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CHAPTER 13

AN INTRODUCTION TO CROSS-CURRICULAR LEARNING

Jonathan Barnes

Chapter Aims

This chapter will:

- demonstrate the links between creative thinking and cross-curricular activity
- draw attention to different approaches to cross-curricular teaching and learning
- establish a range of methods through which cross-curricular activity can be used to raise standards in children's subject learning

Introduction

The world beyond the classroom is cross-curricular. Through my window I see walls, trees, people walking by, cars, birds, clouds and the occasional aeroplane – I understand none of them fully from the perspective of just one curriculum subject. I describe and appreciate the cherry tree outside using a combination of geographical, artistic, poetic,

philosophical and historical vocabularies. Others might perceive the same scene by linking thoughts from mathematics, science, design, music, movement or religious education. We each look on the world, its objects, patterns and experiences, with different eyes. Cross-curricular learning recognises these multiple viewpoints and seeks to build more knowledgeable, lasting and transferable understandings of the world around us.

Cross-curricular teaching and learning has a long history. Plato referred to the importance of linking emotional, practical and intellectual skills, combining music and movement, drama and literature, philosophy and politics. The educational luminaries of the Enlightenment, like Comenius, Rousseau, Froebel, Pestalozzi, each in their way championed cross-curricular approaches. These ideas were developed in the late nineteenth and twentieth centuries by progressives like Steiner, Dewey, Montessori and Isaacs. Like Hadow (1931), Plowden (1967) and the Education Reform Act of 1988 before them, the latest primary education reports recognise that the combined skills and disciplines of a number of subjects are used in solving real-life problems. Today many teachers continue to see cross-curricular approaches as motivating, enjoyable and capable of building relevance and meaning into a curriculum sometimes seen as narrowed (see NFER 2011; Robinson and Aronica 2010; Wrigley et al. 2012).

Links between curriculum subjects have also been closely associated with engendering creative thinking (see Ofsted 2010; Roberts 2006; Thomas Tallis School 2013). Influential psychologists Csikszentmihalyi (1997) and Sternberg (2003) established such links, arguing that creative ideas frequently stem from interactions between subjects or cultures. Making connections between subjects has, however, become controversial. The new National Curriculum in England (DfE 2013) omits reference to cross-curricular links while the National College for School Leadership (NCSL) lists:

- focus on alternative curriculum days and themed weeks, with suspended timetable opportunities for specialist off-site activities facilitated by parents and community volunteers
- focus on adapting a published topic approach, modified according to context and applied across schools to enable the sharing of resources and good practice
- focus on a play-centred approach to learning,

among its recommendations for school leaders (NCSL 2012). Educationalists, such as Gardner (1999, 2004, 2006) and Hirsch (2006), unusually agree on the importance of learning the distinctive knowledge, language and skills of each subject discipline, but Gardner sees their frequent integration as essential for profound and transferable learning while Hirsch argues for a pure 'knowledge curriculum' of continued subject separation. The Cambridge Primary Review (Alexander 2010) stressed the dual importance of progression in subject knowledge *and* thematic curricula, though ex-Secretary of State for Education Estelle Morris could not imagine the words 'cross-curricular theme' passing the lips of Michael Gove, Secretary of State between 2010 and 2014 (*Guardian* 2011). Ofsted, in its rigorous appraisal of successful primary and secondary

schools, makes clear that there is no necessary conflict between single-subject learning and cross-curricular learning; both can exist profitably side by side (Ofsted 2010).

The Scottish and Northern Irish primary curricula are explicit on the value of cross-curricular approaches. The Scottish Curriculum for Excellence, for instance, mentions interdisciplinary work 28 times in its introductory documentation (Scottish Government 2008). The Scottish curriculum groups some subjects together under: expressive arts, health and well-being, social sciences and 'technologies'. It also takes a single-subject approach to mathematics, science, language and RE. In its introduction, the Scottish Government says:

> Interdisciplinary studies, based upon groupings of experiences and outcomes from within and across curriculum areas, can provide relevant, challenging and enjoyable learning experiences and stimulating contexts to meet the varied needs of children and young people. Revisiting a concept or skill from different perspectives deepens understanding and can also make the curriculum more coherent and meaningful from the learner's point of view. Interdisciplinary studies can also take advantage of opportunities to work with partners who are able to offer and support enriched learning experiences and opportunities for young people's wider involvement in society. (Scottish Government 2008)

This chapter highlights evidence suggesting that cross-curricular approaches at their best are highly motivating, inclusive and able to raise standards in all subjects.

The State of the Art in Cross-Curricular Pedagogy

Much learning is informal. Many of the most meaningful experiences for children happen outside the classroom. Casual, unplanned, social and multi-sensory modes of learning are often as influential as any brilliantly planned and well-taught lesson. Educationalists have begun to recognize the mass of connections children make to life beyond curriculum and classroom (see Austin 2007, Barnes 2015; Fumoto et al. 2012; Scoffham 2013; Wrigley et al., 2012; Wyse and Dowson 2009). We are reminded of the often overriding significance of the inner priorities of children in their attitude to learning (for example Abbs 2003; Hicks 2006). Others ask us to listen to 'pupil voice' (Cheminais 2008, Desailly 2012; Ruddock and McIntyre 2007) or consider education's role in the intellectual, social and psychological health of young people (Clift and Camic 2015; DH 2005; UNICEF 2007; WHO 2008). Research such as the Children's Society's *Good Childhood* Report (Layard and Dunn 2009) and UNICEF's Innocenti Report Cards (UNICEF 2013) share many commonalities. Each report stresses comparatively high rates of unhappiness, stress, dissatisfaction and poor relationships in young people in the UK. From them we learn that many children are preoccupied by:

- their family and peer relationships
- their own changing selves
- their personal futures.

Other researchers, for example Hicks (2006), find that young people are frequently worried about global issues like sustainability, poverty, pandemics, global warming, war, terrorism and natural disasters. They tend also to be very interested in new technologies, in particular communications technologies like mobile telephones, social networking sites and computer games.

Despite the unsurprising nature of the above preoccupations, few feature centrally in the curricula of our schools. Indeed, in the new national curriculum (DfE 2013) 'issues' like sustainability, global warming, and poverty are omitted from the primary curriculum. In the world beyond the contrived settings of school, effective and deep thinking and learning (see Marton and Booth 1997) take place on personal and emotional as well as intellectual levels. It is to the sensory and personal inner world of learning that neuroscience has recently turned its attention.

Neuroscience increasingly offers hard evidence that the insights and observations of past psychologists and pedagogues may be valid. As neuroscientist and psychologist Gardner has observed:

> the brain learns best and retains most when the organism is actively involved in exploring physical sites and materials and asking questions *to which it actually craves the answers.* Merely passive experiences tend to attenuate and have little lasting impact. (Gardner 1999: 82, my italics)

Building on such observations and in the context of all learning, Alexander (2010) reports:

> Neuroscientific research ... has shown … that learning is strengthened not only in relation to how many neurons fire in a neural network, but also how they are distributed across different domains, such as the motor and sensory cortices … multisensory approaches (Visual, Auditory and Kinaesthetic rather than Visual, Auditory or Kinaesthetic) are to be encouraged. (Alexander 2010: 96–7)

Translating neuroscientific insights into pedagogy is not a straightforward affair, but neuroscience and education overlap in their belief in the importance of the sensory, physical and exploratory impulses in human learning (Howard-Jones 2012). While such findings do not point directly at the cross curriculum, they do suggest the need for a multiplicity of approaches and contexts for effective learning.

Emotional engagement is also essential for meaningful learning. Neuroscientists have for the past 20 years been pointing to research that shows that the human brain processes stimuli (often unconsciously) at an *emotional* level well before it processes them intellectually (Damasio 1994; Goleman 1996; Le Doux 2002; McGilchrist 2010). If the human mind is to perceive something as important, it must first be aware of its emotional importance. The message that 'we feel therefore we learn' (Immordino-Yang and Damasio 2007) suggests that to activate neural systems across the brains of learners, the teacher must construct emotionally relevant situations to help them learn:

> When we educators fail to appreciate the importance of students' emotions, we fail to appreciate a critical force in students' learning. One could argue, in fact, we fail to appreciate the very reason that students learn at all. (Immordino-Yang and Damasio 2007: 9)

Bringing together evidence from across what Greenfield (2003) calls the 'new science of learning', Alexander also suggests that children's learning should be tied to:

existing experience of the world

multisensory activity

social settings in which language is used

metacognition (including pretend play)

ample opportunity to follow 'what naturally interests them' (Alexander 2010: 98)

I have argued (Barnes 2015; Barnes and Shirley 2007; Scoffham and Barnes 2009) that cross-curricular pedagogies are better placed to motivate, sustain, be meaningful and socially satisfying than a curriculum purely devoted to separated subject teaching. Each item in Alexander's list above, also implies a degree of cross-curricularity. Indeed, the curriculum recommendations of the Cambridge Primary Review include cross-curricular themes like, 'ethics and citizenship', 'the arts' and 'the social sciences'.

Retained, transferable and useful learning is more likely to result from experience or exposure that has been genuinely entered into by the child. Abbs (2003) reminds us learning cannot be conferred on the child, it has to be accepted by them. Learning has to be made an existential experience; it has to have personal meaning to be deeply rooted. Meaningful or 'powerful' experiences are possible in and out of the classroom and are significant starting points for learning, as are opportunities to put learning into practice (Perkins 2010).

The Importance of Powerful Experiences

Any activity that 'lights us up' or makes our eyes sparkle is a powerful motivator. Engaging experiences are not necessarily showy, complex or time-consuming, they are simply activities that capture children's senses, emotions, enquiring minds and their desire to be active. Discovery, invention, physical involvement and creative activity often enthuse us and have probably always generated deep, committed and transferable learning (Panksepp 2004). The quest for deeply involving, ecstatic (literally out-of-body) experience drives many of us. The psychologist Csikszentmihalyi (2002) calls such timeless moments 'flow' experiences. Flow he says describes an optimal learning situation in which ideas and solutions stream from the unconscious mind, self-consciousness, personal worries and self diminish and time seems to stand still. We feel such sensations when we are doing the things we most love, perhaps

reading, drawing, mountain climbing, jogging, singing, knitting. In such times both body and mind work at their best and we feel fulfilled. We look back on such times as happy times. Csikszentmihalyi suggests that a teacher who maximises flow-inducing activity in their classroom also maximises the learning of children.

A curriculum built around the concept of flow would require the planning of a series of experiences likely to be so powerful and emotionally significant that the vast majority if not all children in a class feel involved in them. An emotionally powerful experience need not be spectacular, it may be a well-read story, a visit to the playground pond or reminiscences by the school 'lollypop lady'. It might equally be a trip to the swimming pool, museum or the local wood. Powerful personally involving experiences do not have to be placed at the beginning of a course of study, they can come in the middle or the summation of the work done in a unit of work. Such experiences *should*, however, make real contact with the lives and feelings of both children and their teacher, and require the application of knowledge and skills from several curriculum subjects. Again, many of the most powerful of these experiences occur outside the classroom (Austin 2007; Knight 2013).

Neuroscience shows that emotions are the starting point of most learning. Social scientists since Vygotsky claim that learning is primarily a social and cultural activity (see Noddings 2003; Rogoff 2002; Wenger 1998). Problems and challenges are more easily faced and learned from when tackled in teams and creative advances are usually made in collaborations (John-Steiner 2001). Neuroscientific and social scientific insights come together in suggesting that lasting, transferable learning in both pure subject and cross-curricular contexts is generated by:

- emotional relevance
- engagement in fulfilling activity
- working on shared challenges with others.

These three features are likely to become a reality if learning is planned around shared and engaging experiences. The scientific evidence (as well as the professional experience of many teachers) suggests that powerful, personally involving experiences, planned as part of a lesson or for a series of lessons, provide the best chances of including and improving all learners.

Innovation

Creativity and cross-curricularity are linked. The publication of the *All Our Futures* report by the National Advisory Committee on Creative and Cultural Education (NACCCE, 1999), resulted in a renewed interest in creativity, creative thinking, creative teaching and creative learning. It recommended the setting up of partnerships between innovative workers in the community and schools. Such partnerships were

not to be based on one-off arts projects but on using creative approaches to transform the whole school. Creativity was not seen as only connected to the arts; innovative practice was to include work in all subjects and across subjects. When the Creative Partnerships programme was set up in a range of economically deprived areas of England, the positive results of creative collaboration soon became apparent in a wide range of studies (for example Brice Heath and Wolf 2004; Cremin et al. 2009; Parker 2013; Roberts 2006). Most Creative Partnerships links with schools lasted for a year, some for three years, and in that time cross-curricular approaches naturally dominated in the combined work generated by creative practitioners, school staff and children.

The range of publications supporting teachers in developing creative approaches to learning also multiplied in this period. Led by Beetlestone (1998), Craft (2000, 2005), Fisher (2005), Jeffrey and Woods (2003), creativity was brought into the core language of pedagogy. Many examples of creative approaches to teaching and learning rested on cross-curricular projects. Government advice via the now defunct Qualifications and Curriculum Authority (QCA) also stressed cross-curricular approaches to creativity (QCA 2005). Usually involving two, or at the most three, subject areas, these projects used the connections between different subject mindsets to promote creative thinking. Cross-curricular practice can be defined as: 'when the skills, knowledge and attitudes of two or more subjects are applied to a problem, theme or idea' (Barnes 2015). The limitation to two subjects (English is developed in any cross-curricular pairing) arises from research into the effectiveness of interdisciplinary methods (for example Roth 2000).

The year 2011 marked a change in government rhetoric. Creative Partnerships, the biggest creative education project in the world (Thomson 2014), was disbanded and the subsequent 2014 National Curriculum in England (DfE 2013) hardly mentioned the word 'creative'. Links between subjects are not specifically recommended, but the rationale behind the new 'slimmed down' national curriculum left it to teachers to devise the most suitable teaching approaches. Many schools continue to plan for cross-curricular and creative experiences because they appreciate their motivational and inclusive qualities.

Innovation does not automatically engage all children. Well-planned, creative and shared cross-curricular experience alone will not capture every child's interest. The wise pedagogue will devise a range of easily accessible and practical entry points to maximise the chances of mental, sensory and social involvement. I have collected a number of easily resourced and flexible entry points called 'focus exercises' to help children concentrate on their physical and emotional interaction with place, idea, story, object or person (Barnes 2015). Focus exercises are seen as the initial contact with an experience, they are not tied to specific subject disciplines indeed subject labels ought to be avoided when using them. Neither should they be too focused.

Too sharp a focus can have the effect of directing the child to only one class of experience; the focus exercise should lead to multiple interpretations. The aim is simply for the learner to 'get to grips' with the experience in a personal, sensory way. Drawing, for example, is not used as an art activity but as a means of focusing the mind and brain and increasing the use of language (Brice Heath and Wolf 2004, 2005). Collections are not seen as a science, art or design and technology activity but simply a means of involving children in their own choices or sharpening the use of their senses. Sight, sound, smell or emotional trails may use maps but they are not initially intended to extend understanding of geography, neither do reflections necessarily link to religious education. The focus exercises use touch, taste, smell, sight and feeling to motivate. They give a sense of control within clear, structured activities. Individual or group motivation arising from the focus exercises can then be used to develop and progress thoughts, connections, skills and knowledge within chosen subject disciplines. The essence is that each of these exercises is designed to help the learner engage in a 'present tense' way with a subject, place, person or object. Each focus exercise is also open-ended; the data collected could be used in many different ways.

In addition to pointing to the importance of powerful experiences I have developed a series of focus exercises aimed at provoking creative and cross-curricular thinking at all levels. These I outline below.

Focus Exercises to Launch Creative and Cross-Curricular Thinking

Mapping

Make your own map of a short journey you have taken. Show significant landmarks (buildings, plants, shadows, street furniture, any unexpected things which strike you as important). Use your map in one of the following ways:

(a) emotional maps: How do you feel in each place? Mark on your map with words or colours the emotions you feel in different places. For example: which place makes you feel small, lonely, excited, frightened, cold, happy, or sad?

(b) sound maps: What are the dominant sounds in different areas of your map? Draw symbols or write words that capture the locations of different sounds in the environment.

(c) smell maps: What smells can you identify in this place? Mark on the boundaries between different dominating smells. For example: Where does the food smell strike you? Where is there a more natural smell? How are the smells different?

Figure 13.1 Student teachers making a sound map

Big picture

On a large sheet of paper (A1 or A2) each of four people draw a big impression of the skyline in front of them. One person should draw the skyline looking north, one east one south and one west. Use bold colourful felt pens. The four should then join their drawings to make a continuous collaborative image of 360^0 of the skyline.

Figure 13.2 A child and his teacher drawing a big picture

Emotional frames

Everyone is given a viewfinder with a different *key word* written on it (for example red, sad, lonely, awesome, dangerous, circle). Using your viewfinder to frame it, look around for details (small ones are usually best) that visually illustrate or summarise that key word. Capture your decision in a photo and also include the key word on your viewfinder in the photo. This will remind you of the theme. Take five different photographs using the same word.

Figure 13.3 Child's emotional frame photo

Repeating patterns and measurements

Use a marked piece of string as a measure. Measure and draw one of the repeated modules that make up a building, floor or design. Label the drawing with the measurements made with your measuring string. Make a drawing to show how the shapes fit together.

Story and journey sticks

Individually use a story stick (a piece of card or a real stick with double-sided tape on it) to collect five small items from your walk. Do not collect any living creature. Theme your collection (such as life, decay, colour) or relate it (same colour, same

noun but different examples, such as leaves) or make it a random collection of things that catch your eye. Map your journey when you get back to class, showing where you found your objects. Discuss your choices with your team.

Figure 13.4 A child's journey sticks

Colour match

Collect coloured paint samples showing a range of shades of a single colour (available from DIY shops). Stick double-sided tape to each card and ask children to collect natural and made colour matches from the environment. Attach as many examples of each colour to its corresponding paint colour.

Questions

In your group discuss answers the following questions:

- What would you like to leave here as a gift?
- What would you like to take back with you if you could?
- How many people high do you think that building or tree is?
- How do you feel in this place?

- How many different shades of [colour] can you find?
- What natural life can you see?
- What soft things can you see/What hard things are there here?
- If you worked here what would you have to wear?
- If you owned this what would you wear?

Fridge magnet poems

Fold a piece of A4 paper in half, four times to make 16 folded rectangles. Make a short journey around the school (or playground, forest or street) collecting 16 random words that strike you. Come back to class. Tear out the 16 rectangles and arrange on the desk and try to make a sentence or poem out of at least nine of the words. You can add in any extra small words like *the*, *and*, *of*, *under*, *above* and so on.

Creativity

Creativity differs from innovation. Creative ideas often appear completely new to the child, or the group, or class. Innovations are usually novel improvements to existing ideas. The open-ended nature of the focus exercises listed above often generate surprising and highly creative connections. Connections between the exercises and the previous experience of the child are common and frequently lead to original, valuable and imaginative ideas. With support children can turn these ideas into products or performances: posters, talks, tables, collections, art exhibitions, dances, dramas, debates or compositions. The transferable nature of the skills developed through the focus exercises shows in wide variety of outcomes recorded in a number of studies (for example Barnes and Shirley 2005, Dismore et al. 2008, Scoffham 2013).

Focus exercises can be used as a sensory and personally controlled starting point for learning in subject-led directions too. The 'emotional frames' exercise for instance has been used at the beginning of a modern languages project in French, where children tested the meaning of words like *tranquille*, *claire*, *laide*, *belle*. Frames were also used for a history project where groups took mutiple photos of 'eighteenth-century', 'Victorian', 'late medieval' houses in a single street. In mathematics one teacher wrote short number sentences on each frame and children had to collect photos of the correct answer from aspects of the environment. These examples point to a form of cross-curricular practice where subject learning in a number of different subjects can arise from analysis of the same experience. However, there are other ways of being cross-curricular.

A Taxonomy of Cross-Curricular Approaches

My own research into cross-curricular pedagogies has identified six common and contrasting ways of using more than one subject to respond to a problem, theme or issue. These styles of cross-curricular teaching and learning have different aims, depend upon a range of planning strategies and result in different learning opportunities:

- *tokenistic* cross-curricular approaches
- *hierarchical* cross-curricular teaching and learning
- *multidisciplinary* cross-curricular teaching and learning
- *interdisciplinary* cross-curricular teaching and learning
- *opportunistic* cross-curricular teaching and learning
- *double focus* cross-curricular teaching and learning.

Each suggested category places a different emphasis on combining subjects; each has a different aim.

Having used focus exercises like those above to maximise interaction with an experience the teacher should choose the cross-curricular approach best suited to the learning they wish to promote in their children. Each approach has a different aim. All can be used with all subject disciplines. There are at least six different ways in which they manifest themselves.

Tokenistic cross-curricular approaches

Token cross-curricular approaches are only cross-curricular in name. They do not make real connections between subjects or develop learning in more than one subject. Perhaps a song might introduce a history topic but nothing is made of the song and little done to enhance learning in music, the only aim is to bring some extra interest to a history theme.

Hierarchical cross-curricular learning

Hierarchical cross-curricular learning occurs when ideas from one subject are used to enhance learning in another. The aim is for learning in a dominant subject, perhaps English, mathematics or science, to be enhanced by the introduction of a subsidiary subject, perhaps art, music or dance. If the linkage is genuinely cross-curricular there will measurable learning in both subjects. Songs, chants, rhythms and timbres, for example, might serve as aids to mathematical or language learning but the teacher must establish clear new learning aims within music even if the main intention is to enhance learning in the dominant subject.

Multidisciplinary cross-curricular learning

Multidisciplinary cross-curricular learning, on the other hand, gives parity of importance to two subjects. Two sets of disciplines taken from the curriculum subjects may be used to throw light on a single experience. The aim of multidisciplinary cross-curricular learning is to use a single stimulus for two distinct purposes. Despite arising from the same experience, the subject disciplines do not necessarily meet or affect thinking in each other, learning within the subjects is kept separate. The teacher plans progression, vocabulary, specific skill acquisition in two subject disciplines that are *most* relevant to the experience. It is important for the teacher to name the subjects chosen and to make the children aware of the new learning that has occurred. English is likely always to be present in cross-curricular learning because speaking and listening are always generated, and often writing and reading are necessary for extending the thinking generated by an engaging experience.

Interdisciplinary cross-curricular learning

In interdisciplinary cross-curricular learning the intention is to *connect* or *combine*, often creatively. New learning in two subject disciplines is put together to generate an original and valued product, presentation or idea. In this kind of cross-curricular approach the intertwining of the disciplines deepens the response to a single experience and adds an important element of unpredictability and imagination to the results. To assess learning the teacher often uses some kind of 'performance of understanding' (see Blythe 1998) where learning in each subject is some kind of presentation. Teachers should plan appropriate means of integration of the two subjects and be clear about the objectives for each discipline, therefore this approach is more complex, and perhaps more risky, than multidisciplinary.

Opportunistic cross-curricular learning

In opportunistic cross-curricular learning the child leads. Planning is done in response to children's responses to a shared experience; the teacher may have only a vague subject expectation. Typically children and teacher share a powerful personal experience, such as a visit, visitor, or other powerfully presented stimulus. The teacher, or teaching assistant, listens carefully to children's reactions, observing changes in behaviour. Children may be asked what they would like to do to understand or express the experience better. Opportunistic methods are generally the preserve of the most confident and experienced teachers because they involve a degree of risk and uncertainty. The aim of opportunistic cross-curricular methods is to use children's natural curiosity

and enthusiasm to motivate learning. The adult role is to add challenge, new skills and new knowledge to existing interest. In Csikszentmihalyi's terms, the added challenge or newly taught skill is more likely to ease the child from attention and interest towards a state of flow.

Double focus cross-curricular learning

Double focus cross-curricular learning attempts to establish a balance. Research has shown (for example Roth, in Wineburg and Grossman 2000) that cross-curricular approaches can sometimes sacrifice progression and deep, subject understanding in favour of simple enjoyment. Cross-curricular learning is generally effective in securing progression only when the teacher's subject knowledge is secure and children are aware of their growing subject understanding. The 'double focus' suggests two different modes of learning operating simultaneously, one subject-specific and the other cross-curricular. The separate subject curriculum continues throughout the year, *however* the year is punctuated with frequent opportunities to put newly learned skills and knowledge into action in cross-curricular contexts. In double-focus approaches teachers should plan a string of powerful experiences for every year group in and out of school. Separate subject studies will use imaginative and engaging pedagogies to extend the disciplinary vocabulary, skills and knowledge; the greater the pure subject or discipline input, the more value each subject will have in a cross-curricular setting.

Pure subject skills and knowledge are quickly put into action in 'real world' and relevant contexts. Ideally these powerful personal experiences should be every six weeks or so and consist of field trips, special visitors, visits to galleries, theatres and museums, themed weeks, science fairs, investigative maths days and so on. Each context can become the subject of a two-subject analysis, and again English will inevitably be extended in all responses. Through the school year each curriculum subject should have its turn in helping make sense of and extending the experience. Curriculum planning for double-focus cross-curricular learning starts with planning the powerful personal experiences and matching particular experiences to two different curriculum viewpoints (see Barnes 2015).

Additional Perspectives on Cross-Curricular Teaching and Learning

Planning, progression and assessment are central to ensuring challenge and progress in school learning. Successive governments have been right to emphasise the seamless links between assessment and good quality learning. Cross-curricular learning is more effective when these aspects of teaching are given attention. But teachers' attitude and

approach, the classroom atmosphere and learning environment they construct, their particular pedagogical style, also strongly affect the learning dispositions of children. Cross-curricular approaches can provide an engaging new perspective for children and equally for their teachers.

A Community of Learners

Cross-curricular learning promotes authenticity in teaching and learning. Using the powerful personal experiences described, teacher and class can quickly enter the world of 'real world learning' (Lucas et al. 2013). Authentic learning experiences involve adult and child learners together. Full teacher participation in the learning process does more than motivate children. Through the mirror neurons the quizzical looks on teachers' faces provoke deeper enquiry in children as they mirror their teachers' curiosity. The process of learning alongside children also generates high degrees of sustained job satisfaction and increased awareness of personal creativity (Barnes 2013a; Barnes and Shirley 2007; Cremin et al. 2009). A pedagogy and teacher development programme that works towards genuine co-learning contributes significantly to the resilience of teachers and their capacity to give more to their roles (Barnes 2013b).

Planning

Cross-curricular learning is not without its dangers. In past manifestations spurious links were often made between too many subjects, and little sense of progression or subject record keeping was possible (see Alexander et al. 1992). The current focus on progression and rigour has served to remind all teachers of the importance of challenge and a sense of personal growth in learning. Subject progression will perhaps be more difficult to assess as attainment levels have been taken from the foundation subjects in the new national curriculum for England, but establishing learning targets remains vital to the sense of personal development. Progress towards particular subject objectives is not easy to manage even when only two subjects are involved and detailed planning towards clear and achievable objectives is central. Teachers can map out the direction of planning by asking, 'What new learning, new vocabulary or new skill do I want each child to understand by the end of this lesson?'

New words hold new concepts. Well-chosen vocabulary can often provide the 'backbone' of the well-planned lesson. After deciding upon the experience children will share teachers should identify words in each chosen subject that hold the new ideas, skills or processes they want their children to understand. These new words, highlighted, used frequently and pointedly through out the session, can provide the

framework. New vocabulary also holds the new knowledge and gives children a sense of their own progress towards a goal.

Progression

If we want to avoid the 'bland broth' (Roth 2000) that results from some cross-curricular approaches, detailed forethought is essential. Planning progressive objectives in knowledge and skills requires the teacher to have a secure understanding of the unique skills and core knowledge of the discipline. Children equally need to be aware of progress in themselves. The Cambridge Primary Review (Alexander 2010) uses international and strong evidence to remind us that cross-curricular learning mirrors the way children's minds work, but teachers also need to be aware of how the learning brain thrives on challenge and difficulty and how the sense of genuinely seeking an answer stimulates the capacity to find one. Knowledge of the ways in which the new science of learning can help us plan new challenges and lasting learning is essential to every teacher (see Claxton et al. 2010). While joy and engagement are vital motivators and sustainers they cannot alone generate secure subject development (see House of Commons 2007, 2010). The levelled statements in the pre-2014 curriculum in England, and those in Wales, Northern Ireland and Scotland, remain valuable sources of guidance on the detail of subject progress in addition to the new progression frameworks devised by the national curriculum subject expert panels.

Staff Development

Effective pedagogy demands teachers who see themselves as flourishing people. Successful cross-curricular activities need enthusiasm and commitment on the part of the teacher. Teachers might start by considering how they may become enthusiastic learners in their own right. They may share staff development that frequently exposes them to real, relevant, positive and life-changing experiences themselves. Staff who share creative and cultural experiences and who feel they are developing their own creativity are more capable of sustaining a fulfilling life in education (Barnes 2013b). As a result of meaningful professional development, teachers may be better able to plan a series of powerful experiences to span the year for each class, and those experiences must also be potentially life-changing.

Child-Led Learning

The pedagogy of cross-curricular teaching and learning might include a readiness to allow children to choose the experiences they deem important or it may mean planning

a series of events with children's preoccupations in mind. The United Nations Convention on the Rights of the Child (UNICEF 1989) expects children to have a say in what and how they are taught. The outcomes from powerful experiences, focus exercises and different forms of cross-curricular thinking in many case studies have been greatly enriched because pupil-led responses were encouraged (Barnes and Shirley 2005, 2007; Cremin et al. 2009; Engaging Places website). Teachers in these contexts have been far from redundant. Their role was primarily to teach the skills and knowledge demanded by the children as projects developed but simultaneously they supported, and co-reflected as well as provided the security and safety elements that adults should.

Assessment

Harvard's Project Zero has offered an adaptable format for planning and assessing such experiences (Harvard website). I have adapted the Harvard format for cross-curricular purposes and included an example three-session plan in Figure 13.5. The 'teaching for understanding' approach is founded upon providing plentiful opportunities for children to put their learning into practice in authentic situations. In asking children to apply their new knowledge and skills to real and engaging challenges the successful pedagogue helps ensure the existential, meaningful and satisfying conditions required for deep learning. In planning both feedback and a yardstick for progression the teacher uses their experience and knowledge to make assessment part of a pleasurable and enriching learning journey.

Assessment Definitions

Overarching Understanding Goal (OUG): The essential understanding you wish to develop as a result of the teaching. This is usually values or 'big-picture' based: for example, that the children understand the importance of examining several different types of evidence before arriving at a conclusion (a history OUG). That the children understand that specific combinations of sound and silence can express emotions as well as words (a music OUG).

Understanding Goal (UG): what specific skills or knowledge you want children to learn as a result of this unit (this will be tied to attainment levels in the national curriculum). *Performance of Understanding*: these are opportunities throughout the unit of work, for children to demonstrate the level and depth of their understanding and whether they have reached the OUG or UGs. The teacher will teach the required skills or knowledge and then give children a chance (independently or in groups) to use their new learning to solve a problem, create a product, presentation, collection, exhibition, performance or composition. This is both an assessment opportunity for teachers and children and a chance to understand the usefulness of the new learning.

Powerful shared experience: see above, 'The importance of powerful experiences'.

Sequence of events	**Performances of understanding** (opportunities for children to show the current level of their understanding)	**Assessment** (How will you know that children have engaged, sustained interest, and achieved new and transferable learning?)
Day 1: A powerful personal experience – a visit, visitation, story, event, or surprise designed to fully engage the whole class. Followed up by focused questioning and direct teaching that arises from the experience)	'Introductory performance(s) (showing the knowledge children have already) What did we see/hear/taste/smell/feel? What do we already know about these things? Use brainstorms, mind maps, diagrams, lists, searches, drawings, discussions e.g. Visiting a castle: In groups of 4/5 look around you: what can you see/ photograph/record/draw, beginning with the letter: 'a', 'b', 'c' etc.	**Formative feedback:** Instant, informal and oral, by peers and teacher, on spoken, written or drawn reflections by children **Criteria:** Developed collaboratively by children and teachers
Day 2: Developing a theme – teaching new knowledge, skills and attitudes related to two curriculum subjects and directly connected to the powerful personal experience®	'Supported performances' (demonstrating in groups and with help from teacher/others, the new skills and knowledge acquired during the module) e.g. Back at school after the castle visit: After history teaching and learning, each table of 6 pupils makes a brief presentation about a given aspect of: castle life – domestic, defensive, attacking, building, modern day function After science teaching and learning, each table gives a brief presentation on: forces, decay, strong structures, materials, mural ecology	**Formative feedback:** Instant , informal and oral, given by peers, teacher, visitors including parent helpers whilst children are working AND from self during and after the supported performances **Criteria:** Negotiated, children complete a summary sheet about their learning
Day 3: Applying new knowledge – more teaching in the chosen curriculum subjects, culminating in the setting of a real problem or challenge, that requires the new knowledge to be used	'Culminating performances' (showing how combined knowledge and skills can be applied to a new problem) e.g. End of module event: Each group of 6 is set a task: (a) plan a history/science field trip to the local church/shopping centre/street etc. What would you want the children to learn? How would you make sure they learned it? How could they share their learning with a younger class? (b) plan and shoot a video that shows the science and history to be found in the school building/street near the school, local church etc.	**Formative feedback:** From the groups themselves during and after performance, then formalised written evaluations (two items of focused praise and one question) **Criteria:** Matched against the prescribed knowledge in the national curriculum and the progression suggested by the subject associations

Figure 13.5 Sample planning sheet for cross-curricular three-day module adapted from Blythe (1998)

Conclusion

This chapter ends with a series of provocative questions. Both Plowden (1967) and Alexander (2010) recognised that in the hands of teachers who did not have good subject knowledge and good knowledge of how children learn, cross-curricular methods can be counter-productive. Enjoyment is not the only aim of education; we aim at excellence too, but many children do not discover what they will be excellent at unless they first feel a sense of pleasure in school. Cross-curricular learning as described in this chapter will generate enjoyment, but it is for the best teachers to use that enjoyment to build motivations towards new and deep learning.

Reflection Points

1. How do we as teachers gain the levels of subject knowledge that will give us confidence to approach subject learning in a cross-curricular way?
2. Is cross-curricular learning motivating for all children?
3. Is it true that cross-curricular methods stimulate creative thinking and learning? What evidence do you have?
4. Why do you think that not all children respond well to a purely separate subject-based curriculum?

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