

# Supporting the development of creativity and innovation - further issues examined as part of an extended curriculum development initiative

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## Abstract

*This paper examines the outcomes of an extended multi-agency curriculum development initiative in a representative sample of the twenty one schools involved in the project. The initiative's prime aim was to enhance the creative and innovative components of the Design and Technology curriculum. Throughout the venture teachers were supported in the application of a range of lateral thinking techniques, cognitive development strategies and universally applied methodologies borrowed from other fields of design practice and design education. Additionally, teachers were encouraged to adopt a more appropriate level of intervention in their teaching.*

*The research employs a range of methodologies to gather and analyse the qualitative data generated during the enquiry. This approach has allowed a measure of triangulation, validation and reliability in the research. The outcomes provide evidence of raised standards of achievement and elevated levels of technological capability. The work also provides insights into the broader impact of the initiative in terms of teachers' increased willingness to embrace change, their perceptions of previous practice and their developing expectations of their pupils.*

Keywords: innovation, creativity, curriculum development, teacher intervention

This paper is the fourth in a series of presentations to the IDATER conference which have reported the progress of a long-term curriculum development initiative, the Supporting Innovation in Schools Project (SISP). It is therefore appropriate to provide a brief overview of work to date in order to provide the reader with a context for the research reported here.

SISP is the name given to a collaborative venture involving Liverpool John Moores University, Merseyside Innovation Centre, The University of Liverpool and Merseyside Science and Technology Regional Organisation. The Project is supported by the European Social Fund and aims to enhance the curriculum through the promotion of innovation and the development of creative skills, primarily in Design and Technology.

The Project offered a range of support for

teachers and their pupils. This included in-service training activities, support in schools from the wider design community, university lecturers and students, and specialists working in commerce and industry. Other key tasks in the initiative have been the development of teaching and learning methodologies and the production of adaptable curriculum materials employing a range of media.

The third phase of the Project concluded in December 1998 — although there is a substantial continuing legacy. In total, the Project has directly reached 70 teachers and over 2000 pupils working at Key Stage 4 in 21 schools in the 5 Merseyside LEAs. Indirectly the Project has reached a much broader community through research activities, published materials, regional exhibitions, national events and the SISP website.

All of the above work has been informed by

complementary research activities. The initial 'baseline' research examined the effectiveness of existing approaches to teaching and learning in Design and Technology and represented an attempt to establish a benchmark against which any value added effects could be gauged. The results of this work were reported to the 1997 IDATER conference where the late Professor David Thistlewood provided a critique of Design and Technology in the National Curriculum. Employing his perspective as a design educationalist he questioned the effectiveness of the current orthodoxy in Design and Technology and drew attention to what he perceived to be the subject's lack of effectiveness in developing creative and innovative skills.

".. it is apparent that National Curriculum Design and Technology teaching has not improved, and may have impaired, the preparation of those pupils who present to higher education in a dedicated design discipline such as architecture. They exhibit poor abilities to interrogate their surroundings visually and intelligently, to imagine changes and to image ranges of alternative outcomes, and instead they offer evidence of seeking a 'paramount' design process which they believe must underlie all architectural designing." (Thistlewood, 1997, p.243)

Professor Thistlewood also drew attention to the skills of many teachers of Design and Technology.

"While teachers may be willing to encourage innovative, pupil-directed learning as a complement to National Curriculum requirements, they themselves may lack the attributes they desire for their pupils." (*ibid.*, p.243)

Another presentation to the same conference (Downie, *et al* 1997) provided evidence to support the claim that, in the ten years since the introduction of the National Curriculum, a culture has developed where professional practice is unduly influenced by the perceived constraints of the Statutory Orders and examination syllabuses, resulting in the adoption of inflexible and ritualistic teaching

methodologies. These findings were neither remarkable nor unique. OFSTED (1995) identified 'less satisfactory' learning resulting from pupils' enthusiasm being adversely affected by 'heavily teacher-directed and narrow project work'. Shield also questions the effectiveness of some teaching within Design and Technology,

"...whilst the type of activity taking place is described by teachers as 'problem-solving' or 'design orientated' this may in fact not be so, in that in a number of cases the activities being carried out by the pupils are so circumscribed by restrictions placed on them by the teacher, that they are in effect working to quite closely structured briefs." (Shield, 1996, p.10)

It is within this context and in response to such observations that the drive and motivation for the Supporting Innovation in Schools Project was generated. The challenge was to provide solutions to what David Thistlewood defined as:

"the Project's central problem: that of overcoming teachers' fear of losing control when they suspended the normal practice of teaching by example". (*op cit*, p.243)

The final phase of the 'baseline' research has focused on teachers' values and attitudes in creative and professional practice and was reported at IDATER 98. The outcomes of all of the research activity provided us with a better understanding of the factors which were likely to inhibit the development of the creative and innovative ability of children engaged in learning programmes in Design and Technology. The work helped us to develop a vision of what might be achieved and suggested ways in which we might put that vision into practice.

The prime aim was to encourage teachers to adopt a more appropriate level of intervention in their teaching and to actively pursue the development of creative thinking skills. Teachers were equipped with a 'toolkit' of teaching and learning strategies to support children in the development of critical thinking capabilities and creative skills. By adopting such an approach it became possible



Figure 1 The complementary components of the 'creative toolkit' employed by children engaged in the Supporting Innovation in Schools Project

to provide pupils with an opportunity to engage fully in creative design activities and to avoid the prescription and restriction which had been a major feature of their previous learning experiences. All of the materials were compiled in a single volume which speaks directly to the learner. The book provides a broad range of strategies to support children in the application of creative approaches to the generation and manipulation of ideas.

"... 'thinking about me & design' is a creative toolkit. Employ it to make project work more creative and enjoyable. It is a tool box full of ideas and exercises which can be pulled out at any time and successfully applied in all sorts of situations. Although the focus of our work is Design and Technology we know that in time you will use parts of the 'tool box' in other subjects." (Downie, *et al*/1999, p.11)

None of the approaches advocated by the Project was original. SISP has been unique however, in the application, within Design and Technology, of a broad range of lateral thinking techniques, cognitive development strategies and universally applied teaching methodologies borrowed from other fields of design education. The strategies employed relied heavily on the work of Betty Edwards,

Edward de Bono, Tony Buzan and Howard Gardner. The primary aim of the work has been to support children in the processes involved in design project work at Key Stage Four. Children have therefore been encouraged, through a series of structured activities, to understand themselves better within the context of design and designing. The 'toolkit' has also enabled learners to engage in a structured sequence of complementary activities or to 'dip in' when they needed inspiration or support at any stage of a design activity. The use of 'private log books', 'trigger boards' and 'me boards' has become commonplace in SISP schools. Children have used techniques such as 'deconstruction', 'designing badly' and 'a walk on the wild side' as a stimulating prelude to the development of original ideas. Strategies such as '50 circles' and 'associative imaging' were employed to nourish imagination and to support imaging. 'Scaffolding' and 'mental triggers' have been employed to build and develop ideas. Techniques for testing or evaluating ideas have included collaborative exercises such as de Bono's 'PMI' and 'Six Thinking Hats'. In all of their creative work children were encouraged to take risks and to consider every possibility, regardless of convention.

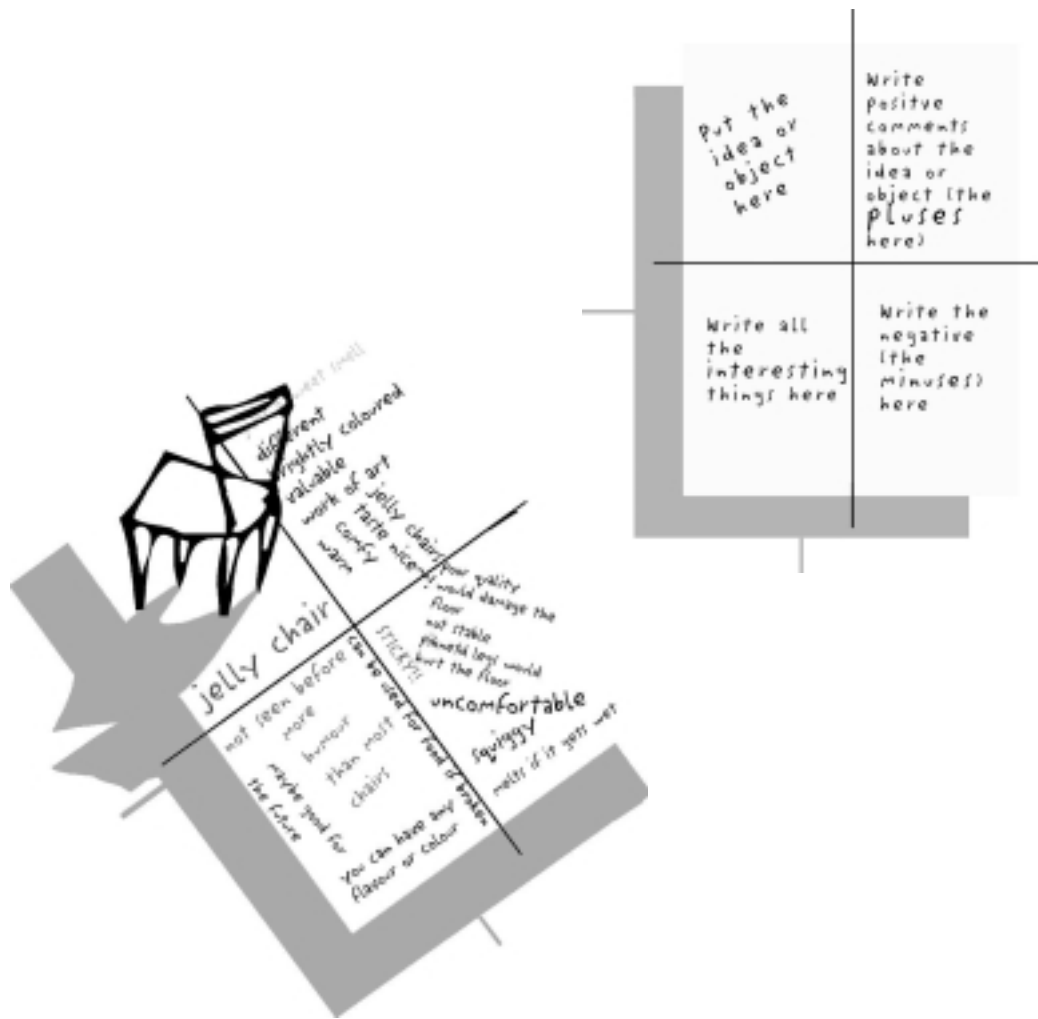


Figure 2 A 'PMI' exercise as part of a furniture design project

The approaches and strategies briefly outlined above were employed by children in a wide variety of contexts. Examples include the immediate school environment and its interface with the community being used as a resource and stimulus for design activities. In another example children have examined the complex digital, commercial and social systems which are to be found in a cyber café as a source of design inspiration. For others, an exploration of the world of fashion and textile design has provided the starting point for design activities. Within such contexts children found the inspiration which has enabled them to exploit the broad continuum of learning opportunities which design furnishes — in architectural design, graphic design, fashion and textile design, furniture design, product design and the design of systems. In each case they were supported in

their work through the adoption of the contemporary practices employed by professionals working in each respective field of design. The Supporting Innovation in Schools CD ROM (Butters, *et al* 1998) provides many examples of these practices and also features children talking about their experiences and the outcomes of their work.

The central issue here is that children have taken ownership of their creative endeavours and in doing so have accepted some measure of responsibility for their own learning in Design and Technology. The Supporting Innovation in Schools Project has equipped teachers with the skills necessary to support learning carried out in this way, the confidence to adopt an appropriate level of intervention and the resources necessary to employ practitioners — such as architects, community

artists, textile designers, chefs, interior designers, aeronautical engineers - to provide specialist input and support.

The tangible outcomes of the work have taken many forms. Where children have examined their school surroundings they have devised, through their design work, ways of dignifying and improving their environment. In a number of cases they have persuaded — through presentations employing architectural models and rendered drawings — their Headteachers, Governors and LEA officials to support the implementation of their proposals. Notable amongst such examples has been the re-design of the pedestrian and vehicular entrances and car park of a city centre school resulting in improvements in safety and security. In another school children have improved the dining facilities enabling a more dignified experience when taking lunch in school. Children working in another school have designed and overseen the creation of a social space for pupils. The design and manufacture of outdoor furniture has enabled the children of a suburban school to make more appropriate use of their landscaped school grounds. Other examples include the design and manufacture of shoes, with the support of the footwear industry. In this example the children went on to organise and stage a fashion show to present their work and to publicise their efforts. Children working in a disadvantaged inner-city school have designed, modelled and eventually installed an internet cafe. These illustrative examples provide some indication of the diverse range of designing and making opportunities which children have been offered through the initiative.

For those closely involved with the Project, the most significant indicator of the success of the work has been the willingness of children to subsequently apply their newly acquired strategic skills in the execution of their individual GCSE project work. The Project has provided them with a model which they and their teachers can relate to and which they are able to apply to a wide variety of contexts. The relevance and the potency of the approaches are self evident to the children as they produce results, are enjoyable and enable them to

make progress without the need for their teachers to constantly intervene to provide stimulus. Tom (15 years), talking about his design work to a visiting Professor from the University of Texas, put it this way: "*you can't put it down — your mind just keeps running on.*"

The Project has provided anecdotal and practical evidence of the enhancement of children's design and technology capability. The sequential elevation of capability has also been evident in the series of well received exhibitions which have been employed to disseminate the outcomes of our work over a three year period. Improved levels of achievement, as measured by public examinations, have also provided a gauge of the effectiveness of the initiative. However, the purpose of this research has been to explore the wider impact of the Project and to attempt to provide qualitative evidence to support our belief that the work has indeed achieved beneficial outcomes.

### Research Methodology

This small scale qualitative research was designed to provide responses from practitioners to three questions.

What perceptible changes have been brought about as a consequence of a school's involvement with the SISP curriculum development initiative in terms of

- a) teaching practice?
- b) the capability of the pupils?
- c) the whole school community?

The justifications for the adoption of the model employed in this research are similar to those outlined in Bennett *et al* (1984) and also by Shield (1996) and make the assumption that expert teachers reflect their values and experience in their professional practice.

The respondents in the study were experienced Technology teachers and curriculum managers who were selected on subjective criteria (for example, advice from 'experts' in the field, such as Local Education

Authority Advisors and Inspectors, SATRO field workers and University lecturers with working experience of the schools).

A further consideration was the wish to involve a 'cross section' of the schools involved in the Project in the enquiry. The method of sampling is analogous to that described by Delamont (1992) as 'opportunity' sampling which places less emphasis on a representative sample, but which requires an acknowledgement in the data analysis of the effect that the sampling method may have had on conclusions.

Three principal tools of investigation were employed in the research. The first of these was a formal reflective statement written by the teachers in which they were asked to consider the principal educational outcomes of their work with SISP. Through this process it was possible to identify the changes which teachers believed to be important and/or significant in the enhancement of their curriculum and working practices.

In common with all such ethnographic studies the work required the continuous monitoring and reflection upon the role of the researcher in order to avoid any misinterpretation of what was observed. We have also been mindful that changes in practice and the effectiveness of the SISP approach could be due to a Hawthorne type effect as described by Hamaker *et al* (1998) where a teacher's enthusiasm for an approach is conveyed to learners, potentially influencing learning outcomes.

Structured interviews with teachers and curriculum managers provided the second investigative tool. This phase of activity enabled a more focused examination of respondents' interpretations and perceptions of the outcomes of the initiative. Extensive field notes gathered during a series of meetings with teachers formed the third and final investigative tool. The thematic content analysis of the reflective statements together with the taped and transcribed interviews and field notes provided the basis for a comparative analysis of the data generated by three different sources from the same group

of respondents. This provided a measure of reliability and validity in the work.

#### **Analysis of Teachers' Commentary Provided by the Reflective Statements and Structured Interviews**

It was evident that many teachers were willing and wanting to bring about change in their existing practice.

*"On a personal front, I needed this Project for me personally, because I felt I was being taken down a route which I had to fulfil because of the positions I was put in. Ten years ago I was a SISP person ... someone who is much more open and lets the kids take ownership of their work and not be too well defined."*

*"SISP provided me with a new perspective – it helped me to reformalise old ideas"*

Many teachers described the difficulties they and their pupils had in adapting to the ideas being promoted through the Project:

*"After all, when you have been fed a prescribed diet of education for 9 years, it is difficult for some people to adapt to working under their own steam".*

*"They took some time to become comfortable with a different method of teaching. They were all very used to being told what to do and how to do it."*

*"They (the pupils) did have some initial difficulties with the freedom we allowed them."*

*"The kids had difficulty with the abstract nature of some of the work – we had to provide something more concrete as a starting point and which they could return to as they began to deal with more difficult ideas."*

Others, notably those with a background in design, had less difficulty in relating to new approaches advocated by the Project:

*"Coming from a background in Art and Design the aims and objectives of SISP are not*

*unfamiliar."*

*"I have brought forward my work as a professional designer as a model for the children to follow."*

A notable feature of the comments provided by teachers were frequent references to the opportunity for debate which SISP provided. Teachers recognised the value of meeting with colleagues and in discussing possibilities and ways forward.

*"I really needed the Project as a 'pick-me-up', a boost in the arm and to take me forward. I realised I wasn't the only person out there...[it] made me feel confident again."*

*"There isn't normally a forum for people to talk openly about the curriculum...there never has been an open debate."*

*"...there were also people who wanted to change but were 'hidden' and Heads of Department in the past who had not wanted change."*

Many teachers referred to previous teaching practice in a way that suggested they had moved forward in their understanding of processes in design and in implementing strategies which were more than just mechanistic. The reflective statements suggested that the majority of the teachers had seen very real benefits in the new approaches and were working positively to embed such changes into their practice.

*"As teachers of the new Design and Technology Orders many of us had had little training in delivering the new curriculum and most of us passively accepted the 'Design Process' as the only vehicle for teaching".*

*"Teaching strategies for learning included the following:*

- ensuring that teachers did not take over 'control' of the project,*
- initiating debates and discussion to give students the opportunity to argue the legitimacy of their design proposals and*

*cultural beliefs,*

- making use of a wide variety of resources to develop drawing skills,*
- providing an opportunity for pupils to design within a 'real' context."*

A number of teachers provided further insights into teaching prior to SISP.

*"The existing National Curriculum Technology Orders and Examination Boards' set criteria are interpreted by teachers in such a way as to enable them to cope with their demands. As a consequence, all pupils are conditioned to respond in the same formulaic manner."*

*"Some teachers may think that allowing pupils to be innovative and lateral thinking could prove disastrous. They are more likely to tell a pupil what to do – they will choose the outcome, then show them how to achieve it. This is how schools develop a 'house style', but it is intellectually shoddy."*

There is much to suggest that teachers think about their practice in sophisticated terms and reflect upon the effectiveness of different approaches to teaching and learning.

*"Where it (SISP) has been useful, is its aim to produce a curriculum which has at its core a common goal, that is, to address the essential disciplines of design. It has given me the opportunity to reflect on my teaching, to make improvements and to share ideas with others."*

*"The Project gave me the quality time needed to question my own practice ... as a consequence we have started the process of change which will allow pupils to take much more control of their own learning."*

*"... the important issue is that staff can see definite benefits and have enhanced their teaching to provide quality learning experiences for our pupils."*

*"(SISP) is to do with the ownership, guiding and mentoring of a project."*

Many teachers commented on the effects different teaching methods had on their pupils and in doing so provided insights into the expectations which children have of Design and Technology.

*"I think some pupils still cannot come to terms with the fact that they have not got a finished wooden or plastic object in front of them. It takes some convincing that they have in fact gone through many valuable learning experiences this term."*

*"...the girls felt that they had produced something "different", but not necessarily better, or to a higher standard than they would normally have produced. In my opinion their design skills were enhanced in a way which surprised them, their thought processes were expanded beyond what they perceived was expected of them."*

Nevertheless, all of the respondents were able to detect an improvement in the ability of their pupils to confidently engage in design related work and saw positive changes in their pupils' attitudes towards their studies.

*"We are moving towards rounded, flexible, free-thinking and mature people."*

*"Students became independent thinkers. They gained confidence in their abilities. This became apparent when students stopped asking "what are we doing today"? They began to take ownership and pride in their work and often displayed work on the walls after writing their names for all to see. They purchased design folders and were proud to carry and display their work around the school. They criticised their own work and that of others quite openly and homework became less of a chore and more enjoyable."*

*"The experience empowered some students and provided a platform from which they could move forward and create in a motivating atmosphere, where there was no right or wrong, but only a positive, creative, self analysing viewpoint."*

*"Pupils adopted an inquiring approach and demonstrated a high degree of self-reliance."*

*There was evidence of excellent ideas and pupils could readily justify their decisions. This latter point featured particularly strongly."*

Teachers and curriculum managers referred to the impact that the Project has had on other curriculum areas.

*"One of the criticisms provide by the last two OFSTED inspections has been the issue of children taking responsibility, ...being given the opportunity to work on their own and to develop their own ways forward. I have observed that Year 10 (D&T) are doing exactly that."*

The impact upon the wider school community was difficult to detect in the written statements. However, in interview, teachers were demonstrably aware of the politics and culture of their school. In the statements written by curriculum managers, changes were clearly recognised and the potential of the initiative to propagate school-wide change was a feature of many of their responses.

*"In the exciting drive to raise the achievements of all pupils, complacency must be challenged wherever it is found and since "Few things are harder to put up with than the annoyance of good example" (Mark Twain), The Technology and Art Departments will be in the vanguard of this drive."*

*"Through the Project a "recognition of quality" has become embedded in the work of staff and pupils."*

*"Reports from Geography, History, and English colleagues are far more exciting. These teachers recognise the influence that Technology is having in raising the quality of both language and presentation."*

Teachers' thoughts with regard to examination success provided revealing insights.

*"We are fairly convinced that there are differences in the performance between the SISP and non-SISP groups."*

*"It is my conviction that participation in the*



*SIS Project has fundamentally changed the quality of teaching and learning in the Technology and Art Departments, obviously so: 11.2% A-C improvement at GCSE in Technology in 1996; 15% A-C improvement in GCSE Art in 1998."*

*"It would be difficult to assess any changes in our already high levels of examination success – 98% or more. What we do see is a much greater confidence in the children's ability to handle exam work."*

Many teachers were, initially, sceptical about and sometimes hostile to the notion that they should, in any way, modify the tried and tested regimes that had enabled them to achieve apparently satisfactory examination successes in the past. What the Project has demonstrated is that levels of success are at worst unaffected by the changes and at best significantly improved.

### Discussions and Conclusions

We know that SISP not only had positive outcomes for teachers who were receptive to and desired change, but also for those who were initially resistant and sceptical. The research has also provided subjective evidence that many of their pupils gained advantage. They have almost universally said that SISP has altered their teaching practice and relationships with children. The balance of power and decision making has shifted. In a curious way we have returned to issues regarding child centred learning which were left unresolved when we moved towards a more vocationally oriented curriculum during the 1980s.

Many teachers revealed a new willingness to consider and value creative thinking skills and cognitive development strategies. It is our view that SISP has provided the starting point for the development of a new 'thinking toolkit' which exploits contemporary ideas about thinking and about intelligence. Teachers have talked about the liberating concept of multiple intelligences and the notion that their pupils can be 'smart' in diverse ways. Design occupies a critical position in this respect, as an area which employs rational, scientific, creative and subjective ways of thinking.

Few teachers are aware that SISP has drawn heavily upon the disciplines and practices of Art and Design. The lack of dialogue between Art and Design and Design and Technology teachers continues to inhibit an holistic Design curriculum.

The research reveals a poverty of information resources and contexts within much Design and Technology teaching. It is our view that the success of any new approaches to the teaching of Design and Technology will be limited if they are not supported by accessible, high quality design and information resources.

There is also evidence to suggest that Design and Technology has found a new status and position in the participating schools. Senior managers celebrate the willingness of teachers to embrace change and recognise the advances which have been made. Colleagues working in Design and Technology are enjoying the status they now have as 'champions' in the drive to raise standards and as valued partners in a high value multi-agency venture.

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