Policy formulation and enactment

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POLICY FORMULATION AND ENACTMENT:

Linked up Thinking?

INTRODUCTION

This chapter explores the challenges, issues and potential of Design and Technology Education as an active contributor in the transformational change towards an interconnected system that offers a sustainable future. The focus is on the process of policy formulation, through translation, into practice and implementation in Design and Technology education in schools. Overall, the aim is to examine what is central to change, the key stakeholders, and what might be considered the inhibitors to enactment of policy and practice change.

Initially, a more general consideration is given to what drives changes in policy and what is required in order to translate policy into practice. For changes in ways of thinking and being to manifest, with meaning and purpose, a more holistic systems-approach is required. Transformational change requires a shift in collective mindsets, a state change, and strategic changes which impact on processes and involve cultural change. By its nature, it is ambitious.

Transformational change takes some time to enact and will never be a 'quick fix'. It aims to bring about change that is embedded and deep rooted. Transformational change therefore, requires more than issuing new economic, social, environmental, and educational policies. For transformational change in education, it is not enough to simply alter policy guidelines, or national curriculum guidelines, tinker with curriculum architecture and assessment regimes and offer a few professional development sessions for teachers. The traditional institutional, incremental, evolutionary changes which comprise the more common developmental approaches will not suffice.

Design and Technology Education (internationally known by various nomenclature; here D&T will be used) is commonly included in school curricula with a view to developing attitudes, skills and knowledge related to creativity, problem solving, communication, making (in the variety of fields related to design, engineering and technologies). Aims, and arguments, for the purpose and value for D&T in school curricula tend towards developing life skills and lifelong learning and employability skills, dealing with uncertainty and the pace of change encountered over time, and potential creative contribution of thinking and action-orientated individuals to society and economy.

A.N. Other, B.N. Other (eds.), Title of Book, 00–00.

The purpose and aims of D&T in the curriculum have developed from the original and more traditional skills and employment preparation of Technical Education and / or the preparation for domestic duties through Home Economics, which tended to be at the root of the subject(s) in the early 20th century. These roots are still prevalent in some 21st century D&T education, while societies, economies and cultures have undergone phenomenal change.

To explore why the learning experiences for young people and the curriculum, as it relates to D&T, need to change the following questions are posed:

- What needs to be in place for D&T to actively contribute to the significant educational goal of attaining sustainable global futures?
- Who is involved in the development of D&T as an agent of critical and practical action for students as global citizens with an understanding of ethical ways that are respectful of peoples, cultures and environments?
- What needs to be in place to allow D&T to demonstrate what it offers in holistic and integrative cross-curricular ways?

This chapter draws on an overview of the past 20 years of developments in one country, with the intention that the general principles can be transposed to the different states, constitutions and national systems of the readers. It examines the long term planning, linked up thinking, the process and players required for any aspirational, transformational change, in which D&T is situated, in order that policy formulated is indeed enacted.

WHAT DRIVES IMPETUS FOR CHANGE?

This section begins to explore the key drivers for change generally. More specifically, it considers the drivers for change in education systems, curriculum architecture, principles, values and content which manifest as changes in policy.

Generally change is thought to be required in relation to issues arising from cultural, social, economic, environmental and educational challenges, problems, ambitions or aspirations. This may lead to policies written from the perspective of party political ideologies and as a consequence such change is driven through by political mandate. There are a range of stakeholders with vested interests which influence core policies either officially or, maybe through less formal civic processes and possibly more subversive and insidious approaches. Lobbyists, activists, professional associations and institutes, unions, media, non-governmental organisations, for example, may work to encourage an alternative view of progress and aspirations for citizens, national and global. Whichever driver, or collection of drivers, drag or push for change, there tends to be a consensus of some sort and very rarely does change occur if a lone individual announces that change is needed and no one joins the call.

Christensen (1997), in the context of commercial, profit-seeking businesses, noted that many recognise innovations and the associated potential for change e.g. in technologies, products, systems and methods. Yet, they prefer the status quo, as their current environment or business model does not facilitate or encourage early adoption. Change is disruptive when it has the potential to meet

the unknown needs, fits new and emerging demands, perhaps not yet even identified, and is not a neat fit with any existing model. There may be the risk of diversion of resources and/or investment which may alienate clients, customers and shareholders. This perpetuates incremental evolution and 'sustaining change', which maintains the relationships with the existing stakeholders/customer base by maintaining some familiarity and does not disturb the status quo. Christensen broadened the term 'disruptive technologies' to 'disruptive innovation' in order that is could be understood more usefully and adopted in a wider variety of contexts, specifically in relation to social change. Christensen et al (2006) apply the term 'catalytic innovation' when disruptive innovation begins to receive a growing interest which results in an undercurrent of activity adopting the new technologies or systems or models and a sizeable momentum is generated. It is then traditional thinking and ways of doing are displaced/ disrupted.

At the level of various national governments and non-governmental agencies, the issues that are increasingly becoming apparent in the 21st century are related to social justice, climate justice, climate change, energy and resource access, the divide between rich and poor, digital communication networks, and access to basic human rights such as water, shelter, and education. These are, undoubtedly, big issues. It is becoming apparent that in order to address these, a different way of thinking and being is required. This demands a fundamental rethinking of systems and infra-structures that have hitherto incrementally developed in ways which, all too often, have fragmented, and become politicised. Once determined, policies for educational change may serve as the driver for change, but in order to be disruptive, or for 'catalytic innovation', they need to take root.

STAKEHOLDER CONVERGENCE

Central to change are the instigators, the stakeholders and the collaborators. The questions which may exercise the stakeholders with a view to instigating change may be as follows: Why bother? Will it make a difference? Who are we trying to change? What exactly are we trying to change? If we can change things, who will it impact on? Who has greatest influence in order to make this happen? Stakeholders, as prospective collaborators, may not always arrive 'at the table' with common goals, but they may, after discussion and debate, arrive at a consensus that change is worthwhile and meaningful. This can be transformed into a common will and motivation to embark on change.

Aspirational and transformational change for education requires a number of key stakeholders to arrive at some consensus and support the enactment of change for all those directly involved and beyond. In brief, there needs to be (cross party) political will with educational, and community stakeholders' agreement / 'buy in'. The key players of the community stakeholders are the teachers who will enact the change in practice, directly with their learners.

Hargreaves (1994) acknowledges the importance of involving teachers in educational change and recognises not only 'their capacity to change, but their desires for changes' (p11.) In order to avoid imposed 'top down' change and ineffectual policies resulting in superficial tweaking of existing practice or policies that remain in the abstract, inspiring little or no enactment, he advises attention is given to the individual teacher, in the collective of the teaching profession, and their personal *desire* for change. Hargreaves examines change through the ethic of practicality, which guides teachers in their own context, culture and world view, their desire for improved experience for their learners and ultimately whether they feel change is of value or not.

Rost, Gresele & Martens (2001), in their model of the phases of integrated action, suggest that for the process of initial policy creation to begin, and for that policy to have some impact, a long standing commitment from different providers and interested parties is fundamental. These stakeholders must all be willing to tackle the same identified issues and aspirations regardless of affiliations. Fundamental to the process of change is the importance placed on consensus of interested parties with motivation for change within and outwith government, be they statutory, non-statutory, voluntary, local or national stakeholders. There tends to be a convergence of various initiatives, from the bottom up, from the top down and, perhaps, a single key player who brings such stakeholders together for a collaborative and consultative phase of change. In summary, the phases of integrated action are as follows:

1. Motivation phase: Integration and information sharing from all players/ stakeholders on board. Analysis of threat (perceived or otherwise); identification of the need for change and motivational drivers for change; and consideration of what may occur if there is no change

2. Action choice phase: Opportunities are identified & motive(s) are clarified; Where a goal oriented action can be identified (for example, to develop a more sustainable nation and increasingly aware global citizens through education, economy and cultural change) this tends to reaffirm the initial motivation by emphasizing the threat. This, in turn, reaffirms the conditions that might arise if *no* action were to be taken. This phase directs action and creates the set of objectives which will drive the volition and implementation phases. It may be necessary to accept some pragmatic and feasible ways forward and identify the timeframes that will be required for actions to be enacted, reviewed and developed before the goals(s) can be reached. If there is no suitable action identified as being relevant or possible, then the process of change will cease;

3. Volition phase: convergence and / or consensus of the will to take action(s) as agreed in the action choice phase;

4. Action implementation phase: Goal oriented action manifests in national strategic objectives and legislative acts, policy recommendations and targets, changes in practice, especially when opportunities arise and can be exploited.

The integrated action model acknowledges the time required for ongoing further commitment from stakeholders, the time for the change(s) to take root, to be adopted, adapted and to be embedded by an increasing number of participants.

COMMON ISSUES AND INHIBITORS ENCOUNTERED IN TRANSFORMATIONAL CHANGE

The importance of having key drivers for any change has already been mooted. What are the key elements that need to be established to stimulate and facilitate any transformational change and ensure the complexities are interpreted into meaningful, collaborative and authentic action in D&T? What needs to be in place to enable the potential contribution of change in terms of D&T reach our learners and have any impact or influence? What might be common issues and inhibitors encountered in transformational change?

As with all change, there may be 'inhibitors' that impact on the pace, direction, ethos and effectiveness of change to the detriment of those driving change. It may be possible to identify the potential obstacles in advance and others may have to be circumnavigated as encountered. Comprehensive and significant change, such as pedagogical and curricular reform, takes multi-agency effort and collaboration. Such reform can easily take a decade or more. In that time, it may be that the rationale for the change is lost, diluted or misconstrued. It is important, therefore, that the long- term benefits, values, and purpose of the change, are kept central and to the agreement of all stakeholders. When critiquing the process of change and examining why it often falls short of what is required with maximum benefit not achieved, Reform Scotland (2013) suggest the potential inhibitors (see Table 1 below) can be addressed, through various carefully planned strategies.

Table 1: suggestions of potential inhibitors: general and in educational context

Potential inhibitors as they relate more generally to change ***may include***	**Potential inhibitors** as they relate more specifically to change in the context of education ***may include***
Elongated time for impact of change can breed apathy, loss of energy and enthusiasm;	*Slow, inflexible systems -difficult to incorporate the change in educational targets, objectives, publically noted achievements and formal qualifications e.g. awarding bodies, university courses.*
Too numerous, unachievable or demotivating targets may disenfranchise practitioners;	*Management / practitioners unwilling to make changes to programmes of work and units, especially if they see no meaningful reason or potential improvement for learners;* *School inspection procedures perceived to be judgmental rather than acknowledging school*

	priorities/helping with internal self – evaluation/review to stimulate improvements;
Bureaucracy, protocols, paperwork and officialdom are perceived to slow rate of change, lose momentum and may remove ownership from the practitioner;	*Lack of resources to communicate and support the change in practice* *National examinations /high stakes assessment encourage 'play safe' approaches rather than incentivising innovation;*
Too much detail provided – no room for groundswell initiatives, no opportunities of freedom and flexibility unique to collective activism and localism of those involved	*Teachers feeling inadequately prepared for developing, planning and assessing new learning experiences;* *Lack of time to interpret and develop the required personal pedagogical content knowledge;*
Conflict of understanding e.g. relating to the reasons and purpose of change, resulting in stand-off, or personal dilemmas.	*Teachers feeling uncomfortable with the values and dealing with topics and controversial issues;*

JOURNEY OF CHANGE: AN EXAMPLE IN CONTEXT

An example of the long term nature of the journey of change through policy to enactment in practice, as related to D&T will be described through a broad-brush overview of the process as it is from one country, Scotland. It will focus on the process of change in policy and practice which embeds sustainability, EDS and global citizenship in governmental policies and practice for education, industry and society and in the school D&T curriculum.

Scotland is a small country with a population of approximately 5 million people. Scotland has remarkably few obligations and prohibitions relating to education contained in statute. The national (central) government has responsibility for the creation and review of the educational legislation, policies, and overall funding of the state educational system and for the curriculum for 3-18year olds. [The current National Priorities are issued under the authority of Standards in Scotland's Schools Act 2000.] Within this framework, the responsibility for enactment is assumed by 32 local councils. Since these local councils have responsibility for local educational budgets and they in turn devolve approximately 90% of the budget and management to their schools, and may be of different party political persuasions and alliances from those in central government, there is room for localised differences within the overall principles. There is no mandatory 'National Curriculum'. There is a national framework of the principles and purposes of education and national guidelines provide the experiences and outcomes that are considered as the entitlement for all children and young people. Schools and teachers are given the professional responsibility for interpretation of the framework and guidelines into practice. Schools and teachers have the freedom

to innovate. They are entitled, and encouraged to take professional decisions and make judgments.

A journey over time: policy formulation

Over the past 20 years, there have been various 'colours' of government making decisions. The changes discussed here began under one political party, continued under a coalition government, and were further developed under a minority government. They are now (2013) fully accepted as having cross-party support. The key driver for this cross party ambition and aspiration for the citizens and for the future of the nation was for the country itself to be a responsible nation (within the global context), based on shared values with sustainability at its core - philosophically and structurally embedded. This required a national strategic approach at national and local level as related to changes in social, environmental and economic contexts, policies and practices.

Development work for the first national guidelines for education, for the learners aged between 5 and 14 years old, involved school teachers, initial teacher educators and local council education directors and officers on various curriculum development working parties convened by the Scottish Consultative Council on the Curriculum. This work resulted in the publication of 5-14 National Guidelines for all curriculum areas, with the first tranche focusing on English and Mathematics (SOEID, 1990).

During this time of curriculum development, a key signal for change came about with the publication of Agenda 21, adopted at the 1992 Earth Summit in Rio de Janeiro, which called on governments to adopt national strategies for sustainable development. Agenda 21 put most of the responsibility for leading change on national governments, but stated that the national governments also needed to work in a broad series of partnerships with participation from international organizations, business, regional, state, provincial and local governments, non-governmental and citizens' groups. The concepts and ideas from Agenda 21, Chapter 36,'Education, Training and Public Awareness', were adopted as the basis for the 'Scottish Curriculum Guidelines for 5-14 Environmental Studies' where Technology Education was with a cognate grouping of People in Place, People in Time, and Science (SOEID, 1993). The shared rationale was explicitly based on the development of knowledge, understanding and attitudes related to sustainable development, and the principles of environmental, societal and ethical awareness, and consequences of actions.

Since the introduction of Technology Education to the Scottish school curriculum, there have been various editions of national guidelines for Technology Education e.g. 'Technology Education for Scottish Schools' (SCCC, 1996), 'National Guidelines for 5-14 Environmental Studies: Society, Science and Technology Education' (revised) (LTS, 2000), and 'Curriculum for Excellence (CfE) Technologies' (LTS, 2009a). They suggest the experiences and outcomes to which young people are entitled. Education for sustainability is given a central

role. For example, 'Technology Education in Scottish Schools' (SCCC,1996:12) described 'technological sensitivity' as an aspect of technological capability which is about having a habit of mind which asks questions about, and reflects on, social, moral, aesthetic and environmental issues, as well as technical and economic aspects of all technological activity. Teachers were to encourage learners to apply considered moral and ethical judgements in evaluating technologies and to appreciate that technological developments have consequences for people, society and the environment of the world. 'The National Guidelines for 5-14 Environmental Studies: Society, Science and Technology Education' (LTS, 2000) promoted developing informed attitudes of learners through the consideration and critique of consequences of actions proposed and of those taken. This included recognition of the provenance of resources and materials and energy transfer used in design and make activities. Generally learners were to be more aware of the full lifecycle of a product from inception through manufacture, transportation, marketing, and use to waste/disposal. Teachers were to help learners appreciate that although technological solutions may be acceptable to some they may be unacceptable to others (LTS, 2000: 76).

In 2002, the Scottish Government instigated a 'National Debate to examine the purposes and value of education for 21st century. The 'National Debate on Schools for the 21st Century', drew on a wide range of responses and consulted with representatives from many sectors, public and private, informal and official associations, groups and individuals, and aimed to identify what was considered to be the value and purpose of education, and what was hindering progress and social equity. This ran concurrently with a review of the whole educational system in Scotland (SEED, 2002; Munn et al, 2004). As a result there was a reformulation of the entire curriculum, including curriculum architecture, for 3-18 years olds. One of the first things to be addressed was the over-crowded nature of the curriculum and the need to limit the teaching of curriculum 'subjects' in silos, disconnected from other 'subjects' with little consideration of the way the world 'works' and the nature of interconnected systems thinking and holism generally. The value of interdisciplinary learning was acknowledged. Greater emphasis was also to be placed on interagency working, and a linking up of the plethora of educational initiatives. So, a significant rethink of purpose and value of education began (Scottish Executive 2004 a & b).

As the discussions, consultations and debates of the Curriculum Reform working party proceeded, significant events and publications filtered through from beyond the educational sphere. For example, the launch of UNESCO Decade of Education for Sustainable Development (2005-2014) was met at ministerial level with a commitment to Sustainable Development Education (SDE) evidenced in 'Choosing our future: Scotland's Sustainable Development Strategy' (Scottish Government, 2005) which emphasised that learning for sustainable development should be a core function of the formal education system. Within 'Choosing our future' are clearly articulated statements with particular relevance to Technology Education (e.g.13.9; 13.13).

Education is directly linked to health and wellbeing, prosperity and economic security and this is further developed with 'Learning for our Future: Scotland's first action plan for the UN Decade of Education for Sustainable Development' (Scottish Government, 2006b) and later 'Learning for Change Scotland's Action Plan for the Second Half of the UN Decade of Education for Sustainable Development' (Scottish Government, 2010c), which advance six principles of SDE, namely:

Interdependence – appreciating the interconnectedness of people and nature locally and globally;

Diversity – valuing the importance of cultural diversity to our lives, economy and wellbeing;

Carrying capacity – acknowledging that the world's resources are finite and the consequences of unmanaged and unsustainable growth are increased poverty and hardship, and the degradation of the environment, to the disadvantage of all;

Rights and responsibilities – understanding the importance of universal rights and recognising that our actions may have implications for current and future generations;

Equity and justice – being aware of the underlying causes of injustice and recognising that for any development to be sustainable it must benefit people in an equitable way; and,

Uncertainty and precaution – understanding actions may have unforeseen consequences, encouraging an informed and cautious approach to the welfare of the planet and its inhabitants.

These principles of SDE are embedded within the wider principles of developing global citizens and are essential across learning themes, featuring throughout all of the curriculum documentation that is used to inform and frame teaching and learning experiences.

Aspiration and ambition for national change established a radical new education framework and was the intent of the curriculum reform, but an education reform alone would not provide the transformational change required. The national priorities, aims and strategic objectives of the Scottish Government, and the on-going developments were being reviewed and evaluated. In summary, this resulted in the 'Government of Scotland's Purpose and Strategic Objectives' (Scottish Government, 2007a). Five core national objectives are to develop a Wealthier and Fairer; Smarter; Healthier; Safer and Stronger; and Greener Scotland, and these are to be achieved within a low carbon economy. The National Outcomes (2007b) and targets are the responsibility of various directorates and stakeholders. For educational reform this meant cognisance of, and links to, the overarching National Priorities (2000).

The players on the journey: collaborators and key stakeholders

Developments in Scotland, drawn from the process of policy formulation through to enactment, specifically related to Learning for Sustainability, suggest that the central collaborators and key stakeholders of educational change are:

- National Government and related committees, government directorate, responsible for developing and progressing the strategic national core objectives for education, environment, health and economy and formulating policy;
- Local Government councils, Education committees, Directors of Education and Quality Improvement Officers; local council education employees - Head Teachers, Senior Management Teams of schools, teachers and school community more generally;
- Education Scotland – a key national advisory agency, responsible for quality and improvement in education, writing, reviewing and supporting curriculum guidance, continuing professional development (CPD) includes Her Majesty's Inspectorate in Education (HMIe);
- General Teaching Council of Scotland (GTCS) - an independent body who create standards/ benchmarks for professional registration, responsible for accreditation of initial teacher education (ITE) programmes, registering eligible teachers, determining entry to teaching degrees and qualifications; supporting practitioner enquiry / research, career long professional development, upholding professional standards;
- Teachers
- Universities – Education faculties, in their design and provision of ITE Programmes; research, dissemination and knowledge exchange; partnerships in developing curriculum, supporting resources, provision of CPD courses and programmes (credit bearing and non-credit bearing); further partnerships with faculties beyond ITE ;
- Certificate Awarding/Examination Body, Scottish Qualification Authority (SQA) for all senior phase National Qualifications.
- Third sector agencies (not-for profit) such as World Wildlife Fund (WWF), eco-schools, Christian Aid, John Muir Trust, Development Education Centres, Planning Aid Scotland, Co-operative, Ellen McArthur Foundation, Grounds for Learning;
- Professional Associations and Institutes e.g. Royal Society of Edinburgh recommends that the Scottish Government and SQA use the revision of Higher and Advanced Higher courses (senior stage certificates) as an opportunity to embed education for sustainability and global citizenship throughout the secondary school curriculum (RSE, 2011).
- Teaching Unions;
- National Parent Forum;
- Future Employers;
- Colleges and Universities – as part of the continuum of education for students, with interest in entry qualifications and achievements, and prior experiences;
- Educational consultants and CPD providers; and
- School Learners and student council - the children and young people.

The role of some of these key players will be exemplified as the illustration is developed further.

FROM POLICY TO CURRICULUM FRAMEWORKS AND GUIDELINES FOR DESIGN AND TECHNOLOGY EDUCATION

The resultant national framework for 3-18 year olds, 'Curriculum for Excellence' (CfE), describes the purpose of education as being the development of four capacities and dispositions of children and young people, for example, being a responsible citizen (Scottish Government, 2006a). Global citizenship, and with it SDE, is a theme across learning, to be embedded by all practitioners at all stages, and in all learning areas. Each of the eight curriculum learning areas, of which Technologies is identified as one, is designed to contribute towards the development of the overall purposes and values of education through its own disciplinary contexts and through connections with other learning areas. The principles and purposes (i.e. the rationale) of CfE Technologies (LTS, 2009a) state explicitly that this learning area is about the development of responsible citizens, examining and debating the issues of sustainable development from an informed perspective. CfE Technologies also provides a framework for 'Technological Developments in Society' as a context for developing technological knowledge and understanding in direct relationship to sustainability. The summary purposes of CfE Technologies are to enable learners to:

- develop an understanding of the role and impact of technologies in changing and influencing societies ;
- contribute to building a better world by taking responsible ethical actions to improve their lives, the lives of others and the environment ;
- become informed consumers and producers who have an appreciation of the merits and impacts of products and services ;
- be capable of making reasoned choices relating to the environment, to sustainable development and to ethical, economic and cultural issues (LTS, 2009a).

The educational entitlement for all learners is that they should have active curricular learning experiences that develop their understanding of the interrelationship of environment, society and economy and equity, of the ecological limits to development and the interdependence of ecological and human well-being. Teachers and learners focus on learning activities which are supported by a framework of 'experiences and outcomes' CfE Technologies (2009b) such as:

> I can investigate the use and development of renewable and sustainable energy to gain an awareness of their growing importance in Scotland or beyond. *(approx 7-11year olds)*
>
> Having analysed how lifestyle can impact on the environment and Earth's resources, I can make suggestions about how to live in a more sustainable way. *(approx 7-11year olds)*
>
> From my studies of sustainable development, I can reflect on the implications and ethical issues arising from technological developments for individuals and societies. *(approx 11-14year olds)*
>
> I can examine a range of materials, processes or designs in my local community to consider and discuss their environmental, social and economic impact, discussing the possible lifetime cost to the environment in Scotland or beyond. *(approx 12-15year olds)*

> I can practise and apply a range of preparation techniques and processes to manufacture a variety of items in wood, metal, plastic or other material, showing imagination and creativity, and recognising the need to conserve resources. *(approx 11-14year olds)*
>
> I can debate the possible future impact of new and emerging technologies on economic prosperity and the environment. (approx 14-15year olds).

The CfE guidelines make direct links with other learning areas of the curriculum to encourage recognition of the mutually supportive and cross platform relationships within the overall framework. For example, CfE Sciences (2009c) suggest that 7 to 11 year old children explore 'non-renewable energy sources and should be able to describe how they are used in Scotland today, and express an informed view on the implications for their future use' with progression to 'investigating renewable energy sources and taking part in practical activities to harness renewable energy sources, and discussing their benefits and potential problems' for approximately 11 to14 year olds.

All Qualification Development teams for new Scottish Qualification Authority (SQA) award-bearing certificate courses, for post 15 year olds, from 2013 onwards, were obliged to incorporate the underpinning rationale of CfE. The SQA acknowledged the role that qualifications play in raising awareness and deepening understanding of the need to focus learning for sustainability. The new qualifications have been developed with the key principles of SDE explicit in the majority of the courses, particularly in the new certificate courses for Technologies (SQA, 2011; 2012a,b,c).

Working towards change: Enabling Policies and Complementary Initiatives

Developing concurrently with the educational reforms led by the education directorate, were initiatives driven by other government directorates (Enterprise, Employment, Waste, Energy, Planning) e.g. zero waste (Scottish Government 2010b), fair trade, sustainability in transport, building and procurement as evidenced in strategic policies with some resulting in acts of parliament, others as recommendations and non-statutory guidelines. For example, those linked to education include the Climate Change (Scotland) Act (2009) with commits to reduce Scotland's emissions levels by 80% by 2050 and 'Schools for the Future Programme' where projects must follow the principles of 'Building Better schools' and 'Building Research Establishments Environmental Assessment Methodology' (BREEAM). Under the Scottish Government's Sustainability Labelling policy a non-technical guide is to be available for all new schools to allow learners, teachers and other school occupants a better understanding on how to control their internal environment in an energy efficient manner. These policies are complemented by others such as investment in renewable energy and power generation technologies, apprenticeships and employment (Scottish Executive, 2003). There are Government Training and Employability incentives which are geared to raise awareness of the skills, knowledge and attitudes required to be able to contribute

towards the process of change in society. These are being given a high profile in schools through the 'green sector careers and the renewables energy economy'.

In summary, with the range of cross party Government policies as described above, driven from internal, national and external, international factors, The enabling policies are now in place. These include the various education policies which state the explicit purposes of the curriculum and create the overall curriculum framework, namely CfE for 3-18 year olds (in development from 2002-2014), which requires all teachers to adopt an across-learning theme of Global Citizenship and Sustainability (Scottish Government, 2008) and also describes the distinctive contribution of D&T through the CfE Technologies learning area. CfE Senior Phase SQA Certificate courses for Technologies (implementation from 2013) embed cradle-to-cradle, design for sustainability, critique of impact, and examination of issues of resource stewardship in the mandatory syllabus content.

Further endorsement of the importance placed on SDE is evident through the publication of the Revised Standards for Registration and Standards for Full registration (GTCS, 2012) state that it is 'a whole-school commitment that helps the school and its wider community develop the knowledge, skills, attitudes, values and practices needed to take decisions which are compatible with a sustainable future in a just and equitable world.' These Standards require all teachers to be confident in their knowledge and understanding of the challenges facing society locally and globally and through learning for sustainability, teachers are to actively embrace and promote 'principles and practices of sustainability in all aspects of their work.' Further to teachers themselves displaying a commitment to, and sharing values of, learning for sustainability', Donaldson's 'Review of Teacher Education in Scotland: Teaching Scotland's Future' (Donaldson, 2011) includes revision of all initial teacher education courses, whereby Learning for Sustainability must be embedded in the revised / new programmes to gain accreditation from the GTCS. The recommendations from the One Planet Schools Working Group (2012; Scottish Government, 2013) for Learning for Sustainability, has been further validated Outdoor Learning, Fair Trade schools and Rights Respecting schools, Youth Parliament, co-operative and social enterprise initiatives and greater value is now placed on recognising wider achievement. Together these policies have generated increased opportunities for learners to engage and take responsibility as active, global citizens and ESD has gained higher visibility and interest from learners and teachers.

Translating enabling policies into practice

These enabling policies create the landscape and contribute to the window of opportunity within which developments in DT practice manifest as learning experiences for young people and children. D&T teachers are free to interpret and translate them into principles and ideas in their classrooms. Although McNaughton (2007) notes that it is less evident that such policies, principles and strategic frameworks for SDE in schools have been translated into practice, Grant and

Borridale (2007) observe that there is some evidence of increased integration of the issues of sustainability in general school ethos and project planning with an environmental emphasis. However, this has, in the main, been through participation in the eco-schools initiative which takes environmental issues as the central driver, although more recently social and economic issues are also explored through global citizenship aspects of the eco-school programme. Eco-School Scotland website figures state that, in January 2013, 98% of all Scotland's local authority schools have registered (i.e. over 3,700 schools) with 46% achieving the highest status award of 'Green Flag'. There is much to critique related to eco-schools, and yet it has become a useful springboard for those who do recognise the limitations (e.g. the checklist and competitive mentality that it can create) at the cost of the intended values development. Such schools tend to develop practice beyond the 'colour of the flags' awarded for completing the activities on the scheme's checklist. Examples, include eco-school groups who have campaigned to have transportation routes altered and reduced private car use in relation to the 'school run'; redesign of school grounds to maximise outdoor learning opportunities; involvement in new school designs; becoming politically active in exposing energy in-efficiency and school building fabric/estate issues; community outreach; and, fair trade enterprise partnership projects. To be successful, these approaches require more than the lone enthusiast teacher providing the opportunities for learners to collect awards for the school. These tend to be possible where sustainability and citizenship is embedded in whole-school systems thinking, or at the very least are driven by a collaboration of learners, teachers and community members. However, for those eco-school groups who cannot grow their collective mind-set further than the litter picking, putting recycling systems in place, and 'passing inspection', the eco-schools scheme remains limited and is rendered less helpful in the journey to transformational change in policy through to enactment.

D&T has a valuable role as part of the whole school ESD approach. The imperative therefore is to adopt sustainability as a frame of mind for a sustainable future. McLaren (2010) notes the need for personal dispositions to be examined and for D&T teachers to recognise the factors which enable or hinder their own willingness and readiness to engage in less familiar arenas of D&T, such as design for sustainability or concepts of the 'circular economy'. Pavlova (2012) sets an agenda for further research and development. A clear and explicit articulation of the contribution of D&T to the curriculum may create the 'desire' that Hargreaves (1994) suggests is critical to teachers' enactment of policy into practice. A well-defined set of principles, purposes and values describes the 'elements' teachers can incorporate in their planning to ensure the contribution is developed beyond rhetoric. In brief, through D&T, learners are to be enabled to:

- Recognise and develop their creativity and enterprising nature;
- Apply designerly thinking through action based challenges which explore issues and opportunities, seeking to address design challenges which offer engagement to enhance, alter, change, innovate;

- Recognise the integration and inter-dependency of people, place, culture, society, economy, industry, and environment through craft, design engineering and developments over time;
- Critique consequences of proposed and / or existing actions, systems, environments and artefacts;
- Acknowledge value judgments, examine consequences- environmental, climate, economic, technological justice;
- Experience opportunities for direct interdisciplinary learning which links designing, making and critiquing authentically with thinking about sustainability principles in products, systems, buildings and landscapes and citizenship ;
- Experience learning which involves partnerships with third-sector and non-governmental organisations and agencies working on real world global challenges;
- Design for sustainability adopting principles such as 'cradle-to-cradle', 'made to be made again', and concepts such as 'waste = food', 'nature as teacher', 'material cascades';
- Participate in meaningful and authentic contexts;
- Identify complexity, issues and scenario-based design challenges;
- Recognise and select indigenous and appropriate technologies;
- Debate controversial issues and discuss contemporary topics.

For the policies to be interpreted into meaningful and authentic practice which incorporates the above, it is important to recognise what works and what does not, and what needs to be in place to stimulate, enhance, and grow effective enactment. In order to add to the growing evidence base (e.g. specific to DT: Pavlova and Turner, 2007; Elshof, 2009; Pitt and Luben, 2009; Elshof, 2009; Pavlova, 2012) regarding such matters and identifying enhancers and inhibitors, and also the positive benefits of learning for sustainability relating to attainment, achievement, health and wellbeing and behaviour, the United Nations University has recently accredited a Regional Centre of Expertise in Education for Sustainable Development for Scotland. This will research and generate innovation through collaborative work between practitioners, academics, government and civic society.

With so many pieces of the policy jigsaw now finally revealed, after many iterations, permutations, consultations, and analysis over the past 20 years, the collaborators and those who were bystanders are now charged with the challenge of translation and implementation of the DT curriculum within the policy frameworks discussed here.

CONCLUSION

National drivers for changes to policies, educational and otherwise, tend to arise from issues with resources, food and energy (sufficiency and reliance), social care and health, industry and economy (with related emergent employment and careers), climate justice, social justice, and education. A strategic national approach for any change to policies needs to have support from the major bodies and players, who in

turn will accept the need set priorities in order to achieve a significant step change or indeed more transformational change. Drivers and stakeholders motivated towards change recognise, and access, the mechanisms and opportunities at their disposal to drive the agenda forward in a strategic way. They use these and networks to create the shared responsibilities and acknowledge the contributions required to be made through distributed leadership in order to have greatest impact and influence.

Leicester, Bloomer & Stewart (2009) suggest that for transformational change to be possible the worldviews of those involved in creating the reconfigured learning experiences of practice are highly influential. Convergence of community of place with community of interest has the potential for the greatest impact for change to be enacted. They suggest that educational change that is considered to be wholly politically motivated will not gain traction from the public, or the teaching profession. Leadership is a significant factor for success for enactment, but the role at the centre needs to be strategic and not one of micro-management. Over-centralisation can lead to a climate of compliance and conformity, limiting the range of approaches taken. Even when the original intention is specifically to empower practitioners at a local level and to encourage diversity to suit the context of learners, if the message or policy is not shared, the result can be that of standardisation and teacher self-confidence can diminish as a result. By encouraging localised change (individual or department or school context, or indeed local authority) there will be varying rates and parallel processes of change. Schools can develop their own ideas within their commitment to reform and, in their own way, encourage as high as possible proportion of engagement with the whole community. Although compromise may be inevitable, for policy to be enacted it is important that the distributed leadership and personal practice avoids compromise that loses sight of the underlying principles and purposes. Those need to remain consistent.

The planning and implementation of the teaching, learning and assessment is in the hands of those who recognise the opportunities for change and work together with shared ambition and aspiration to make these feasible and realistic enough for implementation. This requires incorporation of the principles of the policies and motivation for change to be embedded in the educational culture, ethos of school community, and the framework and curriculum experiences for all young people. Early adopters who explore and innovate can serve as learning for others. They can help refine and act as reviewers and evaluators allowing others to benefit from their experience.

However, the pace of change should not proceed so slowly and in such a dissipated way as to lose the central concept and purpose for the change(s). If the pace is driven from centre, and a time line imposed, then there is a risk that policy may be perceived as ‘an event’ rather than a journey. Over the past 50 years Scottish education has undergone a series of policy-driven changes. Some have been essentially structural, but most have been concerned with curriculum and teaching methodology. Although acknowledging the extensive experience of policy driven change in education, the Commission on School Reform (2013) observe that

the changes have not all been entirely successful. Those policies that created an environment that empowered those at school level to be innovative as part of daily practice allowed change to be better grounded, less burdensome and as a consequence, more rapid. This serves as a reminder of the importance of securing the buy-in from key stakeholders particularly teacher practitioners who are closest to where the impact on the learner takes effect and who can influence practice directly and immediately.

Times of transition and change create a sense of discomfort for many. Demands are made on existing knowledge and understanding, values, attitudes and world views. Change in education and curriculum requirements, society and learner expectation often require changes in pedagogy as well as content and learning experiences. Design and Technology teachers are being challenged to incorporate 21st century concepts of design for sustainability, appropriate technologies and democratic design.

This chapter has outlined, in summary, the changing purposes, expectations of the curriculum, policies and educational initiatives. It has attempted to describe some prevalent aims, aspirations and mindsets required for a 21st century Design and Technology education. Clearly, for a shift in classroom culture and traditional practice to occur, some serious reflection and action is required. The illustration adopted in this chapter shows the complexity; offers a caution of the time and effort required; and witnesses the importance of collaborative participation and empowerment of those who are charged with taking action with the support of the broader stakeholder consensus.

There are many who write about education for sustainability and D&T education. The majority seem to focus on the *why* things should change, not necessarily the *how* to affect change in D&T education. Although the process of enactment has begun, further support is required to enable the teachers to deal with transformational and relational learning, complexity and trans-disciplinary thinking, whilst recognising and valuing the unique disciplinary contribution of D&T as a specialist learning area.

In conclusion, there is recognition, in policy at least, of the great potential for authentic D&T Education when it embraces the importance of education for, in and about sustainability. What does it take to move from the rhetoric to reality; to move from the policies to embedded practice? Time will tell, but the shoots are a healthy looking shade of green.

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