

**Extracts from “Visible Learning for Teachers” (2011) & “Visible Learning”
(2009)
John Hattie**

In the approach by John Hattie, student self-regulation is a highly desirable goal. Self-regulation is possible when a number of other factors of “visible learning” and “direct instruction” are present.

Visible Learning refers to making student *learning* visible to teachers so they can know whether they are having an impact on this learning. It also refers to making *teaching* visible to the student as well so that students learn to become their own teachers, an important component of becoming lifelong learners – something we want students to value. The ‘learning’ part of visible learning is the need to think of teaching with *learning* in the forefront and with the idea that we should consider teaching primarily in terms of its *impact on student learning*.

When the *teaching is visible* the student knows what to do and how to do it. When the *learning is visible* the teacher knows if learning is occurring or not. Teaching and learning are *visible* when the learning goal is not only challenging but is *explicit*. Furthermore, both the teacher and the student work *together* to attain the goal, provide feedback, and ascertain whether the student has attained the goal. Evidence shows that the greatest effects on student learning come when not only the students become their own teachers (through self-monitoring, and self-assessment), but the teachers become learners of their own teaching. In successful classrooms, both the teaching and learning are visible.

Visible Learning for Teachers details the actions that teachers should take at each stage in the lesson:

Preparing the lesson

There are four important parts to consider in preparing to teach a lesson:

1. *Prior Achievement: The levels of students at the start*
2. *Targeted Learning: The desired levels at the end*
3. *Progression: The rate of progress from the start to the end*
4. *Teacher Collaboration*

1. Prior Achievement: The levels of students at the start

A student’s prior achievement has a powerful impact on his or her achievement ($d = 0.67$). What this means is that what students bring to the classroom is a powerful predictor of how well they will achieve. In other words, the brighter a student is at the beginning of the year, the more he or she will achieve. Therefore, the role of the teacher is to *disrupt* this so that those who are behind can learn just as much as the brightest students who walk in the door. For this reason, any lesson planning must begin with teachers developing a deep understanding of what students *already know and can do*.

In addition to learning *what* students know, teachers also need to learn *how* their students learn as well. Since they want all of their students to reach the same high level of thinking, this will require teachers to be particularly attentive during peer-to-peer discussions and will really require teachers to *listen* as well as talk in order to learn about their students’ learning. This contrasts with what is actually occurring in classes. For example, in one study, (Lingard, 2007), 1,000 classrooms were observed and there were particularly low levels of intellectual demand and an overpowering presence of teachers talking and students sitting passively waiting. We need to reverse this trend in classrooms.

In addition to prior achievement, students also bring attributes and dispositions that affect their ability to learn. For example, these might include motivation to learn, strategies to learn, and confidence to learn. Teachers need to know which self-attributes students bring to the lesson so they can enhance these attributes and thereby increase the learning. For example, one self-attribute is *self-efficacy* – the confidence that we can make our learning happen. Those with high self-efficacy see challenging tasks as opportunities to learn something new and those with low self-efficacy may avoid difficult tasks and deny personal agency. Teachers need to know this information about students so they can enhance student confidence, help students to accept rather than reject feedback, and

help them compare their work to academic goals not to other students' work. Teachers can actively teach these dispositions. It particularly helps if teachers understand the attributes and dispositions their students bring to class.

2. Targeted Learning: The desired levels at the end

In planning lessons, there are two parts to consider in thinking about the targeted learning – or where teachers want students to end up. The first is being clear about what is to be learned – the *learning intention* or objective. The second is having a way to know that the learning has been learned – the *success criteria*. These both must be visible for the teacher and the students. The teacher must be clear about the goals in order to keep the class on track toward the objective. Further, the teacher needs to know *not* when the students have completed the *activities*, but rather, when they have learned the concepts and understandings.

Learning Intentions/Objectives Effective planning involves deciding on appropriately challenging goals and then structuring learning situations so students can reach those goals. Having clear learning goals is vital if we want to develop a good assessment and provide accurate feedback to students about how to be successful. If we want students to achieve learning goals, teachers must start by communicating clear goals to students. This involves much more than having students chant the learning intentions at the start of class. Instead we must help students develop a deep understanding of what they are supposed to learn, help them understand what success will look like, how the lesson's tasks relate to the intention, and at the end of the lesson, how much closer they have come to achieving the success criteria.

Success Criteria Success criteria let students know when they have achieved the learning goal. Imagine if you were told to get in your car and you would be informed when you had successfully arrived at your destination. School feels like this for too many students. It's not a surprise that they get turned off of learning.

Furthermore, we can do more than sharing success criteria with students, we can involve them in *making* the success criteria. The idea is to get students engaged in and enjoying the challenge of learning that will keep them invested in and committed to school. Below are five components of learning that relate to the learning intentions and success criteria: challenge, commitment, confidence, high expectations, and conceptual understanding.

- a) **challenge** – Creating a challenge is one of the most essential roles of the teacher because this is the essence of how students learn. However, this is incredibly tricky. Challenge depends on what students already know, so teachers must know students' prior levels of achievement and dispositions. Furthermore, challenge should not be too difficult. To take on a challenge, students need to know about *90 percent* of what they are aiming to master in order to enjoy and make the most of the challenge. In reading it is even *higher* – students must know about 95 – 99 percent of the words on a page before they can enjoy it!
- b) **commitment** – Creating lessons in which students are committed to the learning often comes from creating lessons that are challenging. Two of the most powerful ingredients in planning are commitment and challenge. Peers are also a major source of commitment to school learning through pressure, modeling, and competition.
- c) **confidence** – Having the confidence that they can achieve the learning goals is a vital component of success. This confidence can come from four sources: the student (from past success in learning), the teacher (from quality teaching and feedback), the tasks (from appropriate scaffolding), or peers (from feedback).
- d) **high expectations** – The influence that was highest in all of *Visible Learning* was self-reported grades. Students have reasonably accurate understandings of their levels of achievement. Across six meta-analyses (about 80,000 students), the effect was $d = 1.44$ or a correlation of about 0.80 between students' estimates and their subsequent performance in school tasks. It is important to note that two groups of students were *not as good* at predicting their performances – minority students and lower-achieving students. It has proved difficult to improve the confidence levels of these two groups of students. Rather than having these groups reflect on their performance or rewarding improved performance, the best approach is to emphasize *accurate calibration* and for teachers to provide opportunities for students to predict their performance once they are given clear learning goals and success criteria. Then teaching them to have high, challenging, appropriate expectations is among the most powerful influences in improving their achievement.
- e) **conceptual understanding** – Research has shown that both teacher-created and standardized state-wide tests are dominated by surface-level questions. Students need to develop surface, deep, and conceptual understandings and to do so, all three levels should be integrated into learning objectives and success criteria. Below is an example of three levels of depth of understanding: surface, deep and conceptual thinking

3. Progression: The rate of progress from the start to the end

Teachers must also address the curriculum -- what knowledge and understanding must be taught? While there is too little evidence to suggest that the *order of topics* is critical, what is more important is that there is an *increasing level of challenge* that is tied to the choices of activities, lessons, and lesson outcomes. This is often lost when there is an increasing obsession to align the curriculum with what is tested rather than what is worth knowing in order to live a “good life.” Furthermore, another key idea in thinking about curriculum has to do with how students *progress* through the curriculum. Hattie’s research team analyzed student achievement in New Zealand and found that the single greatest issue was the need for the teachers to develop a common understanding of progress. For example, almost every teacher considered it a badge of valour to dismiss any evidence of progress from previous teachers when new students came into their classes and decided to reassess students at the start of every year. The time lost to reassessing students may have had the same effect as the so called “summer effect” that reduces achievement over the summer ($d = -0.10$). If there were transfer plans or if teachers had a common understanding of progress, this might not happen.

Less teacher talk, more listening: One of the findings of *Visible Learning* is that the proportion of teacher talk to listening needs to change to less talk and more listening! In one study in which students in grades 6 to 12 wore watches that prompted them to record their experiences over 28,000 times found that teachers talk 70 to 80 percent of the time and most of this talk produced the lowest engagement. Further, the more the instruction was challenging, relevant, and engaging, the less the teachers were talking. Another study on teacher talk found that less than 5 percent of class time is devoted to group discussion or to teacher- student interactions that involve a *meaningful* discussion of ideas. Teachers love to talk, but unfortunately most of their talk, even when it calls for a student response, fosters lower-order learning. In addition, a lot of teacher talk is aimed at controlling behaviour so the teacher can continue talking, “Keep quiet, behave, listen, and then react to my factual closed questions. Tell me what I have just said so that I can check that you were listening, and then I can continue talking.” Of course some imparting of information is necessary, but this imbalance needs to be addressed.

Part of why we need teachers to talk less is because it is important for them to *listen*. Listening allows the teacher to learn about the students’ prior achievement and understanding. Listening shows humility, true depth of thinking, and requires genuine dialogue between the teacher and student. It models reciprocity and respect for the students’ perspectives. By listening, teachers show they truly value and are modeling deep communication skills more than just the transmission of knowledge. However, teachers do not *perceive* they are dominating lesson time with their talk, but they *are*, as is shown by video analysis, class observations, and event sampling.

Teachers place evaluation, not teaching methods, at the center of their work : We spend far too much time talking about teaching strategies. While there were many successful teaching methods identified in *Visible Learning*, the point is not for teachers to choose the top strategies and implement away. The point is to choose a method and then focus on *evaluating its impact* on student learning. So often we are content to say, “The students seemed to enjoy it,” or “The students seemed engaged.” However, teachers need to look for evidence – and they should *never* use only test scores – such as teacher judgment, classroom evidence, student reports, etc. in order to get the desired impact (for example, $d = > 40$ within a year’s work.) The best way to choose the most appropriate teaching method is to place *more* attention on the evaluation of the effects of the lesson and use this as a starting point to discuss whether the right teaching methods were used. To place *evaluation* rather than *teaching methods* at the centre of what they focus on, teachers should follow steps that look like this:

Level of understanding	LEARNING INTENTIONS	SUCCESS CRITERIA
Surface (uni-multi-structural)	Recognise that light/sound are forms of energy and have properties	I can name one or more properties of light and sound
Deep (relational)	Know that sound/light can be transformed into other forms of energy	I can explain how light/sound can be transformed into other types of energy
Conceptual (abstract)	Understand how light/ sound allows us to communicate	I can discuss how light/ sound enables us to communicate

The flow of the lesson: learning

Too often, professional development focuses on *how to teach*, not on *how students learn*. If teachers want to help students improve, they need to take the seemingly invisible process of learning, which occurs “in the head,” and make it visible for students. Teachers need to instruct students in “how to learn.” Currently, observations of

classrooms show that there is very little direct instruction in “how to learn” or the use of various learning strategies. Researchers who studied how frequently teachers were teaching students strategies to help them learn found they did so very infrequently; instead they found that teachers taught content and memorization of that content. Perhaps teachers are not aware that there are many theories of learning and a number of recent books on the topic.

When teachers know where students are in the different levels of thinking suggested in these models, *and* teachers know the *next higher level of thinking* toward which students should be working, this is where they can intervene to optimize students’ growth. Given such a wide variety of ways of learning, and the diversity of levels students will be on, this suggests the importance of *differentiation*. However, this does *not* mean that homogeneous groups are the answer. If teachers aim to move students “+1” beyond their current levels, then it can be more useful for students to work with other students who see things differently.

Differentiation All four of the above approaches to learning involve the teacher knowing where students are in their learning so they can move them “+1” beyond this point. Therefore, providing “whole class” instruction is unlikely to accomplish this. Differentiation requires that teachers know, for each student, where he or she is, on the journey toward meeting the success criteria. Is that student a novice, somewhat capable, or proficient? What learning strategies does the student have and how can the teacher help the student develop *other* learning strategies? Then – and this is where differentiation comes in -- depending on which phase of learning, whether their understanding is surface or deep, and their phase of motivation, the teacher can provide *different* ways in which students can demonstrate their mastery of understanding the success criteria. As was stated earlier, the success criteria should be clear to students, but what teachers have students do to arrive at the success criteria may vary. Another typical approach to differentiated instruction is to put students in collaborative groups, but in this case, the groups would *not* be organized by their phase of learning. Rather, students would be grouped by a mixture of those at and those +1 above so that peer interaction can help move all students forward.

Teachers as Adaptive Experts When teachers have a clear idea of the learning goals and yet are very present in class – listening closely to students and “seeing the lesson through the eyes of students” – this allows them to innovate when the strategies are *not* succeeding. These teachers, who have a high level of flexibility, are called “adaptive learning experts.” These are not the teachers with routine expertise that they use over and over, but rather, these are the teachers who pay special attention to students and

Step 1: Be clear about the outcomes (the success criteria) of the lesson or unit. Step 2: Decide the best way to measure the unit.

Step 3: Administer this assessment at the start of the lessons.

Step 4: Conduct the teaching.

Step 5: Re-administer the assessment at the end of the lesson or unit. Based on the results, what seemed to be optimal and less than optimal about the teaching methods and activities? What changes need to be made?

their understanding so they know when to intervene to advance the learning. Teachers who are “adaptive experts” see themselves primarily as evaluators and problem-solvers.

Strategies of Learning: Hattie reports that recently a consortium of about 35 well-known researchers summarized some of the research-based conclusions about processes for learning. While there are too many findings to summarize here, below are a few of the findings:

- a) Materials presented in verbal, visual, and multimedia form provide richer representations than a single medium
- b) Outlining, integrating, and synthesizing information produces better learning than rereading materials.
- c) Stories tend to be remembered better than facts and abstract principles.
- d) Most students need training in how to self-regulate their learning.
- e) Spaced schedules of studying produce better long-term retention than a single session.
- f) An understanding of an abstract concept improves with multiple and varied examples
- g) Making errors is often a necessity for learning to occur.

Strategies for Self-Regulation

It is easy to be overwhelmed by the vast number of *strategies of learning*. Lavery, 2008 lists the relative effects of some of the learning strategies with the *highest impacts* in the chart below (excerpted from pp.105-106). She

found the highest effects from strategies that involve *forethought* (goal-setting, planning, etc.) as well as strategies that involve a more *active* approach to learning.

Strategy	Definition	Example	Effect Size
Organizing and transforming	Overt or covert rearrangement of instructional materials to improve learning	Making an outline before writing a paper	0.85
Self-consequences	Student arrangement or imagination of rewards or punishment for success or failure	Putting off pleasurable events until work is completed	0.70
Self-evaluation	Setting standards and using them for self-judgment	Checking work before handing it in to a teacher	0.62
Help-seeking	Efforts to seek help from either a peer, a teacher, or another adult	Using a study partner	0.60
Keeping records	Recording of information related to study tasks	Taking class notes	0.59
Goal-setting/planning	Setting of educational goals or planning sub-goals and planning for sequencing, timing, and completing activities related to those goals	Making lists to accomplish during studying	0.49
Reviewing records	Efforts to re-read notes, tests, or textbooks to prepare for class or further testing	Reviewing class textbook before going to a lecture	0.49
Self-monitoring	Observing and tracking one's own performance and outcomes, often recording them	Keeping records study output	0.45
Time management	Estimating and budgeting use of time	Scheduling daily studying and homework time	0.44

These are all strategies that can be *taught*. In one study, however, results showed that creating a separate “study skills” course that was not tied to any particular *content* was *not* an effective way to teach these learning strategies. It is important to note that, as when discussing success criteria, it is helpful to share examples of success criteria when teaching these learning strategies. For example, in one study, when students were shown examples of the teacher’s notes, as well as a rubric by which their own notes would be judged, these students created much more effective notes than students who did not receive either of these things.

Learning requires two major skills: deliberate practice and concentration Sometimes learning is not fun. It can take years of practice to become an expert in something. Malcolm Gladwell popularized the idea that it takes 10,000+ hours of practice to become an expert. However, this practice is *not* repetitive skill and drill practice, rather, it is *deliberate* practice. Deliberate practice is *different* from just practice. Deliberate practice involves concentration and someone monitoring and providing feedback during the practice. Furthermore, the activity being practiced is usually a challenge for the student and it helps if the student is aware of the goal of the practice and has a clear idea of what success looks like. A major role of schools is to teach students to *value* deliberate practice and learn that this type of practice leads to competence.

In order to engage in *deliberate practice*, students must also be able to *concentrate* or *persist*. This does not mean they need quiet rooms or long periods of time; it has more to do with *quality* than with quantity. It does mean deliberate attempts to focus on the task and deliberate effort to improve performance. The perfect combination of deliberate practice and concentration occurs when students are given challenging tasks that can be mastered given hours of practice that improves with feedback

The flow of the lesson: the place of feedback

The average effect size of feedback on achievement, as documented in *Visible Learning*, is 0.79. This is *twice the average effect of all the other schooling effects* and therefore places feedback among the *top ten* influences on achievement! However, this influence is variable because feedback is not always implemented effectively. This chapter addresses how to make the most of feedback in the classroom. In a nutshell, to make feedback effective, teachers must have a very clear idea of where students *are* and where they are *meant to be* and then they should aim to provide feedback that reduces this gap. There are a number of ways they can go about providing the type of feedback that will reduce this gap that are explained in the chapter.

The three feedback questions Effective feedback helps students answer three important questions:

1. **Where am I going?** Often students don’t know the goal of a lesson and when they are given a goal, it is often *performance-* related, “Finish the task,” “Make it neat,” “Include as many sources as possible.”

Teachers need to help students answer the question, “Where am I going?” with a *mastery*-related goal. Teachers can do this by creating clear and challenging learning goals and making sure these learning goals are transparent to students.

2. **How am I going there?** It is valuable when teachers provide students with feedback *relative to the starting or finish point*, and *not* in comparison to other students. Rapid formative feedback – which will be discussed later – is useful here.
3. **Where to next?** This is the most interesting question to students because it helps them choose the next most appropriate challenge and can lead them to developing self-regulation over the learning process.

The three feedback levels The following types of feedback are effective when teachers are *aware of* their students’ learning levels (novice, proficient, and competent) and aim to provide feedback at the appropriate level.

1. **Task/product level** (for the novice) – This is the most common type of feedback we see in classrooms. It is more information-focused and aims to help students build their surface knowledge. Examples including telling a student when an answer is correct or incorrect or asking the student to provide more of or different information.
2. **Process level** (for the proficient level) – This type of feedback is geared toward helping the student improve the *process* used to create the product. This feedback can help the student develop learning strategies, detect errors, or recognize relationships between ideas. For example, feedback might include, “You’re asked to compare these ideas. For example, you could try to see how they are similar, how they are different... How do they relate together?” Feedback at this *process level* enhances *deeper* learning than at the task level above.
3. **Self-regulation level** (for the competent level) – Feedback at this level is more focused on helping the student to monitor his or her own learning process. This type of feedback may serve to enhance the student’s confidence to engage further with the task and to encourage the student to seek and accept feedback. This feedback is usually in the form of probing or reflective questions. An example of a comment might be, “You checked your answer with the resource book [self-help] and found that you got it wrong. Do you have any idea why you got it wrong? [error detection] What strategy did you use? Can you think of another strategy to try?”

Don’t mix praise with feedback: Research shows that in order for feedback to assist with a student’s learning, it should *not* be combined with *praise*. While praise is present in *many* classrooms and is used to comfort and support students, there have been several studies that have found a *low effect size* for praise ($d = 0.12$ in one and $d = 0.09$ in another). Another study showed that feedback *without* praise has a greater effect on achievement than feedback *with* praise. Overall, the point is not that we should be horrible to students. In fact, the opposite is true – students need to feel that they belong and in schools where there is a high level of trust between students and teachers there are higher levels of learning. Praise your students to make them feel welcome, just keep praise *separate* from feedback about their learning.

Rapid formative assessment One researcher compared *rapid formative assessment* to 22 other approaches to learning and found it to be the *most* cost effective – this is in comparison to approaches such as a longer school day, more rigorous math classes, class size reduction, a 10 percent increase in per pupil expenditure, an additional school year, and many other approaches.

Rapid formative assessment, as it is being defined, is when short-cycle formative assessments occur during the lesson to provide feedback to teachers and students to help them make decisions. “Should I relearn...Practice again...Move forward?” These “in-the- moment” assessments provide immediate feedback *during the process of learning*. There is a lot of evidence that when these formative assessment practices are woven into the minute-by-minute classroom activities of teachers, there can be a 70 to 80 percent increase in the speed of student learning even when this learning is measured by standardized tests.

The end of the lesson

There is a big focus these days on teachers *reflecting* on their lessons. It’s easy for teachers to wax poetic about their *teaching*, but one of the main messages of this book is that we need to focus on the *effects* of our actions, that is, our impact on students. In fact, Hattie goes so far as to say, “I never allow teachers or school leaders to visit classrooms to observe teachers; I allow them to observe only students – the reactions that students have to incidents, to teaching, to peers, to the activity.” (p. 138) This focus moves the discussion *away* from the teaching toward the *effect* of the teaching. This chapter focuses on the importance of teachers reviewing their lessons, after

teaching, by looking for *evidence* that they have had an impact on both the *climate* of the class as well as the progress on each student's learning trajectory toward the learning goals.

Evidence of an optimal learning climate: How a student experiences a lesson plays an important role in that student's engagement and therefore success in the lesson. For that reason, one researcher conducted a major meta-analysis of 119 studies based on 355,325 students to look at the impact of *student-centered teaching*. This is *not* to be confused with a method of teaching. Rather, a *student-centered* teacher is passionate about engaging students with what is being taught and helping them to succeed. Overall, a student-centered teacher has warmth, trust, empathy, and positive relationships. The reason this is important is because the researcher of the major meta-analysis above found high effect sizes (between $d = 0.64$ and 0.70) for teachers who displayed these characteristics. In evaluating their lessons, teachers must consider whether they created a climate in which students felt *invited* to learn. In addition to the teacher considering the questions below, it is useful to interview students to ask about their reactions as well:

- Did you demonstrate to all students that they were able, valuable, and responsible, and did you treat them accordingly?
- Did the students see that you believe in them, even when they were struggling?
- Did the students get the message from you that they possess untapped potential in learning what is being taught today?

Evidence of effective learning intentions and success criteria When evaluating a lesson, it is important to determine the effectiveness of the learning intentions and success criteria. To begin, consider asking, "Did the students know these?" "Could they articulate them in a way that showed they understood them?" and "Did they see them as appropriately challenging?" One way to approach this might be to ask students to keep a notebook in which they write down what they think they are learning, indicators of their progress, and, at the end, whether they believe they have achieved the learning intentions. Another way to evaluate the appropriateness of the learning intentions and success criteria is for teachers to work with other teachers to critique them. Teachers can look at each others' planning to determine whether it matches the success criteria or they can look at student work to evaluate the quality of the learning intentions and success criteria in light of these work samples.

Evidence of learning : Finally, teachers need to examine the impact they have had on each student's learning. They need to be able to answer:

- Are you aware of each student's progress on the journey from his or her starting point toward attaining the success criteria?
- How close is each student to attaining the success criteria?
- What now needs to occur to help each student to move closer to meeting the success criteria?

To answer these questions, teachers need some type of formative assessment that will help to provide them with this type of evidence and which will help to inform their future decisions about their teaching.

SELF-REGULATION

from "Visible Learning" 2009.

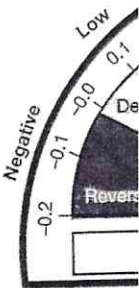
Implementations using student meta-cognitive and self-regulation learning

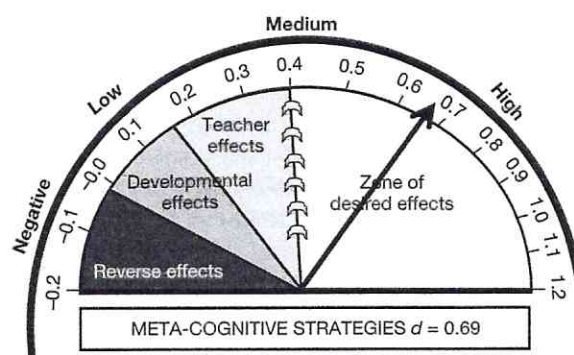
Meta-cognition relates to thinking about thinking. This section outlines a series of programs based on teaching various meta-cognitive strategies, including study skills, self-verbalization, self-questioning, aptitude-treatment interactions, matching learning styles, and individualized instruction.

Meta-cognitive strategies

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 this second layer of problem-solving has recently been referred to by the term "meta-cognition"; this refers to higher-order thinking which involves active control over the cognitive processes engaged in learning. Meta-cognitive activities can include planning how to approach a given learning task, evaluating progress, and monitoring comprehension. A synthesis of effective meta-cognitive training programs (Chiu, 1998),

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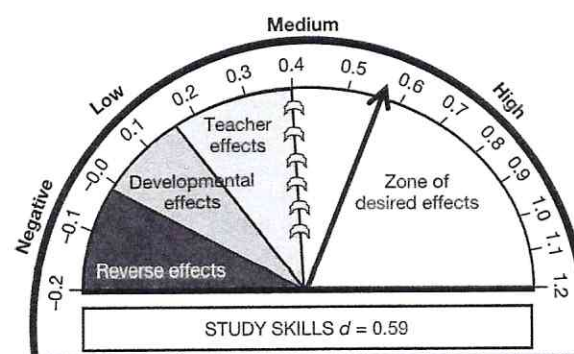
KEY	
Standard error	0.18 (High)
Rank	13th
Number of meta-analyses	2
Number of studies	63
Number of effects	143
Number of people (2)	5,028

found that such training is more effectively implemented using small-group instruction, with students in higher grades, with remedial students, and in less intensive programs. Haller, Child, and Walberg (1988) assessed the effects of meta-cognitive instruction on reading comprehension, and reported an effect size of $d = 0.71$ (see also Chiu, 1998). The most effective meta-cognitive strategies were awareness of textual inconsistency and the use of self-questioning. The more varied the instructional strategies throughout a lesson, the more students were influenced.

Study skills

Study skills interventions are programs that work on improving student learning using interventions outside what the teacher or teachers involved would normally undertake in the course of teaching. Interventions can be classified as *cognitive*, *meta-cognitive*, and *affective*. Cognitive interventions focus on the development of task-related skills, such as note taking and summarizing. Meta-cognitive interventions work on self-management learning skills such as planning; monitoring; and where, when, and how to use tactics and strategies. Affective interventions focus on non-cognitive features of learning such as motivation and self-concept (Hattie, Biggs, & Purdie, 1996). The argument in this section is that courses in study skills *alone* can have an effect on the surface level information, but it is necessary to combine the study skills *with the content* to have an effect on the deeper levels of understanding.

Lavery (2008) found a $d = 0.46$ effect on achievement from meta-cognitive study skills



KEY	
Standard error	0.090 (High)
Rank	25th
Number of meta-analyses	14
Number of studies	668
Number of effects	2,217
Number of people (8)	29,311

interventions. She 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 (Table 9.5). This strategy is "a major part of the forethought phase of this model (which occurs before the learner engages in the task) and has previously been shown to be a crucial aspect of interventions" (Greiner and Karoly, 1976, p. 497). Self-instruction occurs during the performance phase of the model and is an invaluable tool for guiding the learner through the focusing of attention and use of appropriate strategies. Self-evaluation concludes the cyclical model by allowing the learner to self-reflect on performance in

Table 9.5 Various meta-cognitive strategies and the effect sizes (Lavery, 2008)

Strategy	Definition	Description	No. effects	ES	se
Organizing and transforming	Overt or covert rearrangement of instructional materials to improve learning	Making an outline before writing a paper	89	0.85	0.04
Self-consequences	Student arrangement or imagination of rewards or punishment for success or failure	Putting off pleasurable events until work is completed	75	0.70	0.05
Self-instruction	Self-verbalizing the steps to complete a given task	Verbalizing steps in solving a mathematics problem	124	0.62	0.03
Self-evaluation	Setting standards and using them for self-judgment	Checking work before handing in to teacher	156	0.62	0.03
Help-seeking	Efforts to seek help from either a peer, teacher, or other adult	Using a study partner	62	0.60	0.05
Keeping records	Recording of information related to study tasks	Taking class notes	46	0.59	0.06
Rehearsing and memorizing	Memorization of material by overt or covert strategies	Writing a mathematics formula down until it is remembered	99	0.57	0.04
Goal-setting/planning	Setting of educational goals or planning subgoals and planning for sequencing, timing, and completing activities related to those goals	Making lists to accomplish during studying	130	0.49	0.03
Reviewing records	Efforts to reread notes, tests, or textbooks to prepare for class or further testing	Reviewing class textbook before going to lecture	131	0.49	0.03
Self-monitoring	Observing and tracking one's own performance and outcomes, often recording them	Keeping records of study output	154	0.45	0.02
Task strategies	Analyzing tasks and identifying specific, advantageous methods for learning	Creating mnemonics to remember facts	154	0.45	0.03
Imagery	Creating or recalling vivid mental images to assist learning	Imagining the consequences of failing to study	6	0.44	0.09
Time management	Estimating and budgeting use of time	Scheduling daily studying and homework time	8	0.44	0.08
Environmental restructuring	Efforts to select or arrange the physical setting to make learning easier	Studying in a secluded place	4	0.22	0.09

relation to the high as that of s completed tasks evaluates what

The highest to be a valuable the types of str promote a mor keeping, image ranked lowest, i involvement w

With regard shows that the studies of short tertiary studies erred to be "at r with these stud are somewhat 1 change (Hattie meta-analysis, t initial decrease frame is necess of prior study s

For students for those want Shrager and M performance fo Scruggs (1989) mnemonic me Bennett, 1986; struggling at th mnemonic key similar represen the colors of th being transferr first able to re the optimal m strategy adapta the appropriate

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relation to the previously set goals. While self-monitoring is very effective, it was not as high as that of self-evaluation, suggesting that self-monitoring in itself (such as ticking off completed tasks) can be much improved if taken a step further, where the learner actually evaluates what they have monitored.

The highest ranked strategy, that of organizing and transforming, has also been found to be a valuable component of many interventions (Hattie *et al.*, 1996). It is likely that the types of strategies included in this category (such as summarizing and paraphrasing) promote a more *active* approach to learning tasks. While several strategies such as record keeping, imagery, time management, and restructuring the learning environment were ranked lowest, it is likely that this is because they are more passive and involve non-active involvement with the content.