Design and content

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We need to classify the large number of things we teach (just as we classify large numbers of anything else) because the smaller sub-groups are easier to deal with. Once a classification has been made and used however, it does tend to stick. We often get to think that things *are* classified like this. We do not look for possible revisions of the classifications although we would be ready to look at revisions of a scientific principle or of a teaching method. When we get used to particular names for these sub-groups we also resist changes in usage or terminology: they are very upsetting. Change in nomenclature is bad enough when it is a simple replacement of one term by another, as for much of the recent revision of the terminology of chemistry, or the big rationalisation of terms undertaken for the Textiles Industry.[9] It is however much worse when the change in meaning is small and subtle. I am going to suggest in this article that our present rather vague classification into design and content ('the rest') should be replaced by one that is slightly more complex. Please bear with me. I know that 'design v. content' has all the attractions of simplicity and of flag-waving for the once-neglected design element. Nevertheless, I feel it can be improved, i.e. made into a more useful tool for teachers discussion and thinking. *Please* read on!

There has been a parallel classification in science teaching, into 'process' or 'process skills' and content. E.W. Jenkins has recently[1] described the popularity of the idea of 'process skills', e.g. their adoption by the APU and for GCSE. He has suggested several reasons for this and especially for the current emphasis on 'process skills'. For example, if we concentrate on such skills and do not concern ourselves with content, pupils of all levels of ability can be seen to classify, observe, etc., though they may merely be classifying nails according to country of origin, and doing no science of the kind once taught. This is one reason for Jenkin's objection to the classification, and several other school subjects have the same problem. Indeed, I shall be giving most of my reasons throughout this article in terms of Aquarian Home Economics, not science, CDT or Design. This is because I have more detailed experience of this area and because Aquarian home economics is a technology in the sense that products are designed, made and evaluated for a definite use with science concepts used as an essential tool. The Aquarian group of teachers constantly examine and analyse both teaching methods and reactions of pupils and teachers to these. In our experience the 'design v content' classification is often unhelpful, as will be described below.

What is wrong with 'Process' or 'Design' v Content?

Jenkins wants to remove the 'process skills v content' distinction. He finds, as we do, that the 'process skills' do not have the usefulness, as a teachers concept, that has been claimed for them. The first weakness lies in the fact that process and content are in practice completely entwined. As described in an earlier article,[2] we have found that pupils skill in thinking out problems for themselves is very dependent on whether the teacher has provided useful and usable general principles and concepts which help with those problems. When the only content available was a deficient, too-high-level and often inaccurate, even unsound 'science', pupils 'skills' were limited to selecting 'recipes' on inadequate grounds and without real discrimination, and following them in exact detail. They could not therefore cope with new products or new dietary demands unless told exactly what to do. Our new content, which took a long time to work out (more detail below) transformed the situation. I do not think we are likely to see such a 'real life teaching experiment' in the CDT area, because the content seems to have been well worked out and is readily available, but there may be scope for improvement in some other areas. In graphic design and the aesthetic aspects of textiles work, for instance, many teachers are merely allowing pupils to 'absorb' important aesthetic values but we have reason to think that a clear approach and an agreed vocabulary about colour relations could revolutionise ability to use that aspect in design, without in any sense imposing an 'adult aesthetic'.

The intertwining of process and content is also showing up very clearly in the attempt to produce grade-related criteria instead of norm-related criteria for GCSE. Every published attempt has shown that 'skills' at each level must be defined in terms of the concepts that pupils are expected to use. Scotland has definitions like "commonly available, easy concepts" for home economics. In science, a list of basic concepts has been suggested.[13]

The other chief weakness of the process skills approach is that practising scientists deny using it as laid down in teachers texts, just as I, when practising design for books, TV series, etc., also never use the so-called design process.[11] It is a mythical simplification for teaching purposes, and may or may not be the best starting point for pupils: it needs to be looked at, not just accepted as being the basis. It caused me to reject the whole idea of teaching design for many years, and I only saw a glimmer of light when I read J. Christopher Jones.[3] He talks in terms of design methods (which are really tactics) and he recombines these tactics in different ways to produce a different overall strategy for each design problem. This is an exact parallel to the approach that has been worked out by Aquarian teachers[5] for food studies. They teach separate skills such as sequencing or scheduling; time planning; portioning; use of criteria for decision making; evaluation (subdivided into appraising a product against criteria and reviewing and assessing personal progress); and skills of co-operative working (such as sharing tasks, pooling and criticising ideas in discussion, securing unambiguous terminology for discussion.) This was done by focussing design-type work on one skill at a time, not by teaching in theoretical isolation, although for the purposes of this article we are discussing these skills in isolation now. The interweaving of this tactics-teaching into the problems and design briefs pupils require (Design A, described below) has been particularly difficult for food studies because of the amount and complexity of difficult content (Content A, below) that is needed if any useful work, relevant to free living out of school, is to be achieved. The skills and tactics learnt form a bank that can be used later for developing strategies needed with complex food problems.

Chronological Stages Mistakenly Called Skills

Jones' design tactics rang a bell with me: I had been using several already and had found Alexander's Principle in his own book. Our separate tactics rang a bell with teachers: pupils could use them. But now the crucial point: they did not correspond with the chronological stages of the design process. I believe that these chronological *stages* have in the past been mistakenly taken as an analysis of the *skills* involved, merely because teachers have not had time to analyse the skills effectively. The weakness of using the obvious chronological processes is illustrated also by the stultifying effects of trying to teach skills like observing and classifying in science, and also by the fact that the Science APU had to subdivide the process skills originally suggested in various ways, for actual marking of work, and then put them together again to look like the original. The GCSE National Criteria for home economics similarly lists the stages of the design process as assessment objectives, but in practice the marking of pupils work is not made on this basis, it is merely cross-checked afterwards. Skill in the use of criteria, or of the concept of fairness for comparative tests might for example come into two of the stages.

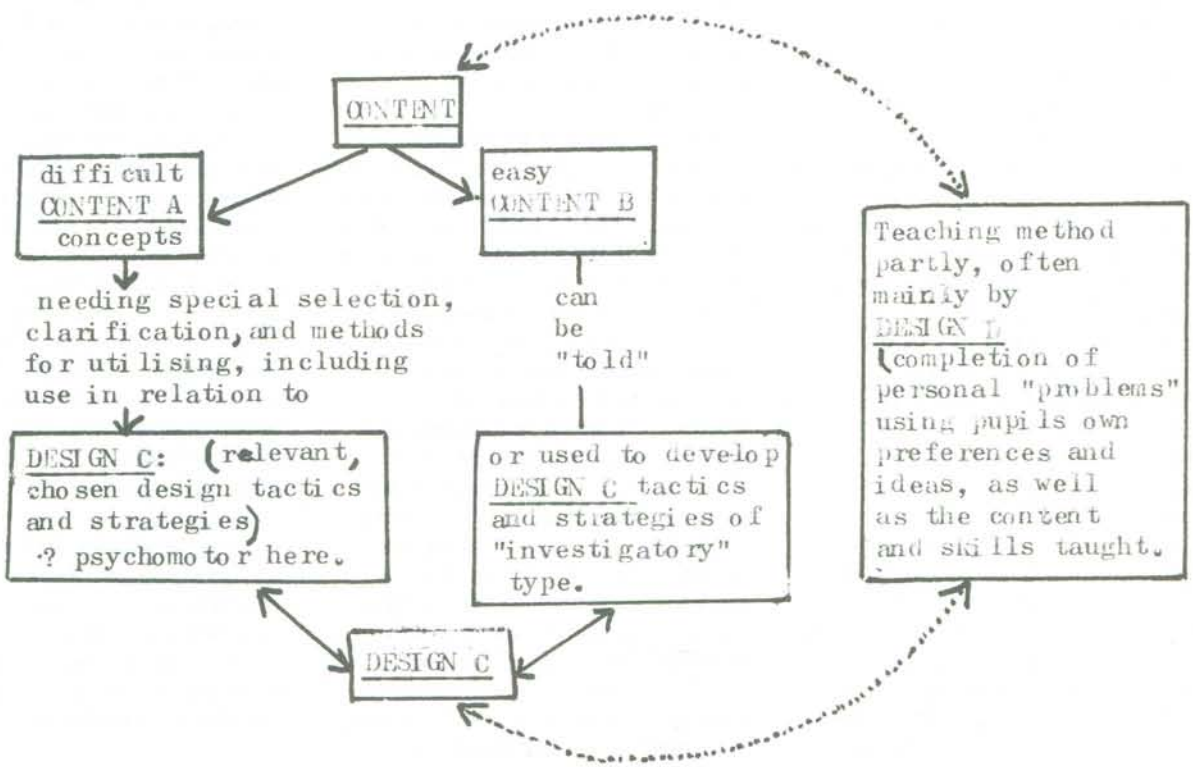
Nor are these chronological processes very helpful in teaching Aquarian food studies, because you cannot use many of them to talk about, discuss, practice, correct and assess, with pupils. When the School Natural Science Society published their list of primary science skills,[6] they similarly found it necessary to include some quite different skills such as 'checking', which really *can* be taught to children and discussed with them, both as an attitude and by practising a list of suggested tactics.[7] A similar use can be made, at higher levels, of the tactics decribed by Jones, or, at a much lower level, of the list of cognitive functions worked out by Feuerstein for teaching to deprived pupils.[8]

Jenkins wants, in consequence, to get rid of the 'process approach' to teaching science. This perhaps goes too far, and I have never met anyone in the design field wanting to get rid of the design approach, though many dislike the 'design process'. The science problem may in the long term be solved by *modifying* the list of 'science process skills', searching out more teachable skills such as checking, or even going back to the old way of teaching the 'scientific attitude'. The design and technology problem is perhaps more complex but we might get on to the right track by altering our fundamental design v content classification slightly, as will now be described.

A New Classification

I suggest first that we divide content into two sections. The first, Content A, consists of concepts which have to be taught carefully because otherwise children can misunderstand, mis-grasp, fail to grasp, or fail to utilise them. Utilisation is important: we do not count a concept as 'learnt' until pupils can put it to practical use: understanding is not enough.[4] We have found that concepts become difficult depending on Piagettian stages (level of abstraction and complexity)[10] but also if they are 'strange', i.e. difficult to fit into the framework of ideas pupils already hold. This may be because of insufficiency of prefiguring experience or because the idea runs counter to commonsense, to desires or to folkways of thinking, and needs 'getting used to'. These difficult concepts will be different for different pupils and for different areas of subject matter. 'Teaching' is here intended as shorthand for 'enabling pupils to learn'. Quite complex methods have to be used. We have worked out

DIAGRAM 1



some general guidelines for the concepts we teach in Aquarian Food Studies, and these apply also to Textiles. The methods include understanding and clarification by specially devised 'practical work for understanding', with discussion, solving and discussing uncluttered 'puzzles' and finally solving 'real life' problems where several other aspects confuse the issue. All this means that design tactics and skills are used in relation to these difficult concepts of Content A, as shown in the diagram.

The remainder of the content (Content B) consists of relatively simple facts etc., which could easily be 'told', read, or found by observation and testing. We tend to sue this group of simple ideas to promote development of 'investigatory' skills such as pooling ideas in discussion, finding out independently from libraries, computer memories, by observations and by tests and trying out. Jenkins has pointed out[1] that computer memories only deal satisfactorily with Content B. It is possible that many of the teachers who advocate teaching of design without reference to content are not facing up to the existence, as a teaching problem, of Content A. They either use exclusively B type Content, as do some home economics teachers, or they are evading the proper *teaching* of difficult ideas, leaving pupils to 'absorb' them or to try to learn them without the special assistance we find necessary.

The practicality of this subdivision of content is also supported by the fact that until a few years ago a quite different basic classification was in use by many workers in curriculum development, especially for primary schools. 'Content' then included both important concepts and important skills, which were to be taught via 'material'. Material was facts and 'topics' which might be of current interest, and even useful as teaching gimmicks, but were deemed less important, more trivial, than the basic of the syllabus. For example work on fractions or on language might be undertaken via a class visit to a bakery. Our new subdivision will also explain clearly what went wrong when Design Faculties in schools at first achieved (superficial) co-ordination by choosing common themes or topics for each half term, e.g. when CDT, Textiles, Food and Design departments all 'did dogs' or 'did France' together. The 'material' (Content B) was mistaken for Content A and Design C.

Implications of Facing Content A Teaching

The difficulty of teaching Content A concepts clearly, getting them clarified in the face of common misgrasp, and getting them utilised, has meant that Aquarian home economics cuts down on the number of concepts taught in the early years, and selects them carefully. They are not selected unless we are sure they will have uses in several different areas or are essential to a satisfactory life, and we aim explicitly to 'transfer' these concepts to other areas. The rules governing what was called 'transfer of training' were worked out at least forty years ago. Further, we have subdivided many concepts which are usually described by a single name, e.g. energy, proteins or eggs, into several different

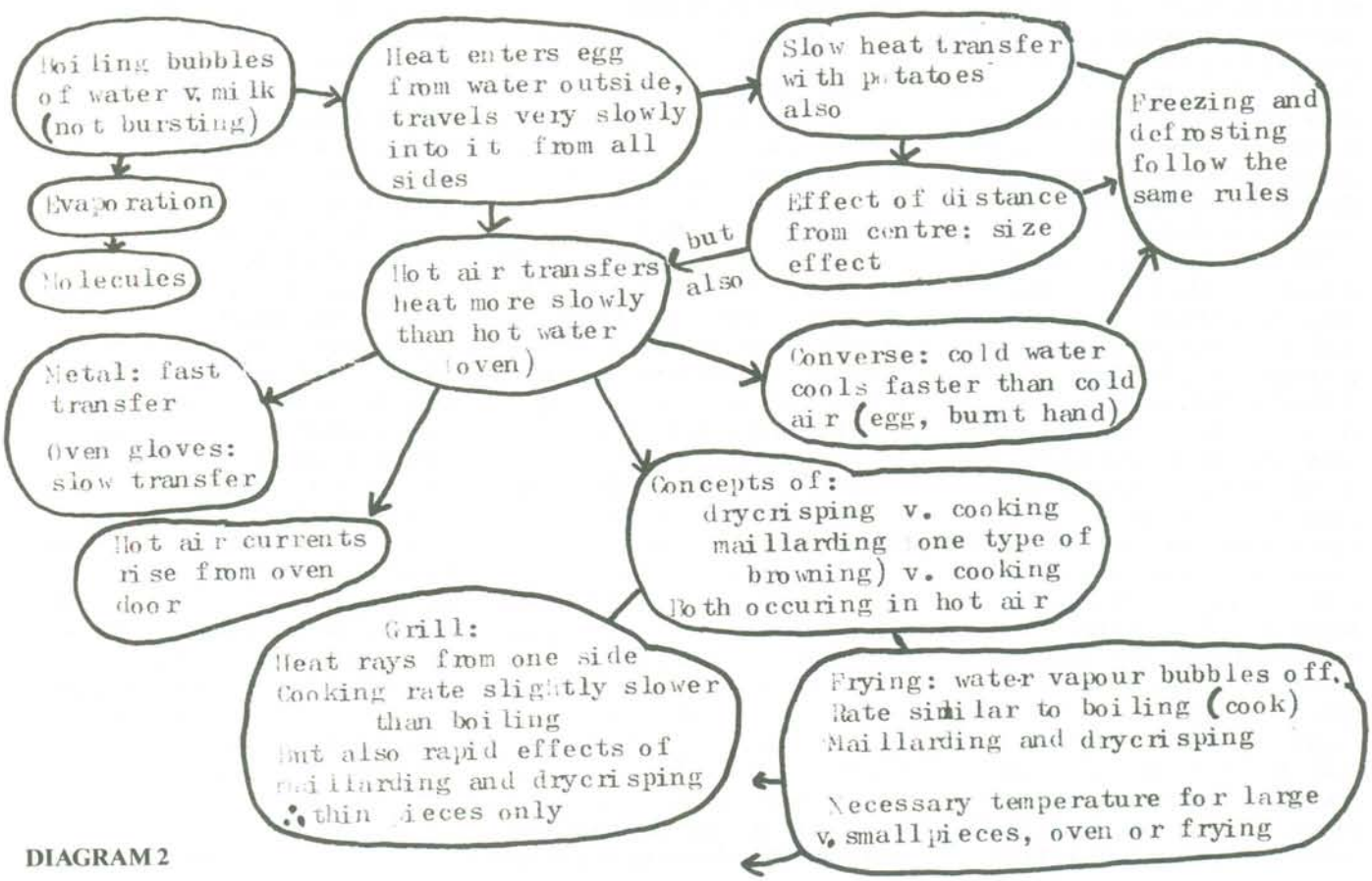


DIAGRAM 2

'facets' and we decide carefully which of these to include, and in what order. This work has all been part of the 'development of new content' described above. The order of teaching depends on pupils ability to use the concepts and facets of concepts, but also on the forging of links between concepts, so that useful frameworks can be built up early on, as distinct from separate 'messages'. Diagram 2 shows an early stage of a framework relating to the slow transfer of heat through food.

Subdividing Design Teaching

We find that for our technology subject we have to divide our aims into two different facets of design teaching. I do not know what would correspond to this in science teaching, but maybe science teaching will in future be based on technology for all junior levels.

The first design facet (Design D) is the idea of pupils taking a task right through from start to finish, including some evaluation, and of ensuring that the task is one they have real heart for because it has been chosen to be personally important, but also by ensuring that pupils think out for themselves, use their own ideas, to some extent all along the line, though the extent of teacher input will vary. Maybe this is what 'design people' really mean by the 'design approach'. It has many important educational values beyond the teaching of design: I need not list them for educationists.

The other aspect or facet of design teaching is, I believe, the teaching of certain selected, useful design tactics or skills. They correspond to a very limited extent to some of the old chronological skills of the fixed 'design process' *and* the 'science process': we find that home economics has a big investigatory aspect as well as the conventional design aspect. Some of these skills could be called attitudes: effective application of an attitude is a skill, and we can have skill in using a tactic. Perhaps this view would satisfy Jenkins. But a new selection of tactics, skills or attitudes will have to be made and this is slow, grass-roots work. Teachers start with hunches and select for general use those skills etc., which they find they can teach, discuss, improve and assess with pupils, to the pupils advantage. We find exchange of ideas within a group of teachers to be essential. The old list has to be winnowed out. Although GCSE assessment is pressing, we are finding out what parts of our teaching scheme are working for pupils and what parts need altering because they do not enable pupils to cope. Feuerstein[8] started by trying to see exactly where pupils failed in tasks that other pupils managed, and he arrived thereby at his famous list of 'cognitive functions', really tactics and skills, that were worth teaching to pupils who were failing. Vocational guidance often uses a similar negative approach. Maybe we should do the same. Perhaps we should not bother at first about accurate assessment: a three point scale, 'Can cope', 'Brilliant needs stretching' and 'Needs help' would suffice, and would also suit the demand for grade-related v norm-related criteria. All assessment of this kind would inevitably relate only to assessment of that skill or tactic in relation to the content pupils are currently learning, a problem already faced by the committee producing GCSE grade related criteria for science.[13]

Some Specific Skills: Values

Craft skills such as wood carving or using a domestic cooker or a burette, which we now usually call psychomotor skills, can be regarded as a separate list of things to teach or as techniques, i.e. skills and tactics which have a very narrow range of application, as compared with most of the design skills and tactics we would select for teaching. It is not always important to assess the amount of manual skill and the amount of understanding needed to push the right buttons. We are trying out ways of helping pupils to learn new techniques when they need them, because this is a problem constantly facing home makers. We are trying out a list of rules for the learner,[12] but the teachers attitude is very important.

We have pondered Archer and Roberts 'design thinking'[2] and decided that our pupils are not doing this in the full sense in junior work for food studies: they are unable to master all the required concepts and tactics to operate them all at once, and we often focus on making a single choice or decision, or take pupils through a series of decisions, one at a time. By the end of their third year pupils should in many cases be able to do the 'mental juggling' necesary to check the effects of possible planning in the many different aspects required: time, equipment, cost, flavour, various nutrition goals, but we are trying to develop tabulation methods etc., which can fulfil the function of the preliminary drawings and models of CDT and Design. Clarifying a complex or general brief into criteria must be added as a later skill, though 'healthy meal' can be given a fixed, learnt list of criteria by the end of year 3. This does not mean that we put off design thinking in the Archer-Roberts sense until the end of year 3. On the contrary, from day 1, pupils are asked for their small ideas for e.g. cutting an onion, getting spaghetti into a small pan, preventing the edge of Welsh Rabbit from browning. This is followed by thinking out whether this is likely to work and trying it out, maybe in 'pilot' fashion at first. This is really thinking of the same sort as the full-blown design-thinking, and is a very important precursor. This sort of thinking was indeed the starting point of the Aquarian idea: to make home economics into a 'thinking' subject. Perhaps this is not the end of the story, however. Lawson[11] describes how designers usually go quickly for a solution on the basis of a few criteria they think important, and *then* work in other criteria once they have a *rough plan to modify.* Perhaps we need to suggest which criteria students in food studies should start on: nutrition criteria, in the shape of the Aquarian Food Groups, have become a popular start for many situations.

Getting ideas about how to start and what to make is another skill we are exploring. Since discussion is such an important feature, many pupils are saved from complete lack of ideas by preliminary discussion as well as by use of books, displays, etc., (but this is a problem for GCSE). Brainstorming and Jones', 'classifying' (really *re*-classifying) also have potential. Teachers cannot expect original ideas to appear every time, 'to order' in a difficult field such as food study, but ethnic mixes and genuine originality can at least enrich choice, for the average pupil. An important skill to teach is avoiding panic decisions.

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