance of the story to the topic (if necessary)
Where can I get useful stories to make lessons more interesting and creative?	• Personal experience; • Colleagues, family members, friends - almost anybody; • Media sources such as books, journals, newspapers, television, films, Internet, etc.

Fig. 4.1 Summary framing questions for using stories

happy ending—she said yes. Stories represent a unique, novel and personal means to enhance the learning experience for students. The very best personal stories, used in context, are a key component of creative teaching as they provide both deep anchors for remembering the subject context and, even more importantly, a potentially positive transformative experience for many students (Fig. 4.1: Summary Framing Questions for Using Stories provides an advance organizer for building a portfolio of useful stories).

4.3.2 Humour

The importance of humour and its uses to enhance learning were identified in Core Principle 9: *A psychological climate is created which is both success-orientated and fun*. The ability to create and use humour productively for the benefit of others is a rare and highly sought after skill, which may explain why professional comedians earn significantly more than teachers. Useful specific definitions of humour have proved problematic, as it takes many forms and is always situated to persons and context. What some people may find extremely funny, others may simply find deeply offensive. Earleywine (2011), in this context, frames humour generically to focus on its interpersonal and outcome features:

> Humour is an intricate interaction between the perceiver and the perceived…
> …humour is anything that somebody deems funny. (p. 21)

Similarly, Tamblyn (2003) sees humor as "a state or quality", which has a number of aspects:

> …humor is openness, optimism – a sort of yes-saying to life. Humor is creativity. Humor is, above all, play. Humor, creativity, and play are the same thing because they all involve the same act: *Finding new connections between things*. (pp 9-10)

While there are many genres or types of humour (e.g., jokes, anecdotes, wisecracks, witticisms, banter, wordplay), they all typically play out in an interpersonal context. If the humour is perceived by some as funny, it will result in smiles or laughter in some form. You may also have noticed that when a number of people laugh, it often has a contagion effect causing others to join in, often unknowing of the exact source of the humour. It is as though laughter of others, just as listening to sad songs or watching emotional scenes in a film, evokes our mirror neurons (neurons that fire when observing someone else having an experience, creating an inner feeling of having the experience oneself) and we respond with sad emotion, often with tears, almost instinctively. Mirror neurons may also be an important consideration for how we interact with students in other ways. For example, showing enthusiasm and displaying good equity in dealing with students may have similar productive unconscious influences on them at the neural level.

Humour has a particularly powerful effect on human motivation as it actually affects all motivational dimensions. Humour creates pleasure (typically manifesting in laughter), reduces pain (as it distracts attention away from the object or perception of pain, if only fleetingly) and is typically novel in some way. In fact, humour and creativity may well be fundamentally linked in terms of shaping aspects of our subjective experience. As Earleywine (2011) noted:

> Creativity and humour appear to go hand in hand. Some researchers view humour as another form of innovative, inspired flair…A few minutes of comedy, if it leads to genuine guffaws, can make folks happy and innovative. A good mood enhances creativity anyway, at least up to a point. (p. 137)

Similarly, Morrison (2008) argued that:

> The creative process flourishes when accompanied by a sense of humour. (p. 3)

Perhaps the most critical aspect of humour for learning is its impact on attention and perception in the learning situation. Firstly, humour, by definition is typically an unpredicted and surprise element in human experience. For example a new joke that we find funny, is funny because of its novelty. If we hear someone tell it a second time, it may actually be boring. My wife, for example, will berate me for repeating a joke or funny story with "We've heard that one before." Now, of course, when told to a new audience, it will be novel and if their mind-set is 'in sync' with that type of humour it will get the usual positive response. If something is new to a particular person, it is creative in his/her eyes. Hence in teaching, a good piece of humour will work well in getting attention and helping to build a positive perception of you in the students' minds, but it has no or limited positive impact once repeated. However, once one can use humour, there is an almost unlimited supply

of resources. It's not the genre that becomes habituated to, it's only the specific example, whether joke, cartoon or story. The essential point is that humour typically catches the attention of the brain as it creates a strong von Restorff Effect, as we explored in Chap. 2 and has Morrison explained:

> The surprise aspect of humour affects the attentional centre of the brain and increases the likelihood of memory storage and long term retrieval. Humor has the potential to hook easily bored and inattentive students. As brain food, humor can't be beat. (pp. 2-3)

However, humour is not just an attention grabber, it is an experience shaper. I have a good friend who has a far greater creative capability for humour generation than anyone I have met. He can tell the funniest of stories, display spontaneous wit, and typically has folk laughing almost at will. When he is not present at an event, people notice immediately and ask, "Where is Tom?" If he is not coming, the groans of disappointment can be audibly heard. Toms presence creates pleasure and novelty and people feel comfortable in talking (and laughing) openly with him. He creates that type of rapport.

In the context of teaching, the same patterns of human attention and perception play out, again much of this is unconscious. Being liked—"seen as a nice person"—is a big factor in positive student evaluation of their teachers. Humour is a key factor in shaping this perception as it helps to foster a positive psychological climate, and facilitates the building of rapport. There are a number of subtle interacting components at play in this experience formation. Firstly, as Morrison highlighted:

> Humor thrives in an environment of trust and is a major factor that contributes to building trust. (p. 6)

Similarly, as Liston and Zeichner (1990), drawing on the work of Macmillan, suggest:

> Honesty and trust are inherent in the activity of teaching, irrespective of context or time… (p. 236)

Collectively, the experience works towards engaging students more emotionally in the learning experience. It's not rocket science to think of ways in which people, teachers or otherwise, can evoke such emotional states in others. In situations in which negative emotions are evoked (e.g., fear, disgust, anger), the only attention given is one of 'how best to exit or put up with the existing reality'. The converse is also true, enthusiastic—humorous and fair-minded teachers are more likely to be perceived as 'nice people'. Morisson (2008) goes as far as arguing that:

> Humor is a key element in building positive relationships with students that will make classroom management an invisible element. (p. 59)

Humour is more than a strategic technique to generate attention or refresh the brain, but is fundamental to our basic need structure enabling us to experience both the joyful emotions as well as deal more effectively with some of the more negative aspects of human experience (e.g., stress and personal loss). The case for humour as

a powerful resource for creative teachers is strong from an evidence-based perspective, both in terms of its outcomes on student learning and attainment, and as a key aspect of the creative design process and ability to teach creatively in situ. However, for many teaching professionals, this may seem a daunting challenge. Many concerned teachers have asked me, particularly in the context of students who appear increasingly distractible in class (so-called Gen Y students), "Do I really have to entertain the students now?" and "Am I supposed to be a comedian also?" Well there's some bad news and some good news. The bad news is that students may well be more distracted in formal classroom situations, in the sense that they won't just sit there and be bored as many might have done in yesteryear. Instead, they may simply access their mobile devices and indulge in more pleasurable activities, disrupting the classroom in some non-productive way. The good news is that we now have much more knowledge on how to teach better, *much* better and creatively. Of course, we are not going to motivate all students all of the time, that's a silly notion. It's like asking medical professionals to cure all illnesses for all people. The reality is that teachers do not need to be highly capable in the comedy stakes, but they should recognize the benefits of humour in creatively enhancing student learning and attainment. As a teacher you need little competence in delivering humour, just the intent to foster it. As students don't generally expect their teachers to be humorous, when this is the case, it is typically experienced as a von Restorff Effect (though students are unlikely to frame it in these terms). I remember vividly an interesting scenario when observing a business studies lecturer teaching 'optional pricing' to a large group of young adult students in a lecture theatre format. He used his honeymoon in New Zealand as the context for some humorous ways to engage and entertain the students, as well as teach the concept in varied and authentic contexts. He explained that on his honeymoon in New Zealand there were many tours with options, at additional costs, of which one was 'bungee jumping'. He added quizzically that he did not choose this option in case an alligator was waiting below and ate him. You probably did not find this particularly funny, neither did I. However, the widespread laughter from the students was quite striking. What is significant is that a teacher does not need much skill in being humorous, only the intent to encourage lighter moments. Students react to what the teacher is trying to do, which is to make the learning experience a bit more fun than is often the case in many dry classrooms. This teacher simply used a bit of humour to lighten up a morning lecture while effectively teaching the designated content knowledge in the syllabus outcomes. His use of humour, as well as stories, had helped to create a positive psychological climate that worked very well in terms of student learning. This teacher did win an excellence in teaching award, and it was not difficult to see why. Apart from the ability to use humour, there were a number of other aspects of his practice that, as a total experience, made perfect sense from an evidence-based perspective. He also had the creative component—using his honeymoon experience (a von Restorff Effect) as the foundation for teaching optional pricing. That's everyday *Little c* creativity, and it's not that difficult to do when one understands the underpinning syntax and heuristics.

Humour then, like other aspects of human capability can be understood, and, while difficult to define, can be described in very specific terms and therefore, as Morisson (2008) argued:

> Humor is a procedural skill that can be learned. (p. 58)

For example, when telling a joke, as when telling a story, there are key aspects of effective presentation. These include, keeping it moving fairly quickly, using movement and expressive voice tone when modelling a conversation between people, and a quick pause before the punchline. This is not difficult to understand and, with some deliberate practice, show a reasonable proficiency in delivery. When people tell me they can't do this, I can usually change their minds in around 1–2 h, through modelling of the story/joke and getting them to do the necessary practice with appropriate feedback. They are not quite ready for a professional career as a comedian, but are good to go in terms of adding this humour component to their teaching skill repertoire of resources. Even easier is the use of materials', such as audio or video clips. The important point is that you don't have to be funny, just the communication of this intent is a rapport builder and communicates your humanness. I recall one teacher who, every week, shared either an amusing story about his dog or a cartoon with his students. It was hardly highly sophisticated humour, but it always lifted the mood in the classroom and communicated to the students that he was making an extra effort to make learning more interesting (or at least, less painful).

Quick wit is a really powerful humour resource but requires more skill in terms of recognizing when and how to use it. I have seen this used by skilful teachers to manage a wide range of potentially disruptive behaviours. Quick wit can break up situations of potential conflict, as it's hard to build up an aggressive psychological state once interrupted by something funny. This often works simply by slowing down the negative response long enough for the negative emotions to settle at the neurological level and a more rational state of mind to take prominence in consciousness. I often use wit to 'call the room', an old comedian's term for being straight and honest with the audience. For example, in a long session on a dry subject, I might say to the students something like, "I know you would rather be on an exotic Island with 'Person x' (I pick a local glamourous celebrity or the like) than here with me doing this on a Tuesday afternoon, but what can we do about it?" This needs to be done with a bit of 'playfulness' in terms of voice-tone and gesture, but typically works as intended because it communicates your empathy and that you share some of their learning 'pain'. Quick wit is probably the most difficult of all humour to do consistently well, and the 'quick' component can lead to saying something that may not be intended and which may be perceived as offensive by some. However, I use this type of humour extensively and have yet to be slapped or reprimanded in any way, so it's not that risky—if one is thoughtful of context.

Even for the teacher who is particularly self-conscious and chooses not to experiment with any form of humour, there is a fairly easy solution, and this is to allow the students to generate some humour and simply participate with a genuine smile. The teacher does not need to be, nor should be, the seat of all humour, it's much better when it's collaborative. (Figure 4.2: Summary Framing Questions for

Humour	
What are the different types of humour that can be creatively used to enhance student learning?	• Jokes; Riddles; Anecdotes; Stories; Cartoons; Witticisms; Impersonations; Humorous video clips, Audio segments or Objects – almost unlimited
What are the main purposes for using humour in teaching?	• Get good attention (Humour is a great resource for creating von Restorff Effects); • Create and maintain a positive psychological climate and build rapport; • Creatively illustrate a fact, concept or principle with high impact; • Icebreaker for new classes (if done well this is a good Primacy Effect)
What must we consider carefully before using humour?	• Sensitivity to the learning group and individuals in terms of political correctness issues, such as ethnicity, gender, sexual orientation, etc.; • Confidence in using the particular humour genre/type (e.g., witticism is more difficult)
Where can I get resources of humour that will work for me?	• Personal Experience; • Colleagues, family members, friends – almost anybody; • Media sources such as joke books, journals, newspapers, television, films, Internet, etc.; • Observe professional comedians (live or on video) – model what they do and how they do it

Fig. 4.2 Summary framing questions for using humour

Using Humour provides a guide for using humour as part of one's creative teaching repertoire of resources).

Finally, it is important to recognize that infusing some humour into everyday classroom interactions is not taking valuable time away from learning the subject. Quite the contrary, as Dewey (1998) argued:

> To be playful and serious at the same time is possible, and it defines the ideal mental condition

4.3.3 Activities

In designing an instructional strategy, one of the most impactful aspects of the learning experience is the activities that students are engaged in to facilitate key learning outcomes. Activities are usually used in unison with methods, and can sometimes refer to the same thing. For example, case studies are considered a method of instruction, but the actual *case* is an activity in itself. In most basic terms activities provide specific structures for students to engage their thinking skills with selected content knowledge and work towards understanding and subsequent

application. Activities can take numerous forms, varying from a single question posed to a large project or dissertation, but they all share a common purpose which is to enhance the learning process towards designated learning outcomes.

In practice, all instructional strategies can be seen as a sequence of planned activities. Some are predominantly teacher-centred, such as explanation (typically framed as lecturing or previously 'chalk and talk'); others involve greater participation and student autonomy in terms of choice and management. There is much talk about the need to make learning more student-centred, rather than teacher-centred and, as noted in Chap. 1, 'The role of the teacher being changed from the "stage on the sage" to "the guide on the side". Frankly, I find this quite disturbing as all instructional strategies should be student-centred, whether they are more teacher-directed or student-managed. For example, lecturing, while typically involving more teacher talk than that of students, does not inevitably mean a lack of student engagement and thinking. Invariably, long periods of teacher talk, especially if it lacks good organization and presentation style is likely to be both boring and ineffective. However, where lectures are delivered in ways consistent with an evidence-based approach (e.g., appropriate chunking, variation of presentation medium, focus on key concepts, questions to encourage thinking) and good presentation skills, they can be highly effective and creative in terms of enhancing student learning and attainment. It is a serious misconception to perceive lectures as a passive experience for learners. As Hattie and Yates (2014) make clear:

> Within the world of psychology, there is no such thing as passive learning, unless this term implies learning to do nothing, in a manner akin to learned helplessness. When we are learning from listening or watching, our minds are highly active…People will often learn more effectively from watching a model perform than from doing and performing that same action in the flesh. Although we note that learners need to be active, this does not mean being active in the physical sense of having to respond overtly. (p. 47)

In contrast, activity for activity's sake is both un-motivating in many cases, and not useful for enhancing learning and attainment. The important point in the present context, is that all components of an effective strategy are a series of activities, and it is more a question of the composition, structuring and effective delivery and management of the overall strategy, rather than a generic framing of teacher-centred-versus student-centred. The aim, over time, is to enable students to develop the necessary learning-to-learn skills and sufficient content knowledge to increasingly initiate, direct and manage their own learning; what is often referred to as 'self-regulated' or 'self-directed' learning. However, well designed and appropriately calibrated activities (i.e., sufficiently challenging and achievable with effort for the student group) are fundamental to effective learning. As Chickering and Gamson (1987) pointed out:

> Learning is not a spectator sport. Students do not learn much just by sitting in class listening to teachers, memorizing pre-packaged assignments, and spitting out answers. They must talk about what they are learning, write about it, relate it to past experiences, apply it to their daily lives. They must make what they learn part of themselves. (p. 3)

The most basic form of activity is the *question*, which powerfully impacts all aspects of the learning process. Robbins (2001) went as far as arguing that:

> Thinking itself is nothing but the process of asking and answering questions (pp. 179-8)

The very nature of posing a question suggests some gap in knowledge in long term memory, hence the question. Once the answer is not found in long term memory, other possible sources are then identified and sought after in order to provide the necessary information. If we ask the right questions in relation to what we need to learn, find appropriate resources and persist in building the necessary understanding and competence, we should be well equipped to meet necessary attainment targets. As McTighe and Wiggins (1998) described:

> The best questions point to and highlight the big ideas. They serve as doorways through which learners explore the key concepts, themes, theories, issues, and problems that reside within the content, perhaps as yet unseen: it is through the process of actively "interrogating" the content through provocative questions that students deepen their understanding. (p. 106)

Questions can take many forms and serve different purposes. For example, they can be closed, and focused on memory of key factual knowledge, such as "What is the currency used in Brazil?" This will provide immediate specific feedback on whether or not students know this particular fact. However, helping students to build a solid understanding of the subject content—that is memorizing relevant information and making the necessary connections through good thinking—requires the use of open ended questions that specifically cue the relevant types of thinking documented in Chap. 2. Questions that can effectively promote these types of thinking are typically *what* and *how* questions. The following are some examples relating to aspects of this book:

- What is the relationship between deliberate practice and expertise?
- What are the similarities and differences between whole class interactive teaching and problem-based learning, and how does this affect the role of the teacher?
- What inferences and interpretations can be drawn from Hattie's meta-analysis of the research on the impact of learning styles on student attainment?
- How might we evaluate the effectiveness of our evidence-based teaching in terms of enhancing student attainment?
- What other ways might we encourage our colleagues to take on the challenge of being more creative in their teaching?

The above question structuring applies to most areas of subject content. Here are some further examples for teaching content that involves the nature and transmission of viruses, focusing on HIV:

- What is the relationship between poverty and HIV infection rates
- What are the similarities and differences between Hepatitis A and HIV, and in what ways are these differences significant?
- What inferences and interpretations can be drawn from the data on HIV infection rates in Asia?

- How might we evaluate the effectiveness of the present HIV prevention programme?
- What other ways might we make people more aware of HIV infection?

You will have noticed that the first four questions focus on critical thinking skills (e.g., analysis, compare and contrast, inference and interpretation, evaluation) and the fifth on creative thinking (generating possibilities). Of particular importance, students need to clearly understand what good thinking actually entails (e.g., the cognitive heuristics identified and outlined in Chap. 2), have opportunities for deliberate practice to apply these in authentic real world contexts, as well as receive clear and useful feedback from expert professionals.

The creative challenge with activities is to design authentic learning tasks that are sufficiently challenging as well as to systematically infuse key concept knowledge and appropriate thinking skills, tailored to desired learning outcomes. While thinking may not be a desirable activity in many situations, for reasons outlined earlier, the brain responds well to mental challenges that are interesting, and in some way novel. Hence, we may be naturally curious and take pleasure in solving problems. For whatever other reason would people do crosswords and other puzzles on underground railway system and buses, apart from relieving boredom? However, apart from personal dispositions, other factors influence our responses to activities, whether school-based or otherwise. Firstly, what is sufficiently challenging will vary depending on the student group and even for individuals within it. Secondly, as Willingham (2009) pointed out:

> …curiosity prompts people to explore new ideas and problems, but when we do, we quickly evaluate how much mental work it will take to solve the problem. If it is too much or too little, we stop working on the problem if we can. (p. 10)

To create activities that enable a range of differentiation (e.g., where all students can be successful, but the activity allows more competent or motivated students to go further in terms of depth or breath of the knowledge and skill areas involved), is particularly challenging and requires creativity on the part of the teacher. These activities can take various formats (e.g., cases, projects, problem-based learning, simulations and experiments).

I have found the following broad design model useful across subject fields in the design of real-world performance-based learning activities that seek to foster the integration of thinking and other process skills with technical subject content:

Step 1 Identify the key technical content areas, types of thinking and other process skills to be incorporated in the learning activity

For this step it is important to:

- select specific topic areas in the curriculum that contain core knowledge (e.g., key concepts, principles and procedures) essential for building understanding of the subject

Table 4.1 Main knowledge and skills components for an electronic engineering project

Project components		
Subject knowledge	**Types of thinking**	**Other process skills**
• Circuit design and integration principles • Circuit building • Use of sensors	• Generating possibilities relating to circuit design • Analysis—part-whole relationships of sensors in an integrated circuit • Compare and contrast—previous options and new options generated • Making inferences and interpretations from data relating to the behavior of sensors in an integrated circuit • Evaluation of interesting options in relation to derived criteria	• Oral and written communication • Teamwork

- identify the types of thinking that are important for promoting student understanding and subsequent competence in these topic areas (e.g., analysis, comparison and contrast, inference and interpretation, evaluation, generating possibilities, metacognition)
- identify other process skills that are to be developed over the duration of the learning task(s) (e.g., communication, teamwork, learning-to-learn strategies).

An example of framing the main knowledge and skill components for an electrical and electronic engineering project is presented in Table 4.1.

Step 2 Produce the learning task activities

This stage involves constructing the project task itself. It is essential to ensure that:

- the task incorporates the application of knowledge, types of thinking and other process skills specified in Step 1
- the activities mirror, as far as possible, real world applications
- it is sufficiently challenging but realistically achievable in terms of students' prior competence, access to resources and time frames allocated
- successful completion involves more than one *correct answer* or more than one *correct way* of achieving the correct answer
- clear notes of guidance are provided which:
  - identify the products of the project task and what formats of presentation are acceptable (e.g., written report, oral presentation, portfolio)
  - specify the parameters and scope of the activity (e.g., time, length, areas to incorporate, individual/collaborative, choice permitted, resource access, support provided)
  - cue the types of thinking and other desired process skills
  - spell out key aspects of the assessment process and criteria.

Box 4.1 Project #2—Moving Car Transit is an example of a project task used in a mechanical engineering module based on the learning outcomes example identified in Step 1.

Box 4.1: Project #2—Moving Car Transit

Project #2 – Moving Car Transit

NOTES OF GUIDANCE

Objective:

This project requires you to design, build and test electronic circuits necessary to control a range of movements in a model car (e.g., mode forward, reverse and stop).

The project is to be done in groups of 3 to 4 and will be completed by xxxx.

Scope:

To meet the project requirements you will need to:

- Form a work team and organize the necessary activities you will need to do in order to complete the technical requirement specified below. (Note: it is important that your team identifies clear roles and responsibilities, distributing and coordinating various tasks appropriately and is able to operate as a high performing team).
- Build and test the following circuits:
  1. Light Dependent Sensor Circuit – to detect the station.
  2. Counter & Display Circuit – to display the Station number on the 7 – segment LED display.
  3. Motion Control Circuit – to activate the motor and move the car in forward or reverse direction.
  4. Voltage Regulator Circuit – to provide 5V dc supply.
- Design a Counter Limiting Circuit that is able to integrate the above circuits, enabling the car to move forward to any Station, reverse automatically and stop after hitting an emergency switch (micro switch) in both forward and reverse directions.
- Incorporate additional specific performance and/or aesthetic features which may differentiate your car from the rest (e.g., can do extra movements, perform faster in certain movements, has novel/attractive appearance).

This ICA project comprises 50% of the marks weighting for this module.

The distribution of marks for the various project components is contained in **Table 4.2**

Table 4.2

Assessment Components	Mark weighting in percentage
Plan, Build & Test Circuits 1-4	40%
Counter Limiting Circuit Design	20%
Creativity (e.g., enhanced functionality, aesthetics)	20%
Teamwork (e.g., goal setting, management of team-roles and responsibilities, dealing with conflict/challenges)	10%
Communication (e.g., clarity and cohesiveness of explanation)	10%
Total	100%

Figure 4.3: Summary Framing Questions for Using Activities provides a guide for enhancing student learning through the creative use of activities.

Activities	
What are the different types of activities that can be used to creatively enhance student learning?	• Specific learning tasks; Quizzes; Competitions; Projects; Visits; Forums; Simulations; Cases; Work experience; Brain gym/puzzles; Experiments; Role-play – almost unlimited
What is important in designing and managing activities?	• Relevant to the learning goal(s) and specific learning outcomes; • Tasks are real life focused, challenging but achievable, based on students prior knowledge and skills, and in the context of resource and time allocation; • Logistic/resource support is available for successful completion; • Clear and sufficient notes of guidance are provided for students in terms of task requirements and assessment components and criteria; • The overall activity provides opportunities for differentiated learning; • Good facilitation skills are maintained throughout the duration of the activity
Where can I get relevant activities that will be challenging and achievable for the students I teach?	• Produce these yourself- that's a real creative challenge, but a great way to fully customize activities to the student group and learning outcomes; • Industry personnel, colleagues; • Media sources such as books, journals, commercial packages, Internet, etc.

Fig. 4.3 Summary framing questions for using activities

It must be emphasized that activities need to be appropriately integrated within the overall instructional strategy which may also include other methods (e.g., co-operative learning, reciprocal teaching, peer assessment). Also, just as a funny story can always be ruined by poor presentation skills, a potentially high impact activity can fall relatively flat with poor facilitation skills.

4.3.4 Presentation Style

The importance of good presentation skills is obvious in the case of teaching. Unclear voice, disorganized sentences, monotonous tone, dull body language, irritating mannerisms (however defined) etc., all contribute to a quick loss of attention, boredom, disengagement and, for those really wanting to learn, frustration. Increasing research evidence is highlighting very specifically how aspects of our presentation style impact on others' perception of who we are and what we are like.

Mlodinow (2012), for example, quoting research by Apple et al. (1979), highlighted the power of voice on person perception. This involved an experiment in which volunteers were asked to judge the attributes of speakers' voices (without

seeing them), who were using exactly the same content, but with specific variation in the vocal qualities. In this way the listeners' assessments would be based on the influence of those vocal qualities and not the content of the speech. Mlodinow's summary captures the key results:

> …speakers with high-pitched voices were judged to be less truthful, less emphatic, less potent, and more nervous than speakers with lower pitched voices. Also, slower-talking speakers were judged to be less truthful, less persuasive, and more passive than people who spoke more quickly. …And if two speakers utter exactly the same words but one speaks a little faster and louder and with fewer pauses and greater variation in volume, that speaker will be judged to be more energetic, knowledgeable, and intelligent. Expressive speech, with modulation in pitch and volume and with a minimum of noticeable pauses, boosts credibility and enhances the impression of intelligence. (p. 113)

However, it is not just the use of voice that is impactful in terms of influencing how people experience a speaker, but also a whole host of non-verbal aspects of interpersonal communication, many operating unconsciously, that significantly affect perception and attention. For example, a key behavioural aspect of human interaction which I have long believed to be fundamental in creating a good psychological climate, whether in the classroom or the local coffee shop, is *Smiling*. Not surprisingly, cognitive neuroscience is providing a strong evidence-base for its impact, which has been summarized by Hattie and Yates (2014):

> …the smile is one of the most powerful tools to use in interpersonal teaching situations. (p. 259)

They go on to note that research:

> …has documented that a split second's exposure to a smiling face can gently alter people's minds with attitudes to neutral objects becoming more positive, as well as other people being rated more favourably. (p. 259)

Smiling provides important feedback to students about your mood and approachability, both at conscious and subconscious levels, and has contagion effects. For example, if you smile at a student he or she is likely to smile back at you and this can quickly spread to his or her classmates. This has such face validity—excuse the pun—but it is not so easy for many people to actually do this and, even more importantly, to do it well. In my first year in Singapore, there was a National Smile Campaign, as it was felt that people did not smile enough and this would be a good thing to encourage in the local community. The intention was well founded, and it provided me, a former teacher of social psychology, to conduct one of those 'strange experiments' that social psychologists often partake in. The basic experimental design was simple, I smile at everybody I walk past in the local 'hawker centre' (this is a Singaporean term for an area comprising a number of vendors providing food outlets, usually but not always outdoors). Social psychologists have thick skins and can deal with embarrassment. What other occupational group goes around with bold faces asking people to give up their seats in crowded underground stations, to investigate the impact of social norms on people's response behaviour? (Milgram 1977). Many in fact did get up, without asking for reasons. It might on

the surface seem unlikely that few people would ask why, but would you like a response such as, "My colostomy bag has just broken and…."? Anyway, I conducted the smiling experiment and held firm despite the great majority of local people, for the first day or two, looking at me as though I was from another world. Persistence is another trait of social psychologists, so I continued the daily smiling routine, and guess what? Some started smiling back to me and, over the period of one week (my designated time for the coverage of the experiment), I had several brief conversations with local Singaporeans. A few even congratulated me on my bravery. Of interest, no one during this week actually initiated smiling at me. That particular experience may support the view that smiling is not particularly easy for many people.

Furthermore, there is skill in smiling, as in most aspects of interpersonal communication. In the context of classroom teaching, it should be brief, natural and unforced, involve scanning the whole group with quick friendly eye contact. Yes, it's a skill requiring deliberate practice, but one well worth developing both for effective teaching and social interaction generally. Of course, smiling is not the content of one's interaction with others, but facilitates setting the climate or context of the interactions, especially towards building rapport. And, as the famous success coach, Anthony Robbins (2001) once wrote:

> Rapport is the ultimate tool for getting results with other people. (p. 231)

Rapport is very much bound up with positive feelings towards someone you like, and results from your perceptions of what they do and how. There is a saying that goes something like this, "People like people like themselves." It also includes liking people, who you might like to be like. This is often an unconscious bonding process, and reflects the human tendency for identification with desired social models. I like Molden's (2001) frame:

> Rapport is long lasting, elegant, respectful, and acknowledging in nature. Rapport connects emotional centres together and creates enjoyable bonds between people. Rapport is the intelligent approach to influencing, regardless of positional power, whereas power and authority are defaults for people in positions of power who have poor interpersonal skills and little flexibility. (p. 72)

Presentation style is not just the ability to use one's voice and specific aspects of body language to maintain positive attention and build rapport, but also to quickly recognize the reactions of other people, and modify one's own communication style accordingly to encourage desired changes in their behavior. This ability to quickly notice, monitor, and to make sense of the external cues from other people, through careful observation and empathic listening, is often referred to as sensory acuity. These skills, while typically associated with professionals working in various fields of applied psychology and detective or military work are now increasingly becoming part of the training of salespeople and customer service personnel. The field of neurolinguistic programming (NLP) which focuses on influencing other people's behaviour through the use of language, voice tone and a range of non-verbal communication strategies has much to offer teaching professionals in terms

of enhancing presentation style. It involves skill in recognising patterns in body language and voice characteristics in order to understand the states of mind of other people and to be able to make accurate inferences about their perception and feelings. In this way, it is then possible to communicate more effectively and get better results in terms of building mutual understanding and rapport. Ultimately, perception and judgements about other people, accurate or otherwise, are the product of their behaviour, and of course, our pre-existing beliefs.

In teaching, as in other human interaction situations, the processes of perception, apprehension and response play out and lead participants to construct their personal realities, and these can be favourable or not for the teachers concerned. For example, Wadd (1973) warned:

> In establishing the order he has decided upon, the teacher must be fully aware that what happens in the first few encounters with the pupils is likely to establish the relationship which he will have to live with for the rest of his contact with that particular class. (p. 87)

Like a first date, a new teacher's first encounter with a class can be the first step of a long lasting positive relationship, or it can be a disaster. In the language of psychology we call this a Primacy Effect, which was outlined earlier and has its roots in our evolution as a survival mechanism. Let's not take too long in ascertaining that the large sabre tooth tiger at the entrance to our cave may not be here offering us a meaty barbeque item. Similarly, the Recency Effect, also discussed earlier, is impactful in these ways. What you say or do at the end of a teaching session, or on your first date, also as a strong impact on the other's perception, feeling and subsequent response to you. Hence, a good Primacy and Recency Effect puts one in a potentially strong position in the person perception stakes. To make this even more impactful, introduce a novel and interesting aspect (e.g., a von Restorff Effect) to the communication encounter and you are well on your way to some positive framing in most cases and situations. For example, enthusiasm is typically considered a positive feature of a teacher's presentation style. However, the inference and interpretation of a person's enthusiasm can only be made by others based on their observation of behaviour, not the person's intent. Hence, if you want to be perceived as an enthusiastic teacher you need to behave like one (e.g., you must display the range of behaviours that people, within the cultural and normative context, typically frame as enthusiasm). We know that variations in movement and proximity, voice and tone, certain types of posture and gestures and eye contact, all contribute to positive perceptions of enthusiasm. We also know that this needs to be done skilfully for it to work in practice. In other words, the best contrived performance works best, but it must not be perceived as contrived—sounds kind of strange, but true. That's why great actors earn such big bucks.

What this means is that the way we structure and conduct our communication behaviours in relation to other people is crucial for influencing their perception of us and the kind of attention, if any, they are likely to give. The impact of good presentation style is particularly significant in influencing students' perception of you as a teacher, especially in the area of being seen as a "nice person".

Many factors and contingencies will affect how others perceive our behaviour (e.g., personality configuration, cultural values and norms, prior experience, mood and situation) but it is far from a random process. People with high proficiency in emotional and social intelligence (however defined) typically have a deep understanding of how interpersonal communication 'works' and, perhaps more importantly, why it often does not. As a result they are able to, through good thinking and careful structuring of their communication strategy, mitigate the likelihood of ambiguity and misperception. Note, I say mitigate not eliminate. I remember a quote, but cannot trace the reference (apologies), but it captures the context so nicely:

> Life is a matter of perception, though more often than not misperception

While presentation style is influenced by the personality and biographical aspects of the presenter and is a holistic performance, it is understandable in terms of the key behavioural components involved and how they work to influence people's perception and behaviour. Skilled observation, listening, voice modulation and calibration of one's body language to the situation and audience are learnable through modelling how they work and effective deliberate practice. The ability to use one's presentation style to specifically engage and motivate learners is a high level skill, akin to that of great orators or other persuasive political figures. In the classroom it is less one of high verbal and visual rhetoric, but equally powerful in terms of creating impact than can be used productively for learning. I often use the analogy of Presentation Style being the ***Pedagogic Glue*** that binds together all components of the instructional strategy and is a major aspect of creative teaching competence. There is a strong evidence base underpinning this, and as the chapter opened with a consideration of expertise creating an illusion of magic, here is another example where such an illusion (and a very useful one in terms of enhancing learning and attainment) can be nicely conjured up by the creative teacher. Figure 4.4: Summary Framing Questions for Developing Presentation Style identifies some key practical ways to develop greater creativity in this important area of practice.

4.3.5 Examples

In teaching students over three decades and across many educational and cultural contexts, a generic response that sticks in my mind is students asking for examples. It's as though an example will provide that special key to open the door to understanding the concept or principle being taught. Examples are a representation of a class or a group of things and, as understanding requires classifying things in order to generalize and differentiate, they play a key role in this organizing process. More complex conceptual understanding is analogous (this is also a kind of an example) in many ways to completing a large jigsaw puzzle. I can remember back to my childhood years, when opening the box of a large jigsaw puzzle containing

Presentation Style	
What are the various aspects of presentation style that make it most effective in creating and maintaining attention and interest?	• Clarity, pace and tone of voice (expressive voice being most effective); • Calibration of body language (e.g., posture, gestures, eye contact, appropriate use of smile) to voice presentation; • Appropriate variation and ability to creatively use stories, humour and examples (appropriate to the learning group) – remember this is your ***Pedagogic Glue***
How can I develop a presentation style that is effective, creative and fits my personality?	• Apply the relevant Core Principles of Learning to oneself. Remember you must understand how it works (key concepts and principles, etc.) and be able to do it well across a range of situations (hence good deliberate practice with feedback is essential); • Observe directly (or from videos) effective presenters and motivational speakers and model what they do and how they do it – (remember NLP?); • Ask colleagues who have very good presentation style to observe you teaching and provide relevant feedback; • Practice, evaluate and modify, etc. from an evidence-base – I might have said this prior!

Fig. 4.4 Summary framing questions for developing presentation style

many hundreds of pieces, that feeling of both challenge and anxiety at the thought of the task ahead. However, by using certain strategies (e.g., finding and assembling all the straight edge pieces to form the border; putting together pieces of specific items in the picture) the task becomes more manageable and eventually, towards completion, easy, as the last several pieces can be quickly put in. Building complex understanding is a bit like this. In terms of the jig saw analogy, examples are key 'instructional pieces' to facilitate this process, enabling the mind to organize information and build a clear and accurate picture of reality (mental schemata) for the topic being learned. The use of a range of worked examples (Effect Size of 0.57, Hattie 2009), in which students can clearly see the full process or procedure for completing an activity, enables them to fully connect their prior knowledge with new knowledge, build understanding and be able to *transfer* learning to other relevant contexts in which it has useful applications. According to Hattie and Yates (2014):

> The worked example effect now stands as one of the most robust findings from applied psychology research. Worked examples provide a form of modelling through demonstrations of successful procedures or products. (p. 151)

Examples also include such things as analogy and metaphor. These liken one thing with another for the purpose of simplification and making things meaningful in terms of the particular prior experience of the students involved. For example, I often used the analogy of creative teaching as akin to good cake-making. A good cake requires a solid base and an attractive topping. Creative teaching requires an

Examples	
What makes an example a good example?	• Relevance to a key concept, principle, skill being taught; • Students can relate to it through their own experiences; • It has a strong real life current impact
When is it most effective to use examples?	• Before or immediately following the teaching of a concept, principle, procedure or skill; • When concepts are abstract or difficult to visualise
Where can I get good examples for the topics I teach?	• Personal experience; • Colleagues, family members, friends – almost anybody; • Media sources such as books, journals, newspapers, television, films, Internet, etc. – almost limitless

Fig. 4.5 Summary framing questions for using examples

evidence-based instructional strategy, which has great SHAPE. It's a very simply analogy, but easy to remember. The reason I have selected examples as a key area for creative teaching is that there is almost unlimited potential for finding or creating powerful examples, analogies and metaphors to support the learning process. Like stories, examples cover all aspects of human experience, and we can use them to creatively communicate difficult concepts in simplified but authentic ways. Good analogies and metaphors are also very likely to result in a strong von Restorff Effect, stimulating attention and interest. Like stories, we can never find or create all the possible relevant examples for the topics we teach, and this always provides us with a challenging and creative avenue for practice. However, over time, with diligence and some creativity it is not too difficult to build a varied portfolio of these valuable pedagogic tools. Figure 4.5: Summary Framing Questions for Using Examples provides an advance organizer for this.

4.4 Summary: Getting into Great SHAPE

There is a saying, accredited to Aristotle (2015), "One swallow does not a summer make". This essentially means that seeing one swallow (swallows are birds that typically migrate toward warmer weather) is not sufficient evidence that the summer is, in fact, on its way. I have no idea how many swallows one must see to feel confident of the impending arrival of summer in a given environment. The point in this context is that one creative act of teaching does not make an effective learning experience for students, nor define a creative teacher. There needs to be consistency in being able to teach creatively in different contexts and over time. Of course, we would not expect even the most creative teachers to be able to teach in highly creative ways in every lesson they teach, just as this would be an unrealistic expectation in any professional field. However, creativity can arise in so many ways in teaching, as SHAPE illustrates. For example, some teachers may be creative in terms of the activities and examples they create for students, others in their

presentation style and humour. It's a challenging task to be a creative teacher, but hopefully I have convinced you that it is a realistic professional goal and one that has much of merit for the students you teach and, equally important, for your professional identity as a teacher.

Creative Teaching Competence, like other forms of competence, is based on the same Core Principles of Learning and involves the teacher developing from novice to varying levels of proficiency towards expertise, and ultimately to adaptive expertise. This perhaps throws a clearer light on differing conceptions of teaching as 'art', 'craft' or 'science', noted in Chap. 1, that have appeared in the research literature (e.g., Eisner 1995). Creative teaching is science, art and craft combined. We now understand, in large part, how this works in terms of the underlying syntax and heuristics involved. There is no real dichotomy between the science and art of teaching, as both are underpinned by strong evidence-bases from diverse fields in the human sciences. The art is the capability for creative weaving of methods, activities and resources into high impact instructional strategies. They can be seen in terms of great SHAPE, and just as David Blaine creates the aura of magic in his performance, the most creative teachers create similar experiences in their classrooms. It has the illusion of magic, but it is expertise and can be learned by motivated teaching professionals over time. Once attained it is exactly as Intrator (2003) depicts in his description of excellent teachers:

> A potent teacher will skilfully and gracefully create conditions and stage activities that inspire students to have a sustained and meaningful encounter with a subject – because they can. (p. 7)

Furthermore, and as an advance organizer for the next chapter, the development of powerful and easy-to-use information-communication technologies is providing an enhanced resource capability for teachers to become even more creative in their professional work. Utilizing the affordances of a diverse range of e-tools for maximizing learning opportunities and attainment for learners is an increasingly fertile field for creative teachers, and will inevitably constitute a key component of creative teaching competence.

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Chapter 5
Getting into Great SHAPE with Blended Learning

5.1 My Early Scepticism Was not Unfounded

I must confess to previously being very sceptical concerning the early euphoria relating to the supposed benefits of information-communication technologies (ICTs) in enhancing learning effectiveness, at least in the short term. Like many others, I regularly experienced frustration when using technology-based databases and software, often questioning, "Why is it that such a simple process seems like the Mars mission?" I particularly remember attending an education conference, waiting to listen to a keynote talk on the benefits of using technology in teaching, only to see the speaker struggle with the applications and not able to even get his PowerPoint slides up on the screen. After some 15 or so minutes he aborted (or postponed) the presentation. I did not even bother to check. Anyway, such experiences did little to inspire us non-techie folk to embrace technology for learning in any sustained manner. Also, it does not seem many years past that e-learning was being touted as, to use an old English metaphor, "The best thing since sliced bread." However, such early overhyping soon waned and it was not that long before a significant evaluation of the use of e-learning in education was referred to as a "Thwarted Innovation" (Zemsky and Massey 2004). Similarly, Oliver (2007), commenting on the lack of ICTs widespread application in educational settings to create engaging and effective learning experiences noted that:

> What appears to be still missing for teachers is appropriate guidance on the effective pedagogical practice needed to support such activities. (p. 64)

Robinson and Schraw (2008), in reviewing the literature on e-learning research, further supported this overall perception:

> Unfortunately, empirical research informing decisions regarding "what works" ranges from sparse at best, to non-existent at worse. This is because e-learning has focused on the delivery of information rather than the learning of that information. (p. 1)

D. Sale, *Creative Teaching*, Cognitive Science and Technology,
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Given a relative lack of widespread application of evidence-based practice in mainstream teaching and training, the adding of technology tools that were often far from user-friendly, in contexts of variable operability and bandwidth capability, these findings were not surprising. The reflections by Shea-Schultz and Fogarty (2002) provide a poignant insight into this apparent failure of ICTs to make the expected significant far-reaching positive impacts on teaching and student learning:

> One thing is certain – e-learning will evolve into something so simple, so elegant yet all persuasive and natural, that our grandchildren will wonder in dismay why we didn't see it coming. (p. 165)

> Truly human-friendly technological design won't appear anytime soon. Computer, networking and software engineers cast the die five decades ago. (p. 89)

However, much is now changing for the better concerning the use of ICTs in teaching and learning. There are a number of factors contributing to this, and overall, their impact is to merge pedagogy and technology into one seamless enterprise to offer increasing capability for highly effective, efficient and differentiated learning experiences. This will become the arena in which professionals can fully display their pedagogic and creative teaching competence. I would also like to think that it may move teaching further towards the profession it has only fleetingly threatened to become: one noted for its wide range of knowledge bases relating to human learning, high skills in learning design and creative competence in practices that significantly enhance learner attainment.

Firstly, and most significantly, there is the recognition that technology tools alone will not constitute anything near a learning revolution. No matter what we can create in terms of computer generated resources, human brains are still little or no different from those of our distant ancestors. As Mlodinow (2012) explained:

> Our genus, *Homo*, has been evolving for a couple of million years. Brain evolution happens over many thousands or millions of years, but we've lived in civilized society for less than 1% of that time. That means that while we may pack our brains with twenty-first-century knowledge, the organ inside our skull is still a Stone Age brain. (pp. 129–130)

Hence, no matter how much information we have in terms of gigabytes and terabytes, it is not going to get quickly assimilated and nicely integrated into long-term memory. The same Core Principles of Learning apply irrespective of mode or medium. For example, looking into a computer screen does not change how our memory systems work.

Secondly, there has been a significant reframing of the use of ICTs towards pedagogic considerations and how they might enhance specific aspects of the learning process, rather than the technologies per se. For many years I sat, and frowned, in meetings on the use of technology tools. I listened to enthusiasts who showed that with several clicks on fuzzily conceived icons one could read other people's opinions as well as offer one's own opinion on an online discussion board. It seemed to them that this technology affordance would exceed the frustration and inconvenience of its complex technical use. It did not for most of us. The pain exceeded the relatively small pleasure, and it was far from novel. From a pedagogic

focus, and using an evidence-based approach, we can now analyse and evaluate the use of various ICTs in terms of how they can enhance aspects of the learning process. In this way we can select and creatively combine those e-tools which are most effective and efficient in promoting learning, and not use technology simply because we have it.

Finally, the technologies are becoming more stable, much faster and, most importantly, user-friendly. For many years, apart from a lack of good pedagogic design, there has been much criticism of online learning in terms of difficult usability. Shea-Schultz and Fogarty (2002) observed that very basic design failure is common in e-learning environments:

> When most learners complain about e-learning, it's often not the training they object to but the confusing menus, unclear buttons, or illogical links. (p. 117)

Similarly, as Shank and Sitze (2004) have pointed out:

> Your success as a designer and developer of online learning is directly tied to your ability to build instructional materials that don't leave users frustrated. (p. 138)

Taken together, while the initial hype of ICTs was premature and over exaggerated, there is now a strong evidence base for their potential to significantly enhance learning and attainment opportunities for a wider range of learners. ICTs are not going to change brain capability and functioning in highly significant ways, but driven by a strong pedagogic literacy, they now provide an exceptional resource capability for teachers to design learning experiences and teach in ways that meet the earlier framing of *Little c* creativity.

5.2 Framing the Genres of Information-Communication Technologies (ICTs)

Even though this is a rapidly developing and changing arena, with new applications and e-tools emerging almost daily, there is an underlying set of generic learning affordances that remain relatively stable. All are related to enhancing some aspect(s) of the learning process, whether the focus is more on providing subject content knowledge, facilitating the building of understanding or skill acquisition. Furthermore, while there may be many applications and specific e-tools available, they will inevitably fall into a limited number of key genres or categories, relating to these broad learning areas. For example, while tablets come in many formats and have different features, they are essentially similar in terms of being compact mobile personal computers. The same is true of the wide range of smartphones, and social media platforms such as Facebook and Twitter.

In terms of ICT genres, a number of broad categorizations have been suggested. For example, Pacansky-Brock (2013) offered the following four main categories:

- Cloud-based applications—accessible from anywhere
- Web 2.0 tools, that make the creation and sharing of multi-media content simple
- Social media, technologies that enable communication and sharing
- Mobile apps.

This captures the essential range of affordances of ICTs as they collectively provide a sufficiently rich resource base to enable mainstream education professionals to teach in highly effective and creative ways, and to do this efficiently. I will be primarily focusing on e-tools that are user-friendly and can effectively facilitate:

1. the production and delivery of differentiated multi-media content and hyper-linked resources
2. communication, sharing and collaboration of learners.

In analysing and evaluating selected ICT applications and e-tools, the Core Principles of Learning will be used as the guiding heuristics. In this way, it becomes possible to identify the key learning affordances for each technology genre and specific e-tool. In summary form, from Chap. 2, learning is enhanced when there is:

- a motivational strategy
- clarity of learning goals, objectives and expectations
- activation of learner's prior knowledge
- a focus on key concepts and principles
- the facilitation of good thinking
- variation in the methods and mediums of presentation
- teaching that works in accordance with memory systems and processes
- deliberate practice to develop expertise
- a success orientated and fun psychological climate
- ongoing quality feedback from formative assessment.

The challenge for maximizing the creative impact of ICTs in teaching and learning is to identify how different applications and e-tools can specifically enhance these aspects of the learning process. For example, in principle, if an e-tool or e-tool combination enhances an aspect(s) of the learning process for a group of learners, then there is potential use in terms of infusion into the instructional strategy. Invariably, e-tools that can enhance a number of these principles simultaneously have a potentially greater utility for learning and attainment. I say potentially cautiously, as it's always necessary to consider other factors, such as cost, ease of use, access and technology integration, etc. A tool may have high affordance on the effectiveness scale, but be inefficient in practice. However, when an e-tool or e-tool combination can clearly have a positive impact across a number of the Core Principles of Learning, this is where we are most likely to get maximum benefit in terms of student learning and attainment. It is also where we can be most creative in both maximizing effectiveness and efficiency, while providing that

added novelty to enhance interest in the situated context. This simply becomes an extension of the creative teaching framework developed in Chap. 4. In terms of Hattie's 'Russian Doll' analogy, the dolls are getting an added ICT 'makeover', so to speak. We would then be using the best method combination in terms of pedagogic design and e-tools integration to produce truly evidence-based creative instructional strategies. That's probably as good as it gets in terms of highly effective and creative teaching. To do this consistently across a range of teaching contexts would constitute expertise in creative teaching competence. This would be the benchmark to aim for in terms of professional development.

In the following sections, we will explore the various affordances of the online environment and how specific e-tools can contribute to enhancing learning and attainment. This will be contextualized in framing the design of Blended Learning, which is perhaps the most significant trend in terms of how ICTs will be used in the format and structuring of learning experiences in the foreseeable future.

5.3 The What, the Why and How of Blended Learning

As with most things relating to teaching and learning, there are different perceptions of blended learning and any one particular definition will lead to some contestation. Indeed, it could be argued that most learning designs are blended in the sense that different methods and resources are typically combined in the creation of teaching and learning strategies. As Littlejohn and Pegler (2007) pointed out:

> Blending is an art that has been practiced by inspirational teachers for centuries. It centres on the integration of different types of resources and activities within a range of learning environments where learners can interact and build ideas. (p. 1)

Effective teachers typically blend (or weave) methods, activities, and other resources into pedagogically sound instructional strategies to meet desired learning outcomes for the students they teach. Furthermore, as we saw in the previous chapter, the generation and blending of appropriate methods, activities and resources is at the root of creativity in teaching. Here, the focus is specifically on the pedagogically driven blending of ICTs into learning design and teaching practices. Over time, we will most likely talk less about the use of technology in teaching as it will just be part of the creative design and facilitation process.

Even in most lectures today, it's rare not to see at least some use of ICT, such as PowerPoint slides or a video, blended into this most traditional of teacher focused format. At the other end of the spectrum, we are seeing the growth of fully online courses, in which there is no traditional face-to-face contact time. Invariably, discussions on blended learning raise questions on what content areas are best delivered online and on what basis, as compared to the face-to-face mode, and what percentage of a programme should be delivered in the different modes etc. These

questions will be addressed later in the chapter. In terms of operationally useful definitions of blended learning, I find the following conceptions capture the essential framing:

> Blended learning is the combination of different training "media" (technologies, activities, and types of events) to create an optimum training experience for a specific audience.
> (Bersin 2004, xv)

> Blended learning is the thoughtful fusion of face-to-face and online learning experience… optimally integrated such that the strengths and weakness of each are blended into a unique learning experience congruent with the context and intended educational purpose
>
> …combines the properties and possibilities of both to go beyond the capabilities of each separately.
> (Garrison and Vaughan 2008, p. 6)

The concept of blended learning is attractive for a number of reasons. Firstly, from a pragmatic point of view, there are affordances in terms of cost, time and convenience. As the demand for higher education increases, in the face of public funding and personal finances decreasing, high cost long duration face-to-face instruction may become an option only for the wealthier minority. It's not high level prediction to forecast an explosion of low cost, even free online or blended learning programmes as MOOC (Massive Open Online Courses) have demonstrated. How this will eventually position itself in the market context is open to anyone's guess at present, but there's little doubt that blended learning, in whatever format, will be a major curriculum option. The challenge will be to make it as effective and efficient as possible in terms of learning design, differentiation, and ease of access to a wider cohort of learner groups. It's here, that creative teaching can be most impactful.

In the following sections I will outline a blended learning design framework which follows the same evidence-based heuristics and creative teaching framework incorporated in the previous chapters. The emphasis is on how ICT genres and tools can be integrated to creatively enhance the learning process, increase attainment and provide optimum learner differentiation. Pacansky-Brocks' (2013) position on the use of e-tools is particularly pertinent in this context:

> The tools here are merely colours in a palette. Like an artist, your task is to select a tool and align it to your own creative vision to construct relevant, engaging learning activities for your students. (p. 130)

5.4 A Design Frame for Blended Learning

This design frame can be applied both at the more macro curriculum level (e.g., a module or unit of study), as well as for individual sessions or lessons. Invariably, as in the face-to-face situation, even the best pedagogic design and practices will not

engage all learners, and certainly not all of the time. As we know, when dealing with humans, you will not, as the saying goes, "Please all the people all of the time". There are *just* better heuristics, but it's an important 'just'. From an evidence-based approach, I use the following broad heuristics in the creative pedagogic design and facilitation of blended learning:

1. Good learning design is ***always*** grounded on evidence-based practice, incorporating core principles of learning
2. ICTs are used ***strategically*** and ***creatively*** to enhance specific aspects of the learning process
3. The completed blended learning design ***maximizes*** the affordances of a range of learning modes and mediums.

This guide can be systematically worked through in the learning design process. Key focal areas for creative thinking and application will be in the strategic enhancement of the learning process and maximization of the blend. You will often find that while working through this design process in practice, new ideas or potential resource blends will come into mind, making this as much an iterative process as a linear one, and that's where much of the creative connections will incubate and hopefully flit into conscious thought—as we saw in Chap. 3. That's the way the brain typically works in terms of creativity in any field.

5.4.1 Good Learning Design Is Always Grounded on Evidence-Based Practice, Incorporating Core Principles of Learning

In the early days of e-learning, and it probably still goes on today, there were often discussions on whether or not there should be a different pedagogy for online learning, an 'e-pedagogy' if you like. Now, drifting back into my past, and hopefully not boring the reader who loathes football, I recall many genres of football, "push and run", "long ball game", and I liked this one, "total football", played by the Dutch national football team in the 1970s. However, here's the main point, they all used a football, had 11 players in a team, passed, headed, and kicked the football, with the objective of winning the game, which entailed, and still does, scoring more goals than the opposing team. Sounds like football, so what was different? Well, in the opinion of many football pundits, the Dutch played the game better than other teams, individually and collectively, when in possession of the ball. The same framing applies to learning online: 'the brain is the brain', whether it's in a face-to-face situation or processing stuff online. Do we need to adapt the teaching strategy, customizing what we know about human learning and teaching methods to the online environment? Of course we do, just as there is always customization of instructional strategies in different face-to-face contexts. However, we now have to effectively negotiate an added customization and adapt it to the

particular nature, affordances and limitations of this different instructional mode. Clark and Lyons' (2005) analysis, in the context of human learning, remains relevant for the foreseeable future:

> The most robust instructional principles are those based on a model of human psychological learning processes….Any given instructional method will be effective or ineffective depending on the extent to which it supports or disrupts basic-learning psychological processes regardless of the delivery media. (p. 594)

Hence, Horton (2006) makes the summative point in this context:

> At its best, e-learning is as good as the best classroom learning. At its worst, it is as bad as the worst classroom learning. The difference is design. (p. 3)

Quite simply, disorganized and over complex content in the online environment is no less disruptive than in the face-to-face context-perhaps even more so. Similarly, dull is dull, wherever, whenever; and we know how this works in terms of brain processes. What was developed in terms of a framework for learning design and creativity in Chaps. 2 and 3, and applied generically in Chap. 4, equally applies here. However, we now have a resource capability which, if thoughtfully used, has almost unlimited creative capability for enhancing opportunities and attainment for a wider differentiated range of learners.

5.4.2 ICTs Are Used to Strategically and Creatively Enhance Aspects of the Learning Process

ICTs cannot presently change the fundamental ways in which the brain works and therefore our focus must be on what the different e-tools can specifically do to enhance aspects of the learning process. For example, at the most generic level, we know that ICTs provide anytime, anyplace access to online resources. Also, computers do not suffer from mental fatigue and we can therefore expect consistency in performance, if the technical architecture is good. Hence, this is a potentially good affordance for those who cannot attend class at designated times.

In understanding more fully the specific range of learning affordances that ICTs might offer, it is useful to consider what technology and human brains are actually disposed to do well in relation to information processing. This provides evidence-based guidance as to the learning contexts in which technologies may be most effective. For example, we know ICTs are much better than the human brain at:

- retrieving information from vast resource banks of data
- rapidly, accurately and effectively processing complex sequences of clearly defined facts
- reconstructing and re-presenting large amounts of information.

In contrast, the human brain is better (at present anyway) than the computer at:

- conceptualising ambiguous problems
- exploring concepts
- formulating and communicating ideas.

Sylwester's (1995) summary, from extensive review of the literature, pulls the present discussion together nicely:

> Our brain is better than a computer at conceptualising ambiguous problems. Conversely, a computer is better at rapidly, accurately and effectively processing complex sequences of clearly defined facts. (p. 120)

Based on the brief comparison and contrast above, certain inferences and interpretations on what types of e-tools offer significant learning affordances for different aspects of the learning process are readily apparent. For example, cloud-based applications such as Google Drive and Dropbox enable the storing, organizing, sharing and collaboration of a wide range of content and applications. This enables teachers to present extensive content resources in various formats and mediums, catering to a wide range of learners' needs and competency levels. The capacity to decentralise the structure of knowledge bases and reconstruct them in dynamic customised digestible bits (knowledge warehousing) makes knowledge even more directly accessible and manageable. Similarly, and perhaps the most significant single learning affordance of the online learning environment is the hyperlink which, at the click of the mouse, can bring together a wide range of text based, multi-media and personnel resources way beyond what is possible in the traditional classroom. Hamilton and Zimmerman (2002) illustrate this vividly when they wrote:

> …the hyperlink, which is practicably without counterpart in the physical world of traditional academics. Within an internet document, hyperlinks are used to bring multisourced information into the primary text or to give the reader a path to alternative media. In essence, this eliminates the *physical* separation of material messages that are *logically* connected. In addition to text, hyperlinked messages may be pictures, sound files, animations, or video clips. External links can refer students to other information-rich Internet sites, including personal Web pages, specialized bibliographies, and professional specialists. (p. 270)

This provides the capability of creating networked resources that enable both faculty and students to create, share and continually develop an extensive and varied range of resources that can support the desired learning outcomes. These can include:

- centralized key resources relating to a module syllabus (e.g., learning guides, module maps, advance organizers, annotated bibliographies of key resources, guidance on how to negotiate potentially difficult topic areas)
- selected prepared resources to support learning (e.g., notes, cases, videos, animations, activities)
- selected web links to provide a networked architecture of extended and dynamic resources

- access, where appropriate, to other digital learning exchange portals (e.g., libraries, specific learning communities).

In the following sub-sections I will illustrate how selected e-tools can significantly enhance different aspects of the learning process. This will involve a consideration of e-tools from a range of genres, focusing mainly on content development and delivery, knowledge building for understanding, and supporting skill acquisition. This provides the key underpinning components for the development of competence. The e-tools selected are not meant to be a comprehensive coverage of the genres or prescriptive in any way, as there are many others that can serve similar pedagogic purposes. Also, I am focusing on those tools that I find user-friendly, both in terms of the teacher/developers' perspective as well as from the learner's experience. Most of the tools discussed below are either freeware or 'affordable', recognizing the latter is always relative.

5.4.2.1 Rapid Content Development Software Tools

The importance of good subject content knowledge, the essential information that needs to eventually end up as well formulated mental schemata in the learner's long term memory is a crucial element of effective learning. Hence, the selection, organization and presentation of content are important considerations in all learning contexts, and especially so in the online context, which usually lacks immediate opportunities for clarification and feedback. It's important also to be highly sceptical of the notion that content is all out there in cyberspace, just waiting to be downloaded by a few clicks of the mouse. This is wildly over-optimistic. While there are numerous and varied resources on the Internet, much may lack validity and usefulness. Keen (2007), for example, makes a damning criticism of so-called internet expertise knowledge contained in such sites as Wikipedia:

> …the real consequence of the Web 2.0 revolution is less culture, less reliable news, and a chaos of useless information. One chilling reality in this brave new digital epoch is the blurring, obfuscation, and even disappearance of truth. (p. 16)

Invariably, this problem can be mitigated to some extent by helping learners to be more critical, and apply good thinking to what they are reading or looking at — often referred to as *media literacy*. The ability to do this effectively and efficiently will constitute an important competence for the serious learner who uses such resources. It's to be noted, of course, that this is not a new human faculty but equally applies to all aspects of human communication. Newspapers, books and other media have been around a long time; it's just that we now have more and more varied information sources to validate.

From an evidence-based approach, in the real world of teaching and learning, well prepared resources, tailored to the desired learning goals and outcomes, with multi-modal and differentiated learning experiences, are a key affordance to support student attainment in most learning contexts. To illustrate this, let's go back to my

GCE 'A' level experience of yesteryear. The lessons typically had the following format for the full 2 year duration of the programme:

- The teacher dictates notes for the whole duration of the lesson
- The students copy these down verbatim or in personal shorthand form
- The students write these out neatly and store them safely after the lesson
- The students memorize these notes for tests and exams.

There were probably some opportunities for questions but I cannot recall these as a significant part of the instructional strategy. It was not pleasurable, and it was not novel, but a dull and boring 'slog' to pass the exams. Such practice was forgivable some 40 years back, but it is not now. We are in a position to use ICTs to create, organize and present our subject content knowledge in highly organized, dynamic and interesting ways. This is where rapid content development tools are particularly useful. In most basic terms these are technologies that enable the production of e-learning content and learning experiences which have the following key elements:

- User-friendly functionality requiring only a short learning curve (in some cases only a few hours) to master
- Teaching and learning resources can be produced and up-dated rapidly. This depends on the amount of resources produced but is significantly quicker than previous e-learning development software
- The content mix can include text, graphics, embedded videos and podcasts, hyperlinks to more detailed and differentiated content, activities and assessments.

This enables teachers to quickly get up to speed in being able to produce and integrate a variety of media rich and interactive learning resources tailored to programme learning outcomes and accommodating a range of student learning capabilities. When guided by a strong pedagogic literacy and creative teaching competence, these tools provide an enormous capability for enhancing the student learning experience at the level of exposure to the content knowledge to be learned. These specifically include:

- Content structuring that ensures good chunking to reduce cognitive overload
- Multimodal presentation to enhance interest and application for the content to be learned
- Ongoing formative assessment of key concepts through short quizzes and immediate feedback.

From my experience, apart from PowerPoint which has been around for a long while, I have found the following rapid content development software tools to be particularly useful:

SoftChalk LessonBuilder enables the creation of interactive web pages for e-learning courses. The software is easy to use (really) and it enables the quick production of interactive lessons that have a professional look to them. Specific features include pop-up text annotations, self-assessment quizzes, and interactive

learning games. After production you can package the lessons for delivery via CD-ROM, Intranet, Internet, or integrate with a Learning Management System. As their homepage states:

> If you can use a word-processing program, you can use LessonBuilder. Designed for teachers and content-experts that don't have time to learn complex software, LessonBuilder is simple, yet powerful, with only the features you need to create exciting, interactive content for your online course

It claims to enable you to:

> Create custom lessons by combining your own materials with interactive learning content. The mixture of personalized content, embedded assessment, and interactivity will increase student engagement and improve learning outcomes.

They offer free trial downloads and the software is well priced in terms of comparative products on the market. The current website is http://softchalk.com/

Camtasia Studio enables the creation of packaged lessons within a self-contained video format that can be web-enabled. It's screen recording system will capture a prepared lesson (e.g., Powerpoint presentation) as well as your voice-over during the recording. Using good pedagogic design, high-quality teaching videos can be shared with students on the Web, CD-ROM, as well as on portable media players such as the iPod. The live action video component adds the human touch to the presentation material and enables both technical professionalism as well as the use of informal narrative and humour. The current website is http://www.techsmith.com/camtasia.html.

VoiceThread is a web-based application tool that facilitates the presentation of an environment of integrated learning resources (e.g., images, video, documents) in which participants can interact and contribute (e.g., voice, video upload) both synchronously and asynchronously as part of collaborative discussion. It is a more interactive collaboration tool than the other tools outlined. The application is easy to use, provides a versatile learning environment that is easily modifiable and reasonably priced. The current website is http://voicethread.com/.

VideoScribe is an easy to use tool that enables the production of content, incorporating text, graphics and audio into a visually powerful and animated video format. In terms of learning affordances, it enhances presentation impact, has the ability to highlight key concepts, and works particularly well in terms of our memory systems. For creative teaching and the development of one's creative teaching competence, it's a real playground for such activity. The opportunities for creating novelty—those powerful von Restorff Effects—into the content structuring are probably unlimited. It is both fun and challenging to use creatively and, from what we know about human learning, it will likely prove to have positive impacts on learning and attainment. I expect there is research on this as I write. The current website is http://www.videoscribe.co/.

While these applications have quite different affordances, all have significant capability to enhance learning effectiveness and efficiency in terms of content provision. Given the user-friendly nature of these e-tools, it will not be a time

consuming or frustrating experience to experiment with them or view some good exemplars. From that basis, it should then be readily apparent which applications (and you can use more than one) are best suited for particular parts of your curriculum and for the students you teach.

5.4.2.2 Communication and Collaboration Tools

The ability to engage with a wide range of relevant content in the context of open communication and collaboration with peers and experts, where there is ease in posing and answering questions to facilitate building understanding, has much by way of learning affordance, and cuts across many of the Core Principles of Learning. This is another area in which ICTs can have increasing creative impact on how learning is facilitated but requires, of course, creative teachers. Students themselves will likely find creative ways in which to use these technologies as they are supposedly the 'Digital Natives' (Prensky 2001). However, are they really? There is much to challenge such popular generalizations, as Hattie and Yates (2014), from reviewing the research, pointed out:

> The central problem with digital native theory is that it is advanced in the absence of any known database…In its raw form, digital native theory has to be seen as considerably overstated and basically incorrect. Human capabilities are not as flexible or tied to experience as this theory might suggest. (p. 197)

They also pointed out:

> The same is true of students today being able to multitask – again the evidence is negative. The notion that the brain can genuinely do two things at one is widely recognized to have no serious validity. (p. 188)

Of all the ICTs, perhaps the most prolific in terms of impact on young people's engagement is the ever increasing range of Web 2.0 and social media e-tools that enable communication, content sharing and collaboration. There is some confusion between what exactly is the difference between Web 2.0 tools and social media tools. As Beattie wrote (2011):

> It would be difficult to find two popular buzzwords that are in more of a quagmire than social media and Web 2.0. (technopedia)

He goes on to argue that while social media is a Web 2.0 innovation:

> …referring to Web 2.0 as social media is incorrect because it ignores all its less social aspects, such as blogs, YouTube, and so on.

For me, I am not too concerned about these fine differentiations, though I note the qualitative difference of social media being more focused on ease and simplicity of user generated content curating, sharing and reviewing. Collectively, these tools provide an extensive platform for both asynchronous and synchronous communication, sharing and collaboration. Learners can engage in multiple platforms of subject content knowledge, share and collaboratively work with these knowledge

sources. Such activity has the potential to help learners to build understanding, join and participate in learning environments and communities that focus on their specific interests and learning goals, whilst in a psychological climate that works for them. Furthermore, related to the capability for extensive resource connectivity, there is the specific connecting (both synchronously and asynchronously) of people globally. Learners can now connect with their tutors, peers and other experts who give their time to enthusiastic learners, as well as pretty much anyone who is prepared to communicate with them. In today's internet society, we can readily go beyond the physical local community of learners, to a global community of learners. In this context there is the emergence of "Communities of Inquiry", which Garrison and Vaughan (2008) defined as:

> …a formally constituted group of individuals whose connection is that of academic purpose and interest who work collaboratively toward intended learning goals and outcomes. (p. 6)

Some words of caution here are pertinent, as popular notions of students being able to build new knowledge through their inherent creative capabilities with various social media and Web 2.0 tools such as blogs and Wiki's may also be somewhat over stated. Indeed, Willingham (2009) argued that getting students to create new knowledge should not be the main goal, rather it's better to focus on developing a best understanding of existing knowledge. He noted:

> …posing students challenges that demand the creation of something new is a task beyond their reach - but that does not mean you should never pose such tasks. (p. 109)

However, communication, collaboration and the opportunity to be creative is motivating, can facilitate differentiation of learning, and provides multiple feedback sources. Hence, from an evidence-based approach, there is much potential for enhancing learning opportunities. There are many e-tools in this genre, and certainly some I have probably not even heard of. Here's my experience of a few.

Facebook, while often not seen specifically in the context of teaching and formal education, offers many good affordances in terms of supporting different aspects of the learning process. Firstly, it's free and easy to use. Secondly, though now perhaps less so, our students are on it and are comfortable with the format. They may be on it less now, as we are on it more. Nothing really changes when it comes to inter-generation interactions, does it? Ok, what are the pedagogic affordances? I find it really easy to keep students updated on key aspects of the programme, get feedback from them on my teaching, generate some lively chat around topics of interest, quickly add or update bite sized resources and quickly hyperlink to more in depth content of interest. The students can do this also. Once a good psychological climate is created with a bit of humour, it can be fun and a very effective collaborative learning experience. There's much that can be done with good pedagogic application and a little creativity.

The blog is a Web 2.0 e-tool I find particularly useful. It is easy to use and young people are very familiar with it. Blogs are now an everyday part of communication channels for most students, albeit with a more social rather than educational orientation at present. However, a blogs capability to enhance learning and

attainment is high if we look at its potential impact through the lenses of the Core Principles of Learning. For example, in order to learn a subject effectively, students need to connect new information with what they already know (Core Principle 3: *Learners prior knowledge is activated and connected to new knowledge*). The very nature and design of a blog facilitates this principle very well, as blog posts typically appear in reverse chronological order with the most recent post appearing at the top of the web browser. Assuming that the blog is regularly updated, students will be able to see a progressive update of the material covered each week and will be able to link what they are currently learning with prior knowledge. Similarly, as different media types can enhance the learning experience (Core Principle 6: *Instructional methods and presentation mediums engage the range of human of senses*), blogs can enable the publishing of a range of multimedia content on the web (video, audio, animation, etc.). They can also make explicit and clarify learning outcomes, encourage good thinking, provide rapid, clear and constructive feedback, as well as create a psychological climate that is success-oriented and fun.

A further affordance of such an online learning environment for promoting student thinking is that the use of asynchronous text can provide certain significant advantages over the typical face-to-face situation. In face-to-face learning, there is often too much information to absorb and too little time for critical and creative thinking around the content. As a result, knowledge may not be fully understood or even effectively transferred into long-term memory. In contrast, the provision of enduring text, which enables students to spend time revisiting this content, posing and answering questions around its application, helps to build a solid understanding of topics over time. As Hamilton and Zimmerman (2002) argued:

> The medium supports iterative exchanges of information and opinions over an extended time period, so ideas are not merely "hatched" and delivered but rather allowed to evolve and be refined in a manner that makes information more convincing, narrative deliveries richer in detail, and learning more thorough. (p. 265)

The blog is certainly, from my experience, a high leverage e-tool. It is easy to use, low cost, and has a range of learning affordances that can be utilized with a sound pedagogic literacy and some creativity.

Kahoot is a student response e-tool that works in an interactive game-based quiz environment. It is free (at the time of writing) as user-friendly as an e-tool can get, and provides a platform in which student prior knowledge and understanding can be readily assessed in a non-threatening and fun environment. The creation of questions is simple and the question types can be easily varied (i.e., the typical multiple choice question format). Also, when used creatively, it can be a powerful catalyst for other parts of the instructional strategy (e.g., extended questioning and discussion post the quiz questions; an advance organizer for new input). It's also a good von Restorff Effect—but don't over-use this. Kahoot is, in terms of a previous analogy, an elegant ICT enhanced "Russian Doll" and, with good *Presentation Style*, open to much creativity in the classroom. The current website is https://getkahoot.com/.

While there are numerous e-tools offering a wide range of communication options, it is important to recognize, as with most things, that more is not necessarily better. There is much online chat and sharing in these social media cyberplaces, but we may also question just how effective such online collaboration actually is in real learning outcome terms. For example, Brown (2009) concluded that:

> The internet helps move information around but has done little to bring people together. Creative teams need to be able to share their thoughts not only verbally but visually and physically as well. I am not at my best writing memos…I haven't heard of a remote collaboration tool that can substitute for the give-and-take of sharing ideas in real time. (p. 30)

Similarly, as Melchior et al. (1997) rightly pointed out:

> One pervasive myth is that the technologies themselves teach important complex skills… they need to be identified, taught, modelled, and reinforced by capable teachers. (p. 91)

Indeed, the development of good thinking is a major challenge in any medium and we explored the reasons for this in Chap. 2. Furthermore, we also explored strategies which firmly established that student thinking can be developed through:

- The explicit modelling of the cognitive processes that are involved in good thinking
- Involvement in questioning processes that cues and reinforces specific types of thinking
- Engagement in authentic real world meaningful tasks (e.g., projects, case studies) that are challenging but achievable and necessitate the use of the main types of thinking (e.g., critical, creative, metacognitive).

There are now many ICT applications that can be used to facilitate and enhance thinking, provided that they are employed thoughtfully within the context of the pedagogic considerations and practices identified in Chaps. 2 and 4. Such applications include:

- Online tutorials involving active problem solving with feedback
- Hypermedia software integrating knowledge, multimedia, activities and feedback
- A range of communication tools (e.g., email, blogs, bulletin boards, forums)
- Constructing software (e.g., desktop publishing, spread sheets) where learners can produce, manipulate and change information
- Simulations and virtual reality programmes.

For example, in a chemical engineering module, in which students had to solve a range of problems in a chemical reaction plant simulator it was noted that certain key factors in the instructional strategy combined to enhance the quality of students thinking. Most important was that the design of activities were challenging but achievable in the time allowed, coupled with appropriate questioning strategies such as cueing such critical thinking skills as analysis, comparison and contrast,

evaluation and making inferences and interpretations (Sale and Cheah 2011). Where activities were not experienced as challenging by students, the simulator lost this capability for enhancing the development of such critical thinking skills. It was also noted that in situations where both faculty and students had shared notions of what constitutes good thinking, there was evidence of further enhancements in the quality of student thinking.

5.4.2.3 Creating Presence in the Online Learning Environment

Creating presence online is not specifically related to a particular ICT genre or e-tool, but is an essential aspect of using a blended or fully online learning format. In the previous chapter, the importance of *Presentation Style* was explored in detail as the ***pedagogic glue*** that creates and structures the learning experience for students. This is where the quality of teaching ultimately plays out at the level of subjective experience for the participating learners. Specific communication features and behaviours that have high impact in the building of rapport and the creation of a psychological climate that is success-orientated and fun were identified and explained in Chaps. 2 and 4. The importance of voice, pace and modulation, the use of eye contact and smile were considered from an evidence-based approach. These subtle but powerful aspects of a teacher's presentation style are key determiners of the way students (both consciously and unconsciously) make meaning of the learning experience and orientate their level of participation accordingly. In the face-to-face situation, the teacher has the advantage, if practices are well executed, to quickly establish, monitor and evaluate the psychological climate of the classroom, and make modifications instantly. However, in the context of the online environment, where the direct visceral aspects of a positive presence are lost, or at least significantly dulled, this is much more challenging for the teacher.

To create and maintain effective presence online, a number of researchers have looked at online presence in terms of interrelated role functions. For example, Hodges and Saba (2002) suggest that there are three role dimensions for online tutors to negotiate if they are to be effective in online tutoring:

- Organisational Role: This involves creating the agenda for the online programme, establishing objectives of the forum discussion, time-tabling, creating procedural rules, and decision-making norms
- Social Role: This involves creating a friendly social environment for learning. It will involve a frequent and lively presence, as well as a sense of humour
- Intellectual Role: This is essentially about educational facilitation. As in any kind of teaching, the moderator should focus discussions on crucial points, ask pertinent questions, and probe responses to encourage critical thinking (pp. 399–401).

Similarly, Garrison and Vaughan (2008) refers to 'social', 'teaching' and 'cognitive' presence in an online community, as summarized below:

- Social presence is focused on open communication and building group cohesion
- Cognitive presence is focused on the process of inquiry and encouraging thinking and discourse among participants
- Teaching presence is concerned with the management of curriculum and instruction, guiding activities and providing structure.

These dimensions of online role functions or aspects of presence, however framed, essentially relate to facilitating the learning experience online, especially the specific ways in which the teacher (facilitator or tutor—as these terms are now increasingly used) can best utilize the resources available in optimizing participants learning. There are many e-tools available for creating and managing this online presence, which range from the most common but highly effective asynchronous tool, the email, to more interactive synchronous virtual classrooms, such as Lync. The choice of particular e-tools is often a matter of preference, cost and access. Many can do the same things, which are to provide communication through the various mediums of text, audio and visual. What is most important is how the communication is conducted, and this is essentially good *Presentation Style*. The creative challenge is how best to apply this contextually for effective presence in the online environment. From an evidence-based approach we have a set of heuristics to ascertain what is likely to work well, how, when and on what basis. As in the face-to-face situation, the initial experience, the *Primacy Effect* is very important. For example, faced with a new group of students, the disorganized teacher with an uninspiring presentational style is likely to experience a very quick downturn in levels of interest and attention. In the online environment, this negative experience is likely to be even more heightened for participants, often leading to early attrition. In my online tutorials, I typically start with a short video, which will have some carefully crafted and positioned supporting text to make a best initial contact, without cognitive overload. A major goal at the onset is to communicate my personal approachability and commitment to supporting the learning group. I am very mindful of my voice tone and body language, and try to work as much on the unconscious mind as the conscious. I am also seeking to convey the best possible clarity on what the purpose of the programme is, how it works, what to expect, and how to deal with any questions and concerns. I then focus on establishing an open and trusting base for ongoing two way *feedback*.

There is much that can be modelled and customized from the field of customer service practices. Customer service professionals are particularly aware of important 'touch-points' in shaping the relationship between the customer service provider (e.g., in this case the online tutor) and the customer (e.g., in this case the online learners). For example, the first impressions (Primacy Effect) are perhaps most significant as we have outlined previously. However, a good first impression can quickly fade, if not maintained and developed to learner expectations. In the hotel industry, for example, other touch-points include the contact with customers in their coming and going from the hotel, making requests—no matter how small—and creating nice surprises (delighters) such as leaving a favourite magazine on the table in the customer's room (previous researched by hotel staff). Of course, we expect a

high level of customer service when staying at the so called top hotels, and usually (not always) receive it. However, this can also be the experience anywhere, as it's not that difficult to do, when you know how and, most importantly, want to do it really well. In my many travels, I have had some of the best customer service experiences in the most modest of places in terms of pricing or ascribed status. The same 'touch-points' apply in the online environment. For example, students will need to be given information and assignments at different points, there will be times when they need clarification and other support, and there will simply be times when they get a bit fed up of doing the work. Hence, try to make these touch-points less painful than they could otherwise be. Even better, and this is where creativity can come into play by introducing novelty and pleasure into the mix. For example, a humorous caption of the present situation that provides a reframe in which the 'funny side' can be seen, or introduce a fun activity. Anyway, here's a few guiding frames that often (not always) work well:

- Ensure clarity, access and ease of use of all designated feedback channels. People don't like being left in 'limbo', so to speak. It's much worse than being given a 'no' in many cases
- Avoid overburdening learners with too much information at any one time; it'll cause cognitive overload and strain. Use the announcement board, and any other programme organizer to provide a clear structure and bite sized guidance on what needs to be done, how and when
- Maintain regular contact, but don't overdo this. Too much communication can become boring and eat up participants' valued time. Most importantly, identify and deal with concerns quickly
- Work towards an informal communication style that fits the comfort zone of your learners. You can find this out through experiment with your use of language and tone, and some safe humour. The more you can work in a friendly informal manner, better is the likelihood of rapport. Once you have this, coupled with sound pedagogy, everything (ok, most things with most people) will work better, especially retention rates and student attainment.

To be more creative, look for opportunities to create an appropriate *von Restorff Effect*, in the context of the learner group. I like to use humour and the occasional poignant story to achieve this. Their usefulness in building rapport and creating a positive psychological climate, was explored in the previous chapter. Invariably, be careful not to overuse these strategies, and ensure contextualization to the learner profile. Also, you may remember the *Recency Effect*? At the end of any specific period of learning (e.g., transitions), check key understanding and provide supportive feedback, key summaries of what's been achieved and what's coming next.

As the online tutor, do not contribute unnecessary confusion and complexity to your learners' already busy lives. Do the opposite—provide structure, be predictable in supporting their learning, and enhance their lives with a bit of fun and humour. And, finally, to the point of repetition, work not only with the conscious aspects of the mind, but pay good service to the unconscious aspects of human psychological functioning. You will find that this works well.

5.4.3 *The Completed Blended Learning Design Maximizes the Affordances of a Range of Learning Modes and Mediums*

This concerns determining what curriculum components and specific learning outcomes can be effectively and efficiently met in the online environment, and what can be better facilitated in a face-to-face context, the 'balance of the blend' so to speak. From an evidence-based approach, the answer is primarily pedagogic and situated rather than numeric. It is not a question of how much online learning versus how much face-to-face learning; rather about how the face-to-face learning context can be enhanced through ICTs and vice versa. The real indicator of effective blended learning is not the amount of face-to-face or online learning but their effective integration within a programme (Garrison and Kanuka 2004).

Therefore, if the previous two stages of the design process have been appropriately negotiated, this final stage is essentially one of practicality and creativity. For example, while we may have an 'ideal' blend in our mind, in practice the 'right blend' may depend on a number of other factors, which typically include the following:

- Programme type and focus (e.g., cost reduction, high impact on attainment)
- Learning group (e.g., prior competence, motivational level, cultural factors)
- Resources (e.g., budget and technology infrastructure)
- Content stability (e.g., enduring, relevance to key outcomes).

As the creative combination of methods, activities and resources underpins creative teaching in the face-to-face context, the same design principles equally apply in the online environment. We now have an increasing range and variety of e-tools that provide affordances for different aspects of the learning process, hence the increasing potentiality for more and more creative combinations. Furthermore, as we create and develop effective and efficient method and e-tool combinations (blends), the creative process will, over time, lead to highly synergistic embedded learning experiences that will move us towards the ideal of maximising learning opportunities and attainment for all students. This is creative teaching competence at the level of adaptive expertise.

5.5 Summary

There is now a convergence or 'singularity' of pedagogy and technology in terms of learning design, and there is little doubt of the potential affordances of ICTs for content development, deployment and management as well as multiple global communication and collaboration mediums to support the learning process. Apart from technical, access and administrative issues, the main differentiator between the good and poor usage of ICTs is one of pedagogy.

Hattie and Yates (2014), made the summative point (as for now) on the impact of computers on teaching:

> What became apparent, through a careful reading of the extensive literature, was the realisation that such positive effects are achieved through applications of the same principles of learning that apply in all other areas of human learning. (p. 199)

It is now viable for most teaching professionals to be able to produce effective, efficient and creative blended learning experiences. It is for this reason that blended learning is unlikely to be just another *creature of fashion* in the educational landscape for our foreseeable future, but a major organizing concept for the design and delivery of learning events. The essential question is how good a SHAPE we can get our blended learning programmes into, and that will be the challenge for teaching professionals globally. If teachers of yesteryear, armed with only a blackboard and a set of coloured chalks, could still create interesting and effective lessons, (and there were those who could do this) then what's the potential for the highly creative teacher in the present context?

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Chapter 6
Developing Creative Teachers: An Evidence-Based Frame on Professional Development

6.1 Closing the Gate on Educational Jurassic Park

In the preceding chapters, the focus has been on framing *creative teaching*, the key knowledge bases (pedagogic literacy) and the underpinning syntax of creative learning design, and how this *works* at the level of subjective experience for learners in terms of enhancing their learning outcomes. This represents the foundational knowledge base from which motivated teaching professionals can build increasing understanding and proficiency in creative teaching competence. However, as we explored in some detail in Chap. 2, expertise does not come easy. It requires considerable effort and perseverance over time, with estimates of 10,000 h as 'the magic number with guided practice' regardless of a person's natural aptitude, popularized by Gladwell (2008). With enough practice, he claimed that anyone could achieve a level of proficiency that would rival that of a professional. It was just a matter of putting in the time, around 10 years. However, the view of 10,000 h for developing high level expertise has been challenged (e.g., Goleman 2013; Epstein 2014). This is not surprising as expertise in different areas may not be equated so precisely in such algorithmic terms. Furthermore, there is practice and *deliberate* practice, so it is probably the case that some individuals are using qualitatively different practice activities, some favouring (or hindering) the route to expertise. Also, there are likely to be constitutional factors (e.g., psychological, physical) that come into play along the journey to expertise, as we are not born with a 'Blake Slate' as Pinker (2003) so comprehensively documented. Finally, but very importantly, the quality of the teacher or coach will have a very significant impact on the rate and effectiveness of learning, as clearly evidenced in Chap. 1. In summary, on the question of how much time is necessary to develop expertise, there are certainly no 'quick fixes' and it will involve much time and commitment, but 10,000 h may be more of a metaphor than an evidence-based heuristic.

The important point in this context is not so much the number of hours it takes to become an expert, but more the specific ways in which aspects of the learning

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experience are approached and structured. Firstly, interest and motivation are of key importance. In the case of teachers, this is likely to vary, as for any occupational or professional group. Some may want to achieve the very highest levels of professional performance, while others may be content with a solid basic competence. Consistent with the perspective in Chap. 2, there are extrinsic and intrinsic aspects to motivation and this is based on subjective perceptions and experiences of 'pleasure', 'novelty' and 'pain avoidance' that can vary over time and as circumstances change. In the context of teaching, a whole host of factors can influence teacher's motivational stances to professional development. These may include their perceptions of the value and usefulness of professional development activities to the real world of the classroom and the practices of teaching. Equally, institutional support and the perceived value placed on professional development by senior management will also influence the amount of time and effort that teachers may give to such activity. For example, I have rarely visited an educational institution that does not claim to value professional development for teachers. However, this is not always the experience of many teachers in terms of the reward systems, whether in terms of financial or status benefits. Also, teachers have lives outside work and, for some, family time or other interests may take a strong precedent over the amount of effort given to 'professional development'.

In the final analysis, despite factors that may support or inhibit professional development, it is the individual's own sense of purpose and desire to become an excellent teacher that is of most importance. For example, there will be those who become creative teachers in contexts of low support, and those who despite being in 'optimal' learning environments, choose to do relatively little in such direction. My motivation in writing this book is largely for those who want to be the best they can be as a teacher, as well as those in educational management, at whatever levels and context, who seek to facilitate such professional development outcomes.

As professional teachers we are in the business of enhancing learning opportunities and achievement outcomes for the range of learners we teach. Therefore, as the term professional implies, we must be as current and competent in the most evidence-based knowledge and practices as we can be. Invariably, as in all professions, this constitutes what we might term a *regulatory ideal*, as relevant knowledge bases are both deep and wide and continually increasing and changing. It is now probably impossible for any professional to know everything of relevance in a particular professional field, and this situation will only become more prevalent almost daily. For example, as knowledgeable as general medical practitioners might be, there often comes a point in the diagnostic process when they decide that it is not possible to fully ascertain (from a definitive evidence-based approach) what the problem is and refer patients to a specialist in the particular medical area. In fact, in many scenarios, there is often a team of specialists involved in making final decisions relating to diagnosis and treatment options. There is simply too much to know in the field for any professional to attain full understanding and competency for every possible medical condition. Hence, it is an unrealistic expectation to expect professionals in any field to be totally current and expert across the complete knowledge domains. However, most professions have moved significantly along

the knowledge funnel (Martin 2009), embracing more evidence-based practice. Sadly, teaching has lagged significantly behind, for the reasons outlined in Chap. 1. It is now time to redress this and finally close the gate on Educational Jurassic Park.

The following sections will explore what this means for teacher professional development, both at individual and collective levels, in terms of an evidence-based approach for facilitating the development of creative teachers (i.e., 'adaptive experts' in terms of Hatano and Inagaki's 1986, framing of expertise). The good news is that we are becoming increasingly aware of how to achieve this and what needs to be done. Invariably, like the development of expertise in any domain or field, it involves much learning, persistence and hard work—but what of real value does not?

6.2 Professional Development that Does Not Work Well

There can be little argument that professional development must be central to enhancing professional practice, and much is made of the need for lifelong learning in a world of exponential knowledge production and rapidly changing occupational structures. Unfortunately, professional development in enhancing teaching quality has typically been tempered by the strong, mostly anecdotal, evidence that much professional development is not effective in terms of improving teacher practice and, most significantly, in enhancing student attainment (Timperley et al. 2008). I recall seeing a quote many years ago that is not inconsistent with the perception of many teachers that I have worked with regarding the usefulness of attending professional development workshops:

> When I die I hope it's in a professional development workshop, as the difference will be hardly noticeable (a teachers comment, anon)

More specifically, Darling-Hammond et al. (2009), from an extensive research base, found that while 90 % of teachers participated in professional development, most of those teachers also reported that it was totally useless. The report shows that:

> …in education, professional learning in its current state is poorly conceived and deeply flawed. Teachers lack time and opportunities to view each other's classrooms, learn from mentors, and work collaboratively. The support and training they receive is episodic, myopic, and often meaningless. (p. 2)

Research Alert (2014) posed the question:

> What form of professional learning has the most abysmal record for changing teachers' practice and student achievement? Clue: it's the kind that 90 percent of teachers normally engage in at school. If you answered, "the workshop-style training session," you're right. Despite its ineffectiveness, it still soldiers on. (p. 8)

I am guilty here, but fortunately there will be many joining me should there be a retrospective inquisition and such practices become indictable offences. I still

conduct professional development workshops in many aspects of curriculum, teaching and assessment, but I am honest with participants about what is realistically possible in such learning events. Sadly there are still some who think competence in a complex skill can be a realistic outcome from a short workshop involving explanation and a little 'hands on' simulated practice. Similarly, having spent many years working out in gyms, I occasionally find it amusing when people express such disappointment that they have not achieved significant weight loss or enhancement in muscle bulk or fitness when they have only spent a few hours over a couple of weeks in the gym (and often doing very little in terms of actual exercise). There are evidence-based reasons for both of these scenarios, as we clearly know. While I have often received positive feedback on many of my workshop programmes (and I am thankful for this), I remain reticent in believing that I have significantly influenced teaching practices to the extent that this has led to significant gains in student attainment. Over the years I have received feedback from some participants, post workshop, claiming that they had changed aspects of practice, and this has transferred to better student learning and attainment (e.g., better student feedback relating to their teaching and improved student performance or grades). However, these are not the majority, and it seems that such individuals are doing something else, which is not the typical behaviour of participants who attend workshops without other supportive follow-up arrangements. We will explore what this is and what the implications are later in the chapter. In general, from doing this work for over 30 years, in a wide range of contexts and countries, I would tend to agree with the findings of Timperley et al. (2008) relating to two extreme but often used approaches to professional development:

- The first is that teachers should be treated as self-regulating professionals who, if given sufficient time and resources, are able to construct their own learning experiences and develop a more effective reality for their students through their collective expertise. Unfortunately, we found little evidence to support the claim that providing teachers with time and resources is effective in promoting professional learning in ways that have positive outcomes for students. (xxv)
- The alternative extreme is where outside experts develop recipes for teaching (typically based on research about what works for students) then present prescribed practices to teachers with an underpinning rationale and monitor their implementation carefully to ensure integrity. The overall evidence is that these processes can be effective in changing teaching practices, but either the changes have limited impact on student outcomes or they are not sustained once the providers withdraw. (xxvi)

From an evidence-based approach, the above scenarios may seem to suggest a parallel Educational Jurassic Park in terms of professional development to that of teaching practices. Indeed, we would expect a lack of agreement and focus on what constitutes highly effective teaching to reflect, as well as reinforce, the existing paradigms relating to teaching and learning. As noted previously, these have been both competing and confusing, and have done little to advance teaching as a profession guided by a strong evidence-base relating to practice. Teachers are

products of their own biography and socialization experiences, and this applies to teacher educators also. Furthermore, once a paradigm has established itself, and members benefit from its prominence, there is little motivation to seek evidence to dispute key tenets or challenge legitimacy, especially when careers and funding opportunities are at stake.

However, apart from ideological and self-interest group influences on shaping paradigms relating to practice, there are other more concrete practical situated factors that have contributed to teacher's negative perceptions and experience of the value and usefulness of many professional development activities. Firstly, given the prior (and this is still current for many) lack of a clear evidence-based professional knowledge and practice framework, the frequent reframing of what is good teaching, and increasing unrealistic workloads, it is not surprising that many teachers are reluctant to invest highly in professional development activities. Furthermore, teaching is somewhat unique in that career progression typically entails *giving up* teaching and taking on more administrative and managerial work, making highly effective and creative teaching more an act of personal choice rather than a route to genuine professional enhancement as a teacher.

Secondly, the mainstream approaches to professional development, which have proved relatively unsuccessful, are not consistent with what we know about effective learning of complex skills such as instructional strategies. Being introduced to new knowledge, even with clear explanations, opportunities to ask questions, and some simulated practice, is only effective as an advance organizer. It may provide the teacher, as a learner, with an interesting new learning opportunity and there may be intentions to try this out further down the line in classroom practice. However, a number of inhibitors to effective learning can typically come into play. The most basic is forgetting. Once a workshop has finished and a few days have passed by, much of the information may be lost, and this in itself may lead to it not ever being tried out. Also, preparing a new instructional strategy will most likely make some extra demands on time. Again, there may be an intention to use the new strategy, but in a busy schedule it's always easier to go with what you have done prior and it may have worked ok anyway. However, even if the strategy is tried out with good intent fairly soon after the workshop, there is every likelihood that it may not work out particularly well, and may even feel counter-productive. This is the learning process at the level of skill acquisition. A few decades ago I decided to learn to play the guitar as this was something I wanted to do at school, but did not have the opportunity. My music lessons at school, as indicated in Chap. 2, were far from motivating. In retrospect, the teacher probably violated every Core Principle of Learning. I had no idea of what we were supposed to learn, saw no relevance in any of it and was occasionally caned for transgressions in reciting the musical scales. Despite my loathing of the weekly music lesson, I remained interested in playing the guitar. Sometimes in life, serendipity provides an excellent opportunity to learn something and this was the case in my mid-twenties. I met a young lady who played guitar and sang in local venues where I lived. She was also studying for an Open University degree in psychology and asked me if I would review some of her assignments before formal submission. Jokingly I said

something like, "Sure, but you will have to teach me how to play the guitar in return." This was partly in jest, but only partly. She readily agreed and the arrangement worked well. However, I soon learned why most people who are initially motivated to play the guitar typically give up within a few weeks. Learning the 'C', 'G' and 'F' chords is easy conceptually, but not at the level of skilful practice. Making a noise like a cat encased in an aluminium dustbin rolling down a steep hill, and having very sore fingers on one's left hand (I am right handed) as well as house-mates smiling quizzically as they walk past is hardly encouraging. Quite simply, knowing how to do something is far from being able to do it, when skills are involved.

In the professional development of teachers, the same scenario plays out. The real challenge is when teachers actually apply newly introduced instructional strategies into their classroom practice at the skill level. As noted prior, they are unlikely to work the first time, or the next time, and perhaps for a number of times. In this context, many teachers will give up, and this makes perfect sense. Apart from time constraints, they may also be concerned about negative feedback from students in such situations, as some may experience the changes as confusing and not see the value in terms of better quality learning at this point in time. Solving the gap between knowledge acquisition and understanding to one of competent application and eventually flexible transfer to a range of other related learning contexts is a challenging scenario for professional development. Hence, the big question, given the constraints of the teachers' professional life, is *how best to do this*?

6.3 Professional Development that Does Work Well

An interesting anchor point in understanding what approach and methodology of professional development works and how, stems from the extensive work of Timperley et al. (2008). The authors summarize the purpose of their work in terms of:

> …to unpack the 'black box' between the professional learning opportunities and teacher outcomes that impact positively on student outcomes. (p. 7)

In essence, there are two interrelated black boxes, as depicted in Fig. 6.1: The 'Black Boxes' of Teacher Professional Development. The first concerns the necessary changes in teachers practice, but this must be of such a nature that it brings about specific changes in student perception and behaviour related to better learning.

The approach to the professional development of creative teaching professionals outlined in this chapter is consistent with the evidence-based approach developed in the preceding chapters. The Core Principles of Learning are equally relevant to teacher learning, as they are for student learning. While teachers, as adult learners, may have certain advantages over younger learners in that they are likely to be more focused and discerning in terms of identifying their learning goals and having greater expertise to plan, monitor and evaluate their learning (e.g., greater

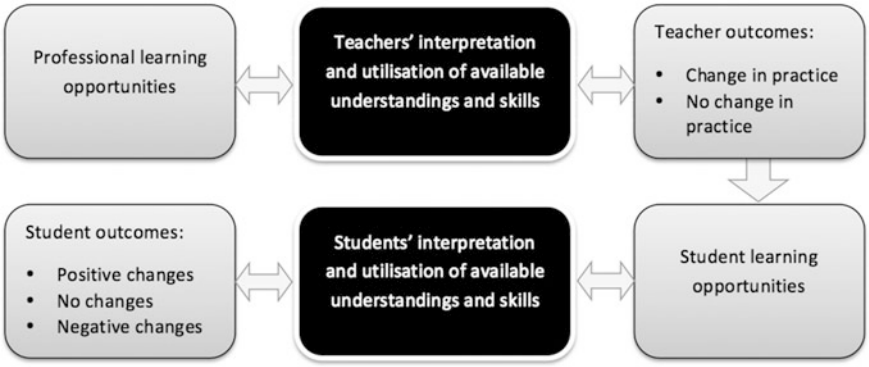

Fig. 6.1 The 'Black Boxes' of teacher professional development

metacognitive capabilities), they are subject to the same cognitive constraints of memory processing and cognitive overload as their younger counterparts. Also, in comparison with their younger counterparts, they may also have more constraints in terms of meeting various role commitments (e.g., family, work) that takes up time and cognitive resources.

However, what is now apparent is that there are a number of evidence-based principles and practices that are clearly aligned to improving teaching quality and enhancing student attainment. This is certainly good news in terms of being able to establish a solid professional development approach for enhancing teaching competence and expertise. However, the kinds of professional development activities that are effective require considerable resource time and effort, which may not be congruent with present practice in many educational institutions. For example, Gulamhussein (2013) emphasized:

> The duration of professional development must be significant and ongoing to allow time for teachers to learn a new strategy *and* grapple with the implementation problem. (p. 3)

Similarly, Joyce and Showers (2002), from extensive research, suggest that staff development focused on student achievement must include the following essential elements:

- A community of professionals who put into practice what they are learning, and share the results
- The content of staff development develops around curricular and instructional strategies selected because they have a high probability of affecting student learning—and, as important, students ability to learn
- The magnitude of change generated is sufficient that the student's gain in knowledge and skills is palpable
- The processes of staff development enable educators to develop the skill to implement what they are learning. (p. 4)

However, as Levin (2008) noted:

> To get good at a new practice takes time and effort….in schools – whether as a teacher or principal or superintendent – there is no tradition or organization that supports carefully supervised learning of this kind. (pp. 80–81)

If we really want to enhance the quality of teaching across the profession, then there is a need for a significant reframing on priorities in educational decision-making. Teaching is the most important factor in student learning and attainment, though it would be interesting to see if most teachers felt this to be at the forefront of educational management thinking at the level of everyday experience. Powell and Kusuma-Powell (2013) make reference to the importance of "Organizational Intelligence" for high levels of effective professional development, which they define as:

> *…the emergence of understood and agreed patterns of effective interaction.* (p. 22)

Schools possessing a high level of organizational intelligence—'intelligent schools'—typically have the following key defining characteristics:

> Teachers in intelligent schools are enthusiastic consumers of new knowledge. School leaders and faculty attempt to stay abreast of recent research and developments in the field. Members attend conferences, present workshops, read and discuss articles, and write for professional publications. Teachers are keen to discover what other colleagues may be engaged in as 'works in progress' and are eager to share and critique new ideas. In short, intelligent schools are inhabited by teachers who are learning and growing. (p. 24)

In many ways organizational intelligence is very much related to the psychological climate of the school and the quality of the relationships formed across faculty members which, when highly positive, will result in not just increases in individuals intelligence but the 'collective intelligence' of all participating. Quite simply, a positive psychological climate is equally good for both teacher and student learning as it relates to human needs and preferred norms of conduct. As Powell and Kusuma-Powell documented:

> Groups that have high collective intelligence are more innovative, more likely to find creative solutions to problems, more likely to engage in reflection and therefore more likely to transfer their learning to new and novel situations. (p. 15)

However, according to the authors, high-levels of organizational intelligence are not that prevalent in educational institutions. They argue:

> …knowledge management in schools remains to a large extent in the Stone Age…
>
> Schools are organizations that specialize in learning and, as such, should be very smart organizations. Frequently, however, they're not. (p. 16)

There is no short cut to achieving expertise and piecemeal professional development will do little to produce the kind of teaching professionals—creative teachers—needed in the present educational landscape, whether in schools or elsewhere. Furthermore, there is much that needs changing in many educational institutions in

terms of relationships and structures to foster organizational intelligence and the development of heightened professional learning as framed above.

However, as educationalists we need to remain optimistic and to do the best we can in the contexts in which we work. The alternative of cynicism or apathy is not really tenable as a teaching professional. With the growing awareness of, and more importantly, the potential widespread adoption of Evidence-Based Teaching, we can increasingly move educational institutions and individual teaching professionals clearly outside the perimeters of Educational Jurassic Park, and then close the gates for good. In the following subsections, specific ways to develop teacher's understanding, competence and creativity at the practical level will be outlined and illustrated.

6.3.1 The Goals and Content of Professional Learning

Core Principle 2: *Learning goals, objectives and proficiency expectations are clearly visible to learners* is as applicable to teacher professional learning and development as it is for the students we teach. Timperley et al. (2008) posed the core question:

> What do teachers need to know in order to deepen their professional understandings (e.g. pedagogical content knowledge) and extend their skills so as to have a positive impact on student outcomes? (p. 27)

The professional development of teaching professionals must share the same foundational knowledge bases as suggested in the earlier framing of *Pedagogic Literacy*. This involves a strong evidence-based understanding of what instructional methods and strategies are most likely to work better across a range of teaching contexts, and on what basis. It will also entail the technical functional competencies and other supporting generic competencies identified in Chap. 3. For the development of creative teaching, using the framing of expertise by Hatano and Inagaki (1986), teacher's will need to both fully understand what is involved in developing creative teaching competence as well as have the opportunities for deliberate practice to work towards adaptive expertise. How this can be facilitated will be explored and developed throughout the chapter. Invariably, for teaching, as in all professions, there is so much content that may have relevance and usefulness to enhancing competency, expertise and creativity, there needs to be careful selection and prioritization of what is most relevant and useful to the task in hand. Timperley et al. (2008) highlighted this fully:

> The world is teeming with activities variously referred to as knowledge utilization, knowledge dissemination, knowledge brokering, knowledge transfer, knowledge exchange, knowledge mobilisation, and knowledge translation. Whatever the term used, the idea is to gather together what the research tells us about a topic of interest and then to synthesise it into practical usable knowledge. (ix)

What this means is that it is not just knowledge per se, but a deep understanding of how these knowledge bases connect to the world of practice and what pedagogic thinking and actions are necessary in situations to create and facilitate learning experiences that result in better learner attainment outcomes. Hence, there must be a high level of teacher engagement in terms of good thinking, strategic application and ongoing evaluation for developing deep understanding (e.g., rich integrated mental schemata in long-term memory). As Joyce and Showers (2002) made clear:

> Understanding of the theory underlying specific behaviours enables flexible and appropriate use of the behaviours in multiple situations and prevents the often ludicrous following of "recipes" for teaching…
>
> Teachers who master the theory underlying new behaviours will implement those behaviours in greater congruence with the researched and tested ideal and are more likely to replicate results obtained in research settings with their own students. (p. 81)

In terms of enhancing creative teaching, a useful comparison has been made by Gulamhussein's (2013) differentiation of teachers in terms of 'Teacher as Intellectual' as compared to 'Teacher as Technician'. The latter clearly denotes key functional competencies outlined prior and, at best, a 'routine expert'. The notion of Teacher as Intellectual seems to possess similar attributes and capabilities to a creative teacher (adaptive expert) as framed in the context of this book. Gulamhussein suggests that this requires:

> …time and resources which allows teachers to think through and create innovative teaching methods. (p. 23)

However, the more specific questions relate to how we create learning experiences for teachers that support such good thinking, especially the creative thinking processes outlined in Chap. 3, to produce novel high impact instructional strategies that enhance student attainment. Good thinking is fundamental to developing deep understanding, and this is equally fundamental to anything we might call professional development. Similarly, what modes of inquiry and thinking strategies and skills are likely to be most effective and useful for teachers to develop their abilities to 'reflect on their practices' in ways conducive to developing a high level of creative teaching competence? Much has been made of what is referred to as *Reflective Practice* as a means to help facilitate this. As we will see later in the chapter, there is some bad news, but there is also some good news, if we use it thoughtfully.

6.3.2 The Process of Professional Development

Understanding requires thinking about the content in relation to specific aspects of practice, and this is an iterative process over time, as is the development of desired skills. Hence, Petty (2015), drawing from the research of Joyce and Showers (2002), argues that it is essential to consider what the training needs should focus on. He suggests the following approach:

- Teachers democratically ascertain "their most pressing needs" and pose the question, "What do our results tell us?"
- A set of improvements is drawn up, combined and prioritized until a common goal (e.g., relating to curriculum, teaching and assessment) is identified, so as to raise attainment.
- (The common goal needs to focus on a process, designed to produce better outcomes etc. It must affect the **student experience** if it is going to have an effect)

Similarly Timperley et al. (2008) use the term 'catalyst' as often being the originator for driving the direction for professional learning. Catalysts can take the form of:

- Information showing that current teaching practices are not achieving the desired outcomes for particular groups of students
- A lack of shared understanding on an area of practice
- Challenging or 'problematizing' current definitions of particular curriculum outcomes.

On this basis, training can be devised and specifically tailored to achieving the common goal. As Petty (2015) describes:

> Training outcomes are agreed for knowledge, skills, and (the hardest part!) transfer to the classroom.

He further suggests that the training provided should be extensive (e.g., a dozen days) and conducted using the following pattern:

- **Knowledge** – explaining theory and rationale etc. using lectures, reading, video, etc.
- **Demonstration and modelling** – showing how, giving examples, seeing it done on video or live, watching simulations etc.
- **Practice** this is mainly simulated practice usually.

The importance of sustained engagement over time was extensively confirmed by Timperley et al. (2008) who concluded:

> Changing practice in substantive ways is difficult. We have reached this conclusion from evidence of the length of time involved, the depth of pedagogical content and assessment knowledge typically addressed, and the multiple learning opportunities that appear to be required. (xi)

They suggest that the learning processes engaged when developing new understandings and skills involve cycles of (one or more of) the following:

- Process 1: Cueing and retrieving knowledge consolidated and/or examined
  Outcome: Prior knowledge consolidated and/or examined
- Process 2: Becoming aware of new information/skills and integrating them into current values and belief system

Outcome: New knowledge adopted or adapted
- Process 3: Creating dissonance with current position (values and beliefs)
  Outcome: Dissonance resolved (accepted/rejected), current values and belief systems repositioned, reconstructed.

A wide range of methods, activities and resources have been found to be useful in helping teachers to go through the learning processes outlined above (e.g., Timperley et al. 2008). These include:

- Listening
- Watching
- Being observed and receiving feedback
- Reading
- Discussing practice with an expert
- Discussing own theories of practice and their limitations
- Examining student understandings and outcomes
- Analysis of current practice and reconstruction of new practice
- Authentic experience of subject in action
- Developing self or mutually identified issues. (p. 29)

All the above activities fully align with the Core Principles of Learning. They involve enabling teachers to experience new concepts and practices through multiple modes and mediums, supporting the activation of prior learning and dealing with ambiguity and misconceptions, reframing on aspects of belief systems where necessary, and building rich mental schemata to ensure deep understanding through good thinking. A particularly effective technique for introducing a new concept to help teachers understand a new practice is that of 'modelling' (Gulamhussein 2013, pp. 3–4). Modelling reveals what is specifically involved in an area of learning, making the knowledge and skill components visible. This can be further reinforced through the use of video-recordings of teachers demonstrating good practices, encouraging critical discourse on what specially is working well that positively impacts the learning process, and how best to develop these skill sets. The use of micro-teaching can take the learning process even further by bridging the gap between understanding and skilful application in practice. Micro-teaching typically involves teachers (usually novices, but not always) conducting short focused lessons to a small group of students (peers in training) in laboratory-type settings which are often video-recorded for later reference. After the short lesson, there is a collaborate appraisal of the lesson and its specific features. This can be done in a number of formats that usually involve combinations of the following key elements:

- The observed teacher offers his/her perception of the lesson, in terms of pluses and areas for improvement, etc.
- Student participants offer their perceptions as above
- Professional development tutors and/or peer coaches offer a summary frame on what was effective and why, and what could be improved and how

- Reference to key video segments are replayed and analysed in context of areas of practice (e.g., perceived as effective or otherwise) for illustration and reinforcement
- Situated role play may be used by a coach to demonstrate an effective use of a method component or skill.

Hattie (2009) documented an effect size of 0.70 for micro-teaching activities conducted using this broad format, which is not surprising as micro-teaching encompasses many of the Core Principles of Learning in applied practice. It has also been my experience, in some 30 years of professional development with teachers, that the micro-teaching activities are seen by participants as by far the most useful aspects of teacher training programmes.

6.3.3 Deliberate Practice in Professional Development

The importance and process of deliberate practice was explained in detail in Chap. 2. The same principles and procedure is appropriate in the context of the teacher's professional development. As Willingham (2009) argued:

> Teaching, like any complex skill, must be practiced to be improved. (p. 147)

Also as Petty (2015) reminds us:

> Deliberate practice is hard work, four hours a day is as much as anyone can manage. I suggest up to one hour a week for teachers.

It is at this stage of the learning process that many institutional professional development programmes typically experience the problems of implementation identified earlier in the chapter. Competence, let alone expertise, does not come easily in any area of life that requires a high skill component. One may have a good understanding of a performance area and speak very intelligently about it, but that's not competence or expertise. The world is full of expert 'armchair pundits', especially in the world of sport. Most people can watch a sport and speak convincingly on what a team or player should be doing, or should stop doing. However, why are they (the actual players) earning millions of whatever currency a year while the rest of us are paying television fees to watch them? In all situations, early attempts at learning a new skill can be highly disheartening especially when one is doing this publicly, and teaching is very much a public situation.

It is for this reason that teachers need strong support systems if they are to do the necessary professional learning to sufficiently master the range of strategies and skills to eventually reach a stage of adaptive expertise. This is particularly the case when teachers are grappling with the actual implementation of new practices as they are in many ways like a novice in any performance situation, often experiencing their performance as erratic and inconsistent, even anxiety producing. In this context it is not surprising that many teachers stick within their comfort zone. However, in the longer term it is *no* comfort zone.

There are many ways in which teachers can be supported as they seek to enhance their practices. Much can be done at an institutional level in terms of providing sufficient time, resources and creating an ethos that recognizes the challenges of such complex learning and the processes involved. Having clear goals and a catalyst to create motivation and direction are of course important pre-requisites. After all, why go through the pain of training and sustained practice for something one does not see as important or useful? Similarly, without support systems that are perceived as meaningful and effective, initial interest may soon wane in the face of busy everyday working schedules. The question in this context then revolves around what support systems actually work best and how?

Teachers as learners are subject to the same learning principles and constraints as their students, especially when they are learning new knowledge and skills. In this situation they have to deal with acquiring new knowledge, building understanding, and doing the necessary practice, as well as dealing with their existing beliefs and emotional responses to change. While they may have greater experience and maturity in self-regulation and metacognitive strategies than many of their students, there is still much cognitive and emotional effort needed to build the necessary understanding and competence. The importance of being in meaningful learning relationships, as documented in Core Principle 9: *A psychological climate is created which is both success-orientated and fun* is equally applicable to teachers as learners. Of particular importance is the process of peer coaching as it enables the clarification of important knowledge, stimulates good thinking, structures focused deliberate practice and provides quality feedback. Coaching acts as a key organizing catalyst for facilitating deep understanding and sustainable competence to enable learners (in this case teachers) to transfer learning across a range of related teaching contexts in a fluent and contextualized way. For example, Joyce and Showers (2002) found that:

> A large and dramatic increase in transfer of training – effect size of 1.42 – occurs when coaching is added to an initial training experience comprised of theory explanation, demonstrations, and practice. (p. 77)

Furthermore, their research revealed that coaching appeared to contribute to transfer of training in five ways:

- Teachers practiced the new strategies more frequently and developed greater skill
- Used the newly acquired strategies more appropriately in terms of curriculum alignment
- Exhibited greater long-term retention of knowledge and skill use with the strategies
- Coached teachers were more likely than uncoached teachers to explain new models of teaching to their students, ensuring that students understood the purpose of the strategy and the behaviours expected of them when using the strategy

- Coached teachers exhibited clearer cognitions in regard to the purposes and uses of the new strategies.

It also helps greatly, as Petty documented (2015), if the teachers themselves respond in positive ways to the professional development experience. He specifically highlights that teachers can proactively help the learning process if they:

- Practice the use of the new methods repeatedly in a relatively short period of time, say five times a month
- Monitor the effects of the new methods on the learners—Did they learn? Could they cope? What did they find most difficult? … What would help them cope better?
- Ask students for their support during these experiments, for example ask for their opinions of the methods, and for their suggestions
- Bring issues and difficulties to their peer coaching team for discussion
- Help and support the experimentation of other teachers in their team.

6.4 A Practical Approach for the Professional Development of Teachers

It is important to always bear in mind that professional development approaches will be largely ineffective without a strong motivational base and commitment from teachers themselves. As Hargreaves and Evans (1997) stated:

> …where educational change is concerned, if a teacher can't or won't do it, it simply can't be done. (p. 3)

At the individual level teachers make their own decisions about the 'kind of teacher' they want to be. Some are so highly motivated, despite facing institutional arrangements that do not support professional development, will still earnestly seek to achieve as high a level of competence and creativity as they can possibly attain. Some achieve this, but some also give up, and I have much empathy with the latter. Sadly, I have seen many excellent and potentially very creative teachers leave the profession, not for the pressures of teaching, but from the conflation of many non-teaching activities and a lack of 'organizational intelligence', as outlined above. In contrast, there are teachers in the profession, who seem to have little motivation to go beyond what they feel they need to do for the job requirements. Over time, some of these teachers may become motivated when given the opportunity of genuine professional development under arrangements that are supportive and the targeted innovation is perceived as practically useful for improving student learning. However, there is no professional development programme that can guarantee to motivate or produce good results with all teachers, just as the very best teachers do not impact all of their pupils productively. As professionals—indeed as humans—we are only accountable for *our* behaviour.

The key aspects of the process and activities required for professional development in teaching to bring about effective and sustained changes in teaching practices that lead to enhanced attainment have been outlined and explained in the preceding sections. In the following subsections, drawing from the work of Petty (2015), two practical approaches for implementing professional development from an evidence-based perspective are outlined:

1. Supported Experiments
2. Active Schemes of Work

Note: A more comprehensive coverage of these two key professional development methods are provided by Geoff Petty on his website geoff petty.com. The following is my summary of some of the key aspects in the context of this chapter.

6.4.1 Supported Experiments

Petty (2015) describes a Supported Experiment as "… a pilot or trial of a teaching strategy new to that teacher". Essentially, the teacher will use a strategy (ideally based on evidence of what methods work) for a given period of time in order to adapt it where necessary to the student group(s) and develop the necessary skill to use it effectively and fluently. In this process, the teacher will have the support of other teachers, who will be reviewing the experiment and its impact on student learning. As Petty summarizes:

> This might include discussions with peers, advanced practitioners, mentors, managers, trainers, or some combination of these… As a rule experiments do not work well first time, and that's fine if we learn from them!
>
> At a designated point, the experimenter will decide whether the experiment has worked or not, in their particular context. This is reported back to other teachers who can also learn from the experiment.

Essentially, a Supported Experiment provides the necessary clear structure for conducting professional development. Furthermore, as an increasing number of teachers embark on conducting Supported Experiments, openly sharing and thoughtfully appraising each-other's work, there is a real building of valued professional knowledge on effective teaching customized to the situated context of the school and its learners (e.g., a "Community of Practice", Lave and Wenger 1993). There are many benefits for adopting Supported Experiments for professional learning. Petty (2015) points out that they:

- model and develop a culture of continuous practice
- include all teachers in continuous improvement
- provide a blame-free culture needed to encourage and support risk-taking and development
- prevent teaching skills from 'plateauing' and becoming stale

- provide the blame-free support needed to really change classroom practice
- encourage the development of teaching strategies that respond to known difficulties
- are inspiring for staff and can even reinvigorate quite jaded teachers

As the Core Principles of Learning provide universal heuristics for guiding the design and practices of teaching, they are equally applicable in the use of Supported Experiments for enhancing teacher learning. It is likely that they will need to use the new instructional strategies a number of times before they reach levels of proficiency that actually achieves the high impact potential in terms of student attainment for this particular method use. Secondly, and equally important, students need to become comfortable and see the relevance of the methods to their learning, which will also take some time. As Petty (2015) made clear:

> Students also need to learn how to respond to the new methods, effective methods are always more demanding of students than conventional teaching. They need to know why these new methods are being used, what it demands of them, and how to respond.

In my experience, this has been fully borne out over a sustained period of time. In previous research (Sale 2014) in which new active and experiential learning methods were systematically introduced into several course programmes, students were fully briefed on the curriculum innovation and its purpose at the outset. An evaluation was conducted that lasted for the full 3-year duration of the diploma courses and was able to capture the learning experience of the students over the complete programme. Two students from each course were also invited (not conscripted) to be "co-participants" (Lincoln 1990, p. 78) in the evaluation research, to add a more authentic ethnographic component. These students chose to participate and knew that the teaching faculty were genuinely attempting to improve their learning experiences and attainment opportunities at the institution. They were given a full briefing on the research purpose and their role and responsibilities in participating in the evaluation. Over the course of the evaluation exercise they were specifically required to:

- Communicate with classmates to identify significant experiences relating to the new teaching approaches used
- Make personal notes and/or blog their experiences in relation to both structured and open questions in the designated student blog
- Meet with the researchers at least once a semester for group sharing.

Informing and involving students from the onset of the implementation of the curriculum innovation provided many valuable insights into their learning experiences, as well as the essential buy-in for the important changes that were being made in their classrooms. The full research experience is documented in Sale (2014).

At present, I am working with faculty who are conducting Supported Experiments on the use of a 'flip classroom' approach. This is a blended learning format, in which students do certain designated learning online prior to attending

the face-to-face sessions. Blended learning was outlined in some detail in the previous chapter, so only the key stages and features of the flip format used by one of our experimenting teams (Teo and Wan 2014) will be outlined here:

The first part of the experiment was conducted for a class of students on a Digital Electronics1 module, over a period of 15 weeks, encompassing a weekly 2-hour lecture session and either a 2-hour weekly session of laboratory or tutorial. In this innovation, the 2-hour lecture was flipped. For the flipped component, an evidence-based pedagogic design was systematically applied with easy-to-use high impact e-tools that were most likely to enhance the learning experience and attainment for the designated student group. For example, Socrative, a classroom response system, was used to pose questions focusing on the key concepts and principles underpinning the structure of the topic being taught. This enabled the lecturer to both activate student's prior knowledge and then, at a later stage, check their understanding of specific concepts and principles. Socrative provides a detailed breakdown of the class profile in terms of correct and incorrect answers, which helps the lecturer to identify areas of the content that have proved most difficult for students. These can then be strategically addressed in the forthcoming face-to-face session. An ongoing process of two-way feedback was maintained throughout the 15 week period by means of the WhatsApp Messenger. This is a cross platform free mobile messaging application that messages (to individuals and groups), which was used to send images, video, textual and audio content to students. In a later part of the series of experiments, Kahoot (which was outlined as a high impact e-tool from an evidence-based approach in the previous chapter) was introduced. Apart from providing the same affordances as Socrative, it adds a heightened fun gamification component. This was immediately recognized as highly effective in terms of getting student attention and, most importantly, genuine engagement with the content learning. In the language of cognitive science, this had an excellent *von Restorff Effect* and hit the 'sweet spot' in terms of an appropriate motivation strategy for this student group. Apart from that, when used effectively, it activates prior knowledge, provides focus on key concepts and principles and generates good thinking (helped by the curiousity factor) to build essential understanding (which it is also able to authentically check). Overall a nice "Russian Doll". Also, let's not forget the impact of the teacher here. Mark Wan, who was the *active teacher* in this series of experiments, is highly experienced, an Academic Mentor for the School of Electrical and Electronic Engineering, and would certainly meet the profile of a creative teacher, in terms of the main criteria identified here. The overall structure of the Supported Experiment had three Phases;

1. Pre-Classroom Phase
2. Face-to-Face Classroom Phase
3. Post-Classroom Phase

Each of these 3 phases are interrelated in terms of the overall instructional strategy, but were designed to be separate and distinct learning experiences in their own right.

The pre-classroom phase involved the design and preparation of the instructional strategy, which necessitated the weaving of the most useful e-tools into which design was perceived by the experimenters as most likely to work (based on the research evidence) as noted above. This involved producing short content focused videos using the free Screencast-o-matic software that allows the production of screen captured video that can be easily uploaded into a learning management system (in this case Blackboard). The videos were kept to a minimum length (not more than 10 min) to avoid cognitive overload. The importance of this was verified from ongoing student feedback that confirmed a strong preference for shorter videos, and was then appropriately adjusted by Mark Wan. There was also the creative use of other resources such as YouTube videos, cartoons, PowerPoint slides with talk overs, selected web links and other resources deemed most relevant to the students in terms of difficulty levels and time frames.

The ongoing use of WhatsApp also ensured that students could be immediately informed of new resources available, reminded of what needed to be done and deadlines, and have their key concerns responded to quickly. Perhaps most importantly, this helped to foster that very important 'personal touch', which works as much unconsciously as consciously in building trust and communicating care and concern. In this phase students were provided with a structured learning experience, incorporating content tailored and customized to their learning goals, variation in terms of videos, audio and text, as well as active learning in terms of quizzes and asynchronous chat and collaboration. This was supported throughout with ongoing feedback to activate and check prior learning, as well as ensure that new understandings were developing as planned.

In the face-to-face phase, from a flip classroom perspective, it is assumed that the students have completed the online work and have come to the lesson (hopefully) with enhanced knowledge in relation to the learning outcomes and specific questions about what they find difficult. Invariably, as explained earlier in the chapter, when innovations are introduced, there is both learning for the teachers and also for the students involved. Mark Wan observed that initially some students did not do what was hoped for and seemed somewhat confused by what was going on. However, with good ongoing feedback, situated modifications to aspects of the instructional strategy and, most importantly, open and honest two-way communication and feedback between faculty and students, this eventually led to high levels of participation and better attainment. In this phase, key aspects of the instructional strategy involved the following integrated elements:

- Pre-lesson quiz result was collected and analysed before class
- Depending on the result of the pre-lesson quiz, there would be situated design and redesign of the instructional strategy, which typically involved combinations of:
  - Mini lectures on topics which students did not perform well on in the quiz
  - Engaging students actively in applying the content used to real work/world contexts through good thinking and simulated practice

- Introducing more challenging and intriguing problems for students to work on collaboratively and solve
- Increasing utilization of peer discussion and assessment while working on group tasks
- Mid-point quiz to test understanding and deal with learning concerns
- Wherever possible, weaker students were provided with the necessary learning support to enable them to keep on track to mastery learning
- At the end of every session, students were polled electronically to evaluate the effectiveness of the learning experience from their perspective, identify any concerns and provide other necessary data that might help to further refine and improve future instructional strategies.

The post-classroom phase was especially interesting, as it facilitated a strong Recency Effect, which was particularly important for effective learning in this context. For example, the use of an exit poll using Socrative, at the end of face-to-face sessions, identified areas that students did not understand—what is euphemistically referred to as "muddy" points. These are often those concepts that are difficult to fully connect to prior knowledge and require greater variation in terms of content exposure and thinking to finally get students to that "aha" feeling of full understanding, often reflected in them saying, "Yes, I've now got it". Mark Wan would, in these situations, create another 'Question and Answer' video to specifically target this area of learning difficulty, inform them of it through WhatsApp and deal with any further questions as and when necessary. Of interest, he would also incorporate a bit of self-depreciating humour by saying to the students, "I didn't do my job well, and I have to redo the video". Such humour is probably the most effective humour genre in terms of building good rapport with people.

The results from evaluation of the Supportive Experiments have been highly encouraging, both in terms of student interest and attainment. For example, Teo and Wan (2014) noted:

> The overwhelmingly positive response in this phase (pre-classroom phase) surprised us. We had thought we had fallen short in terms of quality of video production and the variety of pre-classroom tasks. Nevertheless, the free response comments uncovered some operational shortcomings. Because we had produced videos on the fly, they were often longer in duration than we had planned, and were often only posted the day before the scheduled lesson. (p. 4)

In terms of student attainment, the piloted flip classes in the Semestral 1 Exam achieved cohort means of 91 and 87, which were higher than the 6 other classes who were not on the flip format experiment. This is particularly encouraging as the experiment is still very much in its early phases. The experimenters, as noted above, are already receiving and responding to student feedback, as well as their own observations. The methods being used in the overall approach will inevitably be modified and enhanced over time, which will add further benefits to the learners involved. As the use of blended learning is likely to increase considerably in the coming years, whether specifically in a flip or other formats, Supported

Experiments in this area will prove to be invaluable to the lecturers involved, as well as those in the wider institutional context and beyond.

A feature of the overall learning experience and major contributor to the success of the innovation was the importance of the relationship between faculty and students, and among students, as noted by Mark Wan from conversations with him. He felt that this occurred very strikingly over the duration of the programme and made the experience not only one that facilitated better student attainment but was also personally rewarding—especially given the hard work put into this Supported Experiment. As emphasized previously, the building of a positive psychological climate that is success orientated and fun, as well as using motivational strategies, runs across the whole learning experience, and are key factors in enhancing student learning.

6.4.2 Active Schemes of Work

Teachers producing and using schemes of work has long been part of good planning practice. Just as we plan a lesson, each lesson is part of a wider structure and sequence of learning for a programme of study (e.g., module, unit). Typically a scheme of work is a structured summary breakdown of the whole module or unit, focusing on:

- The specific learning outcomes relating to the key learning goals or topic areas for the particular curriculum programme. These are organized in terms of the best sequencing and appropriately allocated to each of the lessons comprising the programme
- A preferred instructional strategy (e.g., methods, activities, resources) as well as other supporting data for each of the lessons (e.g., details and timelines for completion of assignments, notes relating to infusing related process skills such as thinking, learning strategies)
- Details and necessary guidance on the assessment to be used at specific stages and activities in the programme (both summative and formative).

It is important to 'constructively align' (Biggs 2003) these 3 key curriculum components (learning outcomes, instructional strategy and assessment). What this means is that the instructional strategies should be those that most effectively and efficiently support the learning outcomes for the particular lessons. Similarly, the assessment methods should be those that assess the learning outcomes in valid, reliable, fair and flexible ways to provide as accurate a profile of learner's performance as is viable in the time and resource context available (e.g., efficiency). Equally, and most important for developing learning and attainment, the formative assessment components must, as far as possible, provide the kinds of feedback detailed in Core Principle of Learning 10: *Assessment practices are integrated into the learning design to promote desired learning outcomes and provide quality feedback.*

While a Scheme of Work makes very good sense from the standpoint of pedagogic planning, it may often be done by some teachers as 'just one more of those administrative mandatory requirements' (I have seen a fair measure of this over some 35 years in the profession). In fact, it can and should be a very effective and creative staff development tool as Petty (2015) fully recognizes in his framing of *Active Schemes of Work*. For him, these essential planning organizers can be used dynamically by all the teaching team not only to initially identify best evidence-based instructional strategies, but continually improve them, in a way similar to that of *Lesson Study* outlined in Chap. 4. By explicitly making the schemes of work dynamic and part of a collaborative improvement process, this energizes all the teaching team to actively input into the lesson design, especially activities likely to be most effective for enhancing learning and attainment for the student groups. This is an ongoing process, and when driven by an evidence-based approach, reviewed by ongoing feedback and peer discussion, can significantly improve the learning experience for students. Active Schemes of Work provide the perfect context for faculty skill development and creativity. They also provide a key stimulus for identifying and conducting the most useful Supported Experiments, as well as a great way to foster relationship building and motivation for the faculty involved. Petty (2015) summarizes the rationale and range of benefits as follows:

- **Active learning works.** Research shows that active learning is by far the best for recall, student enjoyment, deep learning (full understanding), and for correcting the learners' misunderstandings.
- **It improves results.** School improvement research shows that Teachers have about three times the effect on achievement as their managers. So achievement, and students' life chances, can only be improved if teaching is improved.
- **It is likely to get commitment to improvement**. Subject centred discussion on how to teach well is at the heart of a teacher's role, teachers usually enjoy being involved in practical development in their own subject area.
- **Teams share best practice** so the best teaching methods are available to all.
- **It raises expectations of teaching quality**. Active schemes of work can raise expectations of what it means to teach well, as well as showing how this can be done.
- **It 'stores' best practice.** Good teachers who leave the college leave behind their methods for others to benefit from and enjoy.
- **It supports beginning teachers.** Novice teachers are given effective methods to adopt, and to learn from.
- **It promotes professional development.** Writing the scheme promotes subject centred discussion on effective teaching and so develops staff.

In the final section of this chapter, Reflective Practice will be reviewed as it has long been muted as a key approach for teacher improvement.

6.4.3 Can Reflective Practice Enhance Creative Teaching?

Over some 25 years or so I have probably been involved in the appraisal of a few thousand (maybe more) teaching professionals in a range of educational and cultural contexts. It was once believed that goldfish, and maybe other fish also, have a memory span of only a few seconds. However new research (not worth referencing) has challenged this and it may be more a question of months. I sometimes feel like this in recalling my teaching activities. We know that memories change in some way every time we evoke them, so I am beginning to worry about the pristineness of some of my recollections. Now that's over, catharsis not excuses, I feel that I can authentically recall a few useful reflections on Reflective Practice. Many years back, in 1992, I completed a Master's degree in education at the University of Exeter. During this programme I remember being introduced to and doing considerable reading and thinking about what reflective practice actually meant and its uses for improving one's teaching. Invariably, I read the definitive texts of the time, especially the work of Schön (1983; 1987). The notion that teachers should carefully reflect on their practice, what they actually do in classrooms, on what basis, and the actual impact on student learning made perfect sense. After all, this is what we would expect professionals to do in field of practice.

In working with teachers in training I have consistently encouraged them to reflect on their practice, as it seemed a *given* method for self-evaluation and opening up areas for future improvement. Hence, asking teachers questions relating to what they thought went well in the lesson and what areas were open to future development was standard practice. However, an interesting observation revealed something that became very noticeable and eventually a bit disturbing over the years. The consistent experience for me is that teachers who actually teach better are generally much more critical of what they are doing than those who failed to impress. The former group are typically able to identify what could be improved and why and, through discussion with them, also seemed to have employed better observational skills and empathy with what the students were experiencing and noticed changes in student's responses to different parts of the instructional strategy. In contrast, the latter group of teachers who clearly seemed to have much less impact in getting attention and engagement, as well as displaying a less organized and contextualized instructional strategy, were often satisfied with what they were doing and offered relatively little in terms of thoughtful analysis and evaluation. These wide variations can certainly be explained in large part by research into the differences between novice and expert teachers (Timperley et al. 2008) and between experienced and expert teachers (Hattie 2003). For example, Timperley et al. (2008) make the following comparison between novice and expert teachers:

> The novice is someone who perceives the unfamiliar teaching situation in terms of discrete elements and, in making use of new skills and knowledge, relies on rules rather than an integrated vision of practice. The primary focus is on the self and one's performance. As competence develops, the discrete elements become integrated into patterns, with some aspects becoming automatic and the teacher less reliant on rules. In contrast, experts have a

> more holistic grasp of relationships within a particular context and fluidly and efficiently solve problems as they arise. The resources on which they are able to draw are much richer. (p. 11)

In summary terms, expert teachers see much more of relevance in the complex dynamic situation of classroom teaching; make better inferences and interpretations of what is occurring and what specifically needs to be addressed. Invariably, they are also better at identifying the causes of classroom problems and, most importantly, are able to create learning arrangements that foster better attainment. Many of such teachers are creative teachers, within the framing heuristics of this book. Hattie (2009) uses the term "with-it-ness" to summarize much of what such teachers are able to do differently and better than the less expert in the profession:

> Teachers need to have the skills of 'with-it-ness' – that is, the ability to identify and quickly act on potential problems and be aware of what is happening in the class (the proverbial 'eyes in the back of the head', or mindfulness). (p. 78)

Indeed, when exploring with the faculty documented above on *what* and *how* they perceive in the experience of teaching and in trying to unpack their personal framing, it seems to be the case that some are clearly seeing more and seeing this in better qualitative terms. They simply seemed to be more 'with-it', as Hattie described. However, this is not surprising. When I look inside the bonnet of my car, I see metal, plastic and some wiring. As a consequence, when the car is not working properly, especially when it does not start, I ring my mechanic. I have learned the hard way that discovery learning may be fun and can lead to some meaningful learning on occasions when one has plenty of time (and patience), but of very limited value in a typical working day. My mechanic always comes up with a solution to the problem. I think he perceives what's under the bonnet somewhat differently and better than me. The same is very true in people and activity perception. There are many factors that determine such differences in perceptual acuity and capability, but much is to do with prior learning and competence, as we now know from research into expert performers, which was explored in some detail in Chap. 2. In the very worst scenario a lack of key content knowledge and poor thinking will result in a fairly limited framing of that particular domain area. For many teachers, and this may sound disturbing, a lack of solid evidence-based pedagogic knowledge and some 'fuzzy' thinking may well lead to both limited and inaccurate perceptions and poor interpretations of what is actually occurring in their classrooms.

Asking many novice teachers (and some experienced ones also) to do reflective practice is similar to asking students to do good thinking, when they lack any prior useful model of what this entails and how it works. Without such knowledge bases, both declarative and especially procedural, this is highly unlikely to occur. A few years ago, I conducted a 3-year longitudinal evaluation on the student learning experiences during the implementation of a large scale curriculum innovation in a major educational institution in Asia (Sale 2014). A significant area of interest in the evaluation was on the development of key graduate attributes, one of which was good thinking (e.g., framed in terms of critical, creative and metacognitive thinking

—as documented in Chap. 2). While the evaluation supported a claim that much of the intended goals and objectives of the innovation had at least taken some positive roots, the majority of students interviewed still had limited and idiosyncratic perceptions relating to what is good thinking. This reinforces the view that good thinking will not naturally occur simply by providing tasks that involve thinking. Like other complex skills, its development is subject to the same Core Principles of Learning. Without, direct explicit instruction and plenty of deliberate practice in a range of contexts, learning will be partial and fragmented in this area. In summary, the evaluation revealed that there had been relative failure to sufficiently infuse an explicit model of good thinking across courses as well as facilitate an effective professional development approach to address this at that time.

In reflecting on one's practice, the usefulness of the outcomes in terms of enhanced teaching proficiency and gains in student attainment depend on what constitute the content and processes that are analysed and evaluated in such reflection. It is likely that the novice tennis players I view from my gym window do reflect in some way on their performance, but on what basis are they reflecting? Without a knowledge base on what constitutes key skills in tennis playing and a systematic process of deliberative practice with expert feedback, it is very unlikely that improvement will be significant—and that seems to be verified in terms of face validity from my observation over time. In terms of reflective practice in teaching, Hattie (2009) made the key point:

> The current penchant for "reflective teaching" too often ignores that such reflection needs to be based on evidence and not post hoc justification. (p. 241)

Similarly, if we are expecting more teachers to move beyond routine expertise to become creative teachers (adaptive experts), then they will need a clear understanding of what this entails, the kinds of skills that need to be developed and how best to manage the learning process in ways that are viable in their personal and professional lives.

Much of this chapter has been focused on documenting what works (and does not work) in terms of professional development, and how best to conduct what works. Certainly without effective professional development, even high levels of expertise, let alone creative teachers, are unlikely to be the norm. As noted, there is both good and bad news. We now have a much clearer picture, as compared to yesterday, on what works, but there is no pedagogic silver bullet and it requires hard work and commitment. Much of professional development has failed to recognize how this works, and that's why it hasn't worked as intended. As a starting point, teachers must have a clear understanding of human learning, which teaching methods and strategies are likely to work best, on what basis and in what context. While institutional support and resources help considerably, these are only—albeit important—support structures. As Levin (2008) concluded:

> …resources alone, however, will not change social practices. Teachers need to see not only what they might do differently but how they could do it in the reality of their classrooms. The key to developing this understanding is ongoing work with colleagues –seeing others

> carry out new practices with students like yours and having others help you learn to do these new practices. (p. 86)

Asking teachers to be more creative may be of little value if they don't know specifically what this entails in the context of actual teaching practices, and how to do this effectively.

Over the years I have been an observer in many workshops on creativity. Sadly, while most have been interesting in part and well intentioned, they tend to offer generalities more than evidence-based heuristics. Having a passion and a belief that one is naturally creative and it's only a question of 'switching on the creative switch' and hey presto 'creative me' emerges, is often the message. However, this is akin to buying that expensive piece of exercise equipment, working out 10 min a day, with no pain, and within a month or two you're the 'body beautiful', or whatever. Positive beliefs and positive thinking are important aspects of successful learning, but they don't inevitably lead to successful learning. However, as outlined previously, while notions of 'quick fixes' in terms of achieving rapid success are attractive, even seductive, it's not how successful learning and attainment of anything challenging works for some 99 % of the population. Creativity, as we saw in Chap. 3 is understandable and is a learnable capability, but it is subject to the same Core Principles of Learning as other human competences. If we want to develop more creative teachers, we must be honest in what is involved. Hopefully, for most teachers, the benefits will be perceived to outweigh the effort that needs to be expended.

Reflection on practice, then, without a clear evidence-based framework for what one is seeking to develop and an effective mode of inquiry (especially good thinking), will likely result only in partial and limited improvement at best. Willingham (2009) made the key point concisely:

> Education makes better minds, and knowledge of the mind can make better education. (p. 165)

An evidence-based approach to reflective practice must first and foremost be grounded in the thoughtful application of validated knowledge relating to human learning and what research has established in terms of the most effective teaching practices (i.e., a strong Pedagogic Literacy). Secondly, it needs an effective and viable mode of inquiry, as outlined in this chapter. It is then possible for teachers to analyse their lessons in an informed and strategic manner. They will be able to focus specifically on the impact of their chosen method and activity blends on student learning experience and attainment, comparing and contrasting present experience and evidence with other lessons previously taught. This informed and effective thinking process will lead to an emerging picture of the overall lesson which will enable teachers to identify areas that are working well and how, as well as areas for further creative improvement. In the technical language of thinking, they will be able to make evidence-based inferences and interpretations about their

lessons and make, as far as is possible, an accurate *diagnosis* of the effectiveness of their instructional strategies. Invariably, this process can be enhanced in terms of validity and usefulness when done with interested and expert peers. From here teachers can generate, again from such heuristics, novel and effective ways to enhance aspects of this topic area for future lessons with similar classes. This is about as *intelligent* as we can get in terms of reflective practice and good professional development, and where creative teaching competence is most visible, which means it can be modelled and transferred to other participating colleagues. Collectively this also constitutes 'organizational intelligence' in action. Over time, professional development activity carried out in this way will lead to enhanced creative teaching competence for the participating teachers and will provide an increasing predictive capability for enhancing the learning experience and attainment opportunities for students. Teachers, using reflective practice in these ways, should be able to better predict the likely outcomes from their lesson planning, accurately diagnose the lessons they teach and be able to improve practices on a consistent ongoing basis, incorporating those *Little c* components that add variety and impact to the learning experience. This is creative teaching, and the process of doing these practices consistently well will develop creative teaching competence, given motivation and persistence over time.

6.5 Summary

A major aim of this book has been to demystify what it means to be a *creative teacher* and how to develop a *creative teaching competence*. Referring back to Martin's (2009) Knowledge Funnel, introduced in Chap. 1, it is clearly evident that as a phenomena (e.g., creative teaching) becomes less of a *Mystery* and more understandable in terms of *Heuristics*, there is increasing opportunity to deal productively with that phenomena. This is exactly the scenario with creative teaching. We are now far from the realm of *Mystery* and increasingly in the domain of validated *Heuristics* as to what constitutes creative teaching. As a result we can both teach our students better as well as develop our expertise in ways akin to other professions, to fully merit the term *Professional Educators*. It is really a matter of volition, as we now know much about what needs to be done and how. For the individual teaching professional reading this book, I hope I have provided a useful frame for you to make your best decisions about teaching and the kind of teacher you might want to be. For the wider institutional community, I can only agree with Hattie (2009):

> We beseech these teachers to be evidence-based but so many government agencies and departments, teacher educators, and others are not evidence-based, and seem reluctant to accept evidence if it is contrary to current policies. (p. 257)

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