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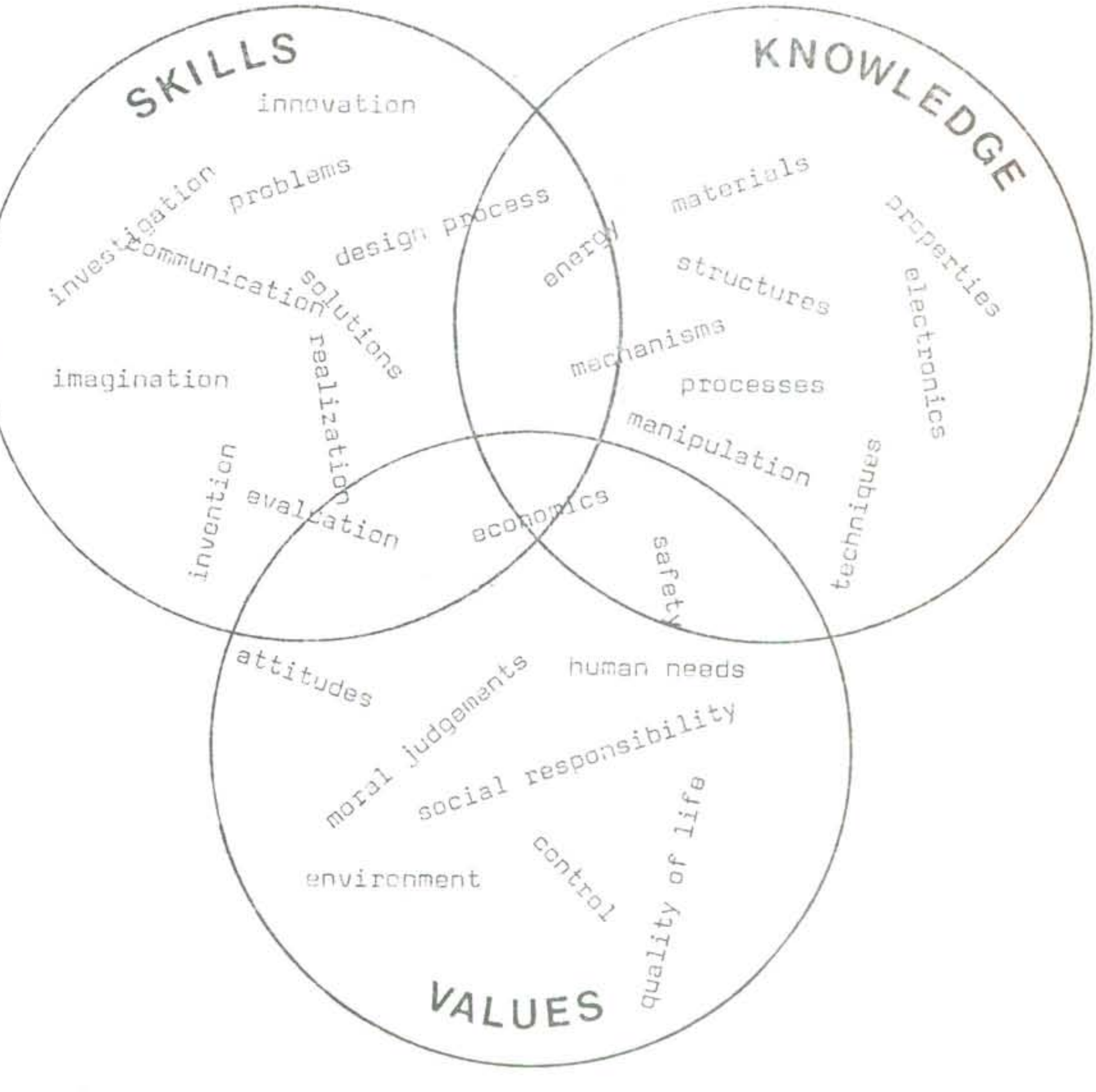
Starting Points

It is not possible to identify any single factor that might be responsible for the rejection of CDT subjects by all but a handful of girls. Societal attitudes which inculcate 'appropriate' sex-role behaviour in males and females undoubtedly play an important part in directing subject choice in school and career choice after school. Equally important, but less widely recognised, are the school institutional factors which reflect gender stereotyped assumptions and which lead to an imbalance in educational outcomes between boys and girls. These factors operate through the timetable and option systems, welfare and career guidance, teacher expectations, teacher/pupil interaction, teaching materials and the hidden curriculum generally. Some LEAs and schools are making determined efforts to reduce the influence that institutional factors can have on the differential pattern of girls and boys subject choice. However, as yet little attention has been given to the ways in which a subject area of itself – by what is taught, how it is taught and why it is taught – can create, in image and in practice, an ethos that is largely rejected by one sex or the other. This article examines the implications of a number of teaching approaches for girls' education in Crafts, Design and Technology.

In recent years some clues have emerged from educational research and from practice in schools which indicate the kind of technological activities that might be welcomed by most girls. Omerod (1979) found that girls who choose a physical science subject are likely to have a more positive attitude towards the social implications of science activity than those who don't. This factor did not seem to influence the choice of physical sciences by boys. Head (1982), from his work on the psychological aspects of subject choice, concluded that

'To obtain a major qualitative improvement to recruitment in science with more girls and with students possessing imaginative, flexible minds it would be necessary to make science more appealing

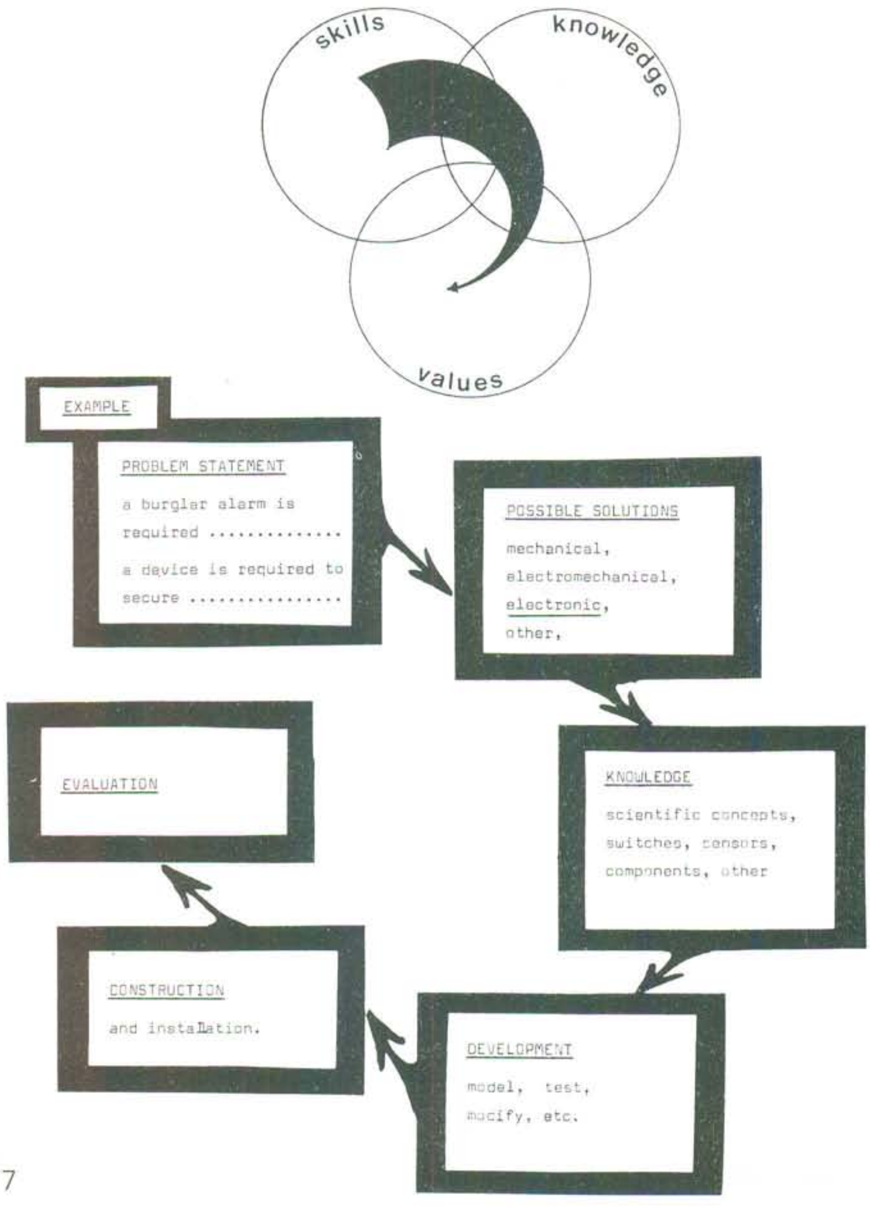
Figure 1
A model showing the three components which combine to constitute an understanding in design and technology



to boys and girls . . . The probable implication is that science would need to be presented in the context of the needs of society and individuals'.

The implications for design and technology are probably the same. Physics and Chemistry share obvious curriculum interests with CDT and they also experience a similar, though less acute, deficit of girls in option courses. The GATE project (GATE 1982) in a limited study of pupil entries in a national design competition found a difference between girl's and boy's design projects that would tend to support the view that a greater emphasis on the social aspects of technology in school 'design and make' activities would be generally welcomed by girls. However, of the three components of design and technological understanding – skills, knowledge, and values (see figure 1) it is the third that receives least attention in existing teaching approaches.

Figure 2
Design and Technology from problems



In traditional handicraft courses, the concern is principally with the acquisition of knowledge – knowledge about materials, construction and techniques. Although this approach is still widely practised in schools, it is seen by educationists as being largely irrelevant to the needs of boys or girls, and is being gradually replaced by either a broad based design approach or a structured technology approach. Both approaches emphasise the intellectual skills involved in designing and making in a technological context but neither have successfully managed to involve the values component in Fig. 1. It is assumed that by being involved in the practical solution of technical problems, pupils will somehow become aware of the impact of technology on society and society's influence on the direction of technological change.

Figures 2 and 3 illustrate these two approaches and highlight the components which are emphasised in each case.

In the 'Design and Technology from Problems: approach the emphasis is placed on problem solving and decision making skills. The starting point for any individual pupil or group activity is the presentation of a 'problem'. Typically it is stated thus:–

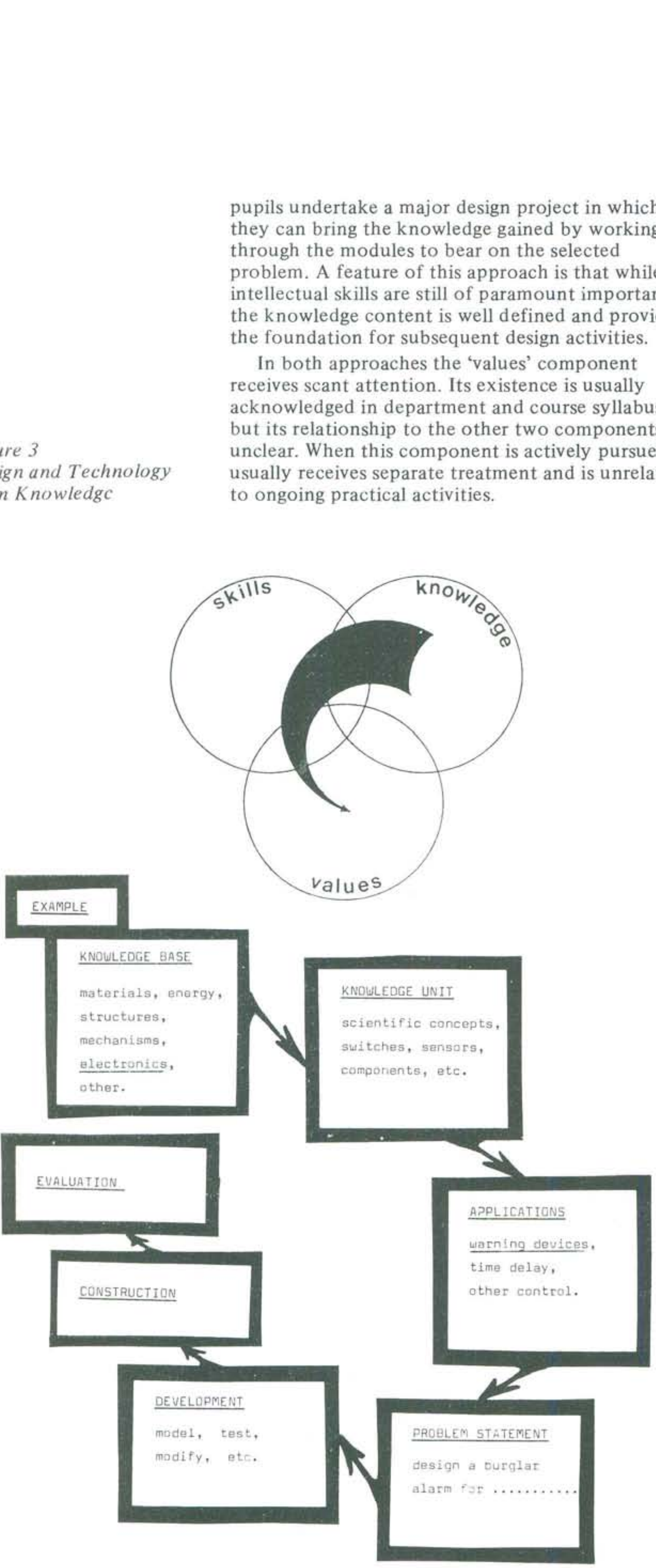
> 'A device/artefact/system is required to solve the problem of . . .'
>
> or
>
> 'Design and make a device/artefact/system that will perform functions XX and comply with specifications YY'.

Pupils are then expected to research the problem and offer alternative solutions. Through a process of investigation and discussion an optimum solution will be arrived at and this will be further developed with the help of models and tests. Following modifications, a device or system is constructed using the necessary materials and techniques and on completion is evaluated against the original specification. A feature of this approach is that knowledge of materials, scientific principles and motor skills is ill defined and is less important than the development of intellectual skills. The particular medium (be in wood, metal, plastic, electronics, etc etc. or a combination of these) in which the design process is executed is relevant only in so far as the most appropriate choice is made for the solution to the problem under study.

'Design and Technology from Knowledge' is a more structured approach and requires pupils to be given a grounding in a series of 'knowledge areas' related to modern technology. Three or four modules from a wide range (materials, energy, electronics, hydraulics, pneumatics, mechanisms, etc.) are selected by the teacher, and pupils follow a series of guided exercises in each in order to build up a knowledge base. After three or four terms pupils undertake a major design project in which they can bring the knowledge gained by working through the modules to bear on the selected problem. A feature of this approach is that while intellectual skills are still of paramount importance, the knowledge content is well defined and provides the foundation for subsequent design activities.

In both approaches the 'values' component receives scant attention. Its existence is usually acknowledged in department and course syllabuses but its relationship to the other two components is unclear. When this component is actively pursued it usually receives separate treatment and is unrelated to ongoing practical activities.

Figure 3
Design and Technology from Knowledge



In either approach the implications for girls' education in design and technology are the same. The subject is, and is seen as, largely concerned with technical solutions to technical problems. Technology's association with objects, things, techniques, scientific concepts, inventions and 'technical fixes' becomes its overriding image; and technology's relevance to people, quality of life, social problems and values become submerged and invisible. As long as the subject so continues to be associated with the impersonal and objective it may remain an anathema to girls.

A third approach – 'Design and Technology from Issues and Situations' – would change the emphasis from objects to people and from the impersonal to the personal (Figure 4).

In this approach the 'values' component is highlighted and is used to guide the designing and making activities. Instead of employing a 'problem' or a 'knowledge area' as the starting point to a teaching activity, an 'issue' is selected for study on the basis that it has some relevance to technology. Problems connected with the issue are identified by pupils (with the use of resource material such as newspaper cuttings, reports and film) and the appropriateness of technological solutions are examined. This will, of necessity, involve pupils in the making of value judgements about the nature of technology and in some cases could result in the rejection of the 'technical fix' and the proposal of social solutions. However, it is likely that some aspect of the issue or situation under study will be amenable to a technology input (in some cases this might come about through the redefinition of the problems exposed). Pupils can then proceed to designing and making activities with the knowledge that *their* work has a social relevance outside the school/workshop and that *their* moral decisions are controlling the direction of *their* technological activity. The approach – design and technology from issues and situations – would ensure that pupils had the opportunity of becoming fully involved in the design process, that they acquired knowledge related to materials and scientific principles, and above all, that they developed an awareness of the interactions between technology and society.

By giving full recognition to all three components – skills, knowledge, and values – Craft, Design and Technology can provide a better technological education for boys and girls and, at the same time, create a subject ethos that is, in practice as well as in image, more attractive to girls than most existing approaches and less likely to be regarded as a 'masculine' subject.

Author's Note
The example shown here – designing and making a burglar alarm – was chosen simply because it has become a popular project in schools and has been submitted in many variations to national design

competitions. Other examples would have served equally well.

For each of the three approaches illustrated by way of this example, a particular scenario is developed. It is not suggested that these are the only possible scenarios. In schools having a particular expertise in, for example, electronics, the outcomes of pupil projects will be influenced in that direction. Other schools may be particularly strong in engineering science and projects will be influenced in this direction. Either case would not alter the basic teaching experience outlined here.

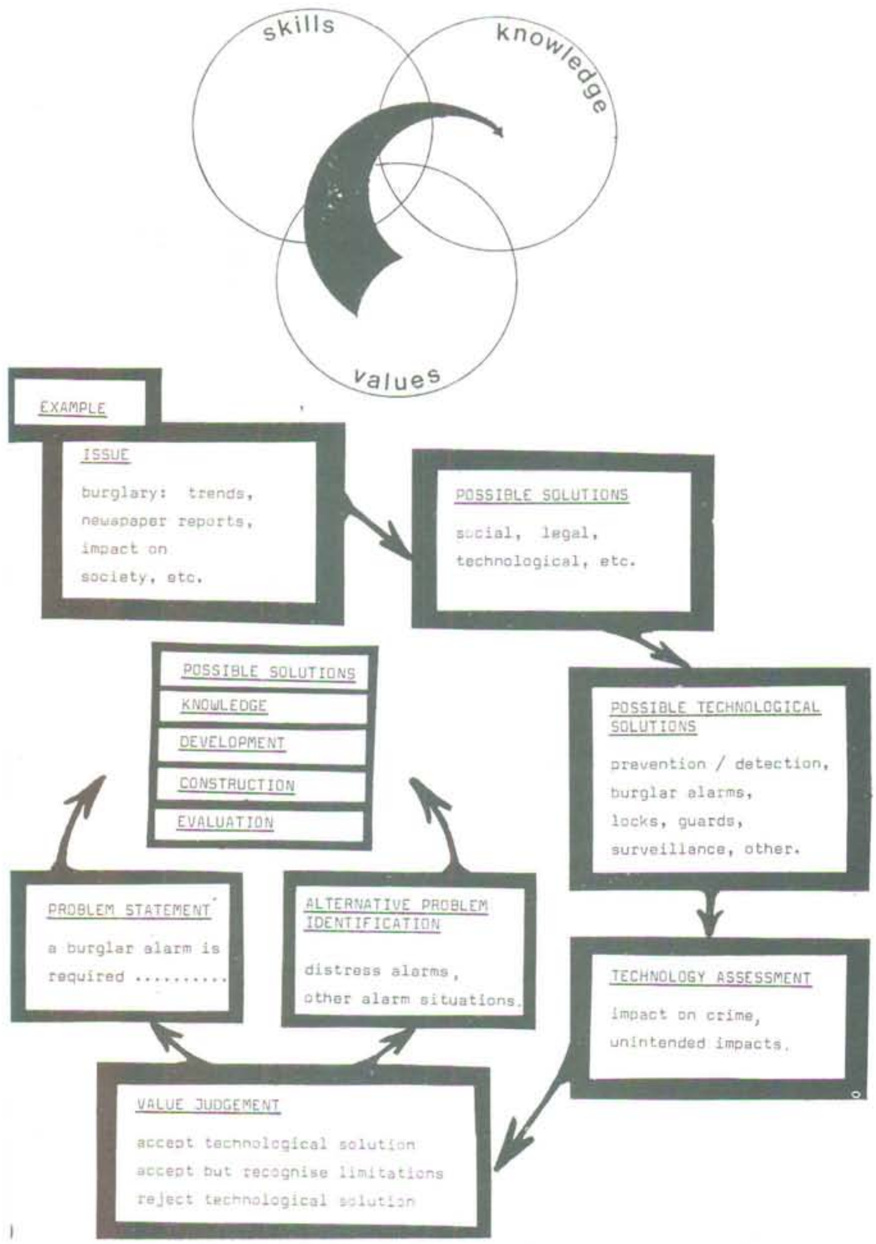


Figure 4
Design and Technology from Issues

References

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