SUCCESSFUL LEARNERS, CONFIDENT INDIVIDUALS, RESPONSIBLE CITIZENS AND EFFECTIVE CONTRIBUTORS TO SOCIETY: EXPLORING THE NATURE OF LEARNING AND ITS IMPLICATIONS IN CURRICULUM FOR EXCELLENCE

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ABSTRACT
This article is a psychologically informed conceptual analysis of what learning means. It argues that practice should draw on descriptions of learning in pedagogical research that have generated improvements similar to those that are being proposed in *Curriculum for Excellence*, Scotland's new curriculum for the 21st century. The article characterises learning in terms of four broad aptitudes (knowledge, strategy, metacognition and beliefs) which are fundamentally dependent on the individual learner's regulation of mental processes. It argues that without examination of how learners construct knowledge bases through thinking and reasoning, and the teachers' role in facilitating such processes, it is unlikely that the intentions of *Curriculum for Excellence* can be fully realised.

ISSUES

In its report, *A Curriculum for Excellence*, Scotland's Curriculum Review Group (2004) was explicit that the curriculum should:

- make learning active, challenging and enjoyable
- not be too fragmented or over-crowded with content
- connect the various stages of learning from 3 to 18
- encourage the development of high levels of accomplishment and intellectual skill
- include a wide range of experiences and achieve a suitable blend of what has traditionally been seen as 'academic' and 'vocational'
- give opportunities for children to make appropriate choices to meet their individual interests and needs, while ensuring that these choices lead to successful outcomes
- ensure that assessment supports learning.

Curriculum for Excellence aims to create high quality learning experiences for every young person in Scotland. It aims to prepare 3 to 18-year olds for life in the 21st century. While badged as the curriculum to develop the four capacities of successful learners, confident individuals, responsible citizens and effective contributors to society, the Curriculum Review Group was nevertheless giving central importance to learning: the individual's constitution of many different kinds of knowledge (Bereiter 2002; Marzano & Kendall 2007). Given the declared importance of 'learning' in *Curriculum for Excellence*, this paper argues that what learning might and could mean has to be deconstructed in the light of research. Yes, the environment for learning, the choice of teaching and learning approaches and the ways in which learning is organised (Curriculum Review Group 2004) are acknowledged as factors, but these do not provide a description of how knowledge bases are constructed through thinking and reasoning, and the teachers' role in facilitating processes such as analysing and articulating concepts, sorting through ideas, connecting thoughts, constructing and reflecting on ideas, constructing courses of action from analyses and formal scientific thinking. Without examination of processes underlying these factors, the general exhortations of what makes learning possible are nothing more than empty straplines.

The necessity of teachers enacting curricular reform through their own engagement (either as critical reader or active participant) with research is well rehearsed in the teacher-as-learner literature (Harvey & Kamvounias 2008; Korthagen *et al*. 2006).

Without teacher engagement in the 'unsolved problems of pedagogy' (Bereiter 2002: 421), educational reform will be at a level of observable behavioural enactment – a still uncomfortably common consequence of initiatives being 'rolled out' (Livingston *et al.* 2004; Soden *et al*. 2008) – rather than at the transformative level anticipated in the new initiative. Successful curriculum reform requires theoretical understandings of learning to design, implement and evaluate educational innovations (Design-Based Research Collective 2003). But it also depends on some understanding of the nature of learning and teaching transactions (Entwistle et al. 2001). In other words improvement in curriculum requires the participants (learners and teachers) to draw on descriptions of learning in pedagogical research that have generated improvements to practice similar to those that are being proposed. Soden *et al*. (2008) concluded that participants in *Arts Across the Curriculum* (a project commissioned by Scottish Government) might have brought about more significant improvements in content learning if they had been encouraged to conceptualise learning in ways suggested in recent pedagogical research. This model of partnership between practitioners and researchers – a model that is being advocated by Christie & Boyd (2004) – is very different from earlier staff-development models in which teachers are given prescriptive advice such as 'do more project based activities with small groups'. Such an approach is not useful (Duffy 1990) due to its limited and fragmented character, and leads often to inappropriate use. This article explores what understanding of learning is needed and argues that pedagogical practice to support learning should proceed from a proper analysis of critical thinking and the cognition and metacognition on which such thinking depends. The purpose of such analysis is not to arrive at uniform practice but to enable practitioners to make informed judgements in complex and necessarily highly variable situations. Thus best practice has to be understood as a phenomenon within a particular set of circumstances.

WHAT IS LEARNING?

An explicitly psychological perspective is adopted in this paper; not because psychology has 'all the answers' but because a psychological level of analysis is thought to have functional value. Because, from this perspective, the individual's acquisition of personal knowledge is the basis of learning in formal education, the teacher's design and implementation of meaningful pedagogical practice is a critical factor. In turn, the effectiveness of the practice depends on the teacher's understanding of how the learner acquires knowledge. The analysis offered below is driven by constructivist accounts of learning. There is significant variation in the many theoretical positions described as constructivism, which has been described as a broad church with a vexed and messy landscape (Fox 2001). The analysis draws on research concerning interrelationships between two conceptions of learning which often are treated independently of the other: a conception of individual learning, emphasising the acquisition of knowledge and cognitive skills as transferable commodities; and the socio-cultural conception of learning as a collective participatory process of active knowledge construction, emphasising context and interaction. The analysis does not extend to the related area of enquiry that critical theorists of education (e.g. Brookfield 1993; Mezirow 1994) have pursued: into pedagogies that help learners to reassert the political dimensions of self-direction by bringing into their critical consciousness those assumptions, beliefs and values which have been uncritically assimilated and internalised. Since the concerns of such theorists lie in ideological critique – in which the sociological, historical and political origins, nature and consequences of ideas are analysed and evaluated – their ideas are less immediately applicable to the focus of this article.

While we do not have any agreed theory of learning that explains widely differing types of learning and learner diversity (Entwistle 2007), Bereiter (2002) offers a conceptual distinction which may be useful in the current climate where

pedagogical concerns seem to include all of a teacher's activities. Perhaps because of the influences of constructivism, the term 'knowledge-building' has been used as a synonym for 'learning'. But, for Bereiter, knowledge-building is inquiry into real questions; activity which is intended to produce knowledge. The knowledge thus created is then in the public arena to be critiqued and modified. In other words knowledge-building is contributing to the world of ideas: what others might more commonly understand as research (Bowden & Marton 1998). Learning, on the other hand, is the acquisition of knowledge and understanding *by the individual*, not for the purposes of contributing to the greater good but purely for the purposes of improving the individual's mind. Fundamentally, learning depends on the mental processes that take place in the individual (Illeris 2007). Because insights from constructivism suggest that learning is enabled when learners engage in question-driven inquiry, participate in projects or otherwise act as scientists, the purposes of knowledge-building and learning have become unhelpfully conflated. But this distinction is important. If teachers are concerned with learning (the main justification for the activity of teaching) albeit that they may be using a knowledge-building approach to facilitate the learning, they must be concerned with what the individual learner derives from the activity rather than with what the class collectively found out. It follows, therefore, that insofar as 'learning is an active construction of meaning by the learner' (Birenbaum 2003: 18), the processes that support learning have to be of key concern to teachers. Furthermore, because the role of thought (an essentially mental activity) in learning is both significant and complex (Marzano & Kendall 2007), the processes that teachers need to focus on, to avoid the reductive pedagogy of which Bereiter (2002) is so critical, are dominantly cognitive. To be concerned about how the individual develops domains of knowledge necessarily involves being concerned with how individual learners retrieve, comprehend, analyse and utilize information as well as how they attend to and regulate these cognitive processes (Marzano & Kendall 2007).

The realisation that teachers must think critically about learning underpins Marton's (2007: 20) explicit aim to make 'theoretical tools available for analysing the extent to which the necessary conditions for achieving specific aims for learning are present in certain situations'. These same tools can then be used to create the necessary conditions. Marton's thesis is that rather than being concerned with what general conditions make learning possible (as, for example, outlined by the Curriculum Review Group 2004), the teacher's attention should be on the actual content that the learner is expected to learn and on how that learning varies according to whether learning is experienced as an increase in knowledge; memorising and reproducing information; applying knowledge; understanding; seeing something in a different way or as qualitatively transformative (Marton *et al*. 1993). So the teacher who allows the learners to believe that 'listing 5 points' is an adequate outcome when what was really expected was a change in understanding (say of grasping a mathematical concept rather than rote procedural application) is encouraging reproduction of content rather than appropriate application of content.

This cyclical, iterative and cumulative view of learning content is also reflected in Rumelhart & Norman's (1981) three modes of learning; in Alexander's (2005) model of domain learning; and in Sternberg's (2005) competence-expertise continuum.

So if, as argued here, learning is the individual's constitution of knowledge for the improvement of his/her own mind, if the cognitive processes of this constitution of knowledge are of primary concern to the teacher, and if this constitution of knowledge varies through the passage of time, what should teachers be concerned with?

PEDAGOGICAL CONSIDERATIONS

For De Corte (1996), it is instructionally productive to characterise what has to be learned in terms of four broad aptitudes: knowledge, strategy, metacognition and beliefs. These aptitudes are learner characteristics that can influence learning, when used integratively and interactively to realise goals. De Corte's descriptions of the four aptitudes – also discerned by psychologists such as Entwistle & McCune (2004), and Vermunt & Vermetten (2004) – find support in extensive bodies of related research on what has to be learned in order to solve problems and approach challenging tasks in a variety of domains (Greeno 1991; Chi *et al.* 1982; Fergusson-Hessler 1993).

Knowledge

The first of these aptitudes is the ability to apply flexibly well-organised knowledge bases, such as those that seem to underlie the communication, numeracy, and technology competences and the political, economic and social literacy that characterise successful learners and responsible citizens in the new initiative. What knowledge is, is variously understood and described in the literature (for example, Alexander *et al*. 1991; Hofer & Pintrich 1997) but Marzano & Kendall's (2007) typology of information, mental procedures and psychomotor procedures is helpful. Information is topic-specific vocabulary, facts, principles, time-sequences and generalisations. Knowledge also includes mental procedures: commonly recognised procedures for applying knowledge, often referred to as procedural knowledge or domain-specific thinking skills such as those used in mathematical and science problem solving (Livingston *et al*. 2004). Finally, psychomotor procedures can be thought of as knowledge because they are learned as information, then shaped and routinised much as mental procedures are, and are stored in memory (Anderson 1983). The knowledge base is significant because of the ways in which knowledge distinguishes experts from novices. Experts:

- possess a wealth (versus a paucity) of highly integrated (versus fragmented) knowledge
- recall relevant (versus irrelevant /tangential) knowledge to good (versus unfocussed) effect
- engage in thoughtful planning and analysis (versus seeking haphazard solution)
- perceive the underlying structure (rather than surface features) of the problem
- operate strategically
- devote time and effort to improved performance (Alexander 2005).

The significance of the knowledge-base underscores the emphasis that Marton places on the content of learning. However, as outlined above, learning is not only about content.

Strategy

De Corte's second aptitude is the ability of learners to apply cognitive processing strategies to process subject matter. This component is a main focus in thinking skills research and is thought to lead directly to enhanced understanding and skills. In other words, as outlined by Marton, some cognitive capacity is expected to develop in processing particular content. *Curriculum for Excellence* makes specific reference to critical thinking. That such thinking seems to be poorly achieved has been attributed in part to its poor delineation in interventions (Kuhn 1999). For Kuhn critical thinking includes: (a) separating beliefs from evidence; (b) imagining beliefs alternative to one's own and knowing what evidence would support these; (c) providing evidence which supports one's own beliefs while rebutting the alternatives; (d) weighing up reasons for believing what is alleged to be known. In

deconstructing curricular goals connected with thinking, critical or otherwise, use needs to be made of typologies/descriptive maps of thinking (e.g. Moseley *et al.* 2004; Halpern 2003; McGuinness 2005). It is essential to draw on such maps in the new initiative to characterise properly the thinking that underpins learning.

Livingston *et al*. (2004) reported that many interventions to promote critical thinking targeted processes such as analysing and articulating concepts, sorting through ideas, connecting thoughts, constructing and reflecting on ideas, constructing courses of action from analyses and hypothetical-deductive thinking. Although new critical thinking probably depends on the execution of many cognitive processes (Halpern 1997), some writers argue that cognitive skills training cannot be expected to bring about critical thinking unless the training invokes criteria for evaluating knowledge (Lipman 1991; Kuhn 1999). Central to Lipman's (1991) definition of critical thinking is appeal to criteria which illuminate what learners need to learn. In addition to critical thinking, Sternberg (2005) argues for creative and practical thinking skills. Regardless of the debate that exists about the value of dissecting cognitive activity into distinct domains (Gottfredson 2003), the evidence strongly supports the position that a learner's cognitive processing should be a legitimate part of the teacher's intentions. Further, that such cognitive activity is modifiable by the task demands made of learners is consistent with Marton's contention that not only should the teacher be concerned with 'increase' or 'improvement' in content learned but should be equally concerned with the mental powers that learners use to process the content in some way. If teachers want learners to be able to engage in critical thinking they need to provide tasks that require mental activities such as making judgments against appropriate criteria and considering what sort of evidence might support or undermine their views. It is therefore necessary that teachers give full attention to cognitive engagement as both a design feature of a lesson and a dimension of learning that is being assessed.

Metacognition

The third broad aptitude in De Corte's model, metacognition involves four functions: specifying goals, and monitoring the processes, clarity and accuracy of what has been learned (Marzano & Kendall 2007). Learners' knowledge of their own cognitive functioning together with their self-regulation comprises the executive control that individuals exercise over their learning (McGuinness 2005). While all learners attempt to regulate their own academic learning (Zimmerman 1998), some are skilful while others remain naïve. Skilful self-regulators view academic learning as something they do for themselves while naïve self-regulators see themselves as victims of their learning experiences. Three phases of cognitive engagement are considered central to self-regulation (Butler & Winne 1995). First learners must analyse tasks and set task goals; a critical step which establishes the direction of subsequent learning. Second, learners must realise their goals through selecting, adapting or generating tactics and strategies. Finally, in monitoring their performance, learners compare their current progress with their goals to judge both the appropriateness of the goals and their own strategic behaviour. Studies reviewed by Butler & Winne (1995) suggest that self-regulation can become more skilful through interventions which *require* skilled self-regulatory behaviour for task completion. As well as believing that metacognition is the mechanism for achieving transfer of what has been learned in one context to others (Kuhn 1999; Haskell 2001), Kuhn & Dean (2004) are of the view that metacognition has the potential to bridge the concerns of educators and researchers whose work is addressed to the development of skilled thinking. Teachers therefore need to understand the mechanisms involved in metacognition and how best to foster it; particularly in the light of evidence that metacognitive and self-regulatory

strategies are neither easy nor automatic to develop and sustain (Pintrich 1999). The extensive evidence for the importance of metacognition serves as a reminder that the learners' perspectives on the learning cannot be discounted (Biggs 2001; Marton 2007), since it is their perception of context as well as their perceptions of their own goals, efficacy and attributions that drive their (appropriate or otherwise) engagement with learning tasks. It is when engaged in activities that are likely to result in learners achieving the desired/intended outcomes that learners will learn.

Beliefs

The fourth aptitude in De Corte's model refers to affective elements such as attitudes, beliefs and emotions. Of pertinence is that learners will hold personal beliefs about what knowledge is, how it can be gained, its degree of certainty, and its stability; known as epistemological beliefs (Hofer 2002). Epistemological beliefs can vary enormously from person to person but mature epistemological belief are represented in the coordination of evidence and criteria (Kuhn & Weinstock 2002) thereby acknowledging that knowledge is generated by human minds, that it is uncertain but can be revised according to agreed/negotiated standards or criteria. Mature epistemological views are considered to matter more because for Kuhn & Weinstock they represent critical thinking of the types discussed above. To be 'fluent' in the capacities suggested by *Curriculum for Excellence*, the cognitive capabilities of analysis, criticism and evaluation would seem essential. Not only are epistemological beliefs of importance in themselves, they will influence how learners respond to the teaching they experience. Persons who view knowledge as uncertain are more likely to conceive of teaching as a process of facilitation, derived from a constructivist perspective. Teachers and learners are thus co-learners with learning being interactive. Conversely, individuals who view knowledge as safe and certain may conceive of teaching as transmission of knowledge, encouraging learners to 'receive' information. In such teaching there may be little attention paid to the personal meaning constructed by learners or to the connections with their prior knowledge.

PEDAGOGICAL IMPLICATIONS

De Corte's model emphasises the integrative aspect of the aptitudes and implies that thinking is inextricably connected with understanding the interconnectedness of concepts in each area of the curriculum. To summarise, 'learning is the central concern of education and is usually conceptualised in terms of accumulating knowledge' (Shuell 2005: 15). Learning is the constitution of knowledge by the individual. The knowledge to be constituted is that in the academic domains which are recognised to be fields of study such as mathematics or history and which are foundational in our post-industrial society (Alexander 2005). Within the formal system afforded by school education, learning is effected through the efforts of both teacher and learner and this, as the evidence reviewed above testifies, is complex. What are the messages from this? According to Alexander (2005), there are three.

Firstly, the importance of knowledge as the distinguishing feature between experts and novices suggests that teachers themselves must be 'the more knowledgeable other' (Vygotsky 1978). The More Knowledgeable Other (MKO) is someone (teacher, peer, electronic tutor) who has a better understanding of a particular task, process, or concept. However, the point is that to be a teacher one must be a More Knowledgeable Other. This is easily recognisable when a learner is in the acquisition (Marton 2007) accretion (Rumelhart & Norman 1981) or acclimation (Alexander 2005) phase. Learners at this point cannot distinguish relevant from irrelevant ideas in the domain and are therefore critically dependent on the MKO. Less obvious perhaps, is the significance of the MKO in the knowing,

structuring or competence phase. When trying to provoke a qualitative shift in the learner's thinking, teachers' critical questions will be key but unless teachers have rich knowledge in the target domain they cannot focus learners' cognitive attention on pertinent discriminations. Jones & Merrit's (1999) findings are relevant to teachers' knowledge and the new curricular intentions. They focused on teaching the means to question and reveal the contestable character of knowledge claims about environmental questions, and this was directed toward constructing knowledge bases, on the grounds that important differences between experts and novices lie in the quality of their knowledge. Similarly, learners learned to handle questions about possible alternative causes, in addition to the proposed cause, about how each possibility could be tested, and about how the evidence, once gathered, matched the expectations (Lawson *et al*. 2000). As a result, learners were able not only to use this form of thinking in the classes in which it was taught but were able also to transfer the form of thinking within the domain of science. Lawson *et al*. (2000) claim that the approach promoted concept construction, helping learners to construct a knowledge base in science, and use the approach competently on the course examinations covering a wide range of theoretical topics.

Secondly, the importance ascribed to knowledge means that learners must develop deep knowledge. It is not enough for them to be merely 'exposed' to content (a practice that has come to be known as 'mentioning') in the belief that by some process of osmosis, they will develop domain-specific knowledge and cognitive capability to use the knowledge. As Alexander points out, this means pedagogical practice which devotes time to learning and requires *effort* from learners. What this requires and what is implied in the new curricular intentions is that what is learned will be transferable from one situation to another. Transfer of learning is a person's use of past learning when learning something new. Haskell (2001) laments that research findings show that education has failed to achieve transfer of learning to any significant extent. What is particularly problematic is 'high road' transfer (Salomon & Perkins 1989) in which an abstract general principle is applied to situations that have no very obvious similarities to situations in which the principle was learned (Haskell 2001). This mindful abstracting is a deliberate search for connections in knowledge and is contrasted with 'low road' transfer, which is assumed to be a less mindful application of what has been well practised. Thus, the learner who is well practised in calculating simple interest might achieve the 'low road' transfer of performing this calculation in a variety of tasks but be unable to transpose the formula when necessary. However, such rooted and principled learning does require an investment of human capital and this may not be well recognised by policy-makers or protagonists who demand target-led achievements evidenced by high-stakes assessment.

A final implication deriving from the centrality of a knowledge-driven curriculum initiative such as *Curriculum for Excellence* is the importance of the sociocultural context in which all learning takes place. For all individuals to develop deep, useful, flexible knowledge bases, their prior learning and individual proclivities can neither be ignored nor discounted. As Marton points out, what the learner experiences is critical. This, in a constructivist perspective, is the basis of all subsequent learning and teachers cannot, therefore, assume that one size fits all. In order to manage the sheer range of learner variability, it is necessary for learners to determine and pursue their own purposes and processes of learning through collaborative work, and accept the constructivist assumption that the locus of intellectual authority resides not in the teacher nor in the resources, but in the discourse facilitated by both teachers and learners. For this to happen, learners' metacognitive processing must be an important concern of pedagogical practice. Metacognitive functioning includes both the awareness and management of one's own thinking (as implied by self-regulation) and the broader understanding of thinking which is typically referred to as epistemological understanding (Kuhn & Dean 2004). The development of profound metacognitive functioning will, as has

been argued above, depend on appropriately demanding knowledge being constituted through argument, reasoning and justification as the bases for belief and behaviour. To this extent the development of excellent learning as exemplified in successful learners, confident individuals, responsible citizens and effective contributors to society is no more than the development of balanced, critical thinkers.

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