Source: *Visible Learning* (2009) by John Hattie

The argument

Visible teaching and visible learning

> We think in generalities, but we live in details.
>
> (Whitehead, 1943, p. 26)

This chapter introduces the major findings that will be elaborated in the following chapters. The aim of this book is not to overwhelm with detail from the more than 50,000 studies and 800+ meta-analyses that form the basis of the discussion. Instead, the aim is to build an explanatory story about the influences on student learning and then to convince the reader of the nature and value of the story by working through the evidence to defend it. It is as much theory generation as it is theory appraisal. The art in any synthesis is the overall message, and the simple adage underlying most of the syntheses in this book is "visible teaching and learning". Visible teaching and learning occurs when learning is the explicit goal, when it is appropriately challenging, when the teacher and the student both (in their various ways) seek to ascertain whether and to what degree the challenging goal is attained, when there is deliberate practice aimed at attaining mastery of the goal, when there is feedback given and sought, and when there are active, passionate, and engaging people (teacher, student, peers, and so on) participating in the act of learning. It is teachers seeing learning through the eyes of students, and students seeing teaching as the key to their ongoing learning. The remarkable feature of the evidence is that the biggest effects on student learning occur when teachers become learners of their own teaching, and when students become their own teachers. When students become their own teachers they exhibit the self-regulatory attributes that seem most desirable for learners (self-monitoring, self-evaluation, self-assessment, self-teaching). Thus, it is visible teaching and learning by teachers and students that makes the difference. The following chapters provide the evidence to defend this overall message.

What teachers *do* matters

The major message is simple—what teachers *do* matters. However, this has become a cliché that masks the fact that the greatest source of variance in our system relates to teachers—they can vary in major ways. The codicil is that what "some" teachers do matters—especially those who teach in a most deliberate and visible manner. When these professionals see learning occurring or not occurring, they intervene in calculated and meaningful ways to alter the direction of learning to attain various shared, specific, and challenging goals. In particular, they provide students with multiple opportunities and alternatives

for developing learning strategies based on the surface *and* deep levels of learning some content or domain matter, leading to students building conceptual understanding of this learning which the students and teachers then use in future learning. Learners can be so different, making it difficult for a teacher to achieve such teaching acts—students can be in different learning places at various times using a multiplicity of unique learning strategies, meeting different and appropriately challenging goals. Learning is a very personal journey for the teacher and the student, although there are remarkable commonalities in this journey for both. It requires much skill for teachers to demonstrate to *all* their students that they can see the students'"perspective, communicate it back to them so that they have valuable feedback to self-assess, feel safe, and learn to understand others and the content with the same interest and concern" (Cornelius-White, 2007, p. 23).

The act of teaching requires deliberate interventions to ensure that there is cognitive change in the student: thus the key ingredients are awareness of the learning intentions, knowing when a student is successful in attaining those intentions, having sufficient understanding of the student's understanding as he or she comes to the task, and knowing enough about the content to provide meaningful and challenging experiences in some sort of progressive development. It involves an experienced teacher who knows a range of learning strategies to provide the student when they seem *not* to understand, to provide direction and re-direction in terms of the content being understood and thus maximize the power of feedback, and having the skill to "get out the way" when learning is progressing towards the success criteria.

Of course, it helps if these learning intentions and success criteria are shared with, committed to, and understood by the learner—because in the right caring and idea-rich environment, the learner can then experiment (be right and wrong) with the content and the thinking about the content, and make connections across ideas. A safe environment for the learner (and for the teacher) is an environment where error is welcomed and fostered—because we learn so much from errors and from the feedback that then accrues from going in the wrong direction or not going sufficiently fluently in the right direction. In the same way, teachers themselves need to be in a safe environment to learn about the success or otherwise of their teaching from others.

To facilitate such an environment, to command a range of learning strategies, and to be cognitively aware of the pedagogical means to enable the student to learn requires dedicated, passionate people. Such teachers need to be aware of which of their teaching strategies are working or not, be prepared to understand and adapt to the learner(s) and their situations, contexts, and prior learning, and need to share the experience of learning in this manner in an open, forthright, and enjoyable way with their students and their colleagues.

We rarely talk about passion in education, as if doing so makes the work of teachers seem less serious, more emotional than cognitive, somewhat biased or of lesser import. When we do consider passion, we typically constrain such expressions of joy and involvement to matters unrelated to our teaching (Neumann, 2006). The key components of passion for the teacher and for the learner appear to be the sheer thrill of being a learner or teacher, the absorption that accompanies the process of teaching and learning, the sensations in being involved in the activity of teaching and learning, and the willingness to be involved in deliberate practice to attain understanding. Passion reflects the thrills as well as the frustrations of learning—it can be infectious, it can be taught, it can be modeled, and it can be learnt. It is among the most prized outcomes of schooling and, while rarely studied

in any of the studies reviewed in this book, it infuses many of the influences that make the difference to the outcomes. It requires more than content knowledge, acts of skilled teaching, or engaged students to make the difference (although these help). It requires a love of the content, an ethical caring stance to wish to imbue others with a liking or even love of the discipline being taught, and a demonstration that the teacher is not only teaching but learning—typically about the students' processes and outcomes of learning.

Learning is not always pleasurable and easy; it requires over-learning at certain points, spiraling up and down the knowledge continuum, and building a working relationship with others in grappling with challenging tasks. This is the power of deliberative practice. It also requires a commitment to seeking further challenges—and herein lies a major link between challenge and feedback, two of the essential ingredients of learning. The greater the challenge, the higher the probability that one seeks and needs feedback, but the more important it is that there is a teacher to provide feedback and to ensure that the learner is on the right path to successfully meet the challenges.

The key to many of the influences above the $d = 0.40$ h-point is that they are deliberate interventions aimed at enhancing teaching and learning. But the message is to not merely *innovate*—but for us to learn from what makes the difference when teachers innovate. When we innovate we are more aware of what is working and what is not, we are looking for contrary evidence, we are keen to discover any intended and unintended consequences, and we have a heightened awareness of the effects of the innovations on outcomes. In these situations teachers become the learners about their own effects! In any innovation there is deliberate attention to implementation and its effects, there is a degree of challenge, and a valuing of feedback. It is critical that teachers learn about the success or otherwise of their interventions: those teachers who are students of their own effects are the teachers who are the most influential in raising students' achievement. Seeking positive effects on student learning (say, $d > 0.40$) should be a constant theme and challenge for teachers. As this does not accrue by serendipity or accident, then the excellent teacher must be vigilant to what is working and what is *not* working in the classroom.

A concept of excellent teaching

A story serves to illustrate my claims about excellent teaching. Some time ago one of my Master's students completed a meta-analysis on the effects of various programs on self-concept of children and adults (Clinton, 1987). The most successful programs were the Outward Bound or Adventure programs. There are four major features of these programs that led to their positive influence. First, Outward Bound programs have an emphasis on the immediate quality of the experience, as well as aiming to have these immediate experiences have an effect on later experiences. That is, there is a planned and intentional transfer of experiences, knowledge, and decisions during the earlier learning experiences to later experiences (see Hattie, Marsh, Neill, & Richards, 1997 for more details). Second, Outward Bound programs set difficult and specific goals that are known to the learner, and then tasks are structured so that participants can attain these goals. The program provides challenging and specific goals (e.g., successfully negotiating a 60-foot cliff by abseiling or rappelling) and then structures situations (e.g., adequate preparation, social support, etc.) so that participants share a commitment to reaching these goals. Third, the program increases the amount and quality of feedback, which is vital to the learning process. The often dangerous and risky situations demand feedback, and the learning intentions and

success criteria are crystal clear. A major function of challenging and specific goals is that they direct attention and effort, and thus the learner is more aware and keen for feedback related to attaining these goals. Fourth, in the Outward Bound program, the instructor is keenly aware of the need to understand and, if necessary, reassess and redirect an individual's coping strategies. Such coping strategies can be cognitive (learning strategies), personal (building of self-efficacy, perseverance in the face of challenge), and social (help seeking, cooperative learning). These four major features are the keys of successful teaching and learning.

As another example, take my involvement in a Bush Search and Rescue Squad which involved teaching the skills and fun of cliff rescues. Consider the following: I am going to take you to the top of a three-storey building and teach you to rappel down the outside of this building. Typically, I would then demonstrate to you how to put on a safety harness, tie the rope in a bowline, and then show you how to lean backwards to commence the descent. In line with the principles of good teaching, I would then ask you, the student, to implement this learning. Typically, such a learning situation leads to much care by the students, an enhanced level of interest in what peers are doing, and high levels of help-seeking behaviors to ensure the knowledge of rope-work is correct and harnesses are correctly positioned. The goals are challenging, specific, and visible, and the learners are committed to them! The learning is actively visible and there are high levels of feedback and monitoring. The learner typically "seeks" the feedback. When a novice first gets to the edge, there is a remarkably high level of peer teaching and learning: it is not natural to fall backwards when descending as it is more typical for the feet to precede the head. When finally the student reaches the bottom there is a surge of excitement appreciating that the challenging goal has been reached (it is abundantly clear what the success criteria are!), the experience was exhilarating, and the learning absorbed in the experience itself. Most want to repeat the experience and continue to enjoy meeting the challenging goals. Moreover, all these acts and most of the "thinking" about the task are visible to the teacher and to the learner. This is the heart of the model of successful teaching and learning advocated in this book.

Visible teaching

It is critical that the teaching and the learning are visible. There is no deep secret called "teaching and learning": teaching and learning are visible in the classrooms of the successful teachers and students, teaching and learning are visible in the passion displayed by the teacher and learner when successful learning and teaching occurs, and teaching and learning requires much skill and knowledge by both teacher and student. The teacher must know when learning is correct or incorrect; learn when to experiment and learn from the experience; learn to monitor, seek and give feedback; and know to try alternative learning strategies when others do not work. What is most important is that teaching is visible to the student, and that the learning is visible to the teacher. The more the student becomes the teacher and the more the teacher becomes the learner, then the more successful are the outcomes.

This explanation of visible teaching relates to teachers as activators, as deliberate change agents, and as directors of learning. This does not mean that they are didactic, spend 80 percent or more of the day talking, and aim to get through the curriculum or lesson come what may. Effective teaching is not the drilling and trilling to the less than willing.

When I reviewed the videotapes of many of the best teachers in the United States (via the National Board for Professional Teaching Standards video assessment task) it was stunning how active and involved the best teachers were in the classrooms—it was clear who was in control in those classrooms. The activity was visible and "in the air"; passive was not a word in the vocabulary of these accomplished teachers—learning was not always loud and heated but it was rarely silent and deadening, and it was often intense, buzzing, and risky.

The model of visible teaching and learning combines, rather than contrasts, teacher-centered teaching and student-centered learning and knowing. Too often these methods are expressed as direct teaching versus constructivist teaching (and then direct teaching is portrayed as bad, while constructivist teaching is considered to be good). Constructivism too often is seen in terms of student-centered inquiry learning, problem-based learning, and task-based learning, and common jargon words include "authentic", "discovery", and "intrinsically motivated learning". The role of the constructivist teacher is claimed to be more of facilitation to provide opportunities for individual students to acquire knowledge and construct meaning through their own activities, and through discussion, reflection and the sharing of ideas with other learners with minimal corrective intervention (Cambourne, 2003; Daniels, 2001; Selley, 1999; von Glasersfeld, 1995). These kinds of statements are almost directly opposite to the successful recipe for teaching and learning as will be developed in the following chapters.

A model of learning

The major point here is that constructivism is *not* a theory of teaching, but a theory of knowing and knowledge, and it is important to understand the role of building constructions of understanding. Bereiter (2002) used Popper's three worlds to make sense of much of what we strive for in school: the physical world, the subjective or mental world, and the world of ideas. These three worlds have major parallels with the three worlds of achievement: surface knowledge of the physical world, the thinking strategies and deeper understanding of the subjective world, and the ways in which students construct knowledge and reality for themselves as a consequence of this surface and deep knowing and understanding. This third world, often forgotten in the passion for teaching facts and thinking skills, is entirely created by humans, is fallible but capable of being improved, and can take on a life of its own. Students often come to lessons with already constructed realities (third worlds), which, if we as teachers do not understand them before we start to teach, can become the stumbling blocks for future learning. If we are successful, then the students' constructed realities (based on their surface and deep knowing) and keenness to explore these worlds are the major legacy of teaching. The contents of this third world are not concrete like books, statues, and teapots (see Bereiter, 2002, pp. 62–63): they are more conceptual. It is certainly the case, as Bereiter documents, that "much of what is meant by the shift from an industrial to a knowledge society is that increasing amounts of work are being done on conceptual objects rather than on the physical objects to which they are related" (Bereiter, 2002, p. 65).

The distinctions are not clean cut, as at all three levels we often learn in a haphazard manner. So much teaching is aimed at the first world—the world of ideas and knowledge, and there is also much discussion about the importance of deep knowledge and thinking skills (the second world). But the task of teaching and learning best comes together when we attend to all three levels: ideas, thinking, and constructing.

> In many situations, it will be impossible to make a clear distinction between knowing or thinking about the conceptual artifact and knowing or thinking about the material world the conceptual artifact applies to [...] What matters is that we recognize conceptual artifacts as real things, recognize creating and improving them as real work, and recognize understanding them as real understanding.
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> (Bereiter, 2002, p. 67).

The real work of schooling is to create or add value to conceptual artifacts in the same way that builders add value to building artifacts. It is a world of conjectures, explanations, proofs, arguments, and evaluations.

Similarly, there can be many cultural artifacts particular to a culture and an important aspect of education is to teach these artifacts. For example, in New Zealand Māori culture, there is much importance attached to whānau (family), history, and cultural norms. A major focus of schooling is to therefore enable learners to adopt these cultural artifacts as a key part of their own conceptual artifacts—a way to see their world in a similar manner to how the culture has learnt to see its world, and communicate its worldviews and values. The importance is that this three-level view of achievement allows relations between theory and observation, personal and cultural belief and observation, and between personal belief and theory.

> ... there are the relations between different theories, different phenomena, and different people's readings of the same phenomena. None of these relations are easy. They are all inferential and highly problematic. But they are what people work on when they are building scientific knowledge.
>
> (Bereiter, 2002, p. 91)

Bereiter claimed that there are a number of commitments to knowledge improvement: the third world is not limited to accepted, verified, or important knowledge objects. It can include discredited theories, crank notions, unsolved problems, and new ideas that may or may not gather a following. In this respect, "the third world is more inclusive than the canons of liberal education. This inclusiveness goes a long way toward eliminating the split between established knowledge and students' constructive efforts because it places the ideas created by students in the same world as the ideas handed from authoritative sources" (p. 237). "Knowing one's way around in the world of conceptual artifacts affords a wealth of possibilities not open to people who know that world only from a distance, if at all." (p. 238). Knowledge building is an activity directed toward the third world. It is doing something to a conceptual artifact. Bereiter claimed that knowledge building includes thinking of alternatives, thinking of criticisms, proposing experimental tests, deriving one object from another, proposing a problem, proposing a solution, and criticizing the solution. It is more than knowing, mistakenly believing, or doubting some knowledge object.

Educating is more than teaching people to think—it is also teaching people things that are worth learning. Good teaching involves constructing explanations, criticizing, drawing out inferences, finding applications, and there "should never be a need for the teacher to think of ways to inject more thinking into the curriculum. That would be like trying to inject more aerobic exercise into the lives of Sherpa porters" (Bereiter, 2002, p. 380). If the students are not doing enough thinking, something is seriously wrong with the instruction. "If the only justification for an activity is that it is supposed to encourage or improve

thinking, drop it and replace it with an activity that advances students' understanding that increases their mastery of a useful tool" (Bereiter, 2002, p. 381).

Surface, deep, and constructed understanding

There needs to be a major shift, therefore, from an over reliance on surface information (the first world) and a misplaced assumption that the goal of education is deep understanding or development of thinking skills (the second world), towards a balance of surface and deep learning leading to students more successfully constructing defensible theories of knowing and reality (the third world).

For many students, success at school relates to adopting a surface approach to understanding both how and what they should learn, whereas many teachers claim that the goal of their teaching is enhancing deep learning (Biggs & Collis, 1982). Brown (2002), for example, investigated the beliefs about learning of more than 700 15-year-old New Zealand students and 71 of their teachers of English, mathematics, and science. Students argued that learning for them primarily meant exhibiting surface knowledge involving the reproduction of taught material in order to maximize achievement in assessments. In contrast, teachers of these same students claimed that they were teaching towards deep learning outcomes. The students were more governed by the tasks and examinations set by teachers and schools, so, despite claims by teachers, the students were very strategic in concentrating on acquiring sufficient surface and whatever deeper understanding was needed to complete assignments and examinations. (The same phenomenon is especially evident when comparing conceptions of learning by academics and their students; Purdie, 2001.)

Students can be strategic in their approach because most questions and examinations (verbal and written) relate to surface knowledge (Marzano, 1991). For example, Gall (1970) claimed that 60 percent of teachers' questions required factual recall, 20 percent were procedural, and only 20 percent required thought by the students. Other studies have found the proportion of surface thinking questions can be in the order of 80 percent or more (Airasian, 1991; Barnette, Walsh, Orletsky, & Sattes, 1995; Gall, 1984; Kloss, 1988). Teachers' questioning may not elicit deep thinking from students because students understand that questioning is how teachers lead and control classroom activity; in other words, students know that the teacher already knows the answer to the questions (Gipps, 1994; Torrance & Pryor, 1998; Wade & Moje, 2000). So much of daily classroom life is "knowledge telling", and thus surface knowledge is sufficient. Students soon learn that studying or learning with surface strategies or methods (i.e., revision, re-reading, and reviewing of the year's work) leads to success. In contrast, teachers claim to prefer a deep view of learning, usually focused on academic and cognitive development, while at the same time they emphasize surface methods of teaching, usually with the defense that this is what is required in order to prepare students for high-stakes qualification examinations or assessments. This emphasis on surface approaches means that students tend to experience very few opportunities or demands for deep thinking in contemporary classrooms.

To be more specific, *surface* learning involves a knowing or understanding of ideas or facts. In contrast, the two *deep* processes—relational and elaborative—constitute a change in the quality of thinking that is cognitively more challenging than surface questions. Relational responses require integration of at least two separate pieces of given knowledge, information, facts, or ideas. In other words, relational questions require learners to impose

an organizing pattern on the given material. Elaborative or extended abstract responses require the learner to go beyond the given information, knowledge, or ideas, and deduce a more general rule or proof that applies to all cases. In such cases, the learner is forced to think beyond the given and bring in related, prior, or new knowledge, ideas, or information in order to create an answer, prediction, or hypothesis that extends to a wider range of situations. From these surface and deep knowing and understandings the learner can construct notions or ideas that then shape the ways they engage in surface and deep learning (the third world of constructed understanding).

These three types of understanding—surface, deep, and constructed or conceptual understanding—are built on the Biggs and Collis (Biggs & Collis, 1982; Collis & Biggs, 1979) SOLO model of student learning that has proven most valuable both in developing models of teaching and learning and also in our understanding of assessment (Hattie & Purdie, 1998; Hattie & Brown, 2004). These forms of building on surface knowledge to develop deep knowledge are becoming common in the research on educational psychology and assessment. It is intriguing to note that the major revision of Bloom's Taxonomy (Anderson, Krathwohl, & Bloom, 2001) introduced four similar levels: factual knowledge (how to be acquainted with a discipline or solve problems in it); conceptual knowledge (interrelationships among elements within a large structure that enable them to function together); procedural knowledge (how to do something, methods of inquiry); and meta-cognitive knowledge (knowledge of cognition in general as well as awareness and knowledge of one's own cognition). This is a major advance on the better-known Bloom's Taxonomy, which confuses levels of knowing with forms of knowledge (see Hattie & Purdie, 1998).

It is critical to note that the claim is not that surface knowledge is necessarily bad and that deep knowledge is essentially good. Instead, the claim is that it is important to have the right balance: you need surface to have deep; and you need to have surface and deep knowledge *and* understanding in a context or set of domain knowledge. The process of learning is a journey from ideas to understanding to constructing and onwards. It is a journey of learning, unlearning, and overlearning. When students can move from idea to ideas and then relate and elaborate on them we have learning—and when they can regulate or monitor this journey then they are teachers of their own learning. Regulation, or meta-cognition, refers to knowledge about one's own cognitive processes (knowledge) and the monitoring of these processes (skillfulness). It is the development of such skillfulness that is an aim of many learning tasks, and developing them so there is a sense of self-regulation.

A reminder about outcomes

As noted in the earlier chapters, the focus of this book is on achievement outcomes. Now this notion has been expanded to achievement outcomes across the three worlds of understanding. It may seem intuitively obvious that the influences on learning that aim for surface learning tend to favor more directed, specific goals, whereas those that aim for deep learning tend to favor more inquiry methods. Not so—this is too simple and can be misleading. Sometimes the deeper concepts need more specific and direct teaching, and sometimes the more surface concepts can be learned via inquiry or problem solving.

A major aim is to develop "over-learning" or fluency of achievement. For example, most of us "over-learnt" learning to walk—we forget the trial and error and pain that was

involved when we first learnt to walk; but we can most certainly recognize that struggle to learn to walk when we have a major accident, and must learn this skill anew. We want a sense of fluency and over-learning of worthwhile activities as a major outcome of schooling. There is over-learning when we consider a person fluent in a language or with a musical instrument, or when we consider a student fluent in math, reading, or science. A sufficient level of fluency can lead to other desirable outcomes such as retention, endurance, stability, and application within a domain (Doughty, Chase, & O'Shields, 2004).

When a student attains a high degree of fluency on a topic, then they have more cognitive resources to devote to the next phase in learning. When tasks are very complex for the student, the quality of meta-cognitive skills rather than intellectual ability is the main determinant of learning outcomes (Veenman, Prins, & Elshout, 2002) "because learners have to improvise and use heuristics rather than call upon knowledge and skill components that are associated with intellectual ability" (Prins, Veenman, & Elshout, 2006, p. 377). The novice is more likely to use trial and error strategies, whereas the student with greater knowledge is more likely to search for all possible strategies that might work (Klahr, 2000). The novice aims to produce data, whereas the expert is more interested in data interpretations. The data gathering precedes the data interpretation. These claims are the case for both the learner and for the teacher.

Our cognitive architecture has limitations: we can only remember so many things at once; we can only devote so much cognitive processing power to learning and resolving dilemmas. We build higher order notions or schema to help us retain more in memory at any one time, and we learn various strategies to assist in the learning process. These limitations relate to the notion of cognitive load (e.g., Sweller, 2006). Certainly when first learning new material and ideas we need effective learning strategies and as much cognitive processing power as we can muster. Experts, compared to non-experts, have deeper and more principled problem representations that allow more retrieval and resolution, thus demonstrating how they can effectively use the load on their cognition (e.g., when playing chess, solving equations, reading history). A key difference, however, between experts and novices, is that it is deliberative practice rather than experience that matters—that is, extensive engagement in relevant practice activities for improving performance (as when swimmers swim lap after lap aiming to over learn the key aspects of their strokes, turns, and breathing).

Such deliberative practice activities:

> are at an appropriate, challenging level of difficulty, and enable successive refinement by allowing for repetition, given room to make and correct errors, and providing informative feedback to the learning [...] Given that the deliberate practice requires students to stretch themselves to a higher level of performance, it requires full concentration and is effortful to maintain for extended periods.
>
> (van Gog, Ericsson, Rikers, & Paas, 2005, p. 75)

All this practice leads to higher levels of conscious monitoring and control that leads to more refinement, and more higher order understandings of the surface and deeper level notions (Charness, *et al.* 2005). It is not deliberative practice for the sake of repetitive training, but deliberative practice focused on improving particular aspects of the target performance, to better understand how to monitor, self-regulate and evaluate their performance, and reduce errors.

The six factors

The next seven chapters of this book are structured around six topics—an assessment of the respective contributions to achievement from:

1 the child;
2 the home;
3 the school;
4 the curricula;
5 the teacher;
6 the approaches to teaching (two chapters).

Of course, there are likely to be interactions between these (another topic too rarely subjected to study and meta-analysis) and this will be returned to in the final chapter. There may also be moderators of these influences, although remarkably, such moderators are few and far between. What works best appears to be similar across subject, age, and context.

The child

The contributions the child brings to his or her learning include:

- prior knowledge of learning;
- expectations;
- degree of openness to experiences;
- emerging beliefs about the value and worth to them from investing in learning;
- engagement;
- ability to build a sense of self from engagement in learning, and a reputation as a learner.

The child brings prior knowledge of learning to their classroom—from preschool, from their culture, from television, from home, and from the previous year. Much of this prior knowledge leads to expectations by students and teachers about learning. A child is born into and grows up in a world of expectations. These expectations are powerful enhancers of—or inhibitors to—the opportunities provided in schools. They come from the parents, from the family, from siblings, from peers, from schools, from teachers, from media, and from themselves. Their own expectations can be formed powerfully from experiences in classrooms. By the age of eight, so many students have worked out their place in the rankings of the achievement equation. It is therefore a concern that one of the greatest influences on student achievement identified in this book is that of self-reported grades—students are very adept at knowing how to rate their performance. If these ratings are too low, then such expectations of performance can set limits of what students see as attainable. Hence, there is power in teachers setting more challenging goals, engaging students in the learning towards these goals, and giving students the confidence to set and attain their goals. A student's own predictions of their performance should not be the barriers to exceeding them, as they are for too many students.

A major way these expectations are manifested in the learning situation is via the

student's dispositions. The key dispositions are the way the student becomes open to experiences, their emerging beliefs about the value and worth to them from investing in learning, and the manner in which they learn that they can build a sense of self from their engagement in the learning enterprise. While these can be changed within schools, they also can be formed and changed in the home, in the playground, via interactions with non-school activities (books, television), and, powerfully, by peers. There are many opportunities for parents and educators to mould dispositions that aid rather than hinder learning, such as developing the child's willingness to engage in learning, the degree that a child aims to enhance his or her reputation that can be gained from being engaged in learning, helping the child attribute success to factors such as effort rather than ability, and developing in the child a positive attitude towards learning. These positive attitudes of openness to experience, willingness to invest in learning, and intellectual engagement can be fostered in preschools, and then developed to a particularly high level in our schools—providing we can ensure that tasks are appropriately challenging to students, and that success is attributed to their investment in the tasks. This can then lead to a sense of reputation enhancement—students derive a sense of self and reputation among peers that they are "learners" (Carroll, Hattie, Durkin & Houghton, 2001). Therein lies success. Such personal dispositions can have a marked impact on the outcomes of schooling.

As will be shown in Chapter 9, having and sharing challenging goals/learning intentions with students is a major condition of successful learning, but on top of this it helps considerably if students share a commitment and sense of engagement to these goals. Many meta-analyses of the effects of intention on behavior have shown that intentions accounted for 28 percent of the variance of behavior, and is highest when students possess actual control over the behavior (e.g., Armitage & Conner, 2001, $d = 0.24$; Hausenblas, Carron, & Mack, 1997, $d = 0.23$; Milne, Sheeran, & Orbell, 2000, $d = 0.20$; Sheeran, 2002, $d = 0.27$; Webb & Sheeran, 2006, $d = 0.29$ between intentions and behavior change). Working towards appropriately challenging goals requires many attributes, such as commitment, engagement, openness to experience, and a desire to seek a reputation among peers as a learner. Levin (1988) has often argued that one of the most powerful predictors of health, wealth, and happiness in adult life relates more to the number of years in schooling than to achievement. Hence, a major goal of schools should be to *turn us on* to learning (irrespective of where we fall on the achievement ladder) and to assist us to be open to new experiences in learning.

There are many ways to entice engagement in learning. Steinberg, Brown and Dornbusch (1997) have argued that no manner of school reform will be successful until we first face and resolve the engagement problem—and they note that this is not merely an educational problem, but is "a more general barometer of adolescent malaise" (Steinberg, Brown & Dornbusch, 1997, p. 63). Too many students are "physically present but psychologically absent" (p. 67). Part of the problem is that students can be confused (cannot keep up, or classes are too difficult), also so many are bored (too easy, too few consequences of the learning). When one adds Nuthall's (2005) finding that most of the material taught in a class is already known by the students, and Yair's (2000) claim that students spend 85 percent of their time listening (or pretending to listen) to a teacher talking, then we make it difficult to foster engagement (see also Sirotnik, 1985). We need, claims Steinberg, better indicators of success, more challenging material, higher expectations, and more successful ways to orient students to succeed in school rather than merely helping students avoid the negative consequences of failing to graduate.

The home

Influences from the home on student learning include:

- parental expectations and aspirations for their child;
- parental knowledge of the language of schooling.

The home can be a nurturing place for the achievement of students, or it can be a toxic mix of harm and neglect with respect to enhancing learning. Many parents, however, begin with positive expectations for their children, and these expectations can be critical to the success of children when they go to school. A major concern, however, is the extent to which parents know how to "speak the language of schooling" and thus can advantage their children during the school years; some do not know this language and this can be a major barrier to the home contributing to achievement and to the realization of parents' expectations for their children (Clinton, Hattie, & Dixon, 2007). Schools have an important role in helping parents to learn the language of schooling so that the parents can provide every possible assistance to their children in terms of developing the child's learning and love of learning, and in creating the highest possible shared expectations for learning.

The school

School effects include:

- the climate of the classroom, such as welcoming errors, and providing a safe, caring environment;
- peer influences.

The effects of schools too often are overplayed—particularly in developed countries. Take two students of similar ability; in many developed countries it matters not which school they attend. Many of the school effects are structural (e.g., architecture of school, timetabling differences) or working conditions (e.g., class size; tracking, or streaming, of classes; school finances). Of course these are important, but they do not define the differences in student achievement: they are among the least beneficial influences on student achievement. That has not stopped these structural and working conditions becoming the most discussed issues in education.

Indeed, one of the fascinating discoveries throughout my research for this book is discovering that many of the most debated issues are the ones with the least effects. It is a powerful question to ask why such issues as class size, tracking, retention (that is, holding a student back a grade), school choice, summer schools, and school uniforms command such heated discussion and strong claims. Such cosmetic or "coat of paint" reforms are too common. So many structural claims involve the parents (more homework), lead to more rules (and therefore more rule breakers), have hints of cultural imperatives (quietness and conformity is desired), and often include appeals to common sense (reducing class size is obviously a good thing!). However, the most powerful effects of the school relate to features *within* schools, such as the climate of the classroom, peer influences, and the lack of disruptive students in the classroom—all of which allow students and teachers to make errors and develop reputations as learners, and which provide an invitation to learn.

Purkey (Novak, & Purkey, 2001; Purkey, 1992) has built a theory, known as "Invitational Learning", which works from the meaning of invitational as "offering something beneficial for consideration". His claim is that we need to create schools that invite, or cordially summon students to be involved in the learning process. The model is based on four propositions:

1 trust, in that we need to convince not coerce others to engage in what we would like them to consider worthwhile activities;
2 respect, in that we adopt caring and appropriate behaviors when treating others;
3 optimism, in seeking the untapped potential and uniqueness in others;
4 intentionality, in which we create programs by people designed to invite learning.

This is not "niceness" at work, but an approach that places much reliance on the teachers and schools to make learning exciting, engaging, and enduring. Where there are school differences, it is these types of effects that are the most powerful.

The teacher

The teacher contributions to student learning include:

- the quality of teaching—as perceived by the students;
- teacher expectations;
- teachers' conceptions of teaching, learning, assessment, and the students—this relates to teachers' views on whether all students can progress and whether achievement for all is changeable (or fixed), and on whether progress is understood and articulated by teachers;
- teacher openness—whether teachers are prepared to be surprised;
- classroom climate—having a warm socio-emotional climate in the classroom where errors are not only tolerated but welcomed;
- a focus on teacher clarity in articulating success criteria and achievements;
- the fostering of effort;
- the engagement of all students.

The current mantra is that *teachers make the difference*. As noted above, this message, like most simple solutions, is not quite right—it is some teachers undertaking certain teaching acts with appropriately challenging curricula and showing students how to *think* or *strategize* about the curricula. 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.

A most critical aspect contributed by the teacher is the quality of their teaching as perceived by the students. Irving (2004) created a student evaluation of high school mathematics teachers based on the National Board for Professional Standards for this domain (www.nbpts.org). After completing a study on the psychometrics of the instrument in New Zealand, he then located a cohort of American teachers who had passed National Board Certification in high school mathematics, and a comparable group who had not passed. He administered student evaluations to both groups. The students were accurate

judges of excellence, and could discriminate between teachers who were experienced and expert from those who were experienced and non-expert. The dimensions that contributed most to this discrimination had a focus on cognitive engagement with the content of the mathematics curriculum, and the development of a mathematical way of thinking and reasoning. It is what teachers get the students to do in the class that emerged as the strongest component of the accomplished teachers' repertoire, rather than what the teacher, specifically, does. Students must be actively involved in their learning, with a focus on multiple paths to problem solving. As mathematical thinkers and problem solvers, the students are also encouraged to go beyond the successful solution of the problem to include the interpretation and analysis of the solution. All the while, students are encouraged to greatly value mathematics and the work that they do in mathematics, and always check the quality of their work to strive for the very best standards. As Irving argued, we should not overlook those who are arguably in the best position to evaluate the teachers—the students who share the classroom with the teacher day in and day out. The myths that students are capricious, and that they are likely to award their teachers high grades was not supported by this research (Irving, 2004). High ratings were not awarded lightly (Bendig, 1952; Tagomori & Bishop, 1995).

There is quite a jump down in the size of the effects to the next contributions related to the teacher: their expectations and their conceptions of teaching. As children are born into a world of expectations, similarly they walk into classrooms with their own expectations to confront teachers who also have expectations of them. Teachers also walk into classrooms with conceptions of teaching, learning, assessment, and the students. We need to better understand these conceptions as it seems they are powerful moderators of the success of these teachers. Having low expectations of the students' success is a self-fulfilling prophecy and it appears that expectations are less mediated by between-student attributes (e.g., gender, race) but held for all students in the teacher's class (Rubie-Davies, 2006, 2007; Rubie-Davies, Hattie, & Hamilton, 2006; Weinstein, 2002). What matters are conceptions of teaching, learning, assessment, and teachers having expectations that *all* students can progress, that achievement for *all* is changeable (and not fixed), and that progress for *all* is understood and articulated. It is teachers who are open to experience, learn from errors, seek and learn from feedback from students, and who foster effort, clarity, and engagement in learning.

The curriculum

Aspects relating to the curriculum that have an influence on student learning include:

- developing a curriculum that aims for the best balance of surface and deep understanding;
- ensuring a focus on developing learning strategies to construct meaning;
- having strategies that are planned, deliberate, and having explicit and active programs that teach specific skills and deeper understanding.

It appears from the many studies reviewed in the subsequent chapters that the major influences on achievement cross curriculum boundaries—the more important attribute is the balance of surface or deep understanding within each curriculum subject, which leads to conceptual clarity. The facility to develop a series of learning strategies for assisting

students to construct meaning from text, develop understanding from numbers, and learn principles is important. These strategies must be planned, deliberate, and explicit, and there need to be active programs to teach specific skills and deeper understanding in the subject areas. Such strategies can then lead to further engagement in the curriculum, leading to the development of problem solving skills, and to the enjoyment of some control over one's learning. This then leads to further developing learning strategies to master content and understanding. A key feature is that many of these strategies can only be enhanced within a domain of knowledge and there can be little transfer (Hattie, Biggs, & Purdie, 1996). This is particularly the case when learning deeper understanding and developing conceptual understanding.

Teaching approaches

Aspects of teaching approaches that are associated with student learning include:

- paying deliberate attention to learning intentions and success criteria;
- setting challenging tasks;
- providing multiple opportunities for deliberative practice;
- knowing when one (teacher and student) is successful in attaining these goals;
- understanding the critical role of teaching appropriate learning strategies;
- planning and talking about teaching;
- ensuring the teacher constantly seeks feedback information as to the success of his or her teaching on the students.

The model of teaching and learning articulated throughout this chapter is based on having specific learning intentions and success criteria, as these frame the degree of challenge, the purpose, and the goals of the lesson. The common themes in what makes various strategies successful are the stipulation of planning, and in particular teachers talking with other teachers about teaching and planning, deliberate attention to learning intentions and success criteria, and a constant effort to ensure teachers are seeking feedback information as to the success of their teaching on their students. This can be enabled when teachers critically reflect on their own teaching using classroom-based evidence, and it can be maximized when teachers are in a safe and caring environment among colleagues and talking about their teaching.

Concluding comments

Teachers need to be actively engaged in, and passionate about, teaching and learning. They need to be aware of, and update their conceptions and expectations of students, and be directive, influential, and visible to students in their teaching. Teachers need to provide students with *multiple* opportunities and alternatives for developing learning strategies based on the surface and deep levels of learning leading to students building constructions of this learning. What is required are teachers who are aware of what individual students are thinking and knowing, who can construct meaning and meaningful experiences in light of this knowledge, and who have proficient knowledge and understanding of what progression means in their content to provide meaningful and appropriate feedback.

Teachers need to know the learning intentions and success criteria of their lessons,

know how well they are attaining these criteria for all students, and know *where to go next* in light of the gap between current students' knowledge and understanding and the success criteria. Teachers are successful to the degree that they can move students from single to multiple ideas then to relate and extend these ideas such that learners construct and reconstruct knowledge and ideas. It is not the knowledge or ideas, but the learner's construction of the knowledge and ideas that is critical. Increases in student learning follow a reconceptualization as well as an acquisition of information.

Enhancing learning also needs school leaders and teachers who can create school, staff-room, and classroom environments where teachers can talk about their teaching, where errors or difficulties are seen as critical learning opportunities, where discarding incorrect knowledge and understandings is welcomed, and where teachers can feel safe to learn, re-learn, and explore their own teaching knowledge and understanding. Teachers must be able to openly discuss the three key feedback questions: "Where are they going?" "How are they going?" and "Where to next?" (The "they" refers to both the teacher and to the student.)

It is also what learners *do* that matters. So often learners become passive recipients of teachers' lessons, but as the meta-analyses throughout this book will demonstrate, the aim is to make students active in the learning process—through actions by teachers and others—until the students reach the stage where they become their own teachers, they can seek out optimal ways to learn new material and ideas, they can seek resources to help them in this learning, and when they can set appropriate and more challenging goals. Students need to be involved in determining success criteria, setting higher expectations, and being open to experiences relating to differing ways of knowing and problem solving. This then leads to their development of beliefs and reputations as a learner, and engaging in self-assessing, self-evaluating, self-monitoring, self-learning, and in learning the surface, deeper, and conceptual domains of worthwhile domains. Kember and Wong (2000) distinguished between active and passive students, and how they perceive good teaching. They found that passive learners preferred teachers who were organized, had clarity of structure, and could specify clear learning objectives, whereas active learners preferred teachers who promoted interaction in class, used a variety of teacher approaches, and displayed high levels of enthusiasm. An aim of schooling should be to maximize the number of active learners, but this requires teachers who can see learning through the eyes of their students and thence know how to engage them in learning that leads to these attributes.

As noted earlier, it is essential to have visible teaching and visible learning. This notion encapsulates directive, activating, and involved sets of actions and content, working with students so that their learning is visible such that it can be monitored, feedback provided, and information given when learning is successful. Fenstermacher and Soltis (2004) imagined the teacher as an executor, using the best learning skills and techniques available to bring about the process of learning. This is similar to the proposal by Salomon and Perkins (1989) that active learning and deep-level processing are central to success and transfer of information; or similar to the claims by Sheerens and Bosker (1997), who concluded that "it seems that highly structured learning or direct teaching, which emphasizes testing and feedback, again emerges as the most effective teaching form" (p. 219). They claimed that for transfer to occur there needs to be deep-level, connected knowledge structures – that is, knowing and understanding needs to be "conceptually deep, cohesive, and connected to other key ideas, relevant prior knowledge, multiple representations, and everyday experience" (Pugh & Bergin, 2006, p. 148). This is particularly powerful when students know

what they know and what they do not know (the meta-cognitive awareness) and when they apply cognitive processing and meta-cognitive strategies. Motivational factors influence the success of learning due to the higher levels of engagement that thence promote these learning strategies.

The major argument is that when teaching and learning is visible, there is a greater likelihood of students reaching higher levels of achievement. It involves an accomplished teacher who knows a range of learning strategies to build on the students' surface, deep knowing and understanding, and conceptual understanding. The teacher needs to provide direction and re-direction in terms of the content being understood and thus maximize the power of feedback, and to have the skill to get out of the way when learning is progressing towards the success criteria. It also requires a commitment to seeking further challenges (for the teacher and for the student)—and herein lies a major link between challenge and feedback, two of the essential ingredients of learning. The greater the challenge, the higher the probability that one seeks and needs feedback, and the more important it is that there is a teacher to ensure that the learner is on the right path to successfully meet the challenge.