

A Creativity Feedback Package for Teachers and Students of Design and Technology (in the UK)

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Abstract

The UK Design and Technology National Curriculum (2000) is introduced by an 'importance of design and technology' statement, which proposes that by studying the subject, students learn to 'think and intervene creatively', 'become creative problem solvers' and 'become innovators'. Teachers of the subject in the UK, however, can look in vain for any practical evaluative tools to help them attach importance to students' creative processes and products, especially in terms of summative assessment. The GCSE (General Certificate of Secondary Education) exam boards' coursework or teachers' guides provide no guidance. For example, no mention of 'creativity', 'creative' or 'innovation' can be found in teacher guides issued by the two main UK design and technology exam boards, Edexcel and AQA (Assessments and Qualifications Alliance). It seems as if creativity is an expected by-product of following the UK National Curriculum (NC).

As part of a doctoral thesis completed at Goldsmiths College, University of London, a 'creativity feedback package' (CFP) was developed to assist both teachers and students to be clear about what creativity is in design and technology, and how it may be rewarded. This paper is a brief synopsis of some of the major findings from this three year research project, carried out with the aim of developing materials which recognise and support creativity for learners at Key Stage 3 (age 12-14).

Keywords

Creativity, feedback, evaluation, process, product, climate

How do teachers support creativity?

The creative spark that illuminates student performance can be stimulated, nurtured and assisted, or it can go unrecognised, undervalued and suppressed. The lack of official guidance for creative activity does not necessarily worry teachers, who have been observed to be content to rely solely upon their own professional judgements (in classroom evaluations) concerning how best to cultivate

creative cultures (Morrison 1993). There seems to be some agreement amongst creativity researchers (Sternberg 1988, Fleith 2000) that there are eight leading strategies that teachers can use:

- be a 'catalyst teacher' by consistently showing intrinsic enthusiasm and motivation;
- provide encouraging and supporting cognitive situations to enable risk-taking;
- make the physical environment as stimulating as possible. Rich resource material, stimulation through field trips, visitors to classrooms and the introduction of artefacts to the classroom benefit creative thought;
- allow students autonomy to cope with varied tasks and problems;
- be aware that students, especially at secondary schools, are often unsure of their own talents and that peer approval is often seen as more important than a display of enthusiasm for creating;
- give information about the creative process and dispel the sense of awe of inventions created for social approval;
- value, praise and reward creative acts;
- attempted risk-taking should be recognised, but failure to take on board basic recommendations from the teacher should not;
- use the National Curriculum as a guide not a rulebook; interpreting it to offer plenty of opportunities for creative behaviours.

Such strategies have been shown in research studies to support creative activity (Beetlestone 1998, Torrance 1988, Westby and Dawson 1995). But none of them help the teacher to locate creativity in the products stemming from 'design and make' tasks; and produce any kind of definite evaluation upon what has occurred. Barlex (2003) believes that design and technology (D&T) teachers in the UK who have been in the post for more than three years should be introduced to new approaches, which emphasise creativity as an outcome for their pupils. This aspect of creativity; the recognising and potential rewarding of the creative acts that they see, does worry teachers (Kimbell et al 2004) who

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are concerned that they will need to justify their professional judgements about the creative processes and resulting manufactured products they see.

Recognising and rewarding

Students should know that creative effort (which leads to success or indeed failure) is valued, and given credit in official marking schemes. It is hoped that the work such as the Goldsmiths College/DfEE/QCA Assessing Innovation Project (Kimbell et al 2004) will provide research from which to propose alterations to UK National Curriculum guidelines, in order to address this issue.

In the meantime, however, there remains the possibility of helping teachers to locate creative activity in processes and products, of assisting them to optimise cultures and environments, and to value creativity when it happens. It was hypothesised that by raising teachers' awareness of the ways in which they influence their students' creativity – (and raise students' awareness of their own creative efforts) that creativity, as it is seen in D&T, might become a little more tangible and unambiguous.

Research methods

First, a definition of creative production was taken to be:

....the ability to use imagination, insight and intellect - as well as feeling and emotion - in order to move a particular set of ideas towards an alternate, previously unexplored state.

(Plsek 1996:4)

Such a definition was felt to describe the way associations of ideas can lead to novel solutions. Then, by discerning the extent to which existing models of creative behaviour interact in the appropriate diagnoses of creative performance, it was found that it was possible to investigate what teachers and students typically do in D&T (in the broadest sense) in terms of an established contextual organiser for creativity.

This organiser was named the '4 Ps' – the process, person, product and press. The last 'P' concerns the environment and context in which the creator operates. Runco (1997) tells us that the 4 Ps of creativity is an established contextual organiser that can guide the development of creativity measures by being a useful facet-separator system. This model was itself a revision of Rhodes' (1961) proposal of the 4 Ps of creativity. It works as a mapping tool for all possible interactions within any observed situation, but a health warning results from conclusions of researchers such as Murdock and Puccio (1993) and MacKinnon (1987), who have attempted in a series of research studies to update the model:

...it might neither be possible, necessary or practical to examine all of the interactions.
(Murdock and Puccio 1993:250)

One of the problems that have been created by this 4 Ps model is that researchers have tended to concentrate exclusively on one facet or another in an effort to produce criteria and to make investigation manageable. This separatist approach seems to have enabled them to focus their attention solely on variables within a specific dimension, without concern for potential interaction effects created by other variables. The contextual organiser is therefore both valuable and dangerous. Each strand has a unique identity academically, but there is little research to demonstrate how each strand functions together in real situations to influence creative productivity.

The organiser did provide a framework to scour creativity theory and related sources. It was quickly found that the measurement of such creative activity is an almost impossible task, due to its complex, contextual and personal nature.

A set of evaluation tools for use by design and technology teachers was derived from a subsumption of the criteria inherent in each facet, drawn from research into creativity, other psychological areas such as motivation and even business theory. It took six months to construct a balanced and suitable set of criteria,

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which was then termed a creativity feedback package (CFP). A period of four months' exploratory pilot work in schools around the UK using Robolab (a LEGO resource) revealed the significance of three aspects of the CFP:

1. The **climate** of support for creativity that teachers engender in their classrooms and workshops is critical to creative success.
2. There are **creative moments** in students' designing processes that, if they can be recorded, can highlight creative concepts and approaches.
3. The **product** emerges as an amalgam of the situation and the ideas for solutions that can iterate from inception right through the making; and can be analysed by consensual expert agreement using some definite criteria for creative products.

This information was then evaluated, and a new package to promote feedback on creative climates, processes and products was derived from it, and tested over a ten-month period in a set of Partnership schools around London that are linked to Goldsmiths University. Key Stage 3 was used to test the CFP throughout.

- The **creative climate** indicator was tested with 15 teachers and 70 students
- The **creative moments** indicator was tested with 96 students
- The **creative product** indicator was tested with four groups of 2-4 teachers and 15 groups of 3-5 students

The CFP was intended to be a package that teachers could use to generate and focus feedback concerning creative activity. The three indicators were designed to be used together to provide information and feedback on creativity over a whole task, because it was hoped that the sum of the feedback produced would provide some clear messages for the teachers and students.

A preliminary pilot study took place with panels of teachers from the Partnership schools to verify that a creative product indicator, which relied on consensual assessment, would work.

The research was primarily carried out to test the efficiency of the package for teachers. A secondary purpose for the research was to test the CFP's ability as data-collecting tool for researchers. This article concentrates on presenting the most significant of these findings from each indicator.

Creative climate indicator

A group of S&C (systems and control) teachers (across the UK) who had been working with specialised materials, and a group of teachers (from Greater London) who were working in all areas of the D&T curriculum completed the full climate indicator. Their students completed a simplified version. Teachers and students were asked to consider, rank and re-rank nine climatic dimensions in order of importance to them:

- Trust/openness
- Risk-taking
- Idea Time
- Acceptance
- Challenge and involvement
- Freedom/independence
- Idea support
- Playfulness/humour
- Debate

The re-ranking exercise ensured that each climatic dimension was considered in relation to the others. The criteria were swapped around on each teachers' indicator to prevent the phenomenon of 'unconscious transposal'. They were then left with a picture of 'the preferred'; their ideal atmosphere or environment for creative work. The teachers (only) were then required to express an opinion or view about which classroom conditions best support each of the climatic dimensions in their school, and which least support it.

These were:

- student numbers;
- staff (and support staff) numbers;
- available existing equipment;
- staff capabilities/knowledge;
- students' capabilities/knowledge;
- curriculum;
- discipline;
- available disposable materials;
- staff attitudes/drives;
- student attitudes/drives.

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A useful way to express these relationships is to show the sum of the rankings given to each criteria by the two groups. For example, the teachers rated 'challenge and involvement' as the climatic dimension most important to them, so it would produce the lowest number given in the rankings. The lowest numbers are at the top of each list of rankings, and the highest at the bottom:

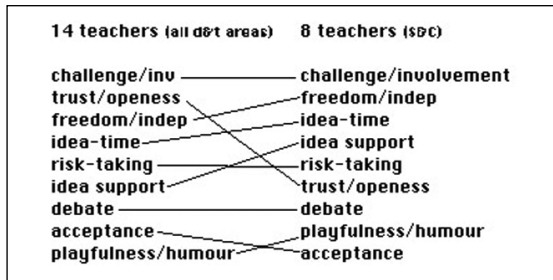


Fig. 2.
A correlation comparison between the final rankings of two sets of teachers using the climate sheet

The changing order of the variables (as evidenced by the lines connecting them) is significant because they visually represent the difference of views from each group concerning the importance of each variable.

All of the correlations above are very strong (except for the differing views about the need for trust and openness to support creative climates) resulting in an overall Pearson correlation coefficient ($r=0.8$). This reveals what can only be described as the possibility of a common culture inside D&T education concerning teachers' views about creativity, and what they do to try to enhance it. There are all kinds of reasons to suggest that common cultures in schools would not exist – particularly given the cultural differences in those 'subject' areas of D&T that have been amalgamated so recently in the UK D&T National Curriculum versions of 1990, 1995 and 2000. The exercise of ranking climate criteria revealed that D&T teachers from all over the UK have views in common about the criteria on the climate sheet. (The climate form was used with D&T teachers from schools in England, Scotland, Ireland and Wales).

The climate form also revealed significant data concerning students' views. These rankings were compared to those of the teacher groups. Again, a strong correlation ($r=0.7$) was found.

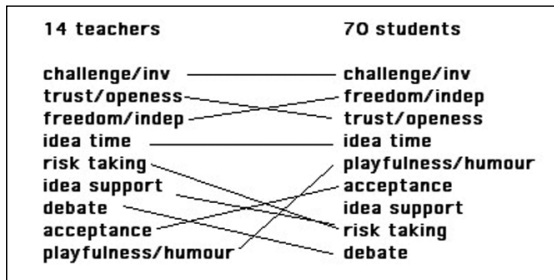


Fig. 3.
A correlation comparison between the final rankings of a set of teachers and their students using the climate sheet

It is proposed that such similar four primary (the first four criteria in each column) rankings ($r=0.8$) indicates an unconscious adopting of their teachers' views about creativity. Whereas analysis of the five dissimilar secondary (the last five criteria in each column) rankings ($r=-0.7$) indicates that students believe that before they can take risks, they need to feel that they and their ideas are accepted and supported.

The dissimilar rankings strongly suggest that teachers and students have different ideas about the role of playfulness and humour in the classroom. The data indicates that students linked creativity to play, and feel constricted and less productive without it. Teachers, on the other hand, ranked playfulness and humour lowest, showing possibly that they feel forced at Key Stage 3 to place their emphases on order, control, and imparting of knowledge and skills. This finding was backed up by qualitative data:

"Sometimes, there is just no time to allow for play and experimentation - I have a syllabus to get through!"
(Teacher 10)

As a feedback tool on its own, teachers stated that it made them think in new ways about their own practice and pedagogy.

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For example, it was found during trials of the LEGO equipment in schools around the UK, and during the pilot studies for this research project in schools around Greater London, that D&T teachers uniformly believed that creativity was within their power to control, via the things that they did.

The CFP's climate sheet was found to be able to provide feedback directly to the teachers that often it was factors outside their direct control, like class sizes, which caused student processes and products to show less creativeness than desired. Such a tool has the potential to alleviate the 'blame' culture that teachers have been shown to feel that they operate in.

It can be seen that (with the exception of trust and openness as a requirement by LEGO teachers) there is a clear top four of climatic dimensions viewed as most important by all groups. The message may well be that for creative cultures to flourish in a D&T dept, these dimensions must be recognised and supported.

Creative moments indicator

The indicator was designed for teachers to issue to their students once or twice during a D&T task (typically every two to three weeks of a nine-week task). The sheet holds a simple explanation of creativity (with an example) and then requires them to reflect in writing, and pictorially if possible, how they feel they have been creative in their projects so far. In this study, it typically took the students 25 minutes to do.

The ultimate aim is an improvement in designing and making skills. As students get used to reflecting upon their ideas, instead of settling for the first idea to meet the need, they might start actively to think about combining more elements and ideas together, using the sum of their preparation and existing knowledge. Although these sheets are principally designed to be of use to students, and can form part of their portfolios, they also aim to identify those students who have been able to articulate more thoughtful, creative ideas, rather than more linear responses to problems.

It is proposed that they can also reveal clues about how this response is influenced by the tasks. Teachers commented that they were very intrigued by the idea that they could now see where their students' ideas came from. One teacher also commented:

"I am also interested in the lack of ideas shown... perhaps we should take some responsibility for this."

(Teacher 6)

Interview data revealed that teachers were positive that once their students got into a routine of completing two or three sheets during projects, they would benefit from breaking up the process of design and make, with reflections of their own mental processes. Such a process is meta-cognitive, 'self-aware' designing.

"It's pretty hard to deceive the teacher with these sheets, because the info has to reflect the product. I think you might get an improvement in creativity in real terms. And I tell you why. Because the kids will be wanting to come up with unusual, even whacky responses to the task. This will take some dealing with by the teachers, but it's always better to have the kids pushing the teachers than the other way round."

(Teacher 5)

Creative connections

Analysis of students' idea sources took place to find out the ways creativity showed up during the processes they recorded. It was found that the students' processes could be categorised in terms of creativeness, because one way of being creative is the pairing or associating of ideas to form a solution to a need:

- no creative combinations of ideas;
- one idea combined with the need to complete the task;
- two or more ideas to combine with the requirements of the task.

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Another warning for future research along such lines must be added here; although modern creativity researchers like Csikszentmihalyi and Epstein (1999) agree that making associations is a primary driver of creativity, associations of mental elements is one way to pick up indications of creativity, but certainly not the only way. A wealth of research in the last 25 years has included the development of numerous instruments which are used in the identification of creative talent.

Kaltsounis and Honeywell (1980) and Torrance (1988) have identified exhaustive lists of 'creativity tests'. But most such creativity tests available can be thought of as measurements of creative potential. These attempt to measure specific cognitive processes such as

divergent thinking, making associations, constructing and combining broad categories or the ability to work on many ideas simultaneously. There are non-cognitive tests too, designed to cover motivation and risk-taking. Facilitatory personal properties like flexibility and tolerance for independence are also measured.

The creative moments indicator is different from all of these, because it directly asks students about the creative incidences they have just encountered during a processes of design and make, and invites teachers to think about the quality of mental connections that their students are making.

For example:

• So, describe a creative moment, however small, that helped you reach the stage you are now with your task. Where do you feel that your creative idea came from?

My base idea came from the word relaxation because I love relaxing and that is one of my hobbies.

My dish is in a leaf ~~shape~~ ^{shape} I got that idea from the Natural Environment because I ~~to~~ took outside the window and I saw a leaf and ~~to~~ that's the way I got my idea.

My base is in a shape of smoke because when I ~~burn~~ ^{burn} my oil, all the smell came out which gave that idea of the smell of the oil.

Sketch the creativity below if you can.

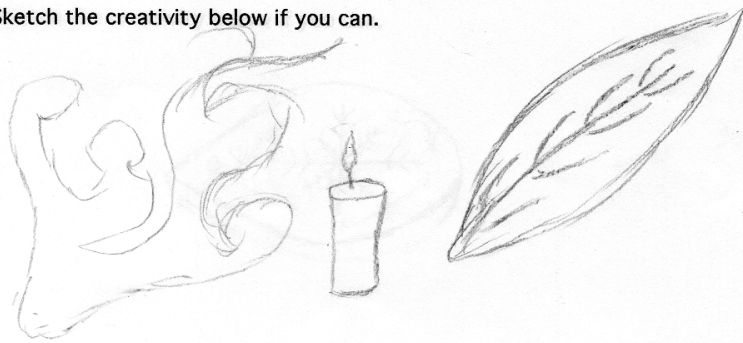


Fig.4
Example of a creative moment from a student who paired more than one idea with the need

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Teacher 2, whose student produced this creative moment, about combining thoughts of the shape of smoke, the shape of a leaf and the smell of oil to actualise the word 'relaxation' for her oil-burner, stated:

"The good thing about the sheet was that they could have a think about where their ideas came from. And we had a great talk about this. I reckon that once they become used to the idea that the things they see and experience really affect the way they design, they might be stimulated to doing lots of different activities in their lives rather than ones they feel comfortable with. It could lead to better designing."

(Teacher 2)

Complexity

The pilot studies had revealed that it is the complexity of ideas involved in a solution that imply its creativity to the user or viewer. Of the three categories of mental activity identified, the second (where one idea combines with the need to complete the task) is viewed as being more analogous to linear problem-solving. Until the student pairs two or more ideas together with the need, he or she can not be considered particularly creative. However, it must be remembered that that *once the student is creative, the idea of counting creative moments becomes irrelevant* because there are so many ways that creativity builds upon itself during its process of coming to life, especially during the making of an artefact.

Of 96 students, 13% failed to produce a creative connection of any sort, or misunderstood the nature of the form. 64%, combined one idea source to the need to find a solution to a particular problem. 23% revealed that they had paired two or more ideas together. The majority of processes described on the creative moments sheets could therefore be regarded as less creative, for they did not record two separate idea sources that have been paired together to meet the need. This finding corresponded directly with researcher observations, findings from other elements of the CFP, and teacher feedback.

The tasks that were set to the Key Stage 3 (KS3) students in each of the four schools were simplistic and controlled, so the opportunities for complexity were found to be sparse. It was found that the tasks set in all schools were very controlled; and the students were discovered to be trying to impose what complexity they could into their projects! At KS4, this phenomenon would be found less because the opportunities for producing complex solutions to unique problems are greater. Thereby lies the scope for the production of an outcome that can be regarded as a creative response because of the surprise, enjoyment and difference it brings to the user.

Gender differences

Sources for ideas were found to be narrow at KS3 age. Just nine categories of sources were found: such as TV or computer games, fashion and people. Clear gender differences were found: over 50% of boys used TV or computer games for inspiration, compared to under 2% of girls. 18% of girls (but not one boy), used magazines for inspiration.

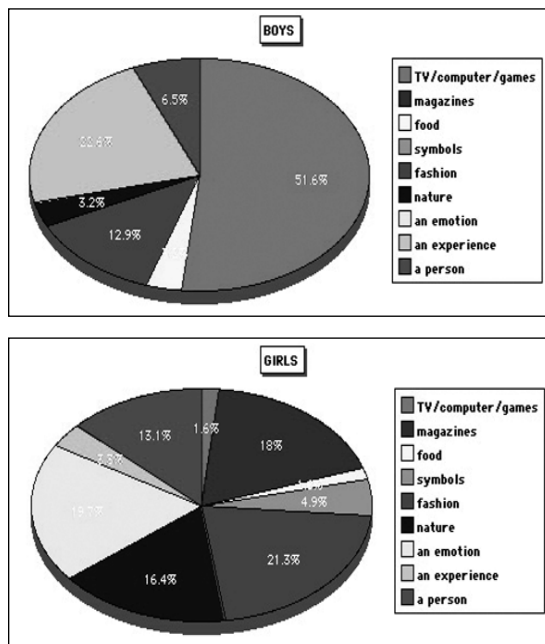


Fig.5. A gender comparison concerning creative idea sources revealed by the creative moments indicators

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Girls were found to be happier to use others' ideas than boys, who actively resisted peers using their work. This **defensive designing** from boys, and accessible, **shared designing** by girls was directly observable during analysis of the creative moments sheets.

13% of the girls used people around them as direct idea sources for their creative combinations, but boys were shown in this study only to use people from their pasts. Girls also used their emotions for ideas, whereas boys preferred to use experiences. 24% of all returns from boys directly used experiences to form creative pairings of ideas, compared to only 3% of girls. 20% of the girls (but not one boy) used emotions to form creative pairings of ideas.

Nature of tasks affecting creativity

By comparing the nature of the tasks in terms of open-endedness to their outcomes, in terms of creativeness, complexity and uniqueness, evidence emerged that the some of *most* creative, unique products were also accompanied (initially) by the *least* creative associations. However, it was found to be the result of implementing the creative moments form in all schools at the start of projects, where the tasks in each were relatively closed-ended (common in the predominantly 'knowledge and skills' time of KS3).

Opportunities for complexity during designing and making (that would naturally lead to creative thought and action) were found to be severely hampered by the presentation of the brief and accompanying indications that risk-taking would not be well supported.

The data therefore implied that those students who were given more closed-ended tasks possibly felt that they had to cram any creative activity into the designing stages. Schools which present students with less closed-ended tasks, on the other hand, should, if the pattern found during this research project is reliable, produce students whose creative activities are allowed to occur with the same strength during designing and making. The difference

in the presentation of tasks is key – and the teacher can make a difference by allowing his or her students to see that if they take risks, they will be supported. They can be invited to respond to this creative freedom with the net result of more unique and creative products.

This data highlights the probability that teachers who remove the 'unexpected'; by controlling the look and function of outcomes, are less successful in facilitating creative processes than teachers who allow creative ideas to be incorporated into a product as they occur to the student. This is risky behaviour for teachers, and it was found that the degree to which they attempted this was in direct proportion to their experience of teaching the D&T curriculum.

Creative products indicator

This was designed to be a score sheet where a small panel of teachers can gather feedback and awareness about the creativity of a product by using scoring to force definite opinions. The sheet has seven criteria of the product to be scored on a 12-point scale.

- uniqueness;
- associations of ideas;
- risk-taking;
- potential;
- operability;
- well-craftedness;
- attractiveness.

These criteria were subsumed from an exhaustive list of qualities of creative products by trialling in pilot (LEGO) schools. However, *numbers were not critical to this exercise*, because the scorer will have his/her unique scale of judgement and frames of reference to the product. The scores *therefore had no real meaning as numbers*; they only helped the scorer to get to grips with the criteria; and reflect the way in which individual thinking processes can be changed by magnifying awareness of creative processes.

Four criteria described the creative *concept*, or idea, and three criteria describe the *quality of*

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build; which evaluate how well how the creative thoughts have been brought into the 'made world'. The emphasis in the CFP's product sheet is that creativity is seen in *both* the concept and the standard of build that the resulting product shows. But it is the *concept* stage where the unique ideas are brought forth, and the *product* stage is the manifestation of those creative ideas. The latter cannot occur without the former. The 'quality of build' is a *vehicle* for the creativity.

The product sheet was given firstly to 15 groups of students over the four schools, during afternoon lessons. Students formed groups of four or five, and chose one product to score with blue pen from their number. This process of debate and scoring typically took 12 minutes. The completed forms and chosen products were then given to a panel of four or five teachers, one of whom had issued the project and sustained it. This panel then scored the products on the same sheet with red pen. The scoring typically taking 40 minutes.



Uncreative products

At each school, the groups had, by the end of the 9-week tasks, constructed virtually identical products. Minor changes in colour, context were noted, and the *teacher panels* produced feedback for themselves concerning the fact that they felt that they were not

getting much risk-taking behaviour back from the students. This was despite the fact that *they all had stated verbally that there was a lot of scope for risky, creative behaviour in the tasks themselves*. The teacher panels revealed that they were aware that it showed in many of the products that their students made. This may indicate a *common culture of non risk-taking* at KS3, and is an argument for the need for creativity *feedback* tools to give creativity 'teeth'.

The *product* sheet data showed that *these students did not believe they had been creative*, and that the *teachers thought even less of their creative ideas*. The emphasis was firmly on making something that works, or *had the potential to work*.



Analysis of the returns suggested that teachers can be placed into two categories of attitude towards the climate for creativity:

- An **overseer** who allows the class to make the most of opportunities in the artificial climate for creativity produced by him or her.
- A **nurturer** who believes that supporting and pushing individuals' ideas forward works best to encourage risk-taking.

A clear trend was found: that teacher panels tended to score the *uniqueness* of the products in front of them much lower than the student

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panels; 37 less points overall. Conversely, teacher panels scored the *potential* of the same products high, whereas the student panels saw much less potential in the products; 48 points less. These discrepancies were due to the different *frames of reference* held by teachers and students. Such frames of reference were found to be about attitude and perspectives.

The teachers on the study were under pressure from factors like schemes of work, time barriers and control issues, so they were found to prefer to set non-risky, controlled, tasks. Outcomes were therefore entirely predictable.

The students on the study, naturally, viewed the tasks as new and unique for them, even though their outcomes were similar to those of their peers. They believed that the ideas involved in the products in front of them did not show *risk-taking*, and their teachers thought they were even less risky: just 70 points out of a possible 180 were given overall. The picture that this revealed was in contrast to teacher expectations. The teachers who said that they expected that there would be lots of creativity occurring, found instead that consensual assessment produced feedback contrary to this. Many found that they had to self-score their own students' products lowest for *associations of ideas* (creative thinking) and *risk-taking*.

However, the *potential* and *operability* of the products were marked higher all round by the teacher panels than the student panels. These differences again were due in all probability to teachers knowing that the products their students made *should* work, because they had carefully designed the tasks so that they would require little riskiness in outcome. This meant that *the tasks effectively had most of the risk-taking built out of them*. It was found that during debates over the criteria, teachers were openly admitting this.

If a warning signal such as this, stemming from using the CFP's product sheet, could be acted upon by the schools involved, it could be an initiator for change. Schools could locate areas that need improving in order to

turn out the kinds of creative products that the D&T NC states are required at KS3. Such feedback can be gathered inter-departmentally and in small steps, therefore getting over any defensiveness about performance standards that Ofsted inspections have long been shown to bring out.

The teacher panels evaluating the efficiency of the package in the last phase of the research agreed that if the creative moments sheet was issued two or three times during a typical nine week task, and the product sheet was used to score creative ideas, some form of progression in terms of creative effort could be revealed. However, they also agreed that creativity at the personal level with individual students at KS3 is typically very small, so results from the CFP were much more likely to be long term, and would grow incrementally (and more obvious) the more it was used.

"I think if my students know I'm using something like the creative product sheet for their marks during a typical nine week task... and using the creative moments sheets they fill in during their time making the cases to help me reach decisions, they might be more creative in the outset."

(Teacher 4)

Further research and development is being done with this CFP in order to make it efficient and personalised for schools. Such personalisation steers clear of including elements of the CFP in formal assessments and is limited to creating direct feedback on creative climates, processes and products for a committed department.

Conclusions

This research showed that the three tools of the CFP have a great deal of promise in the following: none of which have been attempted before with any degree of success in D&T education:

- to facilitate teachers actively to analyse their *classroom cultures* in terms of creativity;

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- to facilitate students to articulate, reflect upon and harness their own *creative processes* in writing and illustration, becoming progressively more aware of their own designing abilities. (Such feedback was also shown directly to assist teachers' understanding of the emerging products, and teachers' awareness of the creative possibilities inherent in the tasks they set);
- to facilitate teachers and students, armed with clear criteria and definitions, to arrive at consensual agreements concerning the creativity of students' *product outcomes*.

Students should know that their creative processes are valued and given credit in official mark schemes. They should be given challenging and more open-ended tasks, shown how to access creative ideas, and be shown how to combine ideas to be creative – rather than settling for linear solutions. It is proposed that by taking on this task, any future iterations of this CFP could facilitate students at KS3 to be recognised as creative as the D&T National Curriculum Statutory Orders expect, as listed in its 'mission statement'.

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References

- Barlex, D. (2004) *Creativity in Crisis? Design and Technology at KS3 and KS4*. Report from a joint invitation seminar (DATA and Nuffield Design and Technology), Nuffield Curriculum Centre, Wellesbourne : DATA 27.
- Beetlestone, F. (1998) *Creative Children, Imaginative Teaching*. Buckingham : Open University Press.
- Csikszentmihayli, M., and Epstein, R. (1999) 'A Creative Dialog - Mihayli Csikszentmihayli and Robert Epstein Discuss Creativity' in *Psychology Today*, Summer Issue, Sussex Publishers Inc. 5-7.
- Esenyck, H.J. (1994) 'The Measurement of Creativity', in M.Boden (Ed.), *Dimensions of Creativity*. Cambridge, M.A. : MIT Press
- 199-242.
- Fleith, D. (2000) 'Creativity in the Classroom: Teacher and Student Perceptions of Creativity in the Classroom Environment' in the *Roeper Review*, 22, 3:148-153.
- Kaltsounis, B., and Honeywell, L. (1980) 'Instruments Useful in Studying Creative Behaviour and Creative Talent' in the *Journal of Creative Behaviour*, 14:56-67.
- Kimbell, R. et al., (2004). *Assessing Design Innovation: a Research & Development Project for the Department for Education & Skills (DfES) and the Qualifications and Curriculum Authority (QCA)*. London: Goldsmiths College TERU, Dec 2004. (Unpublished).
- Murdock, M.C. and Puccio, G.J. (1993) 'A Contextual Organiser for Conducting Creativity Research', in S.G. Isaksen, M.C. Murdock, R.L. Firestien, and D.J. Treffinger (Eds.), *Understanding and Recognising Creativity: the Emergence of a Discipline*. Norwood, N.J. : Ablex 249-280.
- MacKinnon, D.W. (1987) 'Some Critical Issues for Future Research in Creativity', in S.G. Isaksen (Ed.) *Frontiers of Creativity Research: Beyond the Basics*. Buffalo, N.Y. : Bearly Limited.
- Morrison, K.R.B. (1993) *Planning and Accomplishing School-Centered Evaluation*. Norfolk : Peter Francis.
- Pisek, P.E. (1996) Working Paper: 'Models for the Creative Process', in *Creativity, Innovation and Quality*. Milwaukee, WI., ASQC Quality Press 4.
- Rhodes, M. (1961) *An Analysis of Creativity*. Phi Delta Kappan, 42:305-310.
- Runco, M.A. (Ed.) (1997) *The Creativity Handbook, Vol. 1*. Cresskill, N.J. : Hampton Press.

A Creativity Feedback Package for Teachers and Students of Design and Technology (in the UK)

Sternberg, R.J. (1988) 'A Three-Facet Model of Creativity', in Sternberg, R.J. (Ed) (1988) *The Nature of Creativity: Contemporary Psychological Perspectives*. Cambridge, MA : Cambridge University Press 11:36.

Torrance, E. P. (1981) 'Creative Teaching Makes a Difference', in J.C. Gowan, J. Khatena and E.P. Torrance (Eds.), *New Directions in Creativity Research*. Ventura C.A. : Ventura County Superintendent of Schools Office:19-24.

Torrance, E.P. (1988) 'The Nature of Creativity as a Manifest in its Testing', in Sternberg, R.J. (Ed) *The Nature of Creativity*. Cambridge, Massachusetts : Cambridge University Press 148-187.

Westby, E.L. and Dawson, V.L. (1995) 'Creativity: Asset or Burden in the Classroom?' in the *Creativity Research Journal*, 8:1-10.