

Chapter 7

Getting to the Core of Learning: Using Assessment for Self-Monitoring and Self-Regulation

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Pupils in modern society are living in confusing and unpredictable times, in which they must be equipped with skills that enable them to think for themselves and be self-initiating, self-modifying and self-directing. They must acquire the capacity to learn and change consciously, continuously and quickly, to anticipate what might happen and to continually search for more creative solutions. Learning for the twenty-first century involves much more than acquiring knowledge. It requires the capacity for ‘reflective judgement’ – the ability to make judgements and interpretations, less on the basis of ‘right answers’ than on the basis of ‘good reasons’ (King and Kitchener 1994).

Delors et al. (1996), in their powerful work for UNESCO *Learning: the treasure within*, identified four essential pillars of learning – learning to know, learning to do, learning to live together and learning to be – a testament to the growing need for informed, skilled and compassionate citizens who value truth, openness, creativity, interdependence, balance and love, as well as the search for personal and spiritual freedom in all areas of one’s life. This image of learning means fundamental changes in orientations to teaching and learning in schools. It means that schools must become places that foster high-level learning for all students in all of these domains.

Assessment has the potential to be a key element in transforming schools into places of high-quality learning for all students. Why? Because assessment can be one of the most powerful processes that schools and teachers have to prepare students for the future in all of the domains in the UNESCO framework.

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7.1 Assessment for Learning

Since the ground-breaking work of Terry Crooks (1988), Black and Wiliam (1998a, b), and the Assessment Reform Group (1999), assessment for learning has taken hold worldwide as a high-leverage approach to school improvement. In assessment for learning, we have a pedagogical approach that has the potential, at least, to influence student learning. But, as many authors have told us, assessment for learning is not a ‘quick fix’. For teachers really to engage in assessment for learning requires a lot of new professional learning, and it requires changes in how teachers interact with their pupils, how they think about the material they teach and, most importantly, how they use assessment in their daily work. Much of this volume is focused on helping teachers understand assessment for learning better – both the theory on which it is based and the practical processes that make it work.

In this chapter, we aim to provide teachers with a deeper understanding of the ways that assessment can help pupils become thoughtful, self-monitoring and self-regulating learners. Assessment for learning is based on a complex set of ideas and theories and provides a model for teachers to use assessment to rethink, revise and refine their teaching. It also assists them in the provision of feedback and to focus on creating the conditions for pupils to become confident and competent self-assessors. In our experience with teachers who are engaging in assessment for learning, they are often preoccupied with using assessment to inform their teaching decisions and provide feedback to students. Sometimes the feedback gives students the raw materials for becoming better at self-assessment. However, teachers rarely think proactively about what they need to do to use assessment to promote student self-assessment and self-regulation so that students become adept at defining their own learning goals and monitoring their progress towards them.

This chapter is concerned with this second dimension of assessment for learning, emphasising the role of the pupil as the critical connector between assessment and learning. We have called this ‘assessment as learning’ (Earl 2003; Earl and Katz 2005) – the kind of assessment that recognises students as active, engaged and critical assessors who make sense of information, relate it to prior knowledge and use it for new learning. This is the regulatory process in metacognition, in which students personally monitor what they are learning and use the feedback from this monitoring to make adjustments, adaptations and even major changes in what they understand. When teachers focus on assessment as learning, they use classroom assessment as the vehicle for helping pupils develop, practise and become comfortable with reflection and with critical analysis of their own learning. Viewed this way, self-assessment and meaningful learning are inextricably linked.

In this chapter, we expand on this notion of assessment as learning by showing how it relates to current learning theory and by describing teachers’ roles in developing reflection and self-regulation in their pupils.

7.2 Assessment and Learning

How People Learn: Brain, Mind, Experience and School, the seminal synthesis of literature in the cognitive and developmental sciences produced by the National Research Council in the USA (Bransford et al. 1999), identified three principles that underpin how people learn:

1. Students come to the classroom with preconceptions about how the world works. If their understanding is not engaged, they may fail to grasp the new concepts and information, or they may learn them for purposes of the test but revert to their preconceptions outside the classroom.
2. To develop competence in an area of inquiry, students must have a deep foundation of factual knowledge, understand facts and ideas in the context of a conceptual framework and organise knowledge in ways that facilitate retrieval and application.
3. A 'metacognitive' approach to instruction can help students learn to take control of their own learning by defining learning goals and monitoring their progress in achieving them.

These principles portray learning as an interactive process by which learners try to make sense of new information and integrate it into what they already know. Students are always thinking, and they are either challenging or reinforcing their thinking on a moment-by-moment basis.

Before teachers can plan for targeted teaching and classroom activities, they need to have a sense of what it is that pupils are thinking. What is it that they believe to be true? This process involves much more than 'Do they have the right or wrong answer?' It means making pupils' thinking visible and understanding the images and patterns that they have constructed in order to make sense of the world from their perspective (Earl 2003). It means using this information to provide scaffolding for the learner to create new connections and attach these connections to a conceptual framework that allows efficient and effective retrieval and use of the new information.

The following anecdote gives a vivid description of how this learning process happens and the critical role that assessment plays in the learning process. When she was about 5 years old, my niece Joanna (Jojo to the family) came up to me and announced that 'All cats are girls and all dogs are boys'.

When I asked her why she believed cats were girls and dogs were boys, she responded: 'Your cat Molly is a girl and she's little and smooth, girls are little and smooth, too. Cats are girls. The dog next door is a boy and he's big and rough, just like boys are big and rough. Dogs are boys'. Clearly, she had identified a problem, surveyed her environment, gathered data and formulated a hypothesis, and, when she tested it, it held – pretty sophisticated logic for a 5-year-old.

I pulled a book about dogs from my bookshelf and showed her a picture of a chihuahua, a dog that was little and smooth.

'What's this?' I asked.
'Dog', she replied.
'Girl or boy?'
'It's a boy, dogs are boys'.
'But it's little and smooth', I pointed out.
'Sometimes they can be little and smooth', said Jojo.
I turned to a picture of an Irish setter, surrounded by puppies. She was perturbed.
'What's this?'
'Dog', she replied, with some hesitation.
'Boy or girl?'

After a long pause she said, 'Maybe it's the dad'. But she didn't look convinced and she quickly asked: 'Can dogs be girls, Aunt Lorna?'

This anecdote is a simple but vivid demonstration of the process of assessment, feedback, reflection and self-monitoring that we all use when we are trying to make sense of the world around us. Jojo had a conception (or hypothesis) about something in her world (the gender of cats and dogs). She had come to a conclusion based on her initial investigation that held with her experience. With the intervention of a teacher (Aunt Lorna) who used assessment (How do you know?) and created the conditions (the picture book) for her to compare her conceptions with other examples in the real world, she was able to see the gap between her understanding and other evidence. Once she had the new knowledge, she moved quickly to adjust her view and consider alternative perspectives.

This kind of assessment is at the core of helping pupils become aware of and take control of their own learning. And it is this kind of assessment that supports the type of learning that psychologists describe as conceptual change. Rather than transforming evidence that exists in the world to fit established mental structures (conceptions), the mental structures themselves shift (or accommodate) to take new evidence into account. Classroom assessment, in this view, promotes the learner's accommodation process. It is something best – and necessarily – accomplished by the learner herself since it is she who holds privileged access to the relevant beliefs, though as we saw above, the teacher's role is to help make them public (Katz 2000).

7.3 Assessment as Learning

Assessment as learning is premised on the need for all young people to become their own best self-assessors. Why? Because self-assessment is the third fundamental principle of how people learn (Bransford et al. 1999). Although the first two principles identified above are key ingredients of good pedagogy and enhanced learning, the third principle is the one that underpins self-awareness and life-long learning – creating the conditions to develop metacognitive awareness so that they have the skills and habits to monitor and regulate their own learning. Metacognition,

as defined by Brown (1987), has two dimensions – ‘knowledge of cognition’ (knowledge about ourselves as learners and what influences our performance, knowledge about learning strategies and knowledge about when and why to use a strategy) and ‘regulation of cognition’ (planning – setting goals and activating relevant background knowledge; regulation – monitoring and self-testing; and evaluation – appraising the products and regulatory processes of learning).

Metacognition means that pupils must become reflective about their own learning, a skill that like all complex learning requires years of practice, concentration and coaching. It does not have a beginning and an end but rather continues to develop and to be honed across disciplines and contexts (Costa 2006). And it does not happen by chance. If pupils are to become metacognitive thinkers and problem solvers who can bring their talents and their knowledge to bear on their decisions and actions, they have to develop these skills of self-assessment and self-adjustment so that they can manage and control their own learning.

7.4 Helping Pupils Become Their Own Best Assessors

To become independent learners, students must develop a sophisticated combination of skills, attitudes and dispositions. Students become productive learners when they see that the results of their work are part of critical and constructive decision making. They need to learn to reflect on their own learning, to review their experiences of learning (What made sense and what did not? How does this fit with what I already know, or think I know?) and to apply what they have learned to their future learning.

Self-monitoring and self-regulation are complex and difficult skills that do not develop quickly or spontaneously. Teachers have the responsibility for fostering and cultivating these skills. The rest of this chapter is concerned with how teachers can foster the development of self-assessment and self-regulation in pupils.

7.4.1 *Habits of Mind for Self-Regulated Thinking*

A number of writers have referred to the ‘habits of mind’ that creative, critical and self-regulated thinkers use and that students (and many adults, for that matter) need to develop. These habits are ways of thinking that will enable them to learn on their own, whatever they want or need to know at any point in their lives (Marzano et al. 1993).

When people succeed or fail, they can explain their success or failure to themselves in various ways: effort, ability, mood, knowledge, luck, help, interest, clarity of instructions, unfair policies and so on. Some of these are controllable; others are not.

Attribution theory makes clear that to the extent that successes and failures are explained by (attributed to) controllable factors, adaptive motivational tendencies will follow (Weiner 2000). Self-assessment is the mechanism by which learners assign attributions to particular outcomes, and the teacher's role is to help pupils learn how to shift their attributions away from uncontrollable explanations (like ability) to controllable ones (like effort). A student who explains a poor result in a math test by appealing to a lack of ability will be more likely to repeat the same behaviour pattern and meet with the same result on a future occasion than one who attributes the outcome to having not studied the correct material. In the latter example, the subsequent behaviour pattern actually shifts so that the learner asks himself or herself the regulatory question 'Am I focusing on the right material?' at the outset.

Several authors have identified an 'inquiry habit of mind' as an essential component of profitable learning for individuals and groups (Newmann 1996; Costa and Kallick 2000; Earl and Lee 2000; Katz et al. 2002). If pupils are going to develop these 'habits of mind' and become inquiry-minded, they need to experience continuous, genuine success. They need to feel as if they are in an environment where it is safe to take chances and where feedback and support are readily available and challenging. This does not mean the absence of failure. It means using their habits of mind to identify misconceptions and inaccuracies and work with them towards a more complete and coherent understanding. Teachers have the responsibility of creating environments for pupils to become confident, competent self-assessors who monitor their own learning.

7.4.2 Lots of Examples of 'What Good Work Looks Like'

As Sadler (1989) suggested, pupils' ideas of quality can approach those of the teacher if they have good exemplification and support; this is what he refers to as 'guild knowledge'. This knowledge is a prerequisite for pupils, taking responsibility for their own learning and for setting their own targets, since success is only possible if the end results are clearly delineated. Knowing what good work looks like not only increases the learner's conceptual awareness and provides reference points to strive for but also enhances his or her metacognitive awareness of the progress of learning. With such insight and engagement, pupils become more proficient in monitoring their work continuously during production while developing sustainable learning and self-assessment skills. They develop a repertoire of approaches, such as editing and self-evaluating in addition to that of setting their own targets, since their needs become apparent as part of the procedure. If, as Sadler argued, self-assessment is essential to learning because students can only achieve a learning goal if they understand that goal and can assess what they need to do to reach it, the criteria for evaluating any learning achievements must be made transparent to students to enable them to have a clear overview both of the aims of their work and of what it means to complete it successfully.

Although curriculum guides and standards (such as the national curriculum, schemes of work and level descriptions) provide a skeleton image of the expectations for students, nothing is as powerful as multiple images of ‘what it looks like when experts do it’. Not only do pupils begin to see, hear and feel the expectations for the work at hand, they become acutely aware of the variations that can occur and the legitimacy of those variations. Once learners have a sense of where they are aiming, teachers can offer many intermediate examples of the stages along the way and how experts also struggle to meet their own expectations.

Many assessment methods have the potential to encourage reflection and review. What matters in assessment as learning is that the methods allow students to consider their own learning in relation to models, exemplars, criteria, rubrics, frameworks and checklists that provide images of successful learning. When pupils contribute to developing these models, they are even more likely to internalise them and develop a concrete image of what ‘good work looks like’.

7.4.3 Real Involvement and Responsibility

When teachers work to involve pupils and to promote their independence, they are really teaching pupils to be responsible for their own learning and giving them the tools to undertake it wisely and well (Stiggins 2001). How else are they likely to develop the self-regulatory skills that are the hallmark of experts? It is not likely, however, that pupils will become competent, realistic self-evaluators on their own. They need to be taught skills of self-assessment, have routine and challenging opportunities to practise and develop internal feedback or self-monitoring mechanisms to validate and to call into question their own judgements. They compare their progress towards an achievement goal and create an internal feedback loop for learning. The more control and choice that students have in thinking about their learning, the less likely they are to attribute their understanding (or lack of understanding) to external factors like teachers or subject matter. Instead, they become more responsible for their learning and have increased self-efficacy and resilience. For pupils to become independent learners, they need to develop a complicated combination of skills, attitudes and dispositions in order to set goals, organise their thinking, self-monitor and self-correct. Each of these skills can be learned by engaging pupils in these activities and helping them change their learning plans based on what they learn, over and over again during their years in school.

7.4.4 Targeted Feedback

Learning is enhanced when pupils see the effects of what they have tried and can envision alternative strategies to understand the material. Although assessment as learning is designed to develop independent learning, pupils cannot accomplish it

without the guidance and direction that comes from detailed and relevant descriptive feedback from teachers to help them identify their learning needs and to develop autonomy and competence (Gipps et al. 2000; Clarke 2003). Students need feedback not just about the status of their learning but also about the degree to which they know when, where and how to use the knowledge they are learning (Bransford et al. 1999). Effective feedback challenges ideas, introduces additional information, offers alternative interpretations and creates conditions for self-reflection and the review of ideas. Pupils can apply these approaches for themselves to monitor their own learning, think about where they feel secure in their learning and where they feel confused or uncertain and decide on a learning plan. In so doing, pupils are encouraged to focus their attention on the task rather than on getting the answer right, and they develop ideas for adjusting, rethinking and articulating their understanding.

7.4.5 Discussion, Challenge and Reflection

As Vygotsky (1978) argued, the capacity to learn from others is fundamental to human intelligence. With help from someone more knowledgeable or skilled, the learner is able to achieve more than she or he could achieve alone. Ideas are not transported 'ready-made' into students' minds. Instead, as the Jojo story showed, new ideas emerge through careful consideration and reasoned analysis and just as important, through interaction with new ideas from the physical and social worlds. Learning is not private, and it is not silent. It may happen in individual minds, but it is constantly connected to the world outside and the people in that world. Peers and parents can be strong advocates and contributors to this process, not as judges, meeting out marks or favours, but as participants in the process of analysis, comparison, rethinking and reinforcing that makes up learning. Learning is a social activity. Teachers, peers and parents, when they understand their role, and the situation is structured to support the process, can be key players as learners grapple with 'what they believe to be true' in relation to the views, perspectives and challenges of others.

7.4.6 Practice, Practice, Practice

Independence in monitoring learning is not something that just occurs. It does not happen immediately, and there may be setbacks along the way. Even those with natural talent require a great deal of practice in order to develop their expertise. But practice is more than repetitive drills. Modern theories of learning and transfer retain the emphasis on practice, but they specify the kinds of practice that are important and take learner characteristics (e.g. existing knowledge and strategies) into account. Learning and transfer is most effective when people engage in 'deliberate

practice' that includes active monitoring of their learning experiences (Bransford et al. 1999). When teachers involve pupils and promote independence, they are making their students responsible for their own learning and giving them the tools to undertake it wisely and well, by allowing them to experiment with new ideas, try them on, see how they fit, struggle with the misfits and come to grips with them. Effective problem solvers monitor their own mental progress as they plan for, execute and reflect on a learning task, and learners need opportunities to talk aloud overtly about what is going on inside their heads. This requires many opportunities to practise, reflect, challenge and try again.

7.4.7 An Environment of Emotional Safety

Becoming independent and responsible learners who embrace assessment as a positive part of the process is not something that comes easily. In fact, it is downright scary for many adults, let alone young people. It is no surprise that some (perhaps many) students do not wholeheartedly embrace the idea. The extent to which pupils are willing to engage in self-assessment is very much connected to their sense of self and their self-esteem. Persistence depends on expectations of success, even if it is not immediate. However, pupils who have had a history of, or fear, failure will adopt techniques to protect themselves, even if it means avoiding opportunities for learning. Pupils who define themselves by their ability are often dependent on high grades as a visible symbol of their worth and find the challenge of moving away from their positions of confidence rather like a free fall into the unknown. It is not enough to have a few safe moments or episodes of learning. These need to be the norm. Through detailed case studies of individual children throughout their primary schooling, Pollard and Filer (1999) demonstrate how these pupils continuously shaped their identities and actively evolved as they moved from one classroom context to the next. What this means is that each child's sense of self as a pupil can be enhanced or threatened by changes over time in their relationships, structural position in the classroom and relative success or failure. Their sense of self was particularly affected by their teachers' expectations, learning and teaching strategies, classroom organisation and criteria for evaluation.

If students are going to feel at ease with self-monitoring and self-regulation, they need to be comfortable with identifying different possibilities; they need to learn to look for misconceptions and inaccuracies in their own thinking and work towards a more complete and coherent understanding. Students (both those who have been successful – in a system that rewards safe answers – and those who are accustomed to failure) are often unwilling to confront challenges and take the risks associated with making their thinking visible. Teachers have the responsibility for creating environments in which students can become confident, competent self-assessors by providing emotional security and genuine opportunities for involvement, independence and responsibility.

Images and Points for Reflection

Changing assessment to capitalise on its power to enhance learning can be a fundamental shift in the preconceptions that teachers have about assessment – about what it is for, how it is connected to learning and how it works. In fact, shifting to routines in the classroom where assessment is used to help pupils monitor and regulate their own learning requires that teachers draw on their personal metacognitive skills and engage in a process of rethinking their assessment and teaching practices. Teachers, like students, may need help, feedback and reflection so that they can try out and adapt their newly acquired skills and knowledge in new environments. And they need images of how assessment can contribute to student reflection and self-regulation. We have included three examples to stimulate thinking about what using assessment for self-monitoring and self-regulation might look like and as a starting point for creating others.

7.4.8 Image 1 – Primary Mathematics

A primary teacher has been teaching the concept of two-digit addition with regrouping. She uses a worksheet that includes a range of items (such as single-digit additions without regrouping, single-digit with regrouping, double-digit additions with and without regrouping and tricky additions). These items enable her to become an investigator, making inferences and establishing hypotheses about what different pupils understand and what is still unclear or even inaccurate in their conceptions. After she analyses the pupils' work, she conducts a 'think aloud' with the class for each of the items, in which she models her thinking as she attempts each question. In this way, she provides them with insights about the correct approach as well as indicating the kinds of misconceptions and errors that might creep into someone's thinking. Finally, she does individual 'think alouds' with selected students, in which they tell her what they were thinking as they did particular questions (that she identified from their pattern of errors) so that she can help them see where their thinking needs some adjustment or practice. These targeted moments of reflection and rethinking on the part of individual pupils also provide information that forms the basis for the next stage in teaching and the grouping of pupils.

Points for Reflection

1. What content knowledge does this teacher need to construct this assessment?
2. What predictable patterns of errors would the teacher look for in analysing the students' work?
3. How has the teacher created opportunities for individual students to see their own thinking, reflect on it and make adjustments? What other strategies might she use now that she has additional information about their thinking?

7.4.9 *Image 2 – Middle Years Social Studies*

One of the history curriculum targets for pupils in key stage 3 is ‘organisation and communication’. This overarching objective includes several sub-items: recall, prioritise and select historical information; accurately select and use chronological conventions; and communicate knowledge and understanding of historical events. Within ‘recall, prioritise and select historical information’ alone, there are five additional sub-items: organising information; using a range of sources of information; finding relevant information; sorting, classifying and sequencing information; and comparing/contrasting information. The possibility of gaps in knowledge, underdeveloped skills, misunderstandings or misconceptions and confusion for pupils is massive. If teachers are serious about assessment for learning, every assessment task (and there will be many, both formal and informal) should provide insight into different pupils’ status in relation to organisation and communication of history and give pupils the reference points and the exemplars to allow them to reflect on their own thinking. Each assessment should explicitly focus on a subset of the skills, understanding, conventions, etc., that make up the overall curriculum expectation. And the teacher’s job is not just to score the assignments; rather she or he takes each assignment and, over time, constructs and continually adjusts the profile of learning and of teaching for each pupil in order to move their learning forward in effective and efficient ways.

Points for Reflection

1. What are the likely gaps in prior knowledge, areas of difficulty, misconceptions and challenges that students are likely to exhibit in relation to organising information; using a range of sources of information; finding relevant information; sorting, classifying and sequencing information; and comparing/contrasting information?
2. Design an assessment task for ‘recall, prioritise and select historical information’ that allows students to make decisions about their own knowledge and skill in relation to organising information; using a range of sources of information; finding relevant information; sorting, classifying and sequencing information; and comparing/contrasting information.

7.4.10 *Image 3 – Middle Years Mathematics*

At the beginning of the school year, a middle-school mathematics teacher uses a series of ‘games’ that he has devised to give him insights into his pupils’ knowledge and depth of understanding of concepts in the mathematics curriculum. One of these games uses a modified pool table to help him ascertain the pupils’ conceptions of algebraic relationships, either formal or intuitive. Pupils were given a graphic of a four-pocket pool table. They were told that the ball always leaves pocket A at a 45°

Table 7.1 Pool table dimensions and observations

Length	Width	Number of hits	Number of squares
6	4	5	12
3	5	8	

angle, rebounds off a wall at an equal angle to that at which the wall was struck and continues until it ends up in a pocket. Pupils counted the number of squares the ball passed through as well as the number of hits the ball made, the first and last hit being the starting and finishing pockets. They experimented with tables of various dimensions and recorded their observations on a chart (see Table 7.1).

As the pupils gathered data (with many more data combinations than we have included in the table), they began to make predictions about the number of hits, the number of squares and the destination of the ball, based on the patterns that they observed. Some moved to general statements of relationships like ‘You can tell the number of hits by adding the width and the length together and dividing by their greatest common factor’. Or, ‘The number of squares that the ball goes through is always the lowest common multiple of the width and the length’. Other students continued to count to reach the answers without seeing the relationships that existed.

During this task, the teacher wandered around the room observing and noting the thinking that was occurring for individual pupils. He stopped and asked questions, not about the answers that they were recording, but about the process that they were using. He prompted them to think about the patterns and to take a chance at making predictions. All the while, he was making notes on a pad that contained the names of the students and blank fields for writing his observations. From this information, he decided how to proceed in teaching the next series of lessons and how to group the class for the various teaching elements to come. For some, the work progressed very quickly to an introduction of formal notation of an algebraic equation to symbolise the general patterns that they had identified. For others, he used a number of patterning exercises to help them see the patterns that arose and formulate them in very concrete ways. He was very conscious of the importance of moving from concrete experience and direct consciousness of the phenomenon to the more abstract representation. The pool table task gave him a window into his pupils’ thinking and a starting place for planning teaching, resources, grouping, timing and pacing. When he moves on to another concept, all of these are likely to change. Once again, he will need to find out what the students see, what they think and what they understood before he decides what to do.

Points for Reflection

1. What mathematical content knowledge did this teacher need to have to design this task? To learn from this task?
2. What are the patterns of prior learning that he would be looking for in his students’ thinking?

7.5 Further Reading

The following resources may be useful for teachers in their study and implementation of classroom assessment with purpose in mind. This list is not exhaustive. Instead, it includes examples of books, articles, materials and web links that can be the starting point for individuals and groups to build their own personalised assessment resource compendia.

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