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Formative assessment: translating high-level curriculum principles into classroom practice

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The curriculum is the totality of experiences which are planned for young learners through their education, wherever they are being educated. It determines the ethos of the school as a learning community, curriculum subjects and areas, interdisciplinary learning, and opportunities to attain personal and learning goals. An effective curriculum, which meets the needs of the twenty-first century learner improves numeracy and literacy, promotes health and well-being, and supports the social and technical skills required for learning, life and work (lifelong learning). Relatively recent developments in the policy frameworks of numerous nations have seen the implementation of an interactive style of teaching and learning called formative assessment. Formative classroom assessment is a potentially powerful instructional process because the practice of sharing assessment information that supports learning is embedded into the instructional process by design. This article uses a range of sources, including policy and framework documentation relating to the development and implementation of a curriculum which drives interactive assessment practices designed to make evidence of learning visible as assessment data with potentially lifelong effects. The purpose of this article is to delineate a ‘formative curriculum’ designed to drive classroom practices that create responsible citizens, confident individuals, effective contributors, and successful learners.

Keywords: formative assessment; curriculum principles; lifelong learning; interaction; curriculum design; classroom practice

Across the last 20 years, lifelong learning competences and capacities have become a key theme in various nations including, the UK (Department for Employment and Learning, 2010; Scottish Government, 2013), across the European region (European Commission, 2013) and globally (e.g. Organisation for Economic Cooperation and Development [OECD], 2005, 2012). The burgeoning interest in lifelong learning has come about due to the increasingly essential requirement for high levels of

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literacy, numeracy, emotional stability in the face of transition and challenge, and cognitive adaptability in a rapidly changing world (Ecclestone, 2011). Hinchliffe (2006) refers to the twenty-first century economy as the 'knowledge economy', defined here by Powell and Snellman (2004) as the 'production and services based on knowledge-intensive activities that contribute to an accelerated pace of technical and scientific advance, as well as rapid obsolescence. The key component of a knowledge economy is a greater reliance on intellectual capabilities than on physical inputs or natural resources' (p. 199).

The key difference from the past is that skills and competences relevant to the 'knowledge economy' are no longer predictable in a changing socio-economic landscape (Hoskins & Deakin Crick, 2008). The lack of predictability, notes is a 'postmodern condition' of education. Hoskins and Fredriksson (2008) contend that curricula which drive didactic forms of instruction where students are mere passive recipients 'do not function in the rapidly changing technological and globalized world of today where it is not possible to establish which type of knowledge is needed in the next 5 or 10 years let alone a lifetime' (Hoskins & Fredriksson, 2008, p. 11). This statement is also true for the initial training and professional development of teachers and school administrators. School staff charged with the responsibility of preparing young learners for learning and life need to be prepared to observe and interact with them in order to collect reliable and valid evidence for use when planning the next steps in students' learning progressions. However, in a study of Canadian teacher preparation, Volante, Drake, and Beckett (2010) found that few 'faculties teach courses on assessment and evaluation; rather, assessment is embedded into teachable subject areas...therefore the assessment content is not properly infused and is often neglected in teachable subject courses' (p. 46). Consequently, educators continue to deliver curricula which fail to promote learning as an analytical and creative enterprise entailing the consideration of alternatives, openness, and inventiveness (MacIntyre, Buck, & Beckenhauer, 2007). Stiggins (2004), in reference to the US remarked, 'in districts, schools, and classrooms across the nation, educators still assess student learning the way their predecessors did 60 years ago because they have not been given the opportunity to learn about new insights and practices' (p. 22; also see Stiggins, 2014). Shortcomings in teacher preparedness for peer-learning, a key element of curriculum, were also noted by Baines, Blatchford and Chowne in England, 'teachers typically plan for their interactions with pupils, but not for interactions between pupils' (2007, p. 664). Central and local government agencies in alignment with their partners can devise standards documentation which drives close collaboration between central and local government, schools, colleges, universities and the local community to ensure that new curricula drive forward improvements in learning, teaching, and assessment. In

particular, there is a requirement for school staff to work together with students and their parents as legitimate assessment-partners in order to achieve a common ambition, so that the education system promotes and supports the highest possible standards of attainment and achievement.

Curriculum development strategy

Perhaps the most fundamental of strategic considerations is the relationship between formative classroom assessment and the curriculum. In concise terms, all classroom assessment practices must be designed and implemented in ways which follow and support the 'formative curriculum', which in turn drives assessment practices. While the 'formative curriculum' drives classroom assessment, it is not designed to (and therefore does not) predict or limit evidence collection activities because formative assessment is a flexible process best modelled by 'adaptive experts' (Bransford, Derry, Berliner, Hammerness, & Beckett, 2005). Bransford et al. (2005) in their book entitled *Preparing Teachers for a Changing World* describe adaptive experts as teachers who access written information sources, solve problems collaboratively, experiment with their environments, and innovate new ideas to see if they create improvements in their own professional practice and further learning. Teachers of this type compose qualitative relationships (Eisner, 2005) which engage their students with the learning process. The classroom is an open and transparent system where students and teachers work together and 'feedback is used to modify the teaching and learning activities in which they are engaged' (Black & Wiliam, 1998, p. 2). This will promote higher quality learning and teaching and give more autonomy and professional responsibility to teachers.

If the implementation strategy of a 'formative curriculum' is to be successful, then certain conditions need to exist: (1) dedicated political support at all levels of government; (2) a clear and compelling expression of the conceptual framework which underpins 'formative curriculum' and drives assessment practices; (3) close collaboration between teachers, administrators, parents/caregivers, learners, and the wider community, who understand their roles in working together to engage students with the process of their own learning; (4) practitioners approach and manage curricula transformation so that obstacles are perceived as constructive and necessary challenges; (5) the integration of summative and formative assessment activities into a functional system so that they work in concert to support and evaluate learning. When such conditions exist, a 'formative curriculum' ensures that all young people meet the high standards of achievement, including attainment, needed for life and work. The knowledge and understanding, skills, attributes, and capabilities that

young learners will need for the future will be different to those in the past and within a more challenging and competitive environment (Laal & Salamati, 2012). Strategic visions need to suit the cultures in which they will be implemented, and reflect the principles of the ‘formative curriculum’ in order to support greater breadth and depth of learning and place a greater focus on skills development. This includes higher-order thinking skills such as analysis, evaluation, creation, and synthesis.

Contrasting the traditional curriculum

Both initial teacher training programmes and continuing teacher professional development initiatives can engage teachers in communities of practice which emphasise and model the significant differences between traditional ideas about teaching and learning and a ‘formative curriculum’ (see Table 1). Formative curricula are founded upon socio-cultural theories (Vygotsky, 1978) which posit that new knowledge is acquired through interactions with the social and physical environment. Blatchford, Baines, Rubie-Davies, Bassett, and Chowne (2006) in their empirical study into science education in the UK concluded that interactions are of high-quality when learners provide explanations, justifications, predictions, and reasoning. It has been found that these kinds of interactions promote thinking and allow students to demonstrate what they can do (Scottish Government, 2011). Interactions between teacher and students, and among peers need to be based on thoughtful questions, careful listening, reflective responses and effective feedback strategies (Black & Wiliam, 1998; Hattie, 1999).

Principles for curriculum design

A ‘formative curriculum’ is guided by seven core principles which practitioners, through careful moderation, need to build into their lesson planning. They are breadth, progression, depth, challenge and enjoyment, coherence, relevance, and personalisation and choice. Each principle pursues the development of the ‘four capacities’ among young learners. The four capacities are successful learners, confident individuals, responsible citizens, and effective contributors (Scottish Government, 2011). The first capacity, successful learners, is characterised by enthusiasm, resilience, and an openness to new ideas. They are able to use literacy, communication, and numeracy skills, think creatively and utilise meta-cognitive strategies which support the reconstruction of information so it may be applied to similar but novel situations. Similarly, for the second capacity, confident individuals have high and stable self-esteem in the face of challenge, and hold secure values and beliefs. Such learners are able to relate to others, display self-awareness without undue self-criticism and make

Table 1. Contrasting Traditional vs. formative curricula.

Formative curriculum	Traditional curriculum
Students work primarily in groups; flexible grouping.	Students work primarily alone.
Pursuit of student questions and interests is valued.	Strict adherence to fixed curriculum is highly valued.
The teachers have a dialogue with students, helping students construct their own knowledge.	The teachers disseminate information to students; students are passive recipients of knowledge.
Flexible schedules; learning is interactive, building on what the student already knows.	Learning is based on repetition.
Materials include primary sources of material (e.g. community resources) and manipulative materials.	Materials are primarily textbooks and workbooks
The teacher's role is interactive, rooted in negotiation.	The teacher's role is directive, rooted in authority.
Real world application; assessment includes student works, observations, and points of view, as well as tests. Process is as important as product.	Assessment is through testing, correct answers.
Knowledge is seen as dynamic, ever changing with our experiences.	Knowledge is seen as inert.
Content drawn from several subject areas to focus on a particular topic or them. Emphasises big concepts, beginning with the whole and expanding to include the parts.	Curriculum begins with the parts of the whole. Emphasises basic skills.
Parents or guardians play an active role in the learning and development of their children	Parents and guardians do not participate in the learning and development of their children

informed decisions which minimise risk to themselves and to others. The third of the four capacities is responsible citizenship. This entails respect for others and responsible community participation. They have the ability to understand different beliefs and cultures and evaluate complex social issues maturely. Finally, effective contributors display an enterprising attitude and self-reliance. In order to contribute effectively, learners need to be successful learners (be literate and numerate to a high level), and also be able to work as a team and take the initiative to suggest solutions when required.

The rate at which the 'four capacities' develop is assessed via the delivery of a 'formative curriculum'. Teachers gather useful evidence which gives assurances to parents, children themselves, and others, that young learners are progressing in accordance with curriculum standards and developing in line with expectations. It is essential to note that formative assessment does not become formative until the evidence is used to meet

the needs of students (Assessment Reform Group [ARG], 1999; Black & Wiliam, 1998, 2009; Sadler, 1989). Therefore, the curriculum drives planning for the next stages of learning and helps learners progress to further education, higher education, and employment. Through a careful and collective process of moderation and quality assurance, the experiences and outcomes of evidence collection are used to inform future improvements in learning and teaching (Scottish Government, 2011). For the purposes of this article, the Scottish Government's seven principles and 'four capacities' provide a strong example of the over-arching values and principles which relate directly to 'formative curriculum' development. The Scottish curriculum, known as the 'Curriculum for Excellence' (Scottish Government, 2008, 2011), differentiates the principles depending on the stage of schooling; be it pre-school, primary, secondary, or the senior years of school.

Pre-school phase

A formative environment for learning in pre-school settings promotes a high degree challenge and enjoyment and personalisation and choice through planned opportunities to explore different activities, materials, and contexts. Student engagement with learning is characterised as the imaginative and creative use of both indoor and outdoor learning environments (Canning, 2010). School staff at this stage (and others) are encouraged to experiment with the learning environment and try innovative approaches in accordance with Bransford and colleagues (2005) conception of the 'adaptive expert'.

Learning activities in pre-school settings provide rich opportunities for progression (the transition to more advanced learning) and depth (comprehensive coverage within each aspect of a subject) of learning. At this phase of learning and development, the learning activities and environment need to be planned and organised to offer opportunities to extend skills (e.g. communication skills) and deepen understanding. Learning through a wide range of well-designed activities offers relevance (relationship with past experience), coherence (connections within and among subject areas), and breadth (a comprehensive range of experiences across a subject area). Pre-school activities build directly on what is familiar to the child and provide interesting, community-based contexts for learning (US Educational Testing Service [ETS], 2005).

Primary school phase

The broad principle of depth emphasises that children need sufficient time to demonstrate good progress. Further, learners can achieve the learning set out at each level securely and be given the opportunity to apply their

learning across multiple contexts. A variety of learning contexts supports the principle of relevance because ‘content is likely to be retained if it is structured around powerful learning situations that relate to pupils and have meaning in their everyday lives’ (Galton, 2007). The experiences and outcomes include aspects such as enterprise, sustainability, and creativity which schools often have to plan as curricula additions. The experiences and outcomes also provide the basis for challenge and enjoyment and progression. Undemanding experiences, (e.g. worksheets, copying) or low-level activities (e.g. memorisation and the recall of declarative knowledge required for summative tests), are unlikely to provide effective tools in learning (Davis, Maher, & Noddings, 1990; Nagle, 2013). A ‘formative curriculum’ is designed to open up opportunities for active, challenging, and enjoyable learning (Department for Education and Skills [DfES], 2003): ‘it is important that children have a rich and exciting experience at primary school, learning a wide range of things in a wide range of different ways’ (DfES, 2003).

Creativity and vision are essential qualities when developing a range of resources for learning that respond to the needs of children and the school community (Black & Wiliam, 1998; MacIntyre et al., 2007). The encouragement of depth of learning challenges primary teachers to think beyond the notion of progression as moving quickly from one topic or level to the next. A ‘formative curriculum’ encourages discussion of learning, explaining it to others, applying what has been learned in different contexts because spending time to probe and research a particular issue adds depth to learning (Lave & Wenger, 1991; Wenger, 1998). Primary schools have major advantages in promoting coherence by helping children to see links between different aspects of learning within and across subjects and curriculum areas. Primary stage learners can then begin to understand that knowledge and skills are transferable (Government of South Australia, 2012). The principle of relevance is used to help those planning the curriculum to select the content which connects with the child’s experience, learning, and interests in and beyond the school environment. If classroom teachers are to select relevant content, they need to possess in-depth knowledge of the whole child (US Association for Supervision and Curriculum Development [ASCD], 2014). The ASCD (2014) emphasises ‘a whole child approach ensures that each student is healthy, safe, engaged, supported, and challenged, [and] sets the standard for comprehensive, sustainable school improvement and provides for long-term student success’. Primary teachers’ depth of knowledge of their students’ prior experiences, learning, and interests helps them to take account of personalisation and choice during teaching and to provide differentiated support and feedback to individual students. Teachers skilled in the delivery of a ‘formative curriculum’ ‘embellish their explanations with analogies or metaphors, linking them to students’ interests and prior

knowledge' (Danielson, 2011). Rich opportunities for choice at the primary stage may be provided by the school as a whole, for example in their own individualised projects or where they have some control over the content and sequence of learning. The formative classroom is then a place where learners are involved in planning and assessment processes and encouraged to pursue aspects of learning independently (OECD, 2005; Scottish Government, 2008).

Secondary school phase

Curricula shape and reflect the fundamental character or spirit of a school's culture and inform the beliefs and practices of the school community. The fundamental character of a school culture and the values that school staff, students, and parents internalise (cf. Vygotsky) is called ethos. Breadth is ensured through a curriculum where ethos, interdisciplinary learning, and personal achievement are seen as being important. The 'formative curriculum' shapes and reflects an ethos which encourages other types of learning experience. These include outdoor learning and work-related activities (Scottish Government, 2008). Interdisciplinary learning is 'rarely used at the secondary level perhaps because of the traditional emphasis on individualized subject departments' (Desai, 2007). Transforming interdisciplinary teaching at the secondary level must include 'changes in curriculum, instruction, assessments, and teacher professional development in order to support teaching for conceptual understanding and for making cross-disciplinary connections' (Nagle, 2013, p. 144). A 'formative curriculum' responds to this need, and establishes communities of practice and interdisciplinary team-teaching in order to make interdisciplinary learning a reality at the secondary level.

The entire secondary phase needs to be planned so it maintains challenge and enjoyment. In collaboration with students and parents, teachers set the highest possible expectations for that which young people can achieve (Bandura, 1997), with teachers' expectations having the strongest effect (Sciarra & Ambrosino, 2011). A 'formative curriculum' is designed to make high expectations realisable by driving assessment activities that engage learners in enjoyable and pedagogically worthwhile activities where they will learn from their teachers and have the freedom to explore, discover, and retain ownership of their learning (Fleming, 2008). Classroom activities at this stage therefore encourage young people to develop and demonstrate higher-order thinking skills related to creativity and innovation (Partnership for 21st Century Skills, 2009). It is important that young people experience a suitable, challenging gradient of progression during this phase, maintaining progress from their achievements in primary school. The curriculum provides opportunities for learning in depth through opportunities for young people to: (1) engage with

increasingly demanding concepts; (2) develop more sophisticated meta-cognitive strategies that support autonomous learning; and (3) further develop their values and beliefs (Clark, 2012). Schools and their partners plan for coherent programmes which, ‘help students develop an understanding of important connections among ideas and the inclination and ability to use those ideas to make sense of the world’ (Roseman, Linn, & Koppal, 2008). As the principle of coherence connects ideas and those ideas to the real-world, the principle of relevance connects learning with the young person’s experience and interests in and beyond the school environment. During this phase of a ‘formative curriculum’, students develop informed views and apply these to relevant moral and ethical issues.

Senior years of school

The senior phase of the curriculum offers extensive opportunity for personalisation and choice for young people who are expected to make informed choices. Their decisions are based on appropriate information and advice from a wide range of sources about programmes of study leading to qualifications at a level appropriate to the individual’s needs and achievements. Young people are guided in their choice of a well-balanced and coherent programme of study throughout the senior phase which is relevant to their future pathways. The more specialised experiences and outcomes during the senior years ensure that young people will continue to experience challenge and enjoyment. This can ensure a smooth progression through the learning experience from curriculum areas into qualifications through learning which is appropriate to their stage of development as well as having relevance to their personal and learning goals. The ethos of a school is, in part, reflected by the level of parental involvement in helping their children explore, plan, and make the successful transition from high school to college. School staff therefore make a particular effort to ensure that parents are able to understand and use assessment information throughout the senior years of school (Wimberly & Noeth, 2004).

Nexus: from principle to practice

The principles and values that underpin a ‘formative curriculum’ must be seen in all aspects of assessment practice. First, assessments must be inclusive, be a stimulus for personal achievement, and through broadening of experience be an encouragement towards informed and responsible citizenship. Second, a ‘formative curriculum’ emphasises culturally responsive pedagogy (Bailey & Heritage, 2008; Looney & Poskitt, 2005; Pham & Gillies, 2010). In practice, assessment approaches have to avoid

pre-conceptions and stereotypes and be fair to all involved: to young learners, their families and communities. Gutiérrez and Rogoff (2003) observe that curricula often drive a single way of instruction and assessment without accounting for individuals' past experiences with certain local or situational practices. Collins (1993) contends that the typical public school selects the culturally privileged, and excludes the 'underprepared'. These situations are not regrettable lapses; they are, he argues, systemic aspects of 'conventional classrooms' in schooling systems serving culturally diverse communities. Public schools are not neutral settings. School staff need to be aware that 'learning, whether in or out of school occurs in a cultural context. Built into this context are subtle and invisible expectations regarding the manner in which individuals are to go about learning' (Villegas & Lucas, 2002, p. 43). Third, assessment involves making judgements about children and young people's learning. The important decisions that are made on the basis of these judgements have to be based upon sound evidence, professional integrity, and careful moderation. A final practical consideration essential to and constitutive of the 'formative curriculum' is evidence collection methods and the participation of students in their own learning progression. In order to gather good quality evidence of learners' progress through relevant experiences, staff will plan to use a range of approaches that reflect the breadth, challenge, and application of learning and the wide range of skills being developed. The active involvement of children and young people in assessment is essential to ensure they have a well-developed sense of ownership of their learning and help one another (Fletcher, 2008; McCombs, 2014).

What? why? when? and how?: framework for a 'formative curriculum'

What do we assess?

The first question of what a 'formative curriculum' assesses may be answered briefly as knowledge and understanding, skills, abilities, and capabilities. There is perhaps nothing new or innovative in this at first glance. However, the skills, abilities, and capabilities themselves are not only pursuant of 'good learning' inside school, but also beyond school and across the span of learners' lifetimes.

Why do we assess?

In the formative classroom, the matter of *why* schools use formative assessments differentiates it quite dramatically from other assessment methods, for example benchmark and interim assessments. Unlike these 'early warning summative' (Wiliam, 2004) assessments, the *sine qua non* (the essential element or condition) of formative assessment is to share learning intentions and success criteria (Black & Wiliam, 2009). This level

of transparency facilitates high quality (reciprocal and mutual) interaction and feedback which makes students' tacit knowledge visible as evidence that may be used to close the gap between a student's current level of understanding and the desired level of knowledge required to meet standards. Black and Wiliam (2009) characterise the inherent spontaneity of formative dialogue as, 'a formidable problem for teachers' (p. 13). Formidable because it: (1) exposes teachers to the many ways in which students argue, evaluate, and synthesise information for problem solving purposes and (2) it often requires a radical change in their instructional approach (Black & Wiliam, 2006, 2009). When teachers develop procedural expertise in the use of an interactive style of assessment, the use of formative assessments stimulates learner engagement through student reflection, goal-setting, and next steps through personal learning planning. Further, the use of formative assessments ensures an inclusive learning environment, creating an equitable learning environment which enables learners to have the best chance of completion and success (Clark, 2014; OECD, 2005).

Staff plan on how to express what their students are expected to learn in terms that they can understand. They clarify and share learning intentions and success criteria and appropriate experiences for achieving these. Both teachers and learners nurture a sense of achievement by sharing challenging and realistic expectations. Sharing success criteria along with learning intentions allows learners to 'see what success looks like'. With the support of their teacher, success criteria can often be devised by the learners themselves (Department for Children, Schools and Families [DCSF], 2008). Cauley and McMillan (2009) observe that such practices 'encourage students and give them a greater sense of ownership in instructional activities' (p. 3), elaborating that collaborative goal setting improves students' intrinsic motivation.

The notion of student empowerment is consolidated by approaches to assessment that enable learners to say, 'I can show that I can. ...'. Product-oriented approaches to instruction fully involve young learners as active participants and develop them as autonomous, independent learners. At all stages, learners need to understand that collaborative learning will help them develop the drive to learn in increasing breadth and depth. Indeed, emerging research from the field of social neuroscience indicates that when young learners are given expanded opportunities to actively and equitably participate in peer-learning activities, they receive dopaminergic rewards from the mesolimbic system in the human brain. These natural rewards are experienced as feelings of well-being, contentment, or even excitement during peer-interaction. It was found that the production of dopamine reinforces the desire to continue the learning interaction (Guionnet et al., 2012; Krill & Platek, 2012; Redcay et al., 2010; Sakaiya et al., 2013; Schilbach et al., 2013) and heightens the feelings of

anticipation for the next peer-learning activity (Salamone & Correa, 2012). These recent findings present an opportunity for educators to reflect on classroom assessment strategies that capitalise on learners' preference for peer-learning activities (Assessment Action Group/AiFL Programme Management Group [AAG/APMG], 2002–2008). In addition, a key reflective question for building a 'formative curriculum' that motivates young learners to work together is 'does the curriculum provide a sufficient emphasis on active, enterprising learning approaches that encourage creativity and innovation?' (Scottish Government, 2008).

The 'formative curriculum' framework (Scottish Government, 2011) is designed to drive assessments which promote self- and peer-assessment. These are assessment activities which facilitate the recognition and evaluation of evidence relating to their own learning. Peer-assessment and other collaborative learning enable learners to support and extend each others' learning, by being aware of what is expected of them from looking at examples and devising and sharing success criteria. As they develop skills in self- and peer-assessment, learners build confidence and take more ownership for managing their own learning (EPPI-Centre, 2005). By focusing on the processes of learning as well as on their achievement of outcomes, they will develop the capacity for reflective and positive contributions inside, outside, and beyond school. Accordingly, the OECD (2005) emphasises the frequent use of self- and peer-assessment against well-defined goals and criteria as 'skills that are invaluable for learning throughout their lives' (p. 24).

The use of formative assessments requires teachers to use assessment information from a wide range of sources (e.g. observations, records, discussions) to ensure validity, monitor learners' progress, and plan next steps in learning. Assessment information is shared and discussed with learners, parents, and other stakeholders as appropriate, which then makes learning objectives and the 'features of excellent performance' transparent (Shepard, 2000, p. 11). When the stakeholders in the learning process are fully informed and included, each may contribute at appropriate times to setting targets for learning and ensuring appropriate support.

When do we assess?

Assessment takes place in three circumstances. First, as a part of ongoing learning and teaching. This is a flexible moment-to-moment form of assessment, described by Cauley and McMillan (2009) as 'high-level formative'. Teachers who implement a 'formative curriculum' assess constantly as part of daily learning and teaching by observing and communicating with learners carrying out tasks, by looking at what they write and make and by considering how they answer questions. The

spontaneous dialogue between teacher and student which characterises an interactive style of teaching and assessment is called ‘synchronous feedback’ (Black & Wiliam, 2009). Synchronous feedback has been found to enhance learning (Dihoff, Brosvic, Epstein, & Cook, 2004) and promote higher psychological functions, such as synthesis and creation (Maddox, Ashby, & Bohil, 2003; Maddox & Ing, 2005). Through mutual interaction and reciprocal dialogue, teachers and students may gain deeper insights into learning capacities and build up a profile of their progress, strengths, and needs. Crucially, when teachers work with their students in a spirit of reciprocity they are able to involve them in planning what they need to learn next. Second, assessment takes place periodically (from time to time). It involves teachers in evaluating a range of evidence produced over a period of time to provide a summary of progress and achievement, including for qualifications and awards by weighing up all relevant evidence of learning. In this circumstance, time elapses between the production of evidence and its use as assessment information, and so it is ‘asynchronous feedback’ (Black & Wiliam, 2009). A third circumstance in which assessment must take place is at transitions. Both synchronous and asynchronous feedback may occur here as teachers verbally assess students and also test them summatively. Both forms of feedback are formative when the evidence is used to adapt instruction to meet the needs of students. Transition phases are particularly important times for assessment. These phases include pre-school to primary, between curricula stages, primary to secondary, from the broad general education to more specialised education in the senior phase, and beyond school to positive and sustained destinations such as employment and further and higher education. Teachers and parents assess learners carefully for their level of preparedness. Bostock and Wood (2014) suggest that transitions are profound periods of change and transformation, and students ‘should be studied and managed to ensure that [they] are able to grow and thrive during these difficult phases in their education’ (p. 3).

How do we assess?

Formative classroom assessment is a potentially powerful instructional process because the practice of sharing assessment information that supports learning is embedded into the instructional process by design. As Heritage (2010) states, assessment is ‘a process that is fundamental and indigenous to the practice of teaching and learning’ (p. 1). Indeed, the practice of classroom assessment sits at the heart of the instructional process, always guiding learners forward to the next or most proximal stage of development (Vygotsky, 1978). The evidence will be different depending upon the kind of learning being assessed, the learning activity, and learners’ preferences about how to show what they have learned. The

interactive style of instruction and assessment means that evidence emerges during day-to-day learning activities – e.g. describing and recording, exploring and analysing sources, talking and debating with peers and adults and undertaking investigation – as well as from specific assessment tasks, activities, tests, and examinations. As the ‘formative curriculum’ drives assessment practice, assessments drive learning and as such teachers are required to utilise numerous assessment techniques which tap into the sources of learning evidence (Peel District School Board, 2011).

Classroom methods which support a ‘formative curriculum’

A ‘formative curriculum’ drives instruction and assessment methods based upon dialogue, collaboration, and reflection in order to support learning and give all learners the opportunity to succeed (AAG/APMG, 2002–2008; Clark, 2014; Scottish Government, 2011; Victoria State Government, 2009; Victoria State Government West Virginia Department of Education [WVDE], 2013). This may be divided into two overlapping areas of methods which make the sources of evidence needed to assess learners’ understanding accessible. First, methods which prepare students for productive pair and group work by: developing peer–peer communication skills (relational skills training); peer assessment; group work and pair work, for example, concept mapping; traffic lighting primarily for self-assessment and preparation for peer learning. Traffic lighting is the self-assessment of knowledge; for example, vocabulary in modern foreign languages or scientific terminology. It may be done by using colours or symbols which indicate the security of knowledge, in columns which may be headed ‘I can show that I can do...’, ‘I can partially show that I can do...’ or ‘I cannot show that I can do...yet’. They may also apply these statements to the work of others by comparing the work of their peers to commonly understood performance standards. The second area focuses on methods of evidence gathering employed by teachers as they interact with students either individually or as a group: transitioning between whole-class questioning to smaller peer-group discussions; higher order questioning techniques; use of problem-solving techniques; ‘jot time’ (students are afforded an extended period of time to commit their ideas in writing before the beginning of an interaction); use of wrong answers and misconceptions; extended ‘wait time’ before students give their answers; written feedback as comments and not grades; oral feedback; sharing assessment criteria; draft marking and redrafting work as an aspect of mastery-goal orientation; collaborative goal setting; reflective learning using a ‘reflective portfolio’ of logs, dairies and journals. The focus for teachers throughout is a deep and genuine interest in their students’ ideas.

Assessing standards and expectations (progress)

Progress is defined in terms of ‘how well’ and ‘how much’, as well as learners’ rate of progress. This approach will promote greater breadth and depth of learning, including a greater focus on the secure development of skills and knowledge. Assessing progress across a breadth of learning, in challenging aspects and when applying learning in different and unfamiliar contexts, will also help teachers to plan, track progress, summarise achievements in a rounded way and better prepare children and young people for the next stage in learning.

Across the breadth of learning

This will involve sustained achievement in an increasing number of outcomes across the breadth of learning described in the experiences and outcomes. Learners will demonstrate success by building on previous learning and being able to make links in learning by looking back as well as forward. The capacity to do so is expressed by Dewey’s (1934) term ‘esthetic recurrence’, which describes a rhythm in the learning process, one that combines past events with future possibilities that blend together to take learning forward. Macintyre et al. (2007) locate teachers as important resources who model esthetic recurrence for students, noting at the end of their two-year study on evidence gathering and use that ‘esthetic recurrence was what teachers gradually attended to, manifesting relationships... This capacity to perceive relationships among parts was what teachers struggled to interpret and act on throughout the study’ (p. 15). For all participants in the learning experience esthetic recurrence has three key aspects: (1) it reaches out to the relations, associations, and interactions with other individuals, expanding the whole; (2) it looks to the individuality present in each learning artifact seeking personal learning connections; and (3) it presents itself in different contexts and with differing learning consequences so that every recurrence is ‘novel as well as a reminder’ (Dewey, 1934, p. 169). Broadening and enhancing experience within a level are important parts of progression to the next level. A variety of assessment approaches allow learners to demonstrate their knowledge and understanding, skills, attributes, and capabilities across the range of the experiences and outcomes. Assessment of this nature is aligned with teaching that develops a broad range of learning.

In challenging aspects

Not all tasks are created equal, and different tasks will provoke different levels and kinds of student thinking (Stein, Smith, Henningsen, & Silver, 2000). Participating in challenging tasks and activities develops learners’ interest and confidence in some aspects of their learning. It also develops

some skills, attributes, and capabilities to a high level. Formative assessment gives learners the opportunity to demonstrate aspects of learning where they have a depth of knowledge and understanding and skills. Challenging tasks are therefore those which avoid passive memorisation and procedures without connections (low-level tasks) (Nagle, 2013) and emphasise active participation and procedures with connections (high-level tasks) (Davis et al., 1990). When assessing high-level tasks, teachers need to have developed the ability to identify the potential of a task and to determine exactly what student feedback communicates about their current understandings. When teachers develop and implement high-level tasks as sources of learning evidence, they are ‘the architect and designer of the curriculum’ (Lappan & Briars, 1995, p. 138). These roles are entirely consonant with the flexibility and responsibility that underpins the delivery of a ‘formative curriculum’ and allow learners to progress in areas of strength and interest.

When applying learning in unfamiliar contexts

Learning is shaped by a variety of social and cultural antecedents that exist in and around the activities in which people engage (Rogoff, 2003). Thinking and learning (cognition) is shaped by the settings in which learners participate and the activities that take place in those settings (Brown, Collins, & Duguid, 1989; Lave & Wenger, 1991). For example, in Australia, the State Government of Victoria (2009) devised a curriculum architecture designed to reveal the tacit knowledge (beliefs, values, conceptions) of students thus making their ideas visible as assessment information. Teachers plan learning interactions which require students to solve problems in unfamiliar contexts, progressively building the students’ ability to transfer and generalise their learning. At all school levels, teachers provide support to their students as they create and test hypotheses and justify and elaborate on decisions. Of central importance to the delivery of a ‘formative curriculum’ are the practices of monitoring student understanding, providing explicit feedback (both synchronously and asynchronously), and adjusting instruction accordingly (Black & Wiliam, 1998, 2009; Clark, 2012; Nicol & Macfarlane-Dick, 2006). The Australian model may be concisely summarised as follows: engage; explore; explain; elaborate; and evaluate. Each aspect provides moment-to-moment opportunities when evidence can be collected on the knowledge and skills (e.g. literacy and numeracy) and the socio-emotional well-being of learners. Engagement refers to the fostering of positive relations with and among students and the development of shared expectations for learning and interacting. Exploring entails the presentation of challenging tasks which meet the needs of students in order to generate and investigate questions, gather relevant information, and develop ideas. Explaining requires

students to express their ideas and opinions confidently. This aspect of the model provides opportunities for students to demonstrate their current level of understanding through verbal and non-verbal means. Elaboration is a challenging, and therefore highly beneficial, process during which the teacher engages students in dialogue, continuously extending and refining students' understanding. The final aspect of the model is 'evaluation' – referring to the assessment of students' progress against learning goals. Teachers support students to continuously refine and improve their work using assessment criteria in preparation for demonstrations of satisfactory engagement, exploration, explanation, and elaboration, binding the model together through the use of formative assessments.

Warwick University's (UK) Learning and Development Centre (2012) uses the term 'adaptive learning' to express this process, linking it to high achievement. Further, they emphasise that 'adaptive learning encapsulates some of the capabilities that employers are increasingly seeking to obtain from university graduates'. Applying learning in unfamiliar contexts is important to developing higher order thinking skills and provides relevance and purpose to learning, as well as making it more secure (Scottish Government, 2011; Warwick University, 2012). This entails giving students practical problems and then putting them in situations where they must solve the problems by using existing theories and practical techniques in novel contexts. There needs to be a variety of acceptable solutions to these problems so students may develop higher-order thinking skills of creation and analysis and learn from the ideas of their peers (Fraser & Grenhalgh, 2001). Applying learning in unfamiliar contexts therefore also offers opportunities to make links across ideas and concepts they have already learned, an important dimension of twenty-first century skills. Assessment needs to sample learning in the context in which it was developed and in straightforward ways. Assessment also probes the ability to apply the learning in more challenging tasks and in unfamiliar situations as these are important abilities for life and work, and promote resilience and task-persistence among learners.

Conclusion

It has been proposed here that the framework and architectural principles of a 'formative curriculum' create a fairer and more robust approach to assessment. However, instigating change in schools is a highly complex process requiring the strong commitment of governments, administrators, school staff, and parents (Fullan, 2007). Parents play a key role in the delivery of a 'formative curriculum' and need to be engaged as mutual partners in supporting their children's learning (Clark, 2014; Townsend, 1997). School staff inform parents what children are learning, how their work is assessed, and how they can support their children's learning. If

parents are to become active participants in a child's learning experiences, schools need to ensure that parents are aware of learning goals and they have access to information on current progress and achievements. A fundamental aspect of curricula delivery is therefore frequent discussions with parents about options and progression routes (Sayler, 1996; Suffolk County Council, 2014). Townsend (1997), in a study of US and Australian schools, found that effective schools are those which welcome parents by engaging them and involving them in the widest range of school activities; most crucially those concerning their child's development.

Black and Wiliam (2005) observe development and implementation of a 'formative curriculum' will require a different change-management strategy depending on national circumstances, and in some cases may be very challenging indeed. The careful arrangement of consultative networks between teachers, parents, and the wider community is essential if the new curriculum is to operate successfully. The Scottish region of the UK provides a strong case study of wide-spread development and implementation of formative assessments (AAG/APMG, 2002–2008), and a 'formative curriculum' (Scottish Government, 2008, 2011). In that case, even when collaboration networks were secured and the processes of change management among stakeholders carefully planned, conceptual difficulties persisted because the embedding of innovative pedagogical principles is beset by challenges and tensions (Fullan, 2007; George Street Research [GSR], 2007). The enthusiastic problem-solving approach demonstrated by school staff was a large contributory factor to the successful development of assessment strategies which support a 'formative curriculum' (Hallam, Kirton, Peffers, Robertson, & Stobart, 2004). A primary source of conceptual challenge associated with the process of change was the preference of teachers for prescriptive and precise instructions on how to implement new classroom practices (Hallam et al., 2004; Wiliam, Lee, Harrison, & Black, 2004). Yet, Hallam et al. (2004) found that teachers ($n = 72$) responded very positively to the integration of formative assessment practices into their work: 100% of respondents reported that 'formative curriculum' practices were 'very successful' (VS) or 'successful' (S) in increasing teacher understanding of the role of assessment and in improving teacher motivation. Further, 91% of respondents indicated that they were VS/S in changing classroom practices; 92% indicated the project was VS/S at changing assessment practices; 94%, the extent of questioning; 95% in increasing the level of discussion; and 97% of respondents assigned a VS/S rating to an improved teacher focus on the learning needs of students (Hallam et al, 2004). At the most fundamental level, the 'formative curriculum' drives and sustains positive learning interactions and dialogue. As such, an important strand of future research resides in developing fine-grained understandings about high-quality classroom dialogue between teachers and their students and between

peers. When instruction and assessment is characterised by high-quality interactions and carefully moderated activities by interdisciplinary teams, it makes thinking and learning transparent, and therefore accessible as assessment data for use by all involved in a child's learning experience.

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