

Visible Learning by John Hattie (2009) **Summary by Gerry Miller (North Tyneside EAZ Consultant)**

John Hattie is Professor of Education at the University of Auckland, New Zealand. This summary also refers to *Self-Theories: Their Role in Motivation, Development & Personality* by Carol Dweck (2000) and Jo Boaler's work on setting and social class.

Introduction

Visible Learning is the result of 15 years' research and syntheses over 800 meta-analyses (over 50,000 studies) relating to the influences on achievement in school-aged students. It presents the largest ever collection of evidence-based research into what actually works in schools to improve learning.

The main contributors that influence achievement are classified as the student, home, school, curricula, teacher and teaching strategies. A model of teaching and learning is developed based on the notion of visible teaching and visible learning.

A major message of the book is that what works best for students is similar to what works best for teachers. This includes an attention to setting challenging learning intentions, being clear about what success means and an attention to learning strategies for developing conceptual understanding about what teachers and students know and understand.

New Zealand ranks in the top half-dozen nations in reading, mathematics and science and has a high proportion of excellent teachers, who are seeking to always improve and constantly monitor their performances to make a difference to what they do; and many inspire the love of learning that is one of the major outcomes of any school.

Visible Learning identifies what it is these excellent teachers do to positively influence student achievement.

Although the current evidence-based fad has turned into a debate about test scores, Visible Learning is about using evidence to build and defend a model of teaching and learning.

The Challenge

In the past there have been difficulties in summarizing and comparing the huge amount of research into educational methods and "what works" in schools. The vast majority of innovations or strategies can be said to "work" because they can be shown to have a positive effect. But a student left to work on his own, without a teacher, would be likely to show improvement.

In 1976 Gene Glass introduced the notion of **meta-analysis** – whereby the effects in each study, where appropriate, are converted to a common measure (**an effect size**), such that the overall effects could be quantified, interpreted, and compared, and the overall moderators of this overall effect could be uncovered and followed up in more detail.

John Hattie uses these effect sizes to allow us to make a much more sophisticated judgment on what is really making an impact on student learning and achievement.

The nature of the evidence and effect sizes

Hattie looks at 138 different influences on student achievement and places the major results from thousands of research studies along a continuum of effect sizes, ranging from $d = -.34$ to $d = 1.44$.

What do these effect sizes mean?

An effect size of $d = 1.0$ indicates an increase of one standard deviation on the outcome – in this case the outcome is student achievement. A one standard deviation increase is typically associated with advancing children's achievement by two to three years or improving the rate of learning by 50%. When implementing a new program, an effect size of 1.0 would mean that, on average, students receiving that treatment would exceed 84% of students not receiving that treatment.

Hattie's work is based on educational innovations. Research shows that these can be expected to have an average effect size of 0.4 (the "hinge point"). Innovations tend to capture the enthusiasm of the teacher and the excitement of the students attempting something new. So very few innovations have no positive effect at all. It is not unreasonable to claim that at least half of all implementations, at least half of all students, and at least half of all teachers can and do attain an effect size of $d = 0.4$ as a consequence of their actions. Therefore when analysing effects, we can say that anything with an effect size of over 0.4 is likely to be having a visible, positive effect. To put it another way, an effect size of 0.2 or less is low, 0.4 is medium and 0.6 or more is high.

Caveats

1. There are many outcomes of schooling, such as attitudes, physical outcomes, belongingness, respect, citizenship and the love of learning. This book focuses on achievement and that is a limitation of this review.
2. The most successful outcomes come from innovations, and these effects from innovations may not be the same as the effects of teachers in regular classrooms – the mere involvement in asking questions about the effectiveness of any innovation may lead to an inflation of its effects.
3. We need to be careful about drawing too definite a conclusion from an effect size without examining the study. For example, homework is shown to have an overall effect size of 0.29, which is low and well below the average of 0.40. But when you look more closely, you find that primary students gain least from homework ($d = 0.15$) while secondary students have greater gains ($d = 0.64$).

The art of teaching

On the other hand, Hattie has the educational expertise to put these studies into context. For example **he summarises the art of teaching thus:**

“...the act of teaching reaches its epitome of success after the lesson has been structured, after the content has been delivered, and after the classroom has been organised. The art of teaching, and its major successes, relate to “what happens next” – the manner in which the teacher reacts to how the student interprets, accommodates, rejects and/or reinvents the content and skills, how the student relates and applies the content to other tasks, and how the student reacts in light of success and failure apropos the content and methods that the teacher taught. Learning is spontaneous, individualistic, and often earned through effort. It is a timeworn, slow, gradual, fits-and-starts kind of process, which can have a flow of its own, but requires passion, patience, and attention to detail (from the teacher and the student)”.

Quality feedback

A key finding of the study is that the **most powerful single influence enhancing achievement is feedback**. But again we need to be careful with this information. Does this mean that we need to give children more and more feedback to raise their achievement? No! **What is needed is quality feedback and where that feedback has the greatest effect is when teachers receive more and better feedback about their teaching**, and then the ripple effect back to the student is high (Hattie & Timperley, 2007).

The six main contributors that influence achievement: the student, home, school, curricula, teacher and teaching strategies.

1. The Student

The child brings prior knowledge of learning to their classroom – from pre-school, from their culture, from television, from home and from the previous year. Much of this prior learning leads to expectations by students and teachers about learning. These expectations are powerful enhancers of - or inhibitors to – the opportunities provided in schools. By the age of eight, most students have worked out their place in the rankings of the achievement equation. Indeed, Jo Boaler’s research has shown that 80% of children who are placed in an ability grouping at age 5 will stay in the same grouping throughout their schooling.

Self-reported grades: effect size 1.44 (Rank 1/138 P43)

This, the highest recorded influence in the study, simply means that students predict their performance – usually accurately – on their past achievement. If these predictions are too low – and often both students and teachers’ expectations will, on past performance, predict too low, then limits will be set on what is achievable.

On a more positive note, if students are genuinely involved in setting goals and short or medium term targets (ie success criteria) that they believe will help them reach these goals, then their predictions and achievement is very likely to be higher. Carol Dweck's work on fostering a Growth Mindset (Self-Theories: their role in motivation, achievement and development, 2000) indicates that many students see their intelligence – and consequently their future achievement – as a fixed entity (Fixed Mindset), rather than something that can grow and develop (Growth Mindset). If teachers and students work together to adopt a Growth Mindset, then the self-fulfilling low expectations of students (and teachers) can be raised, sometimes dramatically.

Self-concept; effect size 0.43 (Rank 60/138 P46)

Teachers often make claims about the relationship between self-concept and achievement; the common claim being that high achievers have high self-concept and that it is one of their teaching roles to make students feel good about themselves. Such claims presuppose a strong relationship between perceptions of self and achievement. Hansford & Hattie (1982) found a low, but positive ($r = 0.20$) relationship.

The relation between **self-efficacy and achievement**, however, is among the strongest of self-measures (Multon, Brown & Lent 1991). Hattie's summary here bears a strong similarity to **Carol Dweck's theory of self-efficacy**. Hattie says:

“...it is more likely that there are stronger relationships between certain self-strategies and achievement. Achievement is more likely to be increased when students invoke learning rather than performance strategies, accept rather than discount feedback, benchmark to difficult rather than easy goals, compare themselves to subject criteria rather than to other students, possess high rather than low efficacy to learning, and affect self-regulation and personal control rather than learned helplessness in the academic situation.”

Speaking at the Centre for Confidence in Glasgow in September 2008, **Carol Dweck** referred to **the important difference between self-esteem and self-efficacy**. She made the following points:

- Private education buys “**empty self-belief**” of confidence of superiority over others
- **Fixed Mindset self-esteem** is about feeling good about yourself, often in relation to the perceived lower achievement of others
- **Growth Mindset self-esteem** is about having the courage & determination to address weaknesses
- **Confidence & self-efficacy** comes from **mastery of problems through resilience**, not from false self-esteem
- **Growth Mindset Teacher**: “I am not interested in judging how good your work is, I am interested in the quality of your learning”

Hattie suggests that teachers would have more success if they addressed students' low self-efficacy before trying to raise their achievement. **Dweck** shows how to do this by promoting a Growth Mindset in the classroom.

Motivation; effect size 0.48 (Rank 51/138 P47)

There is much value anticipating when student motivation is at its highest. Dörnyei (2001) noted that motivation is highest when students are competent, have sufficient autonomy, set worthwhile goals, get feedback, and are affirmed by others. He also challenged educators to seriously consider student demotivation, caused by, for example, public humiliation, devastating test results, or conflicts with teachers or peers. I would add to this list ability grouping *with very little chance of promotion*.

In her paper “The ‘Psychological Prisons’ from which they never escaped: The role of ability grouping in reproducing social class inequalities.” Jo Boaler, of Stanford University interviewed young adults about their experience of Maths setting at High school.

The adults from set 1 were happy with their grouping but aware that it had shaped their whole experience, those from set 2 downwards talked not only about the ways their attainment had been constrained by the grouping but also the ways they had been set up for low attainment in life. One of the young men from Amber Hill spoke eloquently about the setting experience:

“You’re putting **this psychological prison** around them (...), it’s kind of... people don’t know what they can do, or where the boundaries are, unless they’re told at that kind of age.”

“It kind of just breaks all their ambition ... particularly schools like *Amber Hill* where it’s predominantly working-class kids whose parents don’t necessarily have the ambition *for* them. And then if it’s being reinforced in the classroom with kind of “yes you’re going to be a labourer for the whole of your life” then it means they can’t break out of that box. It’s quite sad that there’s kids there that could potentially be very, very smart and benefit us in so many ways, but it’s just kind of broken down from a young age. So that’s why I dislike the set system so much—because I think it almost formally labels kids as stupid.” (Nikos, ex-Amber Hill student).system so much—because I think it almost formally labels kids as stupid.” (Nikos, ex-Amber Hill student).

In another paper, Setting, Social class & Survival of the Quickest, British educational Research Journal, 1997, she found that:

- There was no evidence that setting raised achievement
- But there was evidence that setting diminished achievement for some students
- There was much evidence that the students who were disadvantaged by this system were predominantly **working class, female or very able**.

She also found that students in the top set could also sometimes be seriously disadvantaged by ability grouping.

“In set 1 for example, the students who experienced the most difficulties in response to setting were originally the highest attainers in the group. At the end of Y8, immediately before the students were setted, Carly & Lorna attained the highest and second highest NFER scores in the school. At the end of Y11 these two students achieved the lowest GCSE grades in set 1 (grade E)”

Carol Dweck does not advocate mixed ability, but, like John Hattie, warns of the dangers of setting on motivation and self-concept. In her research she has found that high achieving girls can suffer badly if they have a Fixed Mindset, due to the blow to their fragile self-esteem caused by suddenly finding themselves struggling in a top set, whereas previously they have seen themselves as achieving well in relation to their peers.

A key problem in many secondary schools is that high sets tend to be large (28-32 students) while low sets tend to be smaller. This is often because the top sets present fewer classroom management problems. The problem with this is that it makes it very difficult to promote students to the top set as it is often full and teachers are reluctant to demote students. If there is not regular movement between sets, students will quickly decide that they have been labelled as “set 3” or “set 5” students and will not be motivated to improve their performance.

Section 2 – Home

Contributions from the Home

Socioeconomic Status (SES) (d = 0.57 rank 32/138 P61)

The three main factors are parental income, parental education, and parental occupation. SES is more important at the school than at the individual level. One of the ways this influence is manifested is that schooling introduces a *language* and set of cultural norms with which many parents, particularly those from lower SES families, are not familiar.

A major study of five of the lowest SES schools in New Zealand (Clinton, Hattie & Dixon, 2007) found major benefits when teaching parents the language of schooling. Strategies included giving families computers and employing former teachers as home – school liaison officers. These people helped parents learn how to assist their children to attend and engage in learning, and to speak with teachers and school personnel.

Home environment (d = 0.57 rank 31/138 P66)

The home environment measures the socio-psychological environment and intellectual stimulation at home. Iverson & Walberg (1982) suggested that achievement is more closely linked to the socio-psychological environment than to parents' occupation and education. Gottfried (1984) found that the most consistent and highly correlated factors with achievement were maternal involvement, variety and play materials. This links with Howard Sharron's "Changing Children's Minds", which stresses the key strategy of personal mediation by teachers, when they are working with children who have suffered deprivation or trauma in their home environment.

Television (d = -0.18 rank 137/138 P67)

The overall effects of television on achievement are small, but negative. However the range of viewing times had different effects. There were slightly positive effects for viewing times of up to 10 hours per week, while over 10 hours had a negative effect and over 35 hours unsurprisingly having a more negative effect.

Parental involvement in Learning (d = 0.51 rank 45/138 P68)

There is much variance in the influence of parental involvement. There are negative effects when parents' involvement comprises a surveillance approach, lower effects relating to parental involvement in early intervention, and much higher effects relating to parental aspirations and expectations and when parents take a more active approach in learning.

Hong & Ho (2005) **concluded that parent expectations were the most important influence on their children's achievement**, whereas parental supervision in the forms of monitoring homework, time watching television, and time going out with friends appeared to have a negative effect on the educational aspirations of students.

Concluding comments

Across all home variables, parental aspirations and expectations for children's educational achievement has the strongest relationship with achievement (d = 0.80). These expectations are more powerful than many of the structural factors of the home, eg single or two parent families, resident or non-resident fathers, divorced parents, adopted or non-adopted children.

Section 3 The School

The contributions from the school

In the developed world the highest proportion of variation in student achievement lies within schools, rather than between schools. Willms (2000) concluded that "the pressure and support for change needs to be directed at particular teachers within schools, not simply at entire schools".

The situation is quite different in less resourced nations (eg throughout Africa) where most variability is between schools.

Attributes of schools

Finances (d = 0.23 rank 99/138 P73)

Although the meta-analyses would seem to indicate that money does not matter, this would be a misleading conclusion. While Hanushek (1989) and other studies have found no consistent statistical relation between educational expenditure and measures of student performance, Hattie found that the problem seems to be that so often money is added into the educational system with little attention to the efficiency or effectiveness of education outcomes.

Greenwald et al (1996) found that we can expect "...comparable and substantial increases in achievement if resources were targeted to selecting (and retaining) more educated or more experienced teachers". Hattie, on the other hand, says there is little evidence to justify "substantial", but agrees with the importance of the teacher (and costs associated with enhancing teaching). In his paper _____(expert teachers) he explains that it is not experienced teachers that make the difference, but **expert teachers – and he explains in detail what he means by expert teachers.**

Mobility (d = -0.34 rank 138/138 P81)

The effect of mobility between schools is quite marked. Transience, or mobility across schools, has become a major trend in recent decades. In New Zealand, 40% of students change schools each year (partly caused by 3 tier system) and in USA 20% change residence each year. The effects of such mobility on reading and maths are negative (Mehana, 1997, $d = -0.27$ vs $d = -0.22$).

The reasons for this decline may be many, but a most important cause relates to peer effects. Galton & Willcocks (1983) found every change of school caused negative effects. They noted typically that there were problems with friendship patterns, particularly friendships to support learning. Following transition the key factor is whether a child makes a friend in the first month (Galton, 1995; Pratt & George 2005).

Principals and school leaders (d = 0.36 rank 74/138 P83)

Bearing in mind that Hattie focuses on the influence of principals on students, there is an important moderator in the meta-analyses relating to the type of principal leadership.

Hattie specifies two major forms of leadership: **instructional leadership and transformational leadership.**

Instructional leadership refers to those principals who focus on creating a learning climate free of disruption, a system of clear learning objectives and higher expectations for teachers and students.

Transformational leadership refers to those principals who engage with their staff in ways that inspire them to new levels of energy, commitment, and moral purpose such that they work collaboratively to overcome challenges and reach ambitious goals.

The evidence from the meta-analyses supports the power of the former over the latter in terms of the effects on student outcomes.

For example Brown (2001) found the effects were greater on instructional leadership dimensions (eg organization, $d = 0.66$) than from transformational leadership (consideration $d = 0.36$, inspiration $d = 0.40$). The effects were much higher at the elementary level ($d = 0.76$) than for middle ($d = 0.36$) and high ($d = 0.44$).

Robinson, Lloyd and Rowe (in press) found that instructional leadership effects ($d = 0.55$) were much greater than transformational leadership ($d = 0.09$). **Specific dimensions of instructional leadership that had greatest effect on student outcomes** were promoting and participating in teacher learning and development ($d = 0.91$); planning, co-ordinating and evaluating teaching and the curriculum (eg direct involvement in the support and evaluation of teaching through regular classroom visits and provision of formative and summative feedback to teachers) ($d = 0.74$); strategic resourcing (aligning resource selection and allocation to priority teaching goals $d = 0.60$); establishing goals and expectations ($d = 0.54$) and ensuring an orderly and supportive environment, both inside and outside the classroom ($d = 0.49$).

Class size (d = 0.21 rank 106/138 P.85)

Meta-analyses consistently show that there is little gain in student achievement from reducing class size. 164 studies between 1980 and 2005 on the effects of reducing class size from 25 to 15 produced an average effect size of $d = 0.13$ (P.87)

One reason for these small effect sizes relates to teachers of smaller classes using the same teaching methods as they were using with larger classes and thus not optimizing the opportunities provided by having fewer students. Many of the more powerful

influences on student learning described in this book could be more effective if the class size was smaller. There could be more (and better) feedback, more interaction with (and between) students, more diagnosis and so on.

Ability Grouping (d= 0.12 rank 121/138)

The meta-analysis studies have summarised more than 300 studies, covering a wide variety of schooling cultures and experiences across all age ranges. The outcomes can be broadly grouped into achievement effects and equity effects. The latter address the question of whether the gains or losses from ability grouping are uniformly distributed across various sub-groups (eg minority vs majority groups or different socio-economic backgrounds). The results show that ability grouping has minimal effects on learning outcomes and profound negative equity effects. The overall effects on Maths and reading were similarly low (reading $d = 0.00$, maths $d = 0.02$), the effects on self-concept were close to zero, and effects on attitudes to subject matter slightly higher ($d = 0.10$). The overall effects for high ability groups were $d = 0.14$, middle ability $d = -0.03$ and low ability $d = 0.09$.

In a study of 25 Junior and Senior High Schools, Oakes et al (2005) found that in most cases ability grouping fails to foster the outcomes schools value. She found that ability grouping fosters friendship networks linked to students' group membership, and these peer groups may contribute to polarized attitudes among high school students, with higher ability students becoming more enthusiastic and lower ability students more alienated. Oakes et al also commented that ability grouping limits "students' schooling opportunities, achievements and life-chances. Students not in the higher tracks (ability groups) have fewer intellectual challenges, less engaging and supportive classrooms and fewer well-trained teachers". In the UK league tables and targets for GCSE scores, based on C grades or above, would be likely to disadvantage lower ability groups.

Hattie concludes that if more lower ability classes were more stimulating, challenging and taught by well trained teachers with high expectations, there may be gains for these students; there are not. As usual the quality of teaching and the nature of student interactions are the key issues.

Carol Dweck comes to much the same conclusion, emphasising the importance of building students' belief in their ability to improve their intelligence and performance at any stage. Being stuck in a low ability group with no prospect of promotion can only have the reverse effect (see Jo Boaler c/f).

Refer to earlier section on Motivation (P4-5 of summary)

Within Class Grouping (d = 0.16 rank 116/138 P93)

Within class ability grouping has a similar effect to ability grouping. Kulik and Kulik (1992) found that the effect size for students in higher ability groups were $d = 0.29$, for medium-ability groups 0.17 and for lower ability groups $d = 0.21$. So once again the middle groups performed worse.

One meta-analysis (Lou et al 1996) found that effects varied according to class size. In large classes (35+ students) the effect of grouping is $d = 0.35$, whereas in small classes (less than 26) the effect is $d = 0.22$ and in medium-sized class it is $d = 0.06$.

Retention (d = -0.16 rank 136/138 P97)

Retention, or making low achieving students repeat a year, is one of the few areas where it is difficult to find a single study with a positive effect. The effect on attendance was even more marked, $d = -0.65$ and retention almost doubled the likelihood of a student dropping out of school (Foster, 1993).

School Curricula effects for gifted students

The curricula effects in this section relate to differential curricula experiences for gifted students within schools, such as ability grouping for gifted students, acceleration & enrichment.

Ability Grouping for Gifted Students (d = 0.30 rank 87/138 P99)

This is different from high ability groups and involves specific curricula aimed at challenging students at the appropriate level. This means there is more likelihood of success in engagement and learning.

Acceleration (d = 0.88 rank 5/138 P100)

An alternative to special classes for gifted children is to accelerate students through the curricula: “Accelerated instruction enable bright students to work with their mental peers on learning tasks that match their abilities” (Kulik and Kulik, 1984). A number of studies have found significant gains in achievement from acceleration, which consistently outperforms enrichment.

Hattie wonders why, if acceleration is so successful, it is one of the least used methods for gifted students. Levin (1988) asked, if acceleration is so beneficial for gifted students, why could it also be used with non-gifted students? Evidence on this question is, as yet, limited from a meta-analysis point of view.

Enrichment (d = 0.39 rank 68/138 P101)

Enrichment involves activities meant to broaden the educational lives of some groups of students (usually gifted).

Wallace (1989) found that teachers’ experience was a key factor here, with those with several years of teaching gifted students having greater effects ($d = 0.88$) than those with no or limited experience ($d = -0.06$)

Classroom Influences – Climate of the Classroom

Classroom Management (d = 0.52 rank 42/138 P 102)

The overall positive effect of a well-managed classroom is not surprising. What is more, some aspects of classroom management can be seen to boost achievement even more, eg:

- Teacher’s ability to identify and act quickly on potential problems $d = 1.42$
- Teacher retaining emotional objectivity $d = 0.71$
- Effective disciplinary interventions $d = 0.91$
- Group contingency strategies (ie behaviour targets) $d = 0.98$
- Tangible recognition of appropriate behaviour $d = 0.82$
- Direct and concrete consequences for misbehaviour $d = 0.52$

Teacher-student relationships were powerful moderators of classroom management ($d = 0.87$)

Group Cohesion (d = 0.53 rank 39/138 P 103)

The major effect identified by the meta-analyses and a key factor in positive classroom climate is classroom cohesion – the sense that all (teachers and students) are working towards positive learning gains in a collaborative way. In situations with greater cohesion it is more likely that there is co-peer learning, tolerance and welcoming of error and thus increased feedback, and more discussion of goals, success criteria, and positive teacher-student and student-student relationships.

Peer Influences (d = 0.53 rank 41/138 P104)

The effect of peers can be considerable, although it is noted how infrequently peers are involved in the teaching and learning process. In our own work we have identified a myriad of ways in which peers can influence learning, such as helping, tutoring, providing friendship, giving feedback, and making class/school a place students want to come to each day (Wilkinson & Fung, 2002).

Levy-Tossman, Kaplan & Assor (2007) demonstrated that for many performance-oriented (or **Fixed Mindset***) students (ie those who focus more on the product or outcome of learning and proving their achievement to others), friendship is not often characterised by intimacy, and thus the concerns with social comparison and impression management may lead to them taking on less challenging tasks to ensure demonstrations of competence; whereas many achievement-oriented (or **Growth Mindset***) students (ie those who focus more on learning as something valuable and meaningful in itself, aiming to master the learning) had more concern for their personal academic development and growth.

** See Self-Theories: their role in motivation, personality and development – Carol Dweck (1999).*

Conclusion

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 pupils in the classroom. Other powerful effects include adapting curricula to be more appropriately challenging (eg through acceleration or differential curricula for gifted students) and having principals who see themselves as instructional leaders.

Section 4 The Teacher

The contributions from the teacher

The current mantra that *teachers make the difference* is misleading. Not all teachers are effective, not all teachers are experts and not all teachers have powerful effects on students. It is teachers' variability in effect that is critical.

In his paper "Distinguishing Expert Teachers from Novice and Experienced Teachers" (2003), John Hattie identified three dimensions that most successfully separated expert teachers from the rest:

- Challenge
- Deep representation
- Monitoring & Feedback

The importance of these dimensions can be seen again in **Quality of Teaching** (below)

He has also described expert teachers as those who meet with colleagues regularly to discuss:

- Evidence of progress of their and their colleagues' students
- How to improve their teaching
- How to change their teaching
- How to do this in the light of evidence that what they are doing at present is not having the effect they you want

Teacher Education (d = 0.11 rank 124/138 P110)

The meta-analyses relating to teacher education show that the effect size on subsequent student outcomes is negligible, although the effect on specific skills is quite high. It seems to be important for student-teachers to be encouraged to shake off pre-conceptions about teaching that they have retained from their own experience, and especially to be encouraged to see teaching through the eyes of their students.

Microteaching (d = 0.88 rank 4/138 P112)

Microteaching is a "laboratory experience" with analysis, reflective teaching and video-taped role-play and typically involves student-teachers conducting (mini-) lessons to a small group of students and then engage in post-discussions about the lessons. This type of experience seems to be the exception rather than the rule for student-teachers.

Quality of Teaching (d = 0.44 rank 56/138 P115)

All the meta-analyses on the relation of the quality of teaching to learning come from student ratings of teachers by college and university teachers. Quality teachers, as rated by students, are those who challenge, who have high expectations, who

encourage the study of their subject, and who value surface and deep aspects of the subject. The lack of student evaluations in elementary and high schools should be a major concern. The visibility of learning from the students' perspective needs to be known by teachers so they can have a better understanding of what learning looks like and feels like for the students.

Hattie also reminds us that the effects of poor teaching can be devastating, not just while the student is in that class, but tend to persist for years to come.

Teacher-Student Relationships (d = 0.72 rank 11/138 P118)

In Russell Bishop's work with Maori students in New Zealand, students, parents, principals and teachers were asked about what influences students achievement. All but the teachers emphasized the relationships between the teachers and the students. The teachers saw the major influence as the child's attitudes and dispositions, their home, or the working conditions of the school – it is the students who are not learning who are somehow deficient. The highest effect sizes for different aspects of teacher-student relationships were non-directivity, empathy, warmth and encouraging higher-order thinking.

Professional Development (d = 0.62 rank 19/138 P 119)

Professional development is likely to change teacher learning (d = 0.90), but these changes have less effect on teachers' actual behaviour (d = 0.60) and teachers' reactions to the PD (d = 0.42) and even less influence on student learning (d = 0.37). The four types of instruction found to be most effective on teacher knowledge and behaviour were:

- Observation of actual classroom methods
- Microteaching (see above)
- Video/audio feedback
- Practice

Higher effect sizes were also found in studies where training groups involved both high school and primary teachers.

Timperley et al (2007) found 72 studies that assessed the effects of PD on student outcomes. They used the effect sizes to ascertain seven themes about what works best in PD:

1. Learning opportunities for teachers occurred over an extended period of time
2. The involvement of external experts was more related to success than within-schools initiatives
3. It was important to engage teachers sufficiently to deepen their knowledge and extend their skills in ways that improved student outcomes.
4. Critically, PD needed to challenge teachers' prevailing discourse and conceptions about learning (when this discourse was problematic, it was usually based on the assumption that some groups of students could not, or would not learn as well as others)
5. Teachers talking to teachers about teaching (involvement in a professional community of practice) was necessary, but not sufficient in itself.
6. PD was more effective when the school leadership supported opportunities to learn, where there was access to relevant expertise, and where opportunities were provided to process new information.

7. Funding, release time, and whether involvement was voluntary or compulsory were unrelated to influences on student outcomes.

Expectations (d = 0.43 rank 58/138 P121)

It is now widely accepted that teachers do form expectations about student ability and skills and that these expectations affect achievement (Dusek and Joseph, 1985). For Hattie the key question is not “Do teachers have expectations?” but “Do they have false and misleading expectations that lead to decrements in learning or learning gains – and for which students?”

Rosenthal and Rubin (1978) looked at interpersonal expectancies (when the experimenter tends to obtain the results that he or she expects) and found a mean effect size of $d = 0.70$ over eight different areas of research. The implication is that teachers are more likely to have their students reach their “expected” outcomes, regardless of the veracity of the expectations. Dusek & Joseph (1983) found that student attractiveness, student prior conduct in class, cumulative folder information and social class were related significantly to teacher expectancies.

Weinstein (2002) has shown that students know they are treated differentially in class due to expectations held by teachers and are quite accurate in informing on how teachers differ in the degree to which they favour some children over others with higher expectations.

Tracking & Mindsets: There are differences in classes where teachers aim to select talent for different pathways (such as schools with tracking) compared with those where achievement cultures aim to develop talent in each child. There are also differences in classes where teachers believe that achievement (and intelligence) is difficult to change because it is fixed and innate compared to teachers who believe achievement (and intelligence) is changeable (Dweck 2006).

“Be prepared to be surprised” seems to be the mantra to avoid negative expectation effects. If teachers and schools are going to have expectations, make them challenging, appropriate & checkable. We should not forget the potentially negative effects of students setting their own low expectations (recall the power of self-reported grades) and not being provided with high levels of confidence that they can exceed these expectations and not only attain but enjoy challenging learning intentions.

Not Labelling Students (d = 0.61 rank 21/138 P124)

Many of the meta-analyses reviewed in this section do not have achievement as an outcome, but do relate to how teachers (and parents) differentiate between special and regular students (and many other labels). The controversy in distinguishing between mentally disabled and non-disabled children is often couched between the developmental and cognitive processing claims. The developmental position is that disabled children pass through cognitive developmental stages in an identical manner but differ in rate and the upper limit of development (Piaget, 1970). The information-processing claim is that they differ in the cognitive processes they use in reasoning. While labels help to “classify” learning-disabled students and can lead to extra funding, rarely do they make a difference to what works best with their learning. Labelling also too often leads to lower expectations.

Teacher Clarity (d = 0.75 rank 8/138 P125)

One of the themes of Visible Learning is how important it is for the teacher to communicate the intentions of the lessons and the notions of what success means for these intentions (success criteria). Fendick (1990) investigated teacher clarity, which he defined as organization, explanation, examples and guided practice, and assessment of student learning – such that clarity of speech was a prerequisite of teacher clarity. The correlation was 0.35 (d = 0.75) and the effects were larger when students, rather than observers, rated the teachers.

Conclusion

We need to talk about quality teachers in terms of what they do and the effects they have on students. Too often we emphasize the personal and professional attributes, but maybe we should to the quality of the *effects of teachers on learning* – so the discussion about teaching is more critical than the discussion about teachers (see Chapters 8 & 9).

Initial Teacher Training Programmes have little impact on how well those teachers influence the achievement of their students. (For details of how these programmes need to be improved, see P127).

Teachers' subject matter knowledge is a conundrum – it is difficult to find evidence that this is important, yet nobody would suggest that teachers should have less! Teachers walk into classrooms with conceptions of teaching, learning, curricula, assessment and their students (Brown, 2004). These factors are powerful moderators on the success of these teachers.

How to invoke higher expectations seems critical, and this may require more in-school discussion of appropriate benchmarks across grades, and seeing evidence of performance before starting the year (Nuthall, 2005, shows half of all material taught in any class is already known by the students). So much of the early part of the year with a different teacher involves trial and error as teachers find out about proficiencies of students. As we have already seen, teacher-student relationships are crucial (d = 0.72) but they take time to develop. Hattie argues that **the greatest single issue facing the further enhancement of students is the need for teachers to have a common perception of progress. When a student moves from one teacher to another, there is no guarantee that he or she will experience increasingly challenging tasks, have a teacher with similar (hopefully high) expectations of progress up the curricula, or work with a teacher who will grow the student from where he or she is, as opposed to where the teacher believes he or she should be at the start of the year.**

To have high expectations and to share a common conception of progress requires teachers to be concerned about the nature of their relationships with their students, as the power of these is critical for learning to occur. Russell Bishop moves around classes in New Zealand, asking students “Does your teacher like you?” He found that most white students said yes, but many ethnic minority students said no. The powerful effect of this work is that, after seeing these results, the teachers are quick to change their practices.

Developing a warmer socio-emotional climate in the classroom, fostering effort and thus engagement for all students, requires teachers to enter the classroom with certain

conceptions about progress, relationships and students. It requires them to believe **that their role is that of a change agent – that all students can learn and progress, that achievement for all is changeable and not fixed, and that demonstrating to all students that they care about their learning is both powerful and effective.**

Section 5

The contribution from the Curricula

Curricula programs: reading

Reading is one of the most contested curricula areas, as so many educationalists have made strong claims as to the best way to teach reading. It is common to polarize the difference as phonics versus whole language and the proponents of each are well heard.

This section summarises 50 meta-analyses on reading research based on over 2000 studies and about 5 million students, with an average effect size of $d = 0.51$, and demonstrates the importance of *gaining a set of learning strategies* to construct meaning from text. This summary of the meta-analyses shows the importance and value of *actively teaching* the skills and strategies of reading *across all years of schooling*. There need to be planned, deliberate, explicit and active programs to teach specific skills. Successful reading requires the development of decoding skills, the development of vocabulary and comprehension and the learning of specific strategies and processes. It is clear that some programs, particularly those based on skills and strategies, are successful, whereas others without such emphases have very minimal effects. Continuing to develop one's proficiency in reading depends on acquiring these skills as well as learning to derive meaning and often enjoyment from the skills of reading.

Reading: visual perception programs ($d = 0.55$ rank 35/138 P.130)

Visual perception refers to the process of organizing and interpreting letters on a page, and is often considered an important aspect of early reading. Kavale and Forness (2000) found that both auditory and visual perception were important predictors of reading for both average students ($d = 0.36$) and students with learning or reading disabilities ($d = 0.38$). There was little difference in accuracy in predicting reading proficiency for many of the auditory and visual perception skills, but it was lower for figure-ground discrimination. Further, the ability to integrate perceptual stimuli appears no more associated with reading ability than individual auditory or visual skills.

Reading: vocabulary programs ($d = 0.67$ rank 15/138 P.131)

Stahl and Fairbanks (1986) found that vocabulary instruction and knowledge of word meanings generally help growth in reading comprehension. A mean effect size of 0.67 indicated that students who experienced vocabulary instruction had major improvements in reading comprehension of passages containing taught words; there was also an effect size of 0.30 for global measures of comprehension. The most effective vocabulary teaching methods included providing both definitional and contextual information, involved students in deeper processing, and gave students more than one or two exposures of the words they were to learn. The mnemonic

keyword method also had positive effects on recall of definitions and sentence comprehension, although one study reported quick fading effects for this method.

Reading: phonics instruction (d = 0.60 rank 22/138 P.132)

“Phonics instruction teaches beginning readers the alphabetic code and how to use this knowledge to read words. In systematic phonics programs, a planned set of phonics elements is taught sequentially. The set includes major correspondences between consonant letters and sounds, short and long vowel letters and sounds, and vowel and consonant digraphs... It may also include blends of letter-sounds that form larger sub-units in words.” (Ehri, Nunes, Stahl & Willows, 2001)

The meta-analysis published by the National Reading Panel (Langenberg et al, 2000) made great play of the power of phonemic awareness in learning to read. They concluded that there are many tasks commonly used to assess and improve phonemic awareness, such as phoneme isolation (what is the first sound in *paste*?); identification (which sound is the same in *bike, bell, boy*?); categorization (recognizing sounds in sequence: *bus bun, rug*); blending (which word is *s/k/u/l*?); segmentation (how many phonemes in *ship*?); and deletion (what word remains when *s* is removed from *smile*?).

The National Reading Panel found an overall effect size on phonological outcomes of $d = 0.86$, on reading outcomes of $d = 0.53$, and on spelling of $d = 0.59$. Teaching that focused on one or two types of phonemic awareness led to larger effects than teaching many more. The effect of phonemic training was still discernable after, on average, 18.5 months. Pre-schoolers seemed to benefit more than elementary school children, with effects decreasing as age increases.

Overall, phonics instruction is powerful in the process of learning to read – both for reading skills and for reading comprehension.

Reading: repeated reading programs (d = 0.67 rank 16/138 P.135)

Repeated reading consists of re-reading a short and meaningful passage until a satisfactory level of fluency is reached. Chard, Vaughn & Tyler (2002) found that the greatest source of variance was the test format – effects from timed tests were larger than from untimed tests, and they argued that this was because timed tests were more likely to assess a student’s capacity to automatically apply word recognition and decoding skills. The skills of automaticity need to be specifically taught, especially to learning disabled students.

Reading: comprehension programs (d = 0.58 rank 28/138 P.136)

Rowe (1985) undertook one of the earliest and largest meta-analyses of reading comprehension research. She found that the effects of these programmes on vocabulary ($d = 1.77$) were greater than on reading comprehension outcomes ($d = 0.70$), and measures using words as the unit of analysis ($d = 1.28$) were greater than when whole texts were used ($d = 0.82$).

Many have argued that words are learned incidentally during reading and this is a major premise of those who argue that reading is best facilitated by a high frequency of reading experiences. However studies show that students learn only about 15% of the unknown words they encounter during normal reading. Older and more able

students learn more word meanings during reading. Thus, if they are a poor reader, it is unlikely they will improve their learning of words just by being asked to read.

Reading: second and third chance programs (d = 0.50 rank 47/138 P.139)

The Reading Recovery program was invented by Dame Marie Clay, who, like John Hattie, was Professor of Education at Auckland University. Reading Recovery is a 12-20 week program and children are discontinued from the program when they are deemed to be ready to return to regular lessons. Vaughn, Hughes & Moody (2000) found large effect sizes for Reading Recovery (d = 0.96), and it was highest when it was a supplement to, rather than a substitute for, classroom teaching.

The following reading strategies had much lower effects:

Reading: sentence combining programs (d = 0.15 rank 119/138 P.134)

Reading: whole language (d = 0.06 rank 129/138 P.137)

Reading: exposure to reading (d = 0.36 rank 76/138 P.138)

Reading to children, especially by parents, has positive effects on reading, in particular on vocabulary acquisition. But reading to children is not sufficient to lead to competent readers – instruction is also needed. Yoon (2002) found that sustained silent reading had little effect on reading attitude. For those who struggle it is an activity confirming that reading is not enjoyable.

Concluding comments on reading meta-analyses

There is much support for the five pillars of good reading instruction: phonemic awareness, phonics, fluency, vocabulary and comprehension – and attending to all is far more important than whether the program teaches one of the five as opposed to another. A teacher using the whole language method needs to be ten times as effective as a teacher using the phonics method to attain the same outcomes in developing reading vocabulary, skills and comprehension. Hattie (2007) found a plateau effect in upper primary and lower secondary years, with little growth in reading skills. Hattie found that teachers do not have a common perception of progress in learning to read during these years; most curricula do not attend to reading progressions; and there is so much emphasis placed on early learning to read that we have not built a perceived need to then continue to build excellent programs to build on this early start.

Writing programs (d = 0.44 rank 57/138 P.141)

Graham & Perin (2007) found that it is powerful to teach strategies for planning, revising and editing compositions (d = 0.82), particularly if the students are struggling writers. Effect sizes for various strategies were: summarizing reading material (d = 0.82), working together to plan, draft, revise and edit (d = 0.75), setting clear and specific goals for what students are to accomplish with their writing product (d = 0.70), using word-processing (d = 0.55), and teaching strategies to write increasingly complex sentences (d = 0.50). Gersten and Baker (2001) found similar effects for strategies teaching students with learning disabilities.

Atkinson (1993) reported an effect size of $d = 0.52$ from workshop instructional treatment of writing, arguing that this effect may be the result of the relationship with “audience”, either because of the presence of a real and immediate audience as in writing workshops, or because of a need to collaborate with others to complete a task. In North Tyneside EAZ we have found a key feature of the Write Away Together program (Andy Taylor & Liz Ayres) is writing for audience (and reading their writing aloud to an adult or group of students), which encourages children to be much more self-critical in their writing and more aware of the impact of their writing on a reader.

Mathematics programs ($d = 0.45$ rank 54/138 P.144)

The power of feedback to students learning maths was highlighted by Baker, Gersten & Lee (2002). They found that the highest effects accrued when teachers provided feedback data or recommendations to students ($d = 0.71$), then for peer-assisted learning ($d = 0.62$), explicit teacher-led instruction ($d = 0.65$), and direct instruction ($d = 0.65$).

Powerful effects of feedback and strategy teaching are also found in studies of teaching maths to lower ability students. Lee (2000) found that the programs with the greatest effect were strategy-based methods ($d = 0.85$), guided practice ($d = 0.86$), peer tutoring ($d = 0.76$), teacher-modelling ($d = 0.73$), using specific forms of feedback ($d = 0.62$), using mastery criteria ($d = 0.63$), sequencing examples ($d = 0.58$), and changing instructions on the basis of feedback ($d = 0.42$).

Use of calculators ($d = 0.27$ rank 93/138 P.145)

Meta-analyses mostly show a low, but positive effect from the use of calculators in maths teaching. Ellington (2000) found that the effects were higher for lower ability students ($d = 0.30$) and negative for higher ability students ($d = -0.23$). He also found that the effects were much higher when calculators were involved in the teaching process, eg when used for composition problem-solving ($d = 0.72$).

All studies tended to show that using calculators helps to reduce students’ cognitive load and allows them to devote their attention to problem-solving.

Play Programs ($d = 0.50$ rank 46/138 P.154)

The place of play in enhancing achievement has long been cited and even today seems very powerful. Fisher (1992) found evidence to suggest that play promotes improved performance outcomes, both in cognitive-linguistic and affective-social domains. For younger children, play makes a difference. This is likely to be related to learning about peer relations and learning how to learn from peers, facing and meeting challenges, the consequence of deliberative practice in play, and the satisfaction from deciding or becoming aware of both the learning intentions and the success criteria from being involved in play.

Specific Curricula programs

Creativity Programs ($d = 0.65$ rank 17/138 P.155)

Overall, creativity programs have a large positive effect on outcomes. Higgins, Hall, Baumfield & Moseley (Durham University 2005) reviewed programs to enhance thinking and creative processing. Across all outcomes, the effect size was $d = 0.74$. Specifically the effect sizes were: 0.62 for cognitive outcomes, 0.62 for curricula achievement, and 1.44 for affective outcomes. Across curriculum domain, the effects were greatest in Maths ($d = 0.89$), science ($d = 0.78$) and then reading ($d = 0.48$).

Outdoor Education ($d = 0.52$ rank 43/138 P.156)

Over all programs, the most consistently successful were Outward Bound or Adventure programs (Clinton, 1987). Hattie, Marsh, Neill & Richards found an average increase of 0.34 across all outcomes. Perhaps the most exciting outcome is that this is one of the few areas in education where the follow-up effects ($d = 0.17$) were positive and were in addition to the effects at the end of the program (so $0.34 + 0.17 = 0.51$). It is rare to find such increasing after-effects from an education intervention, as too many have a diminishing return.

There was much variation between programs, with Australian programs far exceeding American ones. This was believed to be because the former were more orientated to teaching and the latter to outdoor experience.

Cason & Gills (1994) found that longer programs were more effective than shorter ones and younger participants gained more than older participants. Learning about facing challenge, seeking feedback, adapting to peer cooperative learning and enhanced self-regulation about one's skill and strengths seems to last beyond the outdoor experience.

Concluding comments on contributions from the curricula (P.159)

It is less the content of the curricula that is important than the strategies teachers use to implement the curriculum so that students progress upwards through the curricula content. The sharing by teachers of their conceptions about what constitutes progress is critical (and this assists in reducing the negative effects of mobility and changing classrooms), as well as ensuring appropriately challenging surface, deep, and conceptual knowledge and understanding. Too often there is little attention paid to how to build a common perception of progress across the years studying the curriculum (Hattie, 2006).

Teachers need to help students to develop learning strategies that enable them to construct meaning from text, develop understanding from numbers, and learn principles in science. The teaching of these strategies needs to be planned, deliberate, explicit, and part of active programs to teach specific skills and deeper understanding.

The contributions from teaching approaches – part 1 (P.161)

This chapter look at goals, success criteria and fostering student involvement. It follows a model of teaching and learning based on Clarke (2001; Clarke, Timperley & Hattie, 2003) where learning intentions and success criteria frame the challenge and purpose of the lesson. If such goal-directed lessons are to be successful, they must also use appropriate feedback, take account of students' views of the process of learning, and ensure students are actively involved in the monitoring of their own learning and developing meta-cognitive skills.

Table 9.1 (P.162) provides ample evidence of the importance and efficacy of these teaching strategies.

This section also focuses on the importance of Mastery Learning (or mastery oriented learning) and refers to Carl Dweck's work (Elliott & Dweck, 1988), which distinguishes between mastery and learning goals.

Goals (d = 0.56 rank 34/138 P.163)

There is strong evidence that challenging, achievable goals influence achievement, provided the individual is involved in setting them.

Locke & Latham (1990) found that achievement is enhanced to the degree that teachers set challenging, rather than "do your best" goals, relative to the students' present competencies. There is a direct linear relationship between the degree of goal difficulty and performance (see table 9.2 P.165). Goals have a self-energizing effect if they are appropriately challenging as they can motivate students to exert effort in line with the difficulty or demands of the goal. Commitment to the goals helps, but is not necessary for goal attainment – except for Special Needs students, where commitment makes a major difference. "Do your best" goals are too easily attained – in a sense anything you achieve can be defined as your best. But the challenge should not be so difficult that it is seen as unattainable. Rather teacher and student must be able to see a clear pathway to achievement of the goal.

According to Locke & Latham, goals inform individuals as to what type or level of performance is to be attained so they can direct and evaluate their actions and efforts accordingly. Feedback allows them to track their performance in relation to their goals so that adjustments in effort, direction, and even strategy can be made as needed (self-monitoring). Because assigned goals provide an individual with normative information on the expected level of performance, they have major effects on the development of self-efficacy and confidence, which in turn affects the choice of difficulty of goals.

Martin (2006) argued that a good method to assist students in setting task-specific and situation-specific goals was to use the notion of "personal bests". He found that setting personal bests had high positive relationships to educational aspirations, enjoyment of school, participation in class and persistence on the task.

Concept mapping (d = 0.57 rank 33/138 P.168)

Concept mapping involves the development of graphical representations of the conceptual structure of the content to be learnt. The importance of concept mapping relates to its emphasis on summarizing the main ideas in what is to be learnt. It does not seem to matter who does the concept mapping (teacher, student, students in

groups, Horton et al, 1993) but it is important that students are involved, eg in contributing the terms used in the map.

Strategies emphasizing success criteria

It is important that success criteria are as clear and specific as possible (at surface or deep levels, or both) because the teacher and learner need to monitor the student's throughout the lesson to make sure they understand the intended meaning.

Mastery Learning (d = 0.58 rank 29/138 P.170)

Mastery learning means that children learn effectively when provided with clear explanations of what it means to “master” the material being taught. Other features include: high levels of collaboration in the classroom (ie not competitive); high levels of teacher feedback that is both frequent and specific; and the regular (preferably independent) correction of the mistakes students make along their learning path (it also helpful to see mistakes as a positive learning experience).

The important variable in mastery learning is the time required to reach the levels of attainment. The notion is that *learning should be held constant and time should be allowed to vary*, rather than the opposite, which is the norm in traditional instruction. Willett et al (1983) reviewed a dozen different innovations in teaching strategies and found that mastery learning had the highest effects.

Worked Examples (d = 0.57 rank 30/138 P.172)

Worked examples are increasingly used to demonstrate to students what “success” looks like and thus what the goal could be for their own learning. They can also be used for comparison and analysis after the discussion and formulation of success criteria.

With problem-solving, worked examples are used to alleviate the cognitive load for students so that they can concentrate on the processes that lead to the answer, not just providing an answer (that may or may not be correct)>

Implementations that emphasize feedback

Feedback (d = 0.73 rank 10/138 P.173)

Since Hattie's first meta-analyses of influences on student achievement in 1992, it has been clear that feedback is among the most powerful of these influences. He did not initially realise that the most powerful feedback is that provided to the teacher, especially by the student, but also by other teachers. When teachers seek, or are at least open to, feedback from students as to what students know, what they understand, where they have misconceptions, when they are not engaged – then teaching and learning can be synchronised and powerful. Feedback to teachers helps to make learning powerful.

Quality feedback to students is also effective, but while many teachers think they are providing regular, quality feedback, students often disagree!

Carless (2006) asked students and teachers whether teachers provided detailed feedback that helped them with their assignments. About 70% of teachers said they did this often or always, but only 45% of students agreed with these claims. Further, Nuthall (2005) found that most feedback that students obtained in any day in classrooms was from other students, and most of this feedback was incorrect.

Extrinsic Rewards

Programmed instruction, praise, punishment and **extrinsic rewards** were the least effective forms of feedback. Deci, Koestner and Ryan (1999) found a negative correlation between extrinsic rewards and motivation and task performance. Tangible rewards significantly undermined intrinsic motivation, particularly for interesting tasks ($d = -0.68$), compared to uninteresting tasks ($d = 0.18$). In addition, when feedback was administered in a controlling manner (eg saying that the student performed as they “should” have performed), the effects were even worse ($d = -0.78$). Thus Deci et al concluded that extrinsic rewards are typically negative because they “undermine people’s taking responsibility for motivating or regulating themselves”. Rather, extrinsic rewards are a controlling strategy that often leads to greater surveillance, evaluation and competition, all of which have been found to undermine enhanced engagement & regulation (Deci & Ryan, 1985).

A model of feedback (see P.176)

Hattie’s model of feedback concludes with feedback at four levels:

1. Task level – How well tasks are understood / performed.
This feedback may indicate whether the work is correct or incorrect and may include directions to more, different or correct information, such as “You need to include more about the Treaty of Versailles”.
2. Process level – The process needed to understand / perform tasks.
This feedback is more directly aimed at the processing of information, or learning processes needed for understanding or completing the task. A teacher or peer may say to the learner “ You need to edit this piece of writing by attending to the descriptors you have used, so the reader is able to understand the nuances of your meaning” – or for a younger age group “You need to use more powerful adjectives to help the reader understand how the person is feeling – use one of these or your own: devastating; appalling (Shirley Clarke’s Example Comment).
3. Self-regulation level – Self-monitoring, directing and regulating of actions.
This feedback helps the student to self-regulate, encouraging greater skill at self-evaluation, or confidence to engage further with the task without relying on the teacher for help. For example “You already know the key features of the opening of an argument. Check to see whether you have incorporated them in your first paragraph”.

Levels 2 & 3 can have major influences on self-efficacy, self-regulatory proficiencies and self-beliefs about the student as a learner, such that the student is encouraged or informed how to better and more effortlessly continue on task.

4. Self Level – Personal evaluations and effect (usually positive) on the learner.
This feedback is personal in that it is directed at the “self”, which is too often unrelated to performance on the task, eg “You are a great student”, “Well done!”

Level 4 feedback is rarely effective and does not raise achievement. It draws attention to the self, which encourages students to avoid the risks involved in tackling a challenging assignment, so they minimize effort, having a high fear of failure (Dweck, 2000, Black & Wiliam, 1998).

In conclusion, it is important to remember that feedback is only really effective when it follows up effective instruction: it needs initial learning or surface information to build on. If a student has not listened to or understood the basic elements of initial instruction, any amount of feedback is likely to be of little use. Feedback is what happens second, is one of the most powerful influences on learning, occurs too rarely (especially quality or focused feedback) and is most powerful when provided to the teacher.

Frequent testing/Effects of testing (d = 0.34 rank 79/138 P.178)

Another form of feedback is frequent testing, but this is only effective if there is feedback from the tests *to the teachers such that they modify their instruction to attend to the strengths and gaps in student performance*. Gocmen (2003) found an effect size of $d = 0.41$ from frequent testing, but this was much higher when accompanied by feedback ($d = 0.62$) compared to no feedback ($d = 0.30$).

Lee (2006) investigated the effects of statewide high-stakes testing and test-driven accountability policies on reading and Maths in USA since 1990. He found a $d = 0.36$ effect ($d = 0.29$ for reading and $d = 0.38$ for Maths), but the effects only occurred in elementary schools ($d = 0.44$) and middle schools ($d = 0.35$) and not in high schools ($d = 0.03$). There have been very mixed results from studies of states in USA using high stakes testing. For example, Lee (2006) found that states with the strongest accountability programs made greater gains over the years than those with weaker accountability. But he noted that these gains mapped to a similar trajectory to how the states had been performing before they introduces high stakes accountability.

Providing formative evaluation of programs (d = 0.90 rank 3/138 P.181)

As we have already found, feedback to teachers on what is happening in their classrooms so they can ascertain “How am I going?” in achieving the learning intentions they have set for their students, so they can then decide “Where to next?” for the students. Formative evaluation provides one such form of feedback and involves teachers looking carefully at evidence of the effectiveness of teaching programs, innovations etc with an open mind. Their willingness to seek evidence of where students are not doing well in order to improve the innovation, the keenness to see the effects on all students and the openness to new experiences that make the difference. Interventions are not “change for change’s sake” for not all innovations are successful. **The major message is for teachers to pay attention to the formative effects of their teaching, as it is these attributes of seeking evaluation of the effects (intended or unintended) of their programs that makes for excellence in teaching.**

Questioning (d = 0.46 rank 53/138 P.182)

Feedback can also come from teachers asking questions of their students, although it is an adage that teachers already know the answer to most of the questions they ask. The use of questions, especially higher order questions can be a “powerful strategy for building comprehension” (Gadamer, 1993) and can lead to “,,, improved comprehension, learning and memory of the materials among school children as well...” (Craig et al, 2006). So much of class time is spent by teachers asking questions of their students (often 300-400 questions per day – Brualdi, 1998), but

usually these are not open, inquiry questions, they are “display questions” that the teacher knows the answer to and do not enhance understanding or thinking. Redfield & Rousseau (1981) found that gains in achievement may be expected when teachers are trained in questioning skills.

Perhaps of more importance than teacher questioning is analysing the questions that students ask. Structuring class sessions to entice, teach and listen to students’ questioning of students is powerful (Hattie et al, 1998).

Time on Task (d = 0.38 rank 70/138 P.184)

Spending more time on learning (longer school day or school year etc) is unlikely to improve educational performance (Walberg, Niemiec & Frederick, 1994). The key to enhancing learning is to **increase productive time**. Berliner (1984) and Yair (2000) found that “engaged” learning time is usually around 40-50% of lesson time. The percentage was lower when teachers were lecturing or students watching TV and higher when students were working in groups or laboratories. The more students felt “challenged, and the greater the academic demands on students – the more the students are engaged with instruction – the less prone they are to external preoccupations” (Yair, 2005).

Success depends not on the amount of practice or experience that is important in learning new skills, but **the amount of deliberate, relevant, effort to improve performance**. This deliberate practice needs to be “at an appropriate, challenging level of difficulty and enable successive refinement by allowing for repetition, giving room to make and correct errors, and providing informative feedback to the learner” (Van Gog, Ericsson, Rikers & Paas, 2005). They further noted that such practice requires students to stretch themselves to higher levels of performance, and requires much concentration and effort over extended periods, usually of fixed times over many days.

Spaced and massed practice (d = 0.71 rank 12/138 P.185)

It is the frequency of different opportunities rather than merely spending more time on task that makes the difference to learning. So teachers need to increase the rate of correct academic responses to deliberative practice opportunities until minimal levels of mastery (defined by success criteria) are met (Walker, Greenwood, Hart & Carta, 1994). This finding helps us to understand a common denominator to many of the effective practices in this book, such as direct instruction, peer-tutoring, mastery learning and feedback. Deliberative practice increases opportunities to not only enhance mastery but also fluency (the core of precision teaching).

This is not “drill and practice”, which can so often be: Dull and repetitive, involve minimal feedback, not extend or provide multiple different experiences etc. Deliberative practice can involve specific skills and complex performances, and the attainment of success criteria can be motivating and lead to longer retention of sometimes over-learned surface and deep knowing (Péladeau, Forget & Gagné, 2003).

Peer tutoring (d = 0.55 rank 36/138 P.186)

The effects of the use of peers as co-teachers (of themselves and of others) is, overall, quite powerful. If the aim is to teach students self-regulation and control over their own learning then they must move from being students to being teachers of

themselves. Reviews of tutoring literature have shown that peer tutoring has many academic and social benefits for both those tutoring and those being tutored (Cook, Scruggs, Mastropieri & Casto, 1985).

Hartley's (1977) meta-analysis of the effects of mathematics achievement of different instructional modes found that peer tutoring ($d = 0.60$) was the most effective. Peer tutoring was found to be most effective when used as a supplement to, rather than a substitute for, the teacher's roles. The effects on tutors ($d = 0.58$) were similar to the effects on those being tutored ($d = 0.63$). Mathes & Fuchs (1991) found that peer tutoring used with pupils with special needs was more effective than the instruction these students typically encountered.

Rohrbeck, Ginsberg-Block, Fanuzzo & Miller (2003) found that peer interventions that were more student controlled (when peers are involved in setting goals, monitoring performance, evaluating performance and selecting rewards), the effects were greater than when these were primarily controlled by teachers.

We need to remember that students can be producers of teaching and learning, rather than just recipients.

Meta-cognitive strategies ($d = 0.69$ rank 13/138 P.188)

Newell (1990) noted that there are two layers of problem solving: applying a strategy to the problem and selecting and monitoring that strategy. Such "thinking about thinking" involved in the second strategy is known as meta-cognition. Meta-cognitive activities can involve planning how to approach a given learning task, evaluating progress, and monitoring comprehension. Chiu (1998) found that meta-cognitive training programs were more effective if implemented using small-group instruction, with students with higher grades, with remedial students, and in less intensive programs. Haller, Child & Walberg (1988) reported an effect size of $d = 0.71$ for meta-cognitive instruction on reading comprehension.

Study Skills ($d = 0.59$ rank 25/138 P.189)

Study skills interventions can be classified as *cognitive, meta-cognitive and affective*. Cognitive interventions focus on task-related skills such as note taking and summarizing. Meta-cognitive interventions focus on self-management learning skills such as planning; monitoring; and where, when and how to use strategies. Affective interventions focus on non-cognitive features of learning such as motivation and self-concept.

The key message in this section is that courses in study skills alone have limited impact, whereas combining study skills with subject content can make a real difference.

Lavery (2008) found the highest effects from strategies that aimed at the "forethought" phase of learning, such as goal-setting and planning, self-instruction and self-evaluation. Organising and transforming (eg rearrangement of instructional materials to improve learning / making an outline before writing a paper) has been found to be a valuable component of many interventions.

Hattie et al (1996) concluded that "the best results came when strategy training was used meta-cognitively, with appropriate motivational and contextual support" and questioned whether "learning to learn" programmes that are not embedded in the context of the subject are of much value.

Matching Styles of Learning (d = 0.41 rank 62/138 P.195)

It is often claimed that when teaching is aligned with the preferred or dominant learning style of students then achievement is enhanced. Hattie found that many of the studies making these claims were flawed, although he did find that when students enjoy learning then achievement is likely to be higher (which is not surprising!). Hattie found that studies tended to confuse learning strategies, which do make a difference, with learning styles, which do not.

Concluding Comments

The argument defended in this chapter is that successful learning is a function of the clarity of challenging learning intentions, the specifications and the success criteria; the power of using multiple and appropriate teaching strategies with a particular emphasis on the presence of feedback at the right level of instruction; a classroom environment that not only tolerates, but welcomes errors; seeing learning and teaching from the students' perspective; and placing reliance on teaching study skills and strategies of learning.

Emphasizing learning styles, coaching for tests, mentoring and individualized instruction are notes for their lack of impact.

The contributions from teaching approaches – part 11

This chapter investigates a range of teaching strategies, school-wide programs, implementations using technologies, and out of school learning. As noted in the previous chapter, there are the same common themes in what makes some of these successful – pre-planning, deliberate attention to learning intentions and success criteria, and a constant effort to ensure teachers are seeking feedback on how successfully they are teaching their students.

Teaching strategies (d = 0.60 rank 23/138 P.200)

The teaching of strategies covers a wide ambit of methods and has among the higher effect sizes, although most of these meta-analyses **relate to special education or students with learning difficulties.**

Swanson & Hoskyn (1998) included methods such as: explanation, elaboration, and plans to direct task performance; modelling from teachers including verbal modelling, questioning and demonstration; reminders to use certain strategies or procedures; step by step prompts or multi-process instructions; dialogue between teacher and student; questions from teachers; and provision by the teacher of necessary assistance only.

Their research focused specifically on students with learning disabilities.

Marzano (1998) concluded that “the effective teacher is one who has clear instructional goals. These goals are communicated to students and to parents. Ideally the instructional goals address elements of the knowledge domains as well as the cognitive, meta-cognitive and self-system and it is most important for the teacher to understand the interrelationships among the various domains.

Reciprocal teaching (d = 0.74 rank 9/138 P.203)

Reciprocal teaching was devised as an instructional process to teach students cognitive strategies that might lead to improved learning outcomes (initially in reading comprehension). The emphasis is on teachers enabling their students to learn and use cognitive strategies such as summarizing, questioning, clarifying, and predicting, and these are “supported through dialogue between teacher and students as they attempt to gain meaning from text” Rosenshein & Meister, 1994. Each student takes a turn at being the “teacher” and often the teacher and students take turns leading a dialogue concerning sections of a text. Students check their own understanding of the material by generating questions and summarizing. Expert scaffolding is essential for cognitive development as students move from spectator to performer after repeated modelling by adults. The aim, therefore, is to help students actively bring meaning to the written word, and assist them to monitor their own learning and thinking.

Direct Instruction (d = 0.59 rank 26/138 P.204)

Direct Instruction good, assertive teaching using AfL and modelling. It involves seven major steps:

1. Teacher has a clear idea of the *learning intentions* before the lesson.
2. Teacher knows what *success criteria* of performance are to be expected, when and what students will be held accountable for from the lesson/activity. Students need to be informed about the standards of performance.
3. There is a need to *build commitment and engagement* in the learning task (ie a “hook” to grab the students’ attention and interest).
4. There are guides to *how the teacher should present the lesson* – including input (lecture, film, video, tape, pictures, etc), modelling, checking for understanding (and re-teaching a concept or skill if not understood).
5. *Guided practice* – an opportunity for each student to demonstrate his or her grasp of new learning by working through an activity, while the teacher moves around determining level of mastery and providing instant feedback.
6. There is the *closure (or plenary)* part of the lesson. Closure involves those actions or statements by a teacher (or by a student) that are designed to bring a lesson or part of a lesson to a close, usually involving reviewing and clarifying the key points.
7. There is *independent practice*. This reinforces the content or a skill on a repeating schedule so that the learning is not forgotten. This can provide for decontextualisation: enough different contexts so that the skill or concept can be applied to any relevant situation. For example, if the lesson is about inference from reading about dinosaurs, independent practice could be about inference from reading about whales. **The failure to do this seventh step is often deemed responsible for most student failure to be able to apply something learned.**

The effects of direct instruction are similar for regular (d = 0.99) and special education and lower achieving students (d = 0.86), higher for reading (d = 0.89) than maths (d = 0.54), similar for low level word-attack (d = 0.64) and high level comprehension (d = 0.54), and similar for elementary and high school students (Adams & Engleman, 1996).

The messages of these meta-analyses underline the power of stating the learning intentions and success criteria, and then engaging students in working towards these – surely commonly accepted as good, assertive teaching in modern classrooms?

Problem-solving teaching (d = 0.61 rank 20/138 P.210)

Problem solving involves the act of defining or determining the cause of the problem, identifying, prioritizing and selecting alternatives for a solution; or using multiple perspectives to uncover the issues related to a particular problem, designing an intervention plan and then evaluating the outcome. Hembree (1992) found significant direct links between problem solving and various measures of basic performance, in particular skills in basic mathematics. The teacher characteristic with the most positive effect on student performance was specialist training in heuristic* methods (d = 0.71).

Marcucci's (1980) meta-analysis of research on methods of teaching mathematical problem solving also supported the power of teaching the heuristic* method of problem solving. Curbelo (1984) found similar effects of problem solving in maths, but these effects were twice as high as they were in science.

Cooperative Learning (various effect sizes – see below P.212)

There are four groups of meta-analyses that involve cooperative learning.

1. Those that compare cooperative learning vs heterogeneous classes (d = 0.41 rank 63/138)
2. Those that compare cooperative vs individualistic learning (d = 0.59 rank 24/138)
3. Those that compare cooperative vs competitive learning (d = 0.54 rank 37/138)
4. Those that compare competitive vs individualistic learning (d = 0.24 rank 96/138)

Both cooperative and competitive learning are more effective than individualistic methods – pointing again to the power of peers in the learning equation.

There seems a universal agreement that cooperative learning is effective, especially when contrasted with competitive and individualistic learning. The New Zealand education system comes out top on cooperativeness in international comparisons – but it also comes top in competitiveness. The notion that both could be beneficial seems too often forgotten, as most of the research contrasts one with the other. Further, cooperative learning has a prime effect on enhancing interest and problem solving provided it is set up with high levels of peer involvement.

Roseth, Fang, Johnson & Johnson (2006) concluded that under cooperative conditions, interpersonal relations have the strongest influence on achievement, and this clearly points to the value of friendship in the achievement equation. As they concluded “if you want to increase student academic achievement, give each student a friend”. Friendship in schools is not only powerful for the student's sense of well-being but it also facilitates a student's sense of school-belonging (Hamm & Fairclough, 2007) – although for too many adolescents friendships can have the opposite effect if they convey the message that “learning is not cool”.

Peer learning can be powerful – whether cooperatively or competitively. As Nuthall (2007) has shown, most feedback that students receive is from other students (although most of it is incorrect). When there is some structure to this peer learning (as in most instances of cooperative and competitive learning) then the power of peers can be unleashed. Students are more able to collectively make and learn from errors, and their conversations can assist in having the goals, learning intentions and success criteria spelt out for all.

Computer-assisted instruction (d = 0.37 rank 71/138 P.220)

There have been nearly 5,000 studies involving nearly 4,000,000 people on the effects of computer-assisted instruction. Across the various meta-analyses there was little difference across age groups or ability levels of students. There are some differences across subjects, but not in any meaningful way, and no differences relating to the duration of the computer intervention. The use of computers can assist in engagement and positive attitudes to learning and school. They can also increase the probability of learning, but there is no necessary relation between having computers, using computers and outcomes.

An analysis of the meta-analyses of computers in schools indicates that computers are used effectively when:

- a) **There is a diversity of teaching strategies**
- b) **There is a pre-training in the use of computers as a teaching and learning tool**
- c) **There are multiple opportunities for learning**
- d) **The student, not the teacher is in “control” of learning**
- e) **Peer learning is optimized**
- f) **Feedback is optimized.**

This list should come as no surprise given the rest of the claims in Visual Learning, as they also emphasize the “visible learning – visible teaching” messages.

To develop this message further:

- a) **There is a diversity of teaching strategies**

An advantage of the computer is that the method of teaching is most likely to be different from that experienced when the teacher instructs the students – at minimum students get to experience two different teaching strategies. There is an advantage for computer work to be a supplement ($d = 0.45$) rather than a substitute ($d = 0.30$) for teacher instruction.

- b) **There is a pre-training in the use of computers as a teaching and learning tool**

Teachers are frequent users of computers, but more for their personal and administrative use. Many find it difficult to see how computers can be related to their particular conceptions of teaching. Jones (1991) found that more than 10 hours of pre-training had the greatest effect ($d = 0.53$). More importantly he claimed that “less than 10 hours of training is not only unproductive, but it is counterproductive. Those teachers who received such short-term training seem to have classes that achieve substantially less than average computer-using classes, whereas teachers receiving more than 10 hours pre-training achieve up to 72% additional gain beyond the average computer using class”.

- c) **There are multiple opportunities for learning**

There are many ways whereby the use of computers can assist with multiple learning opportunities, e.g tutorials and programming, word-processing, drill and

practice, simulations & problem-solving. Tutorials involve structured learning experiences and these seem to have the greatest effects. Many computer packages may be of better instructional quality than many teachers' instructional methods. Of particular interest is the effects of drill and practice – and despite the moan by many adults, students need much drill and practice. However it does not need to be dull and boring, but can be, indeed should be, engaging and informative. Key attributes that led to higher effects were learner control, not losing sight of the learning goal, and the immediate announcement of correctness or otherwise of the answer to the drill.

d) The student, not the teacher, is in “control” of the learning

A key finding was the increased effectiveness of computer-aided instruction when the student was in control of his/her learning (ie pacing, time allocations for mastery, sequencing and pacing of instructional materials, choice of practice items, reviewing). For example, when using word-processors, students tend to write more and of better quality than when asked to write on paper. This is especially true of weaker writers.

e) Peer learning is optimized

Using computers in pairs is much more effective than when computers are used alone or in larger groups. Peers can be involved in problem solving, suggesting and trying new strategies, and working through possible next steps. As is noted in the sections on group learning, students can learn most effectively when working together, as it exposes them to multiple perspectives, revision on their thinking, varied explanations for resolving dilemmas, more sources of feedback and correction of errors.

f) When feedback is optimized

A further advantage of computers is that they respond to the student despite who they are – male or female, black or white, slow or fast. Teachers claim expertise in anticipating students' reactions and deciding when and to whom to provide feedback, but given the low levels of feedback in most classrooms it is clear that this flexibility means that many students miss out. Computer feedback is potentially less threatening to students and can occur in a more programmed manner. (Blok, Oostdam, Otter & Overmatt, 2002).

Homework (d = 0.29 rank 88/138 P.234)

Homework is a hotly contested area. Many parents seem to judge the effectiveness of schools by the presence or amount of homework – although they expect not to be involved in this learning other than by providing a quiet and secluded space, as they believe that these are the right conditions for deep and meaningful learning. Cooper (1989) argued that the effects of homework are twice as large for high as for junior high, and twice as large again for junior high as for elementary students. Shorter homeworks tend to be more effective, especially if the material is not complex and is novel.

Trautwein, Koller, Schmitz & Baumert (2002) found that a lot of homework and a lack of monitoring seem to indicate an ineffective teaching method. They warned against homework that undermined a student's motivation and that led to the student internalising incorrect routines. The effects are greater for higher rather than lower achieving students, and for older rather than younger students. For too many students, homework reinforces that they cannot learn by themselves, and that they cannot do the schoolwork. The effects are highest when homework involves rote learning, practice or rehearsal of the subject matter.

It is important to note that prescribing homework does not develop time management skills.

Concluding comments (P.236)

There are many teaching strategies that have an important effect on student learning. As noted above, effective teaching occurs when the teacher decides the learning intentions and success criteria, makes them transparent to the students, demonstrates them by modelling, checks for understanding, and reinforces what they have been told by tying it all together with closure. These effective teaching strategies involve much cooperative preplanning and discussion between teachers, optimizing peer learning, and require explicit learning intentions and success criteria.

Peers play a powerful role, as is demonstrated in the strategies involving reciprocal teaching, learning in pairs on computers, and both cooperative and competitive learning (as opposed to individualistic learning).

It is clear that, yet again, it is the differences in the teachers that make the difference in student learning. Related to these teacher influences are the lower effects of many of the interventions when they are part of comprehensive teaching reforms. Many of these are top-down innovations, which mean that teachers do not evaluate whether the reforms are working for them or not.

Bringing it all together (P.237)

Hattie's story is about the visibility of teaching and learning; It is the power of passionate, accomplished teachers who focus on students' cognitive engagement with the content of what it is they are teaching. It is about teachers who focus their skills in developing a way of thinking, reasoning, and emphasizing problem-solving and strategies in their teaching about the content they wish their students to learn. It is about teachers enabling students to do more than what teachers do unto them; it is the focus on imparting new knowledge and understanding and then considering and monitoring how students gain fluency and appreciation in this new knowledge and build conceptions of this knowing and understanding. It is how teachers and students strategize, think about, play with and build conceptions about worthwhile knowledge and understanding. Monitoring, assessing and evaluating the progress in this task is what then leads to the power of feedback – which comes second in the learning equation. Feedback to students involves providing information and understanding about the tasks that make the difference in light of what the *student* already understands, misunderstands, and constructs. Feedback from students to teachers involves information and understanding about the tasks that make the difference in light of what the *teacher* already understands, misunderstands, and constructs about the learning of his or her students. It matters when *teachers* see learning through the lens of the *student* grappling to construct beliefs and knowledge about whatever is the goal of the lesson. This is never linear, not always easy, requires learning and over learning, needs dollops of feedback, involves much deliberative practice, leads to lots of errors and mis-directions, requires both accommodating and assimilating prior knowledge and conceptions, and demands a sense of excitement and mission to know, understand and make a difference.

The conclusions are recast here as six signposts towards excellence in education:

1. Teachers are among the most powerful influences in learning.
2. Teachers need to be directive, influential, caring, and actively engaged in the passion of teaching and learning.
3. Teachers need to be aware of what each and every student is thinking and knowing to construct meaning and meaningful experiences in light of this knowledge, and have proficient knowledge and understanding of their content to provide meaningful and appropriate feedback such that each student moves progressively through the curriculum levels.
(NB Expert teachers meet and work together to constantly improve towards this ideal).
4. 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 students' current knowledge and understanding and the success criteria of: "Where are you going?", "How are you going?" and "Where to next?"
5. Teachers need to move from the single idea to multiple ideas, and to relate and then extend these ideas such that learners construct and then reconstruct knowledge and ideas. It is not the knowledge or ideas, but the learner's construction of this knowledge and these ideas that is critical.
6. School leaders and teachers need to create school, staffroom, and classroom environments where error is welcomed as a learning opportunity, where discarding incorrect knowledge and understandings is welcomed, and where participants can feel safe to learn, re-learn, and explore knowledge and understanding.

When teachers SEE learning through the eyes of the student



When students SEE themselves as their own teachers

In these six signposts, the word "teachers" is deliberate, as a major theme is when teachers meet to discuss, evaluate, and plan their teaching in the light of the feedback evidence about the success or otherwise of their teaching strategies and conceptions about progress and appropriate challenge. This is not critical reflection, but *critical reflection in light of evidence about their teaching*.

Will evidence make a difference?

The theme throughout this book is that the beliefs and conceptions held by teachers need to be questioned – not because they are wrong (or right) but because the essence of good teaching is that teachers' expectations and conceptions must be subjected to debate, refutation, and investigation. Only then can there be major improvements in student achievement. We need to ask about the conceptions of teaching that have led to teachers making decisions about:

- What is best to teach next, without attending closely to what these students already know;
- What materials to choose, with no regard to any evidence (other than prior use) that these are the optimum materials (and so often these materials are made by the cottage industry in teachers' homes);
- How to keep students engaged and busy, but not ensuring that they actually learn
- What activities provoke the most interest, instead of asking what leads to students putting in effort (it is the effort, not the interest level, of the activity that is important)
- How to maximise the challenge of the learning goals and create structures for students to learn via the challenge, rather than structuring the material so that it is easy to learn.

Teachers and principals need to collect the effect sizes within their schools and then ask “What is working best?”, “Why is it working best?”, and “Who is it not working for?”. This will create a discussion among teachers about teaching. This would require a caring, supportive staffroom, a tolerance of errors, and for learning from other teachers, a peer culture among teachers of engagement, trust, shared passion, and so on. Trust reduces the sense of vulnerability that teachers experience as they take on new and uncertain tasks associated with reform. Trust also maximises the occurrence of error and thus allows feedback to be powerful in use and effectiveness. To engender reform that will make a difference requires incentives primarily in terms of teachers learning about their teaching, about what is working and for whom, and from sharing evidence of the effectiveness of their methods.

The personal nature of learning

Olson (2003) states it simply – it is students themselves, in the end, who decide what students will learn. Thus we must attend to what students are thinking, what their goals are, and why they would want to engage in learning what is offered in schools. Learning is very personal to the teacher *and* to each student. While we assemble students in groups (classes, within-class groups), the meaning of the implications of education is personal for each of us. This does not mean we need to attend to individualized instruction but that we need to be aware of the progression of knowledge and understanding for each student – and how they learn by themselves, learn with others, and learn with adults, along with awareness of what they bring from their home and their culture. There are at least three worlds in the classroom (Nuthall, 2005): the public world, which includes teacher-led discussion and work tasks; the private-social world of informal peer interactions, whispers, and note-passing; and the private-individual world of self-talk and thinking. Each world has its own characteristic patterns of behaviour, interaction structures, customs, rules, roles, expectations, and discourse. Nuthall’s major conclusion related to “how little teachers knew about what was going on in their classrooms”. He found that students lived in a personal and social world of their own in the classroom, they already knew 40% of what the teachers intended them to learn, a third of what each student learned was not learned by any other student in the class, students learned how and when the

teacher would notice them and how to give appearance of active involvement, and a quarter of the specific concepts and principles that students learned were critically dependent on private peer-talk or on self-designed activities or use of resources. The world of learning and classrooms from the student's personal viewpoint is so often unknown to the teacher – hence reinforcing Hattie's major claim that teachers need to spend more time and energy understanding learning through the eyes of students.

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21.4.10

To be continued