Using Inter-house Competitions to promote Technology

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Although technology is now a core subject to GCSE level in state schools, it remains an option in many independent schools and therefore has to compete with a wide range of subjects for talented pupils at exam level. This is often made more difficult by the mistaken belief that technology is a lightweight, practical and 'non-academic' subject. In order to raise awareness of the subject and to demonstrate that technology offers pupils the opportunity for creativity, intellectual challenge and stimulation (and of course, fun), we introduced an Inter-House Technology Competition.

The format of the competition is very similar to the Great Egg Race, and the idea of trying it out in school was prompted by a TV programme showing a high-tech version with teams of engineering undergraduates from universities around the world competing to produce the best remote-controlled garbage-collecting robots! Our competition was necessarily more modest!

Mixed teams of six pupils were selected with equal representation from Years 7–8, 9–10 and 11–13, and were given one full school day to complete a task given to them at the start of the day. Each team was provided with the same materials, tools and workshop facilities. The materials included recycled items such as plastic bottles and cans, Jinks construction wooden strip and various types of tubing.

The challenge

The task was to build a device that would be capable of timing an interval of up to six minutes' duration and to produce an appropriate signal at the end of the interval. Teams were advised that their efforts would be judged in the following terms:

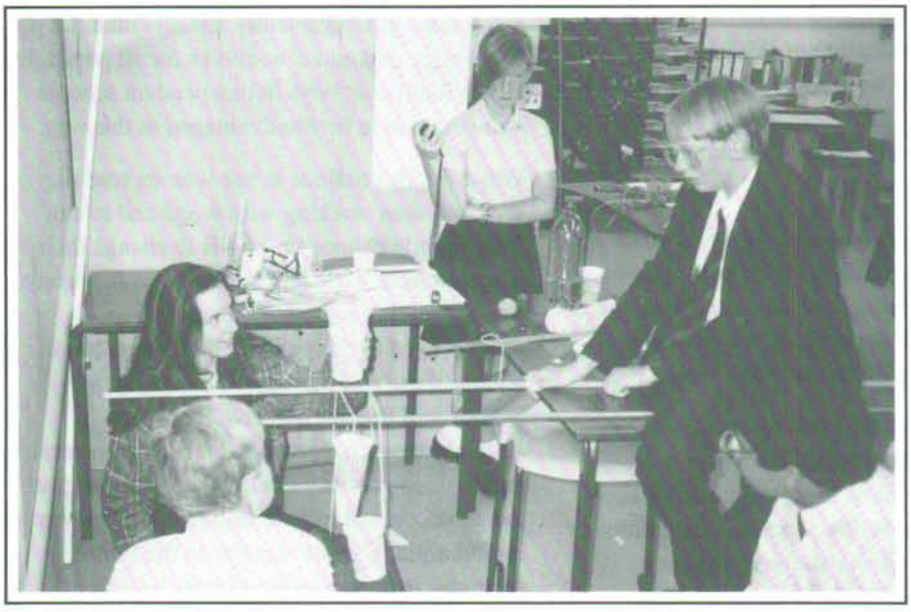
- Effectiveness/accuracy/reliability
- Economy of materials used
- Originality
- Aesthetics of the finished artefact.

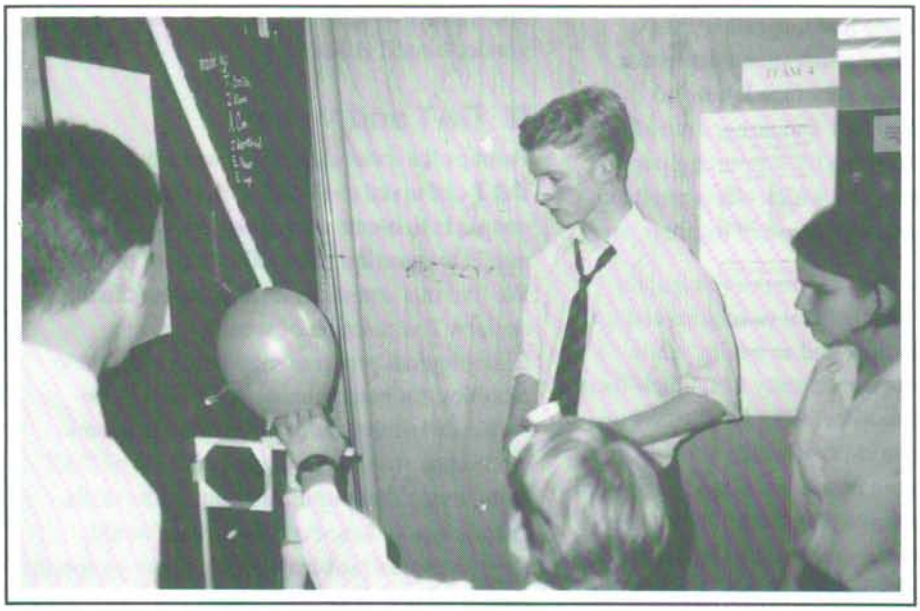
Setting up the competition was great fun, but the real enjoyment commenced when the teams opened their sealed envelopes on the day of the competition. All the teams sensibly spent time considering the problem and outlining possible solutions before starting to experiment with the materials available. A common theme was soon established: all the teams opted for water running into or out of various containers as the basis of the timing procedure, but it was pleasing to see different methods employed for calibrations and for the appropriate warning signal at the end of the timed period.

By the end of the day, four solutions had been devised and four devices built to achieve the desired goal — and nearly all worked successfully most of the time! The major success of the day was much more significant: the pupils had worked together with a spirit of purpose and had thoroughly enjoyed themselves. Their efforts clearly showed the

Materials available to the groups

Milk bottles	Balloons
Plastic drinks bottles	Marbles
Aluminium drinks cans	Nails — various lengths
Cardboard tubes — various	Plastic cups
Plastic tubing	Pritt sticks
Flexible tubing (rubber or plastic)	Sellotape
Copper tubing	Ping-pong balls
Plastic guttering	Ball-bearings
Card	Battery holder and batteries
Paper	Low-voltage DC motor
String	Corks and rubber bungs
Flexible light current wire	Metal and plastic strip
Stiff wire	Aluminium foil
10 mm square section wood strip	Drawing pins
Dowel — various diameters	Paper clips
Welding rods — various diameters	Cocktail sticks
Elastic bands — various sizes	Wooden kebab skewers
Plasticine	Assorted plastic food containers
Blu-tak	Connector block strip





Top left: One of the solutions, based on a Jinks framework

Middle left: Calibrating the counterweight

Bottom left: Adjusting the motorised balloon burster

fusion of imagination, design, science and making skills needed in successful technologists. They had also produced some ideas that I had not considered when posing the problem, which was gratifying.

One solution consists of two plastic cups linked by string running over rollers made of copper tubing. The device is calibrated by marking levels in one of the cups which is then filled with water to the desired level. Water is allowed to trickle from a reservoir into the other cup and when sufficient water has poured into this, the weight counterbalances the time-calibrated cup, causing it to lift and knock a marble down a channel made with guttering. At the bottom of the channel a cork armed with an array of nails rests against an inflated balloon. The resulting alarm is most effective!

The second solution incorporates the small electric motor that the teams were provided with. Again the basic principle of the timing system is water draining into a cup, this time via a decorative but not essential coil of plastic tubing. The collecting cup contains a float made from a table-tennis ball covered with aluminium foil; when the level of water rises, the float is lifted towards two electrical contacts. When a simple electric circuit is completed, the motor spins and causes a nail to burst a balloon — the signal at the end of the interval.

I intend this competition to be an annual event but I am wondering how many suitable challenges I can devise for teams in years to come. Although I am an electronics specialist, I deliberately keep the electrical possibilities simple as I want to enable all pupils to take an active part, not just those following electronics courses. I am sure that other technology departments have run and are running similar competitions, so I would welcome suggestions for possible tasks that fit this kind of format!

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