CURRICULUM FOR EXCELLENCE AND INTERDISCIPLINARY LEARNING

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ABSTRACT

This paper examines the recommendations contained in Curriculum for Excellence (CfE) aimed at encouraging the integration of knowledge, skills and understanding across different areas of the curriculum. It first outlines what is said in the official CfE documentation and supporting materials produced by Education Scotland, noting the absence of references to earlier work on curriculum integration and interdisciplinarity. The sections that follow focus on four issues that are critical for the coherence and success of attempts to promote interdisciplinary work: the way in which interdisciplinarity is conceptualised; ensuring that cross-curricular connections are convincing and intellectually challenging; devising pedagogic strategies that are effective; and addressing operational obstacles to interdisciplinary work.   The paper ends by posing a series of questions that need to be considered if the aims of interdisciplinary learning are to be achieved. It is suggested that, at present, these aims are well-intentioned but rather ill-defined.

INTRODUCTION

In July 2012 the Young Academy of Scotland (YAS) Curriculum for Excellence Working Group organised a workshop to explore aspects of interdisciplinary learning. YAS was established in 2011 by the Royal Society of Edinburgh (RSE). The rationale for this development is explained on the RSE website:

> The Young Academy brings together some of the most able and innovative young academics, entrepreneurs, artists and professionals in Scotland, with the aim of harnessing their creativity to develop a coherent and influential voice on behalf of the most talented people of their generation. The Academy members will be encouraged to work across disciplines to consider many of the most challenging issues facing society either domestically or globally, in fields as diverse as climate change, the economy, ethics or the arts. (www.rse.org.uk)

The emphasis on working across disciplines helps to explain YAS's interest in the interdisciplinary aspects of Curriculum for Excellence (CfE). Presentations at the July 2012 workshop included a report from a voluntary organisation which had developed interdisciplinary materials for schools, input from academics who had written about CfE, examples of projects in primary and secondary schools, and reflections from a retired headteacher and a former senior member of the inspectorate on both the potential of interdisciplinary work and the barriers to its effective implementation. This paper is based on the input to the event by the present writer, expanded and revised in the light of the other contributions and the wider discussion which took place. It represents only the views of the author and should not be regarded as a statement of YAS's thinking on the subject.

The first part of the paper gives an overview of what CfE documents say about interdisciplinary learning and subsequent exemplars available on the Education Scotland website. It draws attention to some earlier attempts to promote interdisciplinary learning as well as to critiques of the thinking underlying these approaches. In subsequent sections four perspectives on interdisciplinary learning are explored: conceptual, curricular, pedagogic and operational.   The paper ends by posing a number of questions that require further elucidation if the CfE recommendations on interdisciplinary learning are to be embedded successfully in classroom practice.

WHAT DOES CfE HAVE TO SAY ABOUT INTERDISCIPLINARY LEARNING?

The first CfE document appeared in 2004 setting out the broad principles of the proposed reform programme (Scottish Executive, 2004). These included the now familiar four capacities of successful learners, confident individuals, effective contributors and responsible citizens. The document also stated that 'There should be clear links between the different aspects of young people's learning, including opportunities for extended activities which draw different strands of learning together'. This brief statement was fleshed out in *Building the Curriculum 3* (Scottish Government, 2008):

> The curriculum should include space for learning beyond subject boundaries, so that children and young people can make connexions between different areas of learning. 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. (Scottish Government, 2008: 21)

Note that reference is made to 'different curricular areas or subjects'. The overarching structure of CfE is described in terms of eight curricular areas - expressive arts, health and wellbeing, languages, mathematics, religious and moral education, sciences, social studies and technologies. So what was being proposed was certainly not an abandonment of traditional subjects. Indeed in *Building the Curriculum 3*, immediately before the section on interdisciplinary learning, it is stated explicitly:

> Subjects are an essential feature of the curriculum, particularly in secondary school. They provide an important and familiar structure for knowledge, offering a context for specialists to inspire, stretch and motivate. Throughout a young person's learning there will be increasing specialisation and greater depth, which will lead to subjects increasingly being the principal means of structuring learning and delivering outcomes. (ibid: 20)

These statements help to explain some of the arguments and counter-arguments that have arisen between advocates and critics of interdisciplinary learning (IDL). The wider academic literature reflecting different perspectives will be discussed in the next section: for the moment a broad characterisation of the Scottish debate will suffice. Those who favour a more radical approach to curricular reform than that offered by CfE say that there has been a loss of nerve, that if you want real flexibility you have to challenge the subject-based curriculum much more fundamentally. They sometimes further argue that it is the subject fiefdoms of the secondary school that have prevented Scottish education from embracing change. It is claimed that these serve the interests of conservative teachers rather than the interests of learners and the needs of employers who are seeking different kinds of skills from those associated with academic learning.

On the other hand there are those who say that it would be a mistake to abandon ways of structuring knowledge that have served education well in favour of something that is often vague and poorly understood. Traditional subjects have clearly defined bodies of knowledge with well-established methods of investigation and standards for determining the validity of new knowledge. Some critics, who are not totally hostile to interdisciplinary learning, argue that you need to have a good grasp of the disciplines before you can engage in worthwhile inter-disciplinary thinking.

On the Education Scotland website there are many references, both general and specific, to interdisciplinary learning (www.educationscotland.gov.uk). It would be cumbersome to give detailed references to every point that is mentioned in what follows, but where a document is deemed particularly important the exact source will be provided. IDL is said to encourage an inquisitive attitude and strengthen motivation as well as helping to develop confidence in facing challenges, both intellectual and practical. Moreover, learning

of this kind 'is connected and directly related to real-life experiences'. Other claims include 'exploration of in-depth topics, issues and problems', the promotion of 'critical thinking' and 'the development of skills for learning, life and work'. Examples of IDL work undertaken by both primary and secondary schools are given, in some cases supported by videos and other materials. The range of work is extensive. Some might be regarded as cross-disciplinary rather than interdisciplinary, in the sense that the emphasis remains on separate subjects (e.g. maths and physics, or English and history) though there is a desire to make connections between them. Others look at social topics which require input from a variety of sources: e.g. sustainable housing; emergency services; traveller children; electric transport; financial literacy; the legacy of major events (such as the Olympics and Commonwealth Games). There are also projects on Scotland (linked to global citizenship), China, the United Nations and the culture and language of 'linked' schools in other countries. Reports of some of these projects include not only accounts of curriculum content and teaching methodology but also planning and operational issues, assessment and evaluation. It is evident that a great deal of thoughtful work has been undertaken in primary and secondary schools across Scotland, though the response from primary schools seems to have been stronger.

As part of the development strategy of Curriculum for Excellence, a number of 'Excellence Groups' were established in 2010. One of these looked at Higher Order Skills with a remit to consider deep learning and advanced thinking skills 'across all areas of learning' (Scottish Government, 2011: 5). Among the 'ambitious cognitive skills' which the group recommends is 'interdisciplinary and multi-context learning' (ibid: 4). A warning note is struck:

> There are those who clearly envisage [CfE] as a short-term programme of change. If this view prevails, courses may be slightly adapted to conform to the surface requirements of the Experiences and Outcomes. Interdisciplinary learning will feature around the margins of the curriculum. Improved pedagogy will be patchily evident. New examinations will replace old. Boxes will be ticked but Scotland will not have risen to the demands of the new age.
> Curriculum for Excellence has to be much more than this . . . Curriculum for Excellence has to be a dynamic process in which change is evolutionary but cumulatively transformative. (ibid: 8)

Interdisciplinary and multi-context learning is seen as one of a number of activities that 'promote and exercise higher-order skills' (ibid: 13). Others include collaborative learning, problem-based learning and action-based research. Emphasis is given to transferable skills that can be applied across different areas of knowledge, though it is also acknowledged that some skills may be subject-specific.

Similar messages are to be found in the interim report of the Commission on School Reform, an independent group set up by the think tanks Reform Scotland and the Centre for Public Policy Studies (RS/CPPS). It refers to 'encouraging progress . . . in relation to deep learning, interdisciplinary approaches, the development of skills and learner engagement' but adds that 'much more needs to be done' (RS/CPPS, 2012: 7). The report also states that 'The measure of educational success is not the extent to which the learner can recall what is taught but the success with which he/she can think, understand and apply knowledge' (ibid: 14). For this to happen effectively requires not only an appreciation of links across the curriculum but also an understanding of the way in which learning promoted through the formal school curriculum connects with learning that takes place elsewhere - in the home and community, through the media, via interactions with other institutions.

One of the limitations of much CfE discourse is its lack of an historical perspective (see Priestley & Humes, 2010). This is seen at its clearest in the absence of appeals to the rich vein of curriculum theory which might have informed and strengthened some of its recommendations. It is also evident in the failure to acknowledge that interdisciplinary learning is not exactly a novel idea. For many years primary schools have used cross-cutting themes or topics as vehicles to promote understanding of a wide range of material.

A project on 'the Victorians', for example, would not be treated simply as a period of history but as a means of exploring aspects of childhood, education, work, health, housing, religion and lifestyle, comparing and contrasting them with the experience of people living today. Skilfully managed, such a project could provide opportunities not only for progression in literacy and numeracy, but also serve as a springboard for work in science and technology, social studies and expressive arts.

In the 1960s and 1970s, there were major research projects which explored the possibilities of acquiring knowledge and understanding in ways that cut across conventional subject boundaries. In the United States, for example, Jerome Bruner's 'Man: a Course of Study' sketched a cross-cultural curriculum based on three recurring questions:

- What is human about human beings?

- How did they get that way?

- How can they be made more so?

    (Bruner, 1968: 74)

In exploring these questions 'five great humanizing forces' served as focal points for the project: tool making; language; social organization; the management of man's prolonged childhood; and man's urge to explain his world (Bruner, 1968: 75). These were not to be regarded as 'airtight compartments' but as domains that interact with each other in complex ways. Another research programme which differed substantially from conventional subject-based approaches to knowledge was Lawrence Stenhouse's Humanities Curriculum Project. Stenhouse, at one time Head of Education at Jordanhill College, Glasgow, later Director of the Centre for Applied Research in Education at the University of East Anglia, argued for a 'process' rather than an 'aims and objectives' model of curriculum. What he hoped to promote in learners was an 'understanding of the nature and structure of certain complex value issues of universal human concern' (Stenhouse, 1969: 12). Towards this end, he was prepared to tackle controversial issues such as war, race relations, social class, and law and order. This required not only accurate factual information, drawn from a bank of material that would be regularly updated, but also serious discussion in which different 'voices' could be heard, imaginative experience (through drama and literature, for example), direct experience (where that was possible), critical analysis and independent judgement. The teacher's role was one of 'procedural neutrality', ensuring that evidence was carefully assessed, and that different perspectives were represented. There were to be no pre-determined objectives, a feature that sits uncomfortably with the systematic specification of 'experiences and outcomes' required by Curriculum for Excellence. Stenhouse acknowledged that his process model 'is far more demanding on teachers and thus far more difficult to implement in practice but it offers a higher degree of personal and professional development' (Stenhouse, 1975: 96-7).

CONCEPTUAL ISSUES

A striking feature of CfE discourse is its lack of serious philosophical analysis of questions relating to the nature and structure of knowledge. In this it contrasts with a much earlier policy document, the Munn Report of 1977, which was strongly informed by the epistemological arguments of Paul Hirst relating to what he called 'forms of knowledge' (Hirst, 1974). A weakened version of the Hirstian approach is evident in what CfE has to say about the eight 'areas of knowledge' but there is no attempt to engage with the academic literature on interdisciplinary learning which offers definitions and justifications for an alternative way of conceptualising what is involved in knowing and understanding (see below).

One of the reasons why interdisciplinary approaches to learning are receiving attention is that, valuable though individual disciplines are, there are many issues which are just too

complex to be addressed in terms of a single discipline. It is significant that, at university level, many fields of intellectual endeavour are now described as 'studies' rather than disciplines. For example, we have Renaissance Studies, Urban Studies, Environmental Studies, Management Studies, Disability Studies, Discourse Studies, Conflict Studies, and so on. 'Studies' serves as an umbrella term indicating that several different perspectives are required to understand the field of enquiry.

Klein has observed that 'interdisciplinarity is a concept of wide appeal' but adds that 'it is also one of wide confusion' (Klein, 1990: 11). Similarly, Moran has referred to the 'ambiguity' and 'slipperiness' of the term interdisciplinary, a situation not made easier by the existence of related terms, such as cross-disciplinary, multi-disciplinary and trans-disciplinary (Moran, 2010). Of interdisciplinarity, he says: 'It can suggest forging connections across the different disciplines; but it can also mean establishing a kind of undisciplined space in the interstices between disciplines, or even attempting to transcend disciplinary boundaries altogether' (ibid: 14). He argues that the value of the term interdisciplinarity lies in its flexibility and indeterminacy and refrains from offering a limiting definition: 'I take interdisciplinarity to mean any form of dialogue or interaction between two or more disciplines: the level, type, purpose and effect of this interaction remain to be determined' (ibid: 14).

Allen F. Repko has reviewed a number of definitions of interdisciplinary studies and drawn on them to frame his own definition:

> Interdisciplinary studies is a process of answering a question, solving a problem or addressing a topic that is too broad or complex to be dealt with adequately by a single discipline and draws on disciplinary perspectives and integrates their insights to produce a more comprehensive understanding or cognitive advancement. (Repko, 2008: 12)

There are several elements of this statement that invite comment. The reference to 'answering a question, solving a problem or addressing a topic' indicates that the educational intention is not simply the acquisition of academic knowledge: the 'comprehensive understanding' that is sought may require a range of skills, including the application of knowledge to practical contexts. Moreover, the ability to see connections between different disciplinary perspectives (signalled by the phrase 'integrates their insights') is an essential part of the process. The development of this ability might be regarded as one component of the 'cognitive advancement' to which the definition refers. Some of the types of learning suggested by Joyce at al. (1997) - learning to think inductively or metaphorically, or learning through simulations or conceptual categories - necessarily involve different disciplinary perspectives and might promote cognitive advancement.

The reference to integration in Repko's definition connects with the approach of other writers in the field. Fogarty, for example, talks about ten different types of integration, ranging from relatively weak forms, which start from existing disciplines and make progressively more connections between them, to relatively strong forms, which start from concepts, topics and categories, and give more weight to the interests of learners than to classified bodies of knowledge (Fogarty, 1991). Beane (1997) would prefer to limit the term integration to approaches which do not take disciplines or subjects as the starting point. He writes:

> As discussions about curriculum organization develop and labels multiply, a pretty reliable way to figure out which is which is to check for the root word *discipline*, which refers to the differentiated categories of knowledge that subjects represent. Where the root word is used - *multidisciplinary, interdisciplinary, cross-disciplinary*, and so on - something other than curriculum integration, usually a realignment of the existing subjects, is almost always intended. (Beane, 1997: 12)

By contrast, Beane states that 'Curriculum integration is not simply an organisational device requiring cosmetic changes or realignments in lesson plans across various subject areas. Rather it is a way of thinking about what schools are for, about the sources of curriculum, and about the uses of knowledge' (Beane, 1995: 616). He goes so far as to say that 'the central focus of curriculum integration is the search for self- and social meaning' (ibid: 616). Compared to CfE, this is a radical agenda and reinforces the point made earlier that the discourse of CfE, in which interdisciplinary is the preferred term, is recommending a relatively modest adjustment to traditional forms of curriculum organisation. Critics might say that this caution will mean that little will change and, as the Higher Order Skills Excellence Group feared, that interdisciplinary learning will remain at the margins of pupils' experience. However, a more sustained attempt at conceptual clarification in CfE documentation might have raised alarm bells among traditionalists. From 'professional' and 'political' perspectives, therefore, policy makers might have concluded that there were advantages in not straying too far into philosophical territory.

CURRICULAR ISSUES

It is assumed that schools, colleges and universities deal in knowledge and skills that are in some sense 'worthwhile'. One of the arguments in favour of disciplines and subjects is that their 'worthwhileness' has been established and tested over a considerable period of time. Lindsay Paterson, a strong critic of CfE reforms, has made the point forcefully:

> The reform neglects the crucial importance of subjects, of the disciplinary structures into which human beings have refined their knowledge over centuries. Where they are mentioned it is tokenistically. Where they are denigrated it is as if they were self-evidently discredited because they are old (as in the dismissive phrase 'traditional subject boundaries'). There is no sense at all that the disciplines are important precisely because they are old, that each generation has a responsibility to renew them, not throw them away, and that, without attention to these necessary specialisms,
> inter-disciplinarity and this entire over-blown reform will amount to mere froth. (Paterson, 2009)

In the light of the quotations above from *Building the Curriculum 3* on the essential role of subjects, Paterson's comment seems over-stated but it does raise the important question of how to ensure that any alternative mode of structuring the curriculum is not an arbitrary collection of themes and topics of limited value. Moreover, some of the topics suggested by advocates of inter-disciplinary or integrationist approaches to the curriculum (e.g. freedom, culture, community) are so general as to provide little guidance as to how they might be given curricular coherence. Alternatively, some topics are so specific, and subject to such idiosyncratic interpretation, that they have potential to inflict educational damage. Pring (1976: 107) cites the example of a primary school project centred on bees. Now bees are interesting creatures and much can be learned from a study of their behaviour and life cycle. But the head teacher who had decided on the focus of study chose to make links that might be regarded as rather questionable. He drew parallels between queen bees, worker bees and drones on the one hand with royalty, respectable citizens and layabouts on the other. In other words, he imposed his own social prejudices on an aspect of the natural world, seeming to find justification for his views.

This highlights the fact that interdisciplinary or integrationist themes have to be both well-chosen and not subject to misinterpretation or distortion. As Brophy and Alleman observe: 'Just because an activity crosses subject matter lines does not make it worthwhile; it must also accomplish important educational goals' (Brophy & Alleman, 1991: 66). One of the reasons for the success of Stenhouse's Humanities Curriculum Project was that it was based on a set of criteria that were used to test the value of what was being taught. Lessons were expected not only to offer clear definitions of key terms but also to draw on a range of sources of information, introduce students to ways of assessing the validity of evidence, and develop in them skills of rational argument and critical thinking. Arguably the

recommendations on interdisciplinary learning in CfE need to be backed by a more detailed specification of the standards that should be met in deciding whether a particular theme or topic has the potential to generate learning experiences that are worthwhile in themselves and provide a basis for further progression. It is certainly the case that there is a requirement to relate interdisciplinary work to the experiences and outcomes as set out in the overall CfE structure (Scottish Government, 2009), but that raises some pedagogical issues about the extent to which IDL might be compromised by too much emphasis on pre-determined outcomes. These will be discussed in the section on pedagogy below.

An example of a topic which would provide a useful focus for exploring the criteria that might be applied to proposals for IDL is Scottish Studies. The Scottish Government announced in 2011 that this should be a required element in the school curriculum and recommendations from a Working Group on Scottish Studies across the curriculum were published in March 2012. The proposal clearly has a political dimension which has produced varied responses. Some see it as long overdue, a welcome acknowledgement of the distinctiveness of Scottish national identity and a recognition of the changed constitutional position of Scotland within the United Kingdom since 1999 (with the re-establishment of a Scottish Parliament in Edinburgh). Teachers have pointed out that quite a lot of material that would come under the heading of Scottish Studies is already taught in schools (particularly in English and History departments). Critics of the proposal have expressed a fear that there might be a risk of political indoctrination in the run-up to the referendum on independence in 2014. There is clearly scope for an extended debate on what might be included and how it might be presented. For example, would Scotland's achievements in science, engineering and medicine be represented? Again, would some of the less admirable aspects of the nation's past be covered, to avoid the charge of national boasting - e.g., the involvement of Scots in the slave trade and the chequered history of land ownership?

A different type of example, which raises methodological as well as substantive issues about the nature of interdisciplinary learning, would arise from an exploration of what counts as 'evidence' in different disciplines (see Bell *et al.*, 2008). Most disciplines invoke the concept of evidence in some form. Scientists look for empirical evidence, literary scholars for textual evidence, sociologists and anthropologists for cultural evidence, historians for documentary evidence, and so on. Are they using the same concept or are there fundamental differences? Even within disciplines there are disputes about the nature of evidence: for example, within psychology, there are divisions between the 'hard science' school of thought and those who proceed using more interpretive methods of enquiry. Well-chosen interdisciplinary topics could thus raise interesting questions about the validity of different forms of evidence.

PEDAGOGIC ISSUES

Inter-disciplinary work may require a different type of teaching from that associated with the subject-based curriculum - less formal, more exploratory, learner-centred rather than teacher-centred (see Lenoir *et al.*, 2000). If one of the aims is to encourage learners to be flexible and creative, and acquire skills that would make them more independent in their learning, this would suggest that the teacher's role should become less directive. Several CfE documents emphasise the importance of 'active learning', though there is some evidence to suggest that this is a concept that is poorly understood by many teachers, some interpreting it merely in terms of physical activity rather than intellectual, psychological and emotional engagement with the material to be learned, thereby producing a deeper form of learning than that arising from routine classroom activities (see Priestley, 2013, in press).

Primary teachers are perhaps better equipped than secondary teachers to employ techniques suited to IDL. This is because they have been trained to work across the curriculum and are used to structuring their teaching in ways that draw attention to links between different subjects. They are also responsible for the early development of literacy and numeracy which are so fundamental to understanding in all areas of the curriculum.

The fact that children remain with the same teacher for most of the school day is an additional advantage which primary schools have over secondaries. The comparative rigidity and artificiality of the secondary curriculum makes it much harder to integrate cross-curricular themes and topics into the working day. The American educationist, Elliot Eisner, has observed:

> There is no occupation . . . in which workers must change jobs every fifty minutes, move to another location, and work under the direction of a different supervisor. Yet this is precisely what we ask of adolescents, hoping, at the same time, to provide them with a coherent educational program. (Eisner, 1992: 618)

Awareness of this limitation was heightened some years ago when schools' inspectors adopted the practice of following individual classes as they moved from one period to the next and pupils were expected to adopt a different mindset every 50 minutes or so as they adjusted to the expectations and methods of different specialist teachers. Despite this, however, the pattern of the secondary school week has proved remarkably resistant to change.

A common feature of the literature on interdisciplinary learning is the importance attached to collaboration and teamwork. This is not surprising since the very term implies communication between people coming from different disciplinary backgrounds. One example, cited in the Education Scotland materials to support CfE interdisciplinary work (under the heading 'Marks on the Landscape'), of a practical project requiring extensive collaboration by people with different kinds of expertise would be planning a structure of some kind – e.g. a school, a bridge, a house of the future, a lighthouse, an oil platform. This would involve exploring aspects of science, technology and engineering. It would need to take account of environmental factors, materials, quantities, costs and aesthetic considerations. The Scottish Parliament building, the location and cost of which became highly contentious issues, could be cited as an example of what can go wrong with high-profile public projects.

Effective collaboration may require input from people other than teachers and agencies other than educational establishments. There is increasingly acknowledgement that educational institutions no longer have a monopoly of knowledge to the extent that they did in the past. This is partly a result of the digital revolution but it also arises from the fact that all sorts of other agencies are repositories of knowledge and skills - public and private bodies, third sector organisations, local communities. Many private sector companies and charitable organisations now produce materials intended for use in schools: the topics covered include energy resources, global citizenship and children's rights. At the YAS meeting referred to at the start of this paper, one of the presenters gave an account of a project on 'remembrance' developed by Poppy Scotland. This included the opportunity for pupils to produce a film based on research carried out in their own neighbourhood. The results can be viewed at www.poppyscotland.org.uk.

Some writers see great potential in outdoor learning as a stimulus to interdisciplinary work (see Allison et al., 2012). It brings together elements of the natural and built environment, often requires practical, investigative and problem solving skills, and can pose challenging social and ethical issues. A report on the potential of outdoor learning as part of Curriculum for Excellence referred to the opportunities for linking learning across the curriculum (Scottish Government, 2010). More specifically, it stated:

> Learning in the outdoors can make significant contributions to literacy, numeracy and health and wellbeing. In literacy there are opportunities to use different texts: the spoken word, charts, maps, timetables and instructions. In numeracy there are opportunities to measure angles and calculate bearings and journey times. In health and wellbeing there are opportunities to become physically active in alternative ways and to improve emotional wellbeing and mental health. (Scottish Government, 2010: 9)

A further pedagogic consideration relates to the extent to which interdisciplinary projects can be fully planned in advance. Teachers are normally expected to give careful thought to the planning of their lessons and, certainly in the recent past, were encouraged to devise lesson plans in terms of 'aims and objectives'. The language of CfE is less prescriptive but there is still a clear expectation that lessons should not be left to the inspiration of the moment and the examples of IDL given in the material provided on the Education Scotland website are set out in terms of the CfE 'experiences and outcomes' which they are intended to overtake. However, the experience of Stenhouse, working to a 'process' model of the curriculum, suggests that there are limits to the amount of advance planning that can be undertaken. An exploratory IDL project may lead in interesting, unexpected directions and it would be unfortunate if pupil interest were discouraged by an inflexible insistence that everything must be subordinated to pre-specified outcomes. This reinforces Stenhouse's point that, in adopting a process model, teacher judgement is critical. Knowing when to depart from the script and allow for a degree of improvisation calls for a high level of professional skill. At one level, CfE is intended to give more scope to teachers to exercise their judgment rather than follow guidelines from above, but uncertainty about which curriculum model is driving the whole programme makes this rather problematic. Once again, the importance of having a clear conception of the philosophical basis of any curriculum is reinforced.

OPERATIONAL ISSUES

Many worthwhile ideas founder on the operational obstacles which are placed in their way by existing practices, vested interests and fear of change. Grand visions are important but so too is hard-headed realism. In 2010 a study group of Scottish teachers undertook a visit to Denmark, where IDL is well-established, and concluded that more time was needed to plan projects, rather than leaving them to the commitment and enthusiasm of individuals, and that there was a case for the appointment of an IDL coordinator, particularly in secondary schools (Hepburn, 2010). In this part of the paper reference is made to some of the 'nuts and bolts' issues that may frustrate attempts to promote inter-disciplinary studies.

In the school context, one of the most important of these is timetabling. A key aim of CfE was to 'de-clutter' the curriculum. However, worthwhile interdisciplinary projects might well require blocks of time that are longer than traditional 'periods' in the secondary school. As soon as this is proposed, complaints can arise from teachers who feel that the time allocation for their subject is being squeezed. This is likely to be a particular problem in the upper secondary school where the pressure from the examination system and the demands of university entrance tend to narrow the focus of both pupils and teachers. It would not be impossible to develop appropriate forms of assessment for interdisciplinary work, though the precise criteria would require careful discussion (see Boix-Mansilla & Gardner, 2003). Past experience suggests that unless work is assessed in some way, preferably through formal certification, it tends to be undervalued. Universities would have to be satisfied that the products of interdisciplinary work - whether in the form of mini-dissertations or artefacts of various kinds - demonstrated achievement of a kind and standard that was relevant to any course for which admission was being sought. Some interdisciplinary projects - for example, those which are pursued in practical settings outside the school context - might not easily provide that kind of evidence.

IDL might also encounter professional resistance from teachers' unions and the General Teaching Council for Scotland (GTCS), particularly if it was perceived as moving from the margins of educational provision to occupying a more mainstream position. Although the main Scottish teachers' unions like to position themselves as fairly radical in political terms, when it comes to curricular change they have a strong record of defending the status quo. Their repeated calls for delays in the implementation of CfE can be seen as evidence of this professional conservatism. Likewise, the GTCS has not shown a great deal of flexibility in relation to the qualifications which allow teachers to work in areas that may stray beyond their registered category. All teachers in state schools have to be registered with the GTCS.

For secondary teachers, registration depends on qualifications in specific subjects. It can be anticipated that questions would be asked about the expertise of teachers who may be required to move beyond their specialist areas in order to engage in interdisciplinary work.

Another set of operational issues would arise in connection with practical interdisciplinary projects which involved young people going out of school premises to visit workplaces, public bodies and voluntary organisations. Bureaucratic concerns about the disclosure clearance of adults who would come into contact with the young people, as well as health and safety and insurance issues, would be likely to surface. Moreover, the research evidence on inter-professional working (involving, e.g., teachers, nurses and social workers) is not particularly encouraging, highlighting differences in language, values and relationships to clients (see Forbes & Watson, 2012).

What these potential practical problems suggest is that goodwill on its own may not be enough to advance the cause of interdisciplinary learning. Unless skilfully promoted, with political backing, a clear strategy and persuasive leadership, it might suffer the same fate of those early initiatives in the 1960s and 1970s (e.g. those of Bruner and Stenhouse), and be added to the long list of educational experiments which have failed to bring about the changes they promised. Paechter (1995), reporting on the results of a major project on the difficulties of assessing interdisciplinary work in English schools, concluded that teachers needed to 'be given time to explore the nature of the work proposed and the hopes and expectations that they bring to it. Space must be provided, not just for planning, but also for the exploration of meanings' (Paechter, 1995: 101). This again reinforces the argument that successful implementation of curricular change has to be underpinned by solid conceptual groundwork.

CONCLUSION

This paper has attempted to explore some of the implications of interdisciplinary work as recommended by Curriculum for Excellence rather than offer a series of firm recommendations about how it should be carried out. Some of the questions that require further reflection are the following:

- Is it the case that there has to be a basic grounding in established disciplines before worthwhile interdisciplinary work can take place? If so, what are the implications for thematic and project work in the primary school?

- What are the best starting points for inter-disciplinary work - teacher enthusiasm, pupil interests, controversial issues, practical problems?

- Would it be possible to draw up a list of criteria to determine what would constitute a worthwhile inter-disciplinary project?

- Is there a downside to inter-disciplinary work - can it cause intellectual or psychological damage: can it even inhibit learning? Some learners may respond better to a highly structured, sequential approach to learning than to the open-ended, exploratory pedagogy which often accompanies interdisciplinarity.

- Should the disciplinary defensiveness of some teachers be challenged directly? If not, what are the best means of encouraging them to move a little beyond their comfort zone?

- Is the internet a good vehicle for promoting inter-disciplinary learning or does it lead to the making of false or superficial connections between different areas of knowledge and understanding?

- What metaphor best captures the nature of inter-disciplinary activity - boundary-crossing, bridge-building, bilingualism, risk-taking, imaginative leap? IDL can be

construed variously as akin to geographical exploration, architectural construction, a new form of discourse, an intellectual adventure (which may be unsettling) or a moment of creative inspiration.

The last question is particularly interesting because metaphors, like IDL itself, depend on making connections between elements that may initially seem discrete, thereby opening up new perspectives and encouraging fresh insights. All of the questions need to be considered in the context of the implementation stage of the whole Curriculum for Excellence reform programme. Despite the reservations that have been expressed by teachers and others, there is no going back on the policy. To retreat would damage not only individual and organisational reputations, but also the reputation of Scottish education as a whole. One of the weaknesses of CfE is that it was under-conceptualised right from the start, insufficiently grounded in historical and theoretical understanding. That same weakness is reflected in what CfE documents have to say about interdisciplinary learning. For this reason, further work is needed under all four of the headings that have been utilised in developing the above analysis - conceptual, curricular, pedagogic and operational. At present the field of IDL is well-intentioned but rather ill-defined.

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