

CDT: Missing the Point?

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The main aim of CDT should be to facilitate the realisation of pupils' ideas. It is not primarily about learning particular skills such as graphic techniques or processes, or practical skills or any other facet of CDT which are simply the tools by which our ideas are brought to fruition.

Teachers are in many cases putting the emphasis too much on the 'tools of the trade', when they should be concentrating on teaching pupils how to develop and realise their ideas. They misunderstand the design process by not making children aware of the purpose of the parts of the process which build up to the realisation of that idea.

Whilst accepting that in theory the system operating in schools does incorporate the essential techniques of designing, are teachers in danger of being swallowed up by the mechanics of the design process and thus losing sight of the main objectives — the pursuit of IDEAS, imagination and inventiveness?

Do we really know why we are teaching pupils various graphic techniques? Is it to make the drawings more attractive? Is it to allow us to communicate with other people? The answer to both these questions is YES, but these points are subsidiary to the main reason for using these methods. The primary aim is to visualise an idea, to see what it might look like for oneself and in so doing enable judgements to be made about its worth. 'Ideas are important because they are the means whereby children interpret their experiences and invest it with personal meaning'.¹

There is no correct way to stimulate ideas in children. It is not appropriate to talk of a design process if this means that teachers use a standardised system to solving design problems — a going through the step approach.

CDT used in its imaginative way should give pupils a wide variety of experiences and from this standpoint there can be no finite way to approach the teaching of CDT.

It is variety not only in content but also in approach which is vital to the pupils overall experience in CDT. This variety

can and should effect the way we set problems, the methods we use and the manner in which we develop background knowledge and skills, and the form in which pupils ideas are realised.

We do not always need to set design briefs on a real life situation or an egg race problem, for genuine understanding can come from simply manipulating materials. We should be prepared to copy a piece of craftsmanship, make a specific joint in isolation, or make a model purely to explore the parameters of model making if in so doing we are extending pupils understanding and ability to realise their own ideas.

In other words it does not matter from which angle a design problem is approached, indeed the more varied the approach the more stimulated the thinking. What does matter is that the aim 'To help children and young people to realise their own potential and to handle their own creative and inventive processes with sensitivity, discrimination and honesty'² is always kept to the forefront in the establishing of design problems.

To get back to basics — rather than processes, what is it we ask them to do when we ask children to design? Designing is the solving of problems from whatever approach or by whichever process.

As many people as one may ask will have as many notions as to what is involved in designing, but a statement of particular interest is that designing involves 'the imaginative jump from present fact to future possibility',³ which collaborates with the standpoint that ideas are essential to designing or that 'imagination is the designers trump card'.⁴

This emphasises that whatever design methods or processes used in school, teachers must teach children to use their imagination. In other words teachers should be asking children to use their imagination to solve design problems.

Having established that the CDT teachers main aim is to develop imagination in children the rest of this dissertation will discuss how this might be achieved.

Opening Up Real Perceptions of the Problem/Solution

Let us begin by taking a look at design problems. Much has been written about the constitution of design briefs and it is not the intention here to discuss them at length except to raise one vital point.

Who is identifying the problem? Substantially this is being done by the teacher who has seen this as a way of controlling a brief to the extent that its solution will incorporate the use of certain skills, which it is felt the pupils need to acquire:

The degree of control has been allowed to vary but in general pupils are often given little opportunity to find or shape the problem. The difficulty is that by exerting this kind of control we are in fact controlling the solution and therefore limiting the possible outcome.

Limitations may well be important but the emphasis is wrong for we should be controlling the context in which the problem has been devised.

If a class is asked to produce a spatula/spoon, allowed to draw a few shapes and given a piece of wood pre-cut to a certain size, do pupils really achieve anything of lasting importance from the experience? Can it even be called a design experience? What parameters have been established by which pupils can judge the validity of their solution? Are pupils simply being allowed to change slightly what is basically the teachers idea?

As an aid to imaginative thought pupils need a knowledge of what the design problem really is before they can begin to initiate change. 'Designers need to know the present before they can predict the future'.⁵

Has the situation really been explored, have we asked the right sort of questions and stimulated the relevant discussion?

Have we really promoted a genuine understanding of the problem and in so doing opened up pupils perceptions of that problem?

Have pupils been involved in a relevant research programme?

Are we 'extending the boundaries of a design situation so as to have a large enough and fruitful enough search space in which to seek a solution' ⁶

Possibly the problems could have been approached in a different way.

Are wooden implements used for cooking in your home? If so what are they used for? Are they used in specific situations and if so what is being done and why. Are they being used for moving food about? If so what sort of food? What sort of movement? Are they used for lifting out items of food or liquid? What food or which liquid? Are different ones used for different operations? If so why? What operations? Is shape and size important? Why? Is the length of the handle important? Do we need different shapes for different operations?

By now we are beginning to build up an understanding of the size of the problem and are in a position to ask pupils how we could go about investigating the problem.

This may well lead to some practical experimentation of a scientific nature.

Are the implements used to prevent liquid burning? Why do liquids burn? What liquids are we concerned with? At what temperatures do they burn? How long does it take? What materials stay cold when used to stir hot liquids?

And some practical investigation using actual implements. Does the size, shape of the pan, make a difference? What action takes place when liquid is stirred? Do people use a circular or a whisking action? Oh look when I go round and round the face of the spoon goes flat against the side of the pan at two points. Perhaps a flat shape is not the most efficient. Is there a better way?

This kind of interaction should raise many different points which could provide stepping off points for individual pupils whose interest has been aroused by a particular issue.

We may have discovered that it is difficult to remove food from the pan as it has to be brought out by holding the food against the side and it has a tendency to fall off.

This line of thought could have been directed towards asking why this happens and if there is a way of overcoming the problem? Or we could simply be asking whether the shape allows the user to get into the corners of the pan?

Other issues have not yet surfaced. What are the advantages/disadvantages of using

wood? Is another material more suitable? What is already available in the shops?

There are many ways in which this is a good thing and shows that the parameters of the problem are always expanding and that designing is a continuous journey of exploration.

Methods which pupils use for the investigation may vary from the level of basic discussion to the compilation of a suitable questionnaire and pupils may well have been involved in consulting people in the home economic department, the science department, parents and possible outside agencies. Even when the teacher may have been moved to investigate an unknown area which might benefit the groups research. ie. Are wooden implements allowed in commercial premises or are they considered unhygienic? The more enquiry is promoted the more will be discovered.

Why is this level of research and investigation important? One of our aims as teachers should be to develop initiative and one of the ways of doing this is to always encourage pupils to carry out research with the aim of building up a knowledge of what the problem really is.

More importantly, without this background we are omitting a vast area where ideas are generated. For it is by asking the questions, investigating the issues raised and by doing the necessary research that our imagination is stimulated and our ideas begin to form as to how a solution may be reached.

It would be a 'mistake to begin designing by thinking only of the problem, as we call it, and to leave thinking of how it is to be solved to later stages' ⁷

We should be certain that pupils know why they are researching a problem and that the parameters of the research lead a pupil to a better understanding of the problem.

Following directly from this we must ask the question HOW without having established this basic foundation, do we establish the necessary criteria on which pupils' judgements can be based?

For our investigation should not only build a knowledge of the problem and suggest possible solutions but also establish a range of functional requirements against which ideas can be assessed.

'Answering some of the questions that must be answered if one is to get from ignorance-of-the-new. with which one

begins, to the knowledge of what the problem really is as well as of the solutions'.⁸

Resources — The Essential Background

Do schools or CDT departments have the resources of information to back up a genuine research programme?

Do we as a matter of course ask pupils to find out about something after initially establishing how they might do this?

One way of encouraging this would be to establish a research facility. A system could be developed of presenting information mounted on card and covered with protective film which was stored within a centralised area within the department.

This could well cover much basic information stored and presented in an attractive format and clearly indexed.

Areas could include:-

Materials	Mechanisms
How to work materials	Structures
Joining methods	Pneumatics
Fixing and fittings	Hydraulics
Finishes	Etc, etc.

Much of this information can be gleaned from standard textbooks, journals and periodicals and photostatted. In addition to an information base a resource collection could contain:-

- i. Almost any form of stimulus material.
- ii. Evidence of pupils' previous work, possibly in photographic form.
- iii. Illustrations of all types of man made products.
- iv. Results of pupils' investigation presented in either written or graphic form carried out in various areas of study.

These two systems may well be mobile on wheels or castors which would allow them to be moved into areas when needed and locked away in safe storage when necessary.

Essentially they should be capable of continuous expansion and there use by pupils encouraged by all members of staff.

There would be three main advantages to using such a system:-

- 1) It would be another way of encouraging pupils to find out.
- 2) It would relieve some of the minute by minute pressure on the teacher who needs to have time to

spend with pupils on a one to one basis if he is to be in a position to support pupils on individual design work.

- 3) It is another way of building up a background of information which can stimulate pupils' ideas.

Designers in industry are steeped in knowledge and background in their chosen field. They would know and have evaluated technically and aesthetically every other competitive product on the market. They would beyond this have an historical background of how various related products have developed over the years. Before they sat down to start work they would know precisely what problems they faced in designing the new product and have ascertained the likely areas where distinct advantages might be created.

The point is made not to suggest that we could or would want to build such a detailed background in a specific area, but to demonstrate that designers do not work in a void but from a solid base which has not only established their perceptions of the problem but has created the necessary stimulation of ideas. It is this that we must go some way towards if we are to make designing in schools a rewarding, demanding and stimulating experience.

Display — as a Stimulus to the Imagination

This base could be substantially broadened if DISPLAYS were consistently mounted in workshops and studios.

Many professional designers work or develop their ideas from observation, however remote this might at first appear. Much time is spent developing design students ability to see and be aware of all that is going on around them. Seeds of ideas can come from almost any source and simply from starting points from which the designer can build.

'The greatest nonsense is talked about the impossibility of making the student discover everything for himself; no one asks that he should learn how discoveries are made ... Always something noteworthy is first observed, then the chase begins' (Professor Armstrong).

The environment and the rooms pupils work in should form an essential base in stimulating pupils' awareness of the world around us and an area which is constantly used by members of staff to develop the aesthetic understanding of the pupils.

At present many workshops are devoid of any display material and what there is has often gone yellow with age and long since lost any impact it may once have had. The length of time material is on display is critical and we should be aiming to change at least part of the exhibits every week if we are to sustain pupils' interest.

Rooms need to be genuinely stimulating, we are after all asking pupils to be creative within these areas. Pupils' work and the work of outside designers and craftsmen and women are more obvious items to display. Less obvious is the use of almost anything from the natural or man made world, which shown in a selective way could stimulate interest.

Most importantly these displays should reflect the results of pupils' initiative. Displays on different topics could be mounted when pupils for instance exhibit the results of their investigation into colour, pattern or natural structures. These could be used as an invaluable asset to develop pupils' awareness of display techniques and form an interest point for other pupils, and a direct way of broadening pupils' awareness. Alternatively the teacher could start off a display which pupils were encouraged to add to with their own material. In this way children can become involved in shaping their environment.

Material could subsequently be remounted and stored in the resource system which again would reflect a direct input by the pupils.

As these displays and resources reflect the pupils' efforts it is possible that they are more likely to survive the ravages of the less responsible in the school.

It would be worth emphasising here that the whole purpose of mounting displays in whatever form, is to stimulate the pupils' imagination, provoke discussion and therefore form another starting point from which ideas may be generated.

Developing Ideas — Do We Do Enough?

If pupils have thoroughly investigated a problem, IDEAS will come because the parameters have been established.

We will have established a set of criteria by controlling the CONTEXT IN WHICH THE PROBLEM HAS BEEN DEVISED, and although this will inevitably have an effect on the solution, we should be certain that we are not in fact controlling the solution and leaving little room for a pupil to demonstrate genuine creativity.

The solution should not have been too restricted for there must be room for pupils to develop initiative by exploring a wide range of possible solutions, nor too open leaving the possible solution without parameters.

The degree of control used by the teacher in directing the investigation will vary as should the method of approaching the solution. Sometimes it may be necessary to work logically and methodically, working through each stage at a time, because to work any other way would prove complex. At other times it may be appropriate to work in virtual confusion, by trial and error and in a purely experimental way.

Do we encourage students to get into confusion to find something new?

Do we allow practical improvisation?

Do we encourage students to abandon work which leaves them cold and be always ready to make a fresh start?

We are now asking pupils to create order by controlling the various aspects which have been revealed by their investigation.

How will they proceed? The pupils have been asked to consider two broad areas:-

- 1) What will their solution look like, ie. its appearance, shape and character?
- 2) How will it work? ie. in functional terms.

We have spent considerable time opening up pupils minds by investigating the problem, is this enough? Do we step back now and wait for the idea to flow?

Do we give enough help in these areas? Have we concentrated our efforts in a discernible area?

Have we equipped the pupil to make decisions about their designs or will these judgements be made on a purely arbitrary basis? Have we really opened up pupils' perceptions of a solution? Have we furnished him with the resources for coping with the difficulty in hand?

A difficulty is an indispensable stimulus to thinking, but sometimes they overwhelm, submerge and discourage. A large part of the art of instruction lies in making the difficulty of new problems large enough to challenge thought, and small enough so that in addition to the confusion naturally attending the novel elements, there shall be luminous familiar spots from which helpful suggestions may spring.⁹

We should now be concentrating on creating a set of known areas not

necessarily based on past experience but on a need to give a basis for the solution.

Perhaps we have been investigating the possible design of a clock face and considering ways in which many modern watch faces have been designed using colour and geometric shapes. Is the pattern an important aid to reading the time? Why have these particular patterns and colours been chosen?

Has it something to do with fashion? Why is fashion an important consideration in our design? Are the geometric patterns and associated colours connected to those currently used in fashion clothing?

Although the teacher may have started the ball rolling by using an illustration of a typical watch, he/she may well direct the investigation into various patterns/colour combinations used in teenage clothing. Photographs could be brought in by pupils from popular magazines which illustrate various pattern and colour combinations and might include examples of those in other cultures. These could then form the basic inspiration for the pupils developing design.

We have moved the research into an area of interest to the children, and have instigated directly relevant research, and we have formed a basis for each individual child to produce a clock incorporating a unique pattern based on an essential design criteria.

We have not solved the problem, simply defined the parameters and context in which the design may develop.

Much design work still needs to be done.

Can my chosen pattern be transmitted into material suitable for the manufacture of the clock face? Should I only use part of the pattern, or a suggestion of the pattern?

What scale should the pattern have in relation to the clock face?

Do I need to use different colours or could I simply use the pattern and create different levels?

Are certain patterns/colours masculine or feminine, or will my solution appeal to both sexes? Do I need two solutions?

Does the pattern suggest a possible shape for the clock face itself?

Can the shape of the hands relate to the face and/or pattern/colour used?

Does the face have to be flat?

The teacher is here acting as a catalyst for possible approaches, he is constantly opening up opportunities and casting light on the situation. He/she is facing pupils with real design decisions, having created a solid base from which a solution can be approached.

The problem is the right way around ie. Here is a fabulous idea, how am I going to make it?

Much has been written about the problems of related levels of skill having to be appropriate to the problem.

If ideas were all that matters we should stop at nothing to help pupils to realise their ideas.

Students on design courses in Polytechnics will in some cases use technicians to make up a part or the whole of a proposed design. Indeed the Royal College of Art use a similar approach with their industrial design students.

Some students will however be preparing to set up as designer/makers and have developed as highly skilled craftsmen and women. However for both groups the problem is the same. How can I find a way to realise my ideas.

Designers in industry will spend a vast proportion of their time in liaison with other departments attempting to find ways to make a required product. They do not necessarily start from the basis that here I have a machine which I know is capable of this or that, but from the point that here I have an idea which I suspect is commercially viable and is there a way of making it on this machine? Or does it involve us in considering a new machine or a new technological process? Or if we have not the ability can another company produce the component?

Whether a machine is used because it has a known capability or if a whole new approach to that machine is necessary, the objectives are the same, which are to find a way of realising an idea.

In schools it would be appropriate for a technician to assist in the realisation of a pupil's idea especially in areas where a pupil lacked a particular skill at that moment which would otherwise prevent a good idea being implemented. It should be possible to use the expertise in the department in an attempt to find a way in which the child may realise his/her idea. Beyond this a child may be guided to consult other departments, people with particular expertise, or outside agencies, even local firms.

We are after all in the business of developing pupils' ability to overcome problems and this may well include the initiative to use and explore various avenues in resolving an idea.

Communications — Who Are We Communicating With and Why?

The Lincolnshire project has suggested that any course must satisfy certain criteria of which the following is an extract. 'To heighten pupils' natural capacity for building images of things and systems in the mind's eye, for manipulating these images in a constructive and analytical way and for conveying them through a variety of means, such as sketching, drawing, diagram making, constructing, calculating, writing, speaking and so on'.¹⁰

Are we in danger of missing the point?

Are we simply conveying images?

Who are we conveying these images to?

All methods used in the communication of ideas, whether they be graphic, verbal or written are means of visualising or articulating a problem or a solution?

Designing can only take place in stages as our perception of an idea develops and this relies on a child's ability to visualise or articulate each proceeding stage.

We are basically communicating with OURSELVES!

Sketching, drawing, writing, speaking, etc. are basically methods which help designers develop their ideas. Although we should never ignore the fact that we will need to communicate these ideas to another party, we should also be aware that it is of secondary importance. If we accept that ideas are important we should also realise that each child may require a different path to follow, and although we must attempt to develop skills in all areas we should ensure that we are not creating an insurmountable barrier for a pupil to climb, by using an inappropriate method.

If we are looking to promote an individual pupils' ideas this will mean spending time with each pupil on a one to one basis which demands a high degree of classroom organisation.

It is part of our roll as teachers to widen pupils' perceptions of possible lines of thought which may lead them to a solution and to help them to choose an appropriate method of communicating their ideas to themselves and others.

How can we do this?

By what criteria do we make this choice?

J.C.J. would suggest that 'You choose whatever method will tell you what you do not know, but need to know, in order to proceed'.¹¹

This concisely describes the reasons for choosing a method and emphasises the fact that designing is a continual process of development.

'In industry communications are usually concerned with three forms of language, written, oral and practical. We cannot say that one form of communication is better than another, but rather that the various forms are suitable for different needs.'¹²

If pupils are to develop their ability to choose an appropriate course of action, it is important that they understand WHY they might use a particular technique, for instance WHY sketch?

Do pupils understand why they might use sketching as

- 1) A means to perceiving or visualising their ideas and
- 2) A way of telling someone else what their idea is about.

'The freehand sketch is of great value in preliminary planning and design in which we want to prepare formal technical drawings. The rough sketches that a designer prepares in developing an idea may be seen as thinking on paper ...'

'One important function of the sketch is to help you communicate with yourself — to solve problems, develop ideas, understand concepts and relationships and create new designs. If you cannot adequately describe an object with words alone it will help you to use a sketch. The freehand sketch is particularly well adapted to work out concepts in your mind's eye as it is quick, easy, requires few materials and can be retained, reused and referred to later. Designers must often consider many possibilities, they reject, develop, evaluate and select as they solve problems or create products. To do this job effectively they must learn to sketch as they read and write — to sketch as they think ...' 'As a rule, design sketches are much freer and less refined than other sketches, but this does not imply that they should be careless or lacking in pride of workmanship. It means only that the major effort in drawing them will be clearly to express ideas rather than to perfect an ARTISTIC EFFECT'.¹³

Some pupils feel that they cannot sketch. This is a barrier we must overcome, we need to teach pupils how to sketch.

However if sketch is a difficulty we must reduce the problem to achieve goals.

If we are looking for ideas does the quality of the sketch really matter? It matters only in the sense that it becomes more difficult for the pupils to communicate with themselves and the teacher and somewhat harder therefore to move to the next stage.

Professional designers would in many instances be loathe to show other people these rough sketches as they simply represent to them their thoughts in visual terms before they have started the process of selection leading towards a firm proposal. It could prove inhibiting to show other people what in fact represents the wanderings of the mind.

Do pupils know why they might use colour or shading? Whilst accepting the usefulness of these techniques, is their use:-

- 1) Helping the pupils perception of their idea?
- 2) Helping someone else understand their idea?

If it is not its use is purely cosmetic?

Does it really matter HOW MANY ideas a child has when we are presumably looking for a good one?

A professional designer might spend days chasing around a problem without seriously coming up with one good idea, whilst on another occasion ideas may come tumbling forth in profusion.

Do pupils understand WHY they might use the written word when sketching? Is its use helping to clarify pupils thinking and so further enable them to develop their ideas?

Do teachers really encourage pupils to talk about their ideas with fellow pupils, interested parties and experts in other fields who may be able to help? — 30 seconds spent in discussion may be enough to cast another perspective on the situation and spark a new chain of thought.

Do teachers talk to individual pupils with the aim of widening their perceptions of the problem/solution, as a matter of course?

A teacher in this context is like the conductor of an orchestra, he is controlling the situation, drawing out responses, moulding and shaping the overall effect, providing inspiration and direction, what he/she is not doing is playing the tune which is most definitely left to the members of the orchestra.

A model or mockup can in many circumstances provide more information about a proposed design than many hours spent sketching. Even for a professional designer their comes a stage when conception of an idea on paper becomes impossible and it becomes necessary to build a mockup of bits, parts, details or whole items, for the purpose of clarifying the designers perception of his/her developing idea.

Professor Bruce Asher 'sees parallels between notation as the language of science, the natural language as the language of the humanities, and the language of design as modelling'.¹⁴

It is a hands on experience, a first realisation and the first time we can view our ideas in three dimensions and to scale. A point to assess our ideas, apply judgement and consider the next move.

It would be worth at this state repeating J.C.J.'s suggestion 'That you choose whatever method will tell you what you do not know, but need to know, in order to proceed'.¹⁵ There can be no finite way forward, it may be necessary to go backwards, even to start again and it may be necessary to fluctuate between modelling, sketching and discussion as the need arises.

'One is always free to swap courses (to redesign the design process) if what one learns on the way shows that one is on the wrong track ... This course swapping is very likely to occur, designing being so informative an activity. If it does not happen then perhaps it is a sign that ones aims are too modest'.¹⁶

Two further points:-

Do pupils know why they might do a working drawing?

Is it helpful in resolving a pupil's idea?

Who is the drawing for? We are not after all in the business of instructing others to make up our ideas.

Is it necessary to do a presentation drawing? If it is done WHO IS IT FOR and what purpose does it serve? We are not having to sell our ideas to an outside agency prior to the design being realised. However if we are not realising our idea in any other way it might be one way of showing how our idea might look if it was realised.

Developing the Solution — A Continuous Process

When we look at manmade products we can be amazed and left wondering HOW SUCH ACHIEVEMENTS HAVE BEEN

MADE. If we are not careful this can enshroud an object in mystery. But we do need to see things in context and realise that the particular solution has been achieved after a lengthy investigation into what has gone before and a long and exhaustive development programme.

The time spent on developing an idea in industry would in general constitute a far greater proportion of time than that spent on the original idea. WHY?

Firstly we are working with an item in three dimensions often full size or in the form of an accurate model. However brilliant the original idea it is at this stage that the hard work takes place. Every facet of the solution will be considered, evaluated and the weak areas isolated. The consequences of action will be considered, ie if this is done will it affect that? Actual materials will be used rather than simulations and the whole project will gradually be drawn together.

Designing is a continuous process, it is an exciting and on going experience calling for constant reappraisal.

At present the emphasis in schools can be towards having an idea and realising it, rather than seeing the idea as the beginning of a development. Placing the emphasis on the latter would increase the time spent in actually handling the idea in three dimensions and decrease the time spent on initial two dimensional work and puts more emphasis on a 'hands on' experience and anticipates that it may well be easier for pupils to assess and develop their ideas from a three dimensional form.

If we are concerned with the development of a design, do we ever examine and evaluate existing design solutions, such as manufactured products, with the aim of demonstrating to children just how many and what sort of design decisions have been made in arriving at a particular solution?

The sort of discussion that might revolve around a particular product such as, for example, a packet of 'After Eight Mints' might be as follows:-

Were the chocolates aimed at a particular area of the market?

For what occasion were they bought?

How was the name arrived at?

What does the name imply?

Why not 'After Sevens' or 'After Nines'?

Why chocolate covered mints?

What criteria were used in arriving at the size and shape?

Why are they individually wrapped?

Why not completely wrapped?

Why use a clock symbol? Why an old clock?

Why do you think the colour combination of gold lettering on a green background was used?

Is the shade of green critical?

Could other colours have been used?

Does the colour of the inside of the box matter?

How will the box open?

Why remove the chocolates from the top and not the end?

Is there any justification for naming each individual wrapper?

If the manufacturer set out to sell expensive chocolate has he succeeded?

Whilst accepting the example chosen may not come within the range of the pupil's own experience, it is nevertheless a good example for this particular discussion because it shows the range of choices the designers had to make extremely well. This sort of examination could be an invaluable way of demonstrating HOW and WHY design decisions are made, it could be made appropriate to all age groups and to a varied range of products. It would be a way 'To heighten children's awareness to the world around them and develop their sensory enjoyment of it through first hand experience'.¹⁷ It would also form a technique for teaching pupils what sort of considerations are involved in both designing and evaluating their own work.

Evaluation — Basis for the Next Move

We are in a unique position in CDT as evaluation is a real possibility within an area where there are no right answers. In fact NO can be as useful an answer as YES in determining the next move.

Is the process of evaluation misunderstood? For it is NOT simply something to be attempted on completion of a particular design project, as by then it is too late to act upon the issues that have been highlighted.

EVALUATION should start the minute there is an idea to evaluate, and progress to be a constant ongoing and vital part of developing an idea. We should encourage pupils to evaluate their own particular response to a design problem and use this

information as the basis for developing the next move.

A positive criticism given during the development of an idea gives the child the opportunity to rethink, whereas at the end its effectiveness is likely to be reduced.

It can be a pretty painful experience to find out at the end that what appears to be an attractive solution is not in any way functional. The problem should have been considered at a much earlier stage and the design modified to accommodate such limitations.

It would perhaps be worthwhile for a pupil to keep a record of WHY decisions were taken during the progress of a design which could later be the basis for any final evaluation.

EVALUATION can only be carried out if the criteria by which judgement is to be made is known and this depends, as already discussed, on a thorough knowledge and understanding of the original problem having established distinct guidelines.

Our methods of evaluation should be flexible to account for the variations in a child's approach to realising ideas. For example it might be that the child has so internalized the decision process that he produces an idea without producing evidence to back it up. Whilst another child may have to make use of every aid to stimulate imaginative thought.

However, if as we have argued CDT is primarily about ideas, then it is the evaluation of these ideas which should concern us. If for instance we have asked a group of children to produce a piece of creative writing, that is exactly what we would be looking for. If it is badly written and poorly spelt, but genuinely suggested some imaginative thought, we should be prepared to assess this highly. If in addition the work was well written and correctly spelt this would be a bonus which should receive extra recognition.

In CDT the depth of research, the thoroughness of the investigation, the quality of graphic presentation and manufacture, whilst being important areas where ability should be developed in a child and recognises, it is the quality of the idea that should command our attention.

We are looking always for pupils to not only grasp the technology but to use it in a creative way.

Conclusion

It has been suggested that the teaching of CDT should be ideas oriented, not skill oriented and some possible ways of stimulating imaginative responses have been discussed.

To achieve this teachers need a thorough understanding of all areas of the design process and the flexibility to direct children to take on an appropriate approach in finding a way to solve their particular problem.

We need to be careful that traditional subject definitions are not simply artificial barriers, for we should simply be providing children with the ability to choose or appropriate material in which to resolve their idea.

CDT is a relatively new subject which is still struggling to find its feet and justify its existence in the curriculum for all children. CDT teachers have an opportunity to make this an important part of a child's experience, if we get it right. It is for this reason that it is vital that teachers understand the emphasis in the presentation of design before we run the risk of alienating our best brains.

At present we have just three years, if we are lucky, while children spend a small amount of time in the CDT department as part of 'the circus' before options are made. This time should not be used simply, to develop skills, but to fire imagination, stimulate interest in all children and to present CDT as an exciting challenge where they and their ideas are valued. Our aim 'To win the hearts and minds of children',¹⁴

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