# Working together, working alone: parallel projects for developing understanding

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*In schools, group work is common in D&T, but how easy is it to work in a team, and do adults need to practise team skills as much as children?*

As teachers, and as advisers of teachers, we frequently recommend that pupils undertake projects working in groups, both as an organisational stratagem and because we wish them to experience team working. Teachers usually have personal experience of working as members of planning and assessment teams, and many have had experience of work in teaching teams, but relatively few have had experience of being in teams to design and make products. Yet this experience may be radically different from work in teams with other objectives, particularly if the intended outcome is not a single product but a batch of products.

For this reason we consider it important that students should learn at first hand what group design work can be like. The students described here are in the second year of our Primary BA(Ed.), specialising in Design and Technology. One aspect of the course requires that they work together in groups to design and manufacture a product. The group size here is usually nine or ten, thus a year group will be organised into two or three teams.

## The Batch Production project

The structure of the project is as follows: in the third week of the project, each student produces a design proposal for an artefact to be made by the group working together. 'Production Day' for this is fixed for a single day in the final or penultimate week of the term, and each team of n students must produce a batch of n+l products on that day.

Week 3 includes an exercise through which the group arrives at criteria for choosing a design to develop. Each design is then presented by its author, and each member of the group rates it against the criteria. Aggregate scores are derived. The group is now in an interesting situation: they have collectively drawn up a list of 'rational' criteria, such as visual appeal, ease of construction, and so forth, but the highest-scoring design is not necessarily the one which becomes the final choice of the group. The criteria inform, but need not control, the choice. It has happened that the majority of group members prefer an alternative design, either because the balance of criteria is nearer an optimum, or because factors which are more subjective come into play. If the latter is the case, these need to be articulated in the group, so that a clear set of criteria whereby the choice is finalised can be presented. By the end of this meeting, groups must have arrived at a choice.

## Forming a team

They now need to form a working team for their batch production. What needs to be done? How can it be achieved most efficiently? How do we progress our individual learning targets through this project and also make an effective contribution to the group? How will communication within the group be ensured, and the effective working of the team be controlled, with everyone pulling their weight and making a positive contribution? Each group has regular meetings to monitor progress, to which a tutor may be invited if help is needed.

The teams progress on the project by modelling the ideas, refining and prototyping the chosen design, and preparing jigs and systems to aid the manufacture. Good ideas from rejected designs are often incorporated during the refining process. The process of team development is often an issue which is only recognised as stresses in the team demand attention, and the art of making criticisms while at the same time keeping the team together and on track is sometimes painfully learnt.

## Production Day

A great deal of detailed planning and preparation is undertaken for the Production Day itself. The team may be sub- divided into work groups, or a production line organised. Timings for various parts of the production process need to be estimated. Materials need to be prepared, and cutting and drilling jigs made and mounted ready for use. Some components may be prepared in advance, others must be made on the day itself. Batch Production Day is invariably and inevitably hectic, bringing unforeseen tensions (the paint doesn't dry fast enough, for example, or another team has booked the bandsaw) and some ingenious solutions to problems (last year one resourceful team member organised relays of students to carry the painted components into the ladies' loo, where the hand dryers could be pressed into service). The sense of achievement in completing the batch production is almost its own reward!

The benefits of carrying out a group project of this kind are manifold. Students learn at first hand about aspects of production management

'The dish ran away with the spoon': two examples from a batch of ten demonstrating a basic crank mechanism

which are not accessible through an individual approach to project work. They also learn, through the group process of criterion setting and the design 'competition', to apply greater rigour in their choice of personal project pathways. Of vital importance is learning to operate as a member of a team, and the concomitant understanding that a team cannot function well unless team members understand not only the objectives that have been set for their work, but also how to:

— manage group processes within the team
— deal with tensions
— express criticism and disagreement
— handle criticism and disagreement from others.

## Team evaluation

Students review their contribution to the team and seek the views of other team members on their contribution, as part of the self-evaluation process. Tutorial support includes seminars dealing with group processes, and tutors monitor the team process, which is taken into account in assessment of the unit. It is hoped that the greater awareness of the needs of teams and team members thus generated will assist these intending teachers in supporting pupils in team projects later on. Students are enabled and encouraged to learn from each other, to value each other's skills and ideas, and to seek advice from each other as well as from tutors.

## Individual projects

Until this year, the batch production exercise took place in the Autumn term. The term's units of subject work demand that students develop their own skills and understanding of mechanisms, and that they carry out design project work based on that understanding. The term's work starts with the stimulus of a museum visit to London, where the Museum of Childhood in Bethnal Green displays a wealth of toys, educational and recreational, old and new. The trip also includes visiting Paul Spooner's Mechanical Cabaret in Covent Garden, and students are both inspired and impressed by the range of creative possibilities which is opened up to them here.

Alongside the specialist teaching input, often using kit materials for modelling and testing mechanical systems, students undertook two parallel projects. The brief in each case was to design a 'tabletop' toy to stimulate children's interest in mechanisms — a fairly common project in many institutions. However, the projects had two distinct outcomes, of which one was personal, and unique, with relatively tight constraints placed on the design, while the other was constrained only by the requirements of the batch production.

Why do two projects in parallel? Discussion with students revealed a range of opinion, from those who felt that parallel demands offered them an opportunity to seek relief from one project in attention to the other, to those who found the simultaneous deadlines too great a

source of pressure. Observation suggests that learning from one did indeed support development in the other. Moreover, the time management demands of having two commitments of such very different natures confronted students more strongly with the need to prioritise activity, to set targets realistically, and to maintain commitment to targets and deadlines. Students were enabled, on the one hand, to achieve time savings in each project by carrying out similar tasks on each in a single working session (when sketching ideas, for example). On the other hand, it is only rarely that a mishap of planning or accident prevented a student from using working time effectively on both projects.

## Serial projects

This year, the two projects occurred for the first time in separate terms, with the introduction of a new structure for the BA in Education. This entailed some significant changes in the nature of both projects. The individual project continues to be tied to the theme on mechanical systems. The group project module is now freed from that particular constraint, but continues to involve batch production of a functioning system. The teams concentrated on designing a modular and portable display system for school/INSET use. It was certainly easier for the students to concentrate on the needs of the batch production, since no other project work acted as a distraction. Team functioning has on the whole been less difficult than in previous years. The quality of outcomes has been high. Whether the transference of learning from this into individual projects will be maintained, remains to be seen.