

GCSE Technology: a new approach via graded assessment

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How useful is assessment software in D&T teaching? Here Martin Pearce describes his use of WinTech software to support Graded Assessment in GCSE Technology

Design & Technology as a GCSE subject was not taught in the school until 1990, and the first cohort of pupils sat their GCSE examination in June 1992. This group originally contained ten pupils but by the time the set assignment was published, only two pupils had completed enough coursework to warrant attempting the set assignment or the written examination. Those two remaining pupils went on to achieve passes at level C.

The technology department was at that time ill equipped to teach the subject at GCSE level, having no IT, electronics or graphics equipment. The previous teacher of technology had perceived it as a purely practical subject, timetabled under the subject name of 'woodwork'. This focus on a single component of the syllabus had resulted in all funding for the subject having been concentrated on the equipping of a fairly comprehensive 'wood workshop'. The concept of the subject as being solely practical had caused many Y10 pupils to perceive it as being educationally unsuitable at GCSE level, and therefore no GCSE option group had ever evolved.

The first GCSE group had to be bussed once a week to the local Technical College in order to use computers, and electronics and graphics equipment had to be purchased during the first term of the new course.

The disastrous drop-out rate of the first GCSE group during their first year meant that a group of two pupils could not be supported on the timetable. This resulted in the entire Y11 syllabus having to be taught in 'twilight' sessions after school with the two pupils supplementing their after-school sessions with huge amounts of homework.

The assistance of the advisory teacher for technology was sought, and a plan to supplement my teaching with his input was evolved. On the advisory teacher's advice, we approached ULEAC (University of London Examinations and Assessment Council) on the subject of Graded Assessment and the advisory teacher initiated a series of training days at the local Teachers' Centre for all secondary technology teachers.

By the time GA had been introduced to the authority and I had received my Link Teacher training, it had become too late to put the next Y10 through GCSE under the GA scheme, but Years 9, 8 and 7 were eligible. The advisory teacher had by this time acquired ten Nimbus

186 computers for the school's use along with suitable DTP, CAD and word-processing software.

The considerable achievement of Matthew and Wayne (my two remaining GCSE pupils), in obtaining passes at C, had by now given the subject some status and the drop-out rate for 1992's group was lower.

The difficulties of accessing the curriculum for this group had been lessened by the new resources, but the obstacle of a written examination still existed.

■ The Previous GCSE Model and Graded Assessment

Many of the disadvantages for the pupils of the Design & Communication route to GCSE have been explained above, but two other major disadvantages also existed:

- The traditional disciplines: the division of Craft Design and Technology into three examination syllabuses has its roots in the traditional skill areas addressed by the subject. These were, roughly, the designing and making aspect of the subject, the technical drawing aspect and the technical aspect. The designing and making area, covering mainly the construction of artefacts in a variety of materials, became a course called Design & Realisation. The technical drawing area became Design & Communication, and the technical area became Technology. These were, and are still, GCSE examinations in their own right, although the original divisions hark back to the days of GCE and CSE. Graded Assessment has attempted to combine all the disciplines within the subject area into one examination syllabus. This means that food technology, business studies, textiles, graphics, construction, energy & mechanisms, the built environment and IT can all be used as vehicles to build projects on. The holistic ethos of the early days of GCSE, and the emphasis on 'process', were fundamental to the establishment of GA, making it highly appealing to teachers in mixed schools with mixed-ability groups.
- The unequal opportunities: the traditional perceptions of CDT being a 'boy's' subject and home economics and textiles a 'girl's' subject, were swept away by the new

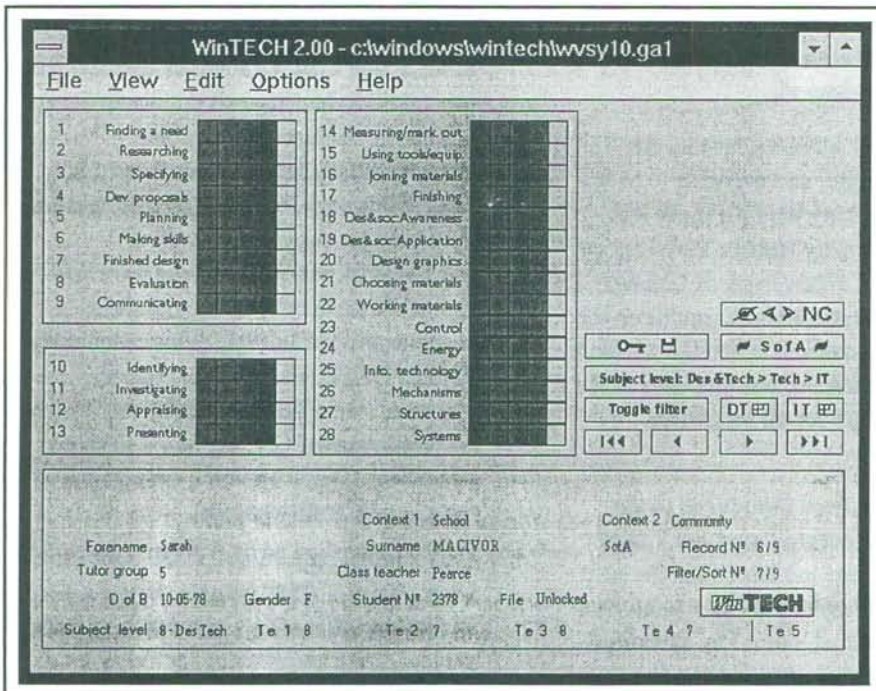
concept: that all these disciplines addressed 'process' and could be studied in an holistic manner.

The emphasis on extended project work and presentation made the subject much more appealing to girls, as did the combining of the previously gender-associated disciplines.

■ Teaching and Learning Styles

The GA approach of extended project work across the entire subject and continuous assessment, has coincided with a TVEI initiative in Flexible Learning and Supported Self-Study within the school. The acquisition of CD-ROM hardware and software, along with 486DX computers and state of the art software for CAD and DTP, has promoted teaching and learning styles within design & technology that bear little or no resemblance to the traditional 'design and make' concept. Pupils now pursue individual interests in a variety of disciplines, yet these interests are consolidated under a single project title. The access to the assessment criteria via assessment software such as WinTech enables pupils to progress their projects smoothly, and to identify which criteria need to be addressed in order to cross attainment levels. My own time, and that of my technician, can be used by pupils to assist in technical operations and discuss the practicalities of their projects. The less able pupils receive much more of my time, yet progress at a rate that suits their abilities.

The Graded Assessment screen



Previously the constraints of the syllabus had entailed the whole group having to study specific areas of the curriculum in a 'class', in order to ensure that the questions in the examination that fell outside their 'design and make' experience could be answered. Pupils relied on me to advise them of their levels of attainment, these being expressed in simple 'out of ten' or 'A, B, C, D' marks. The pupils can now see on the computer screen (or print-out) exactly where they are in relation to the entire curriculum.

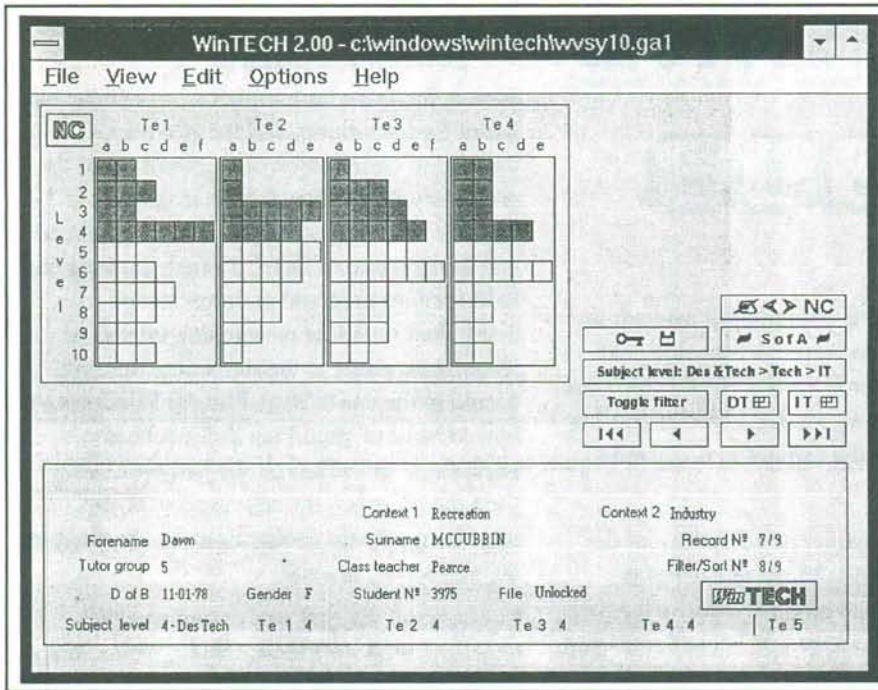
■ How the software works

The WinTech recording system runs under Microsoft Windows and has a simple mouse-operated front end that is easy to use. There are two main screens, the Graded Assessment screen and the National Curriculum screen.

The Graded Assessment screen displays the graded assessment criteria and every time the cursor is placed over a Level box, the relevant level statement is displayed. A click on the mouse inserts that level and the program displays the levels in the boxes at the bottom of the screen. The year details and the details of the course can be inserted, and these appear on the print-outs. This allows the course to be planned in a way that makes full use of the skills offered by the teaching staff.

Both the Graded Assessment screen and the National Curriculum display the pupil's registration details and the relevant contexts of the projects. The levels for GA and NC are not identical because the Programmes of Study for the National Curriculum require composite structures to be built into projects, and these need not follow a logical theme. Nevertheless, by the time a pupil is at Level 7 or 8, the quantity of work needed to achieve these levels tends to bring the two systems into line. Pupils can read the statements and suggest higher levels, and the screens show the criteria needed to achieve a higher level in the project. These can form the basis of a project plan in GA or NC; if the project fails to achieve the required level as extrapolated in the project plan, the statements that are not reached can form part of the discussion made by the pupil when evaluating his or her work.

IT capability is monitored on yet another screen, broken down into the five strands of IT.

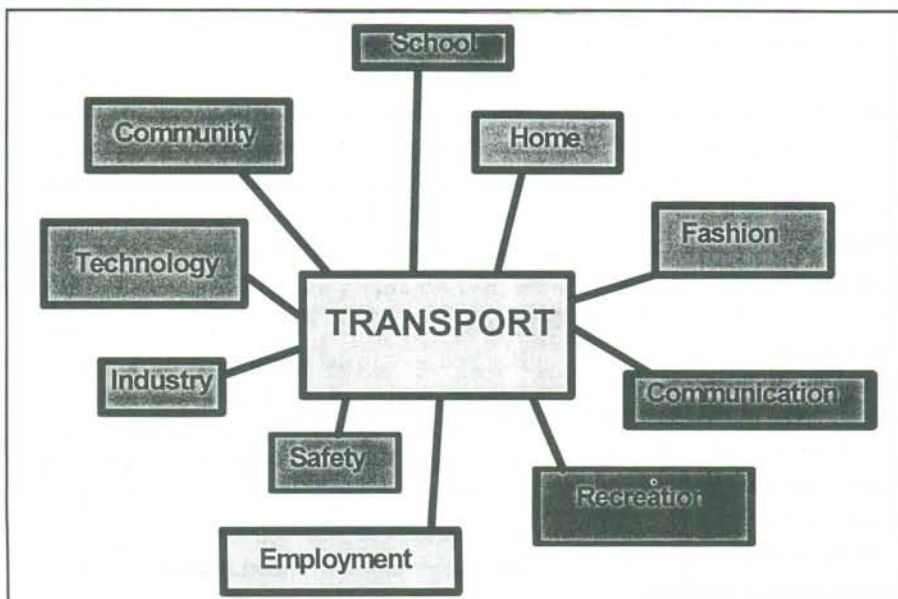


The National Curriculum screen

■ The Project

The major part of this study concentrates on a single project carried out over a period of six weeks with my current Y10 group, using the WinTech software to identify the progress of each individual pupil's project. The pupils accessed the WinTech software themselves and planned their projects according to both GA and NC criteria. I observed them using the software and discussed the decisions that they made in the light of accessing the criteria.

The project was a small part of a far broader topic that the group had been studying for most of the term, and the pupils could decide whether to create a specific artefact or piece of research for the project or liaise with another



pupil on their project, while continuing with their broader project. The success criteria were that every pupil must investigate a new aspect of the curriculum, or research and learn a new skill.

The broad topic on which all the pupils had been working was Transport and the Environment, while the specific project for the study was to revolve around National Bike Week.

Of the ten pupils in the group, six addressed the criteria of the new project, while three continued with their broader work, only giving practical assistance when requested by another member of the group; one pupil absented herself from most of the proceedings by failing to attend school on the days that technology was timetabled.

The group had previously looked at a wide range of aspects of transport and the environment. During the earlier weeks of the term, we had as a group visited the local Ministry of Transport driving inspector school, and those of the group who had wanted to had driven cars on their test site with an instructor. Some of the group also visited a local motorcycle track, where they rode trial bikes over rough land.

At the start of the broader project I showed the group a diagram of what I thought were the possible relationships of the various aspects of Transport and the Environment. I also supplied copies of the *Highway Code*, and numerous different magazines on all aspects of transport.

■ The Bike Week project

After an initial discussion with the pupils about National Bike Week, they prepared their briefs and presented them for discussion.

Simon decided to look at DTP as an area that he was unfamiliar with, having only joined the school recently. Sarah had previously edited an edition of the school magazine, and was familiar with DTP, but wanted to interview Derek Roberts, an expert on cycling who had given a lecture on the history of cycling during last year's Bike Week. Simon and Sarah decided to work together on a special Bike Week edition of the school magazine, and Sarah would share her DTP skills with Simon.

Dawn had decided to design some posters on the effects of cycling and the environment using a CAD program (Windows Draw), as she had not used CAD before. Neil wanted to

National Bike Week 1993

design a poster using photographs taken at last year's Carshalton to Hastings bike ride, and Tony wanted to mount a Bike Week exhibition. Dawn, Neil and Tony worked together pooling their resources for the exhibition, to include their posters.

Wayne decided to carry out a Bike Count on National Cycle to Work Day, and asked the other members of the group to help by logging the number of bikes to pass a T-junction during both rush-hour periods.

Throughout the project the pupils consulted the WinTech database and explored the level statements, adjusting the direction of their work in order to cover new ground.

Their briefs were written in a way that ensured that they would address areas of the curriculum that they had previously ignored or not attempted. For pupils new to the school, or on a low level, there was a fairly wide choice of areas for development. Pupils on a high level had less choice, with the pupil on the highest level having to return to areas of the curriculum previously covered, and adopt a narrower focus for her researches.

Even at this early point in the project, the advantages of the software were apparent. The previous Y10 had attempted this same project last year, but had relied on me to prompt them when drawing up their design briefs. Much of the previous year's projects had involved taking old, discarded bikes and renovating them, using skills already acquired. Few of the projects managed to cover new ground and the girls were alienated by work that consisted mainly of stripping down frames and gears sets. The exhibition that was finally mounted consisted of these renovated bikes, but little in the way of information was displayed, although some research was carried out into the history of some of the older bikes donated by the public. Throughout last year's project, the pupils required my guidance and input in order to progress, and apart from a photographic record of the exhibition, very little in the way of usable work resulted.

■ The Bike Week edition of the school magazine

Simon, Sarah and myself became the editorial board for the edition, and the two pupils decided to commission other members of the group to write articles for the magazine. Regular editorial meetings were programmed and Sarah wrote to Derek Roberts inviting him to the school to record an interview on tape. Sarah then set about researching interview techniques, while at the same time tutoring Simon in the use of Page Plus for Windows. A new version of Page Plus had just been purchased, and although she had previously used the program, the new aspects of the upgrade meant that both pupils had to interpret the new user's manual.

Simon spent the best part of two weeks experimenting with the software, while Sarah made video tapes of any current affairs or news programmes that gave an insight into interviewing technique. Derek Roberts, the subject of the interview, was known to have strong views on the environmental aspects of cycling, and on the demise of the British cycle industry.

I met with both the pupils to discuss not just the editorial aspect of their publication, but to pull the different strands of the entire Bike Week presentation together.

Dawn, Neil and Tony had decided when planning their exhibition that the week needed a common logo to give an homogeneous feel to it, so Dawn designed one.

As the software that Dawn was using for her posters also ran under Windows, it was decided by all the pupils to be suitable, as it used a typeface accessible from all the Windows programs.

Simon was by now fairly adept at using Page Plus, but found that the new version contained very little clip-art. He decided to work for a few study lessons with Dawn and Neil in order to access the clip-art in Windows Draw, a program that he had not previously used.

Meanwhile Sarah had received a letter from Derek Roberts and the interview day was set. She had written the questions in a way that opened gently and slowly moved onto her chosen interest, of whether a bike could totally replace a car as an individual's only means of transport in this day and age. Sarah decided with the help of WinTech that her interview was addressing the following level in ATT:

9b — Review their own knowledge base and draw up a strategy to exploit expert sources.

She felt that she had a knowledge base on bikes, being a keen mountain biker, and that she had reviewed this in the light of her researches into Derek Roberts, who had written many books on the subject of bikes.

Simon by now was receiving copy for the magazine, and was confident enough of his new skills to present a dummy print-out of the front page, complete with Dawn's logo and his redesign of the magazine logo. He had successfully combined a piece of clip-art from Windows Draw with Dawn's logo and by consulting the criteria in WinTech, decided that he was addressing the following level at AT5:

6a — Use information technology to combine and organise different forms of information for a presentation to an audience.

Both Sarah and Simon had decided to interrogate the WinTech database for National Curriculum levels rather than GA levels when assessing their projects. Most of the time my Y10 pupils use the NC criteria for their projects, although they are not NC pupils, being the last year to move through the school prior to the National Curriculum orders coming into force. They are, of course NC pupils in other subject areas, and if they were in the school for Y9, would have been involved in SATs pilots in design & technology as well as information technology.

Before the project Sarah had achieved a Level 7 at AT1, while Simon had only achieved Level 3 at AT5.

The interview went off smoothly until Sarah asked the question, "Do you think that it's worth, in the long run, paying £2000 for a bike with all the extra bits, than it is paying for a car, when cars are quicker?", at which point she needed to use all the skills she had learned from examining other people's interviewing techniques, in order to keep re-phrasing the question until Derek Roberts would answer it. The interview took Sarah and Simon a considerable amount of time to transcribe and edit down to approximately 1,500 words.

The articles all written, the editorial board honed them down to a size suitable for the publication. Editing the articles required most of them to be rewritten, in order to correct the English and inject some humour. The back page required Simon and Sarah to import more clip-art from Windows Draw, in an effort to

redress the rather dry presentation of the interview in the centre pages, caused by its length.

■ The Exhibition

Having designed a logo, Dawn chose a simple outline and a contrasting typeface for her posters which were printed out A4 and blown up on the photocopier for display.

She then consulted various databases for medical and environmental data, along with publications from environmental and cycling organisations (a letter signed by the entire group had been duplicated and sent to a variety of environmental and cycling bodies, asking for suitable leaflets). Dawn's interrogation of WinTech led her to the conclusion that she was addressing AT4:

6e — Illustrate the economic, moral, social and environmental consequences of design and technological innovations including some from the past and other cultures, using specific examples.

and AT5:

4a — Use information technology to retrieve, develop, organise and present work.

Dawn's level at the beginning of the project was Level 4 at AT4, and Level 3 at AT5.

Neil and Tony had by now received publications and leaflets from the environmental and cycling bodies, and decided to make a display of material taken from these publications. They planned to put some of the school's collection of vintage bikes (donated by the public after an appeal during last year's Bike Week) on display, along with Dawn's posters and Neil's photographic montage of last year's bike run.

As with the exhibition of bikes in last year's event, Neil and Tony spent many hours cleaning and oiling their selected vehicles. Both thought that the WinTech criteria suggested that by virtue of the fact that they were having to research the characteristics and styles very thoroughly to unearth data on these ancient bikes they were addressing AT4:

5c — Understand that artefacts, systems or environments from other times and cultures have identifiable characteristics and styles, and draw upon this knowledge in design and technological activities.

Prior to the project Neil had achieved Level 2 at AT4, as had Tony.

■ The Cycle Count

Wayne used Word for Windows to design a simple check-sheet, and organised some of the others to accompany him to Carshalton Ponds during both rush-hours on National Cycle to Work Day and count the cycles crossing the T-junction. He planned to use the data for a simple bar chart, and exhibit it along with the others' work. Unfortunately a spell of time off school due to illness halted these plans. Using WinTech, Wayne identified his project as addressing AT1:

4b — Devise ways of gathering information in addition to using printed sources.

Prior to the project Wayne had achieved Level 2 at AT1.

■ Conclusions

An attempt to evaluate a complex GCSE syllabus and its assessment software during the course of a single project, would do little justice to either GA or WinTech, and this study was not intended to be definitive. The issues of flexible learning and pupil motivation that have emerged from monitoring the pupils' interaction with a database are of great value to my teaching, and have confirmed my belief that IT can perform a tutorial role in the classroom.

The project with the pupils was presented by me as one in which I wanted them to individually approach an area of the curriculum that they had not attempted before. It was seen by them as one during which they would acquire a new skill or concept. The single levels identified by the individual pupils in no way represent the levels that the pupils will achieve as the projects are compiled and evaluated. There was no time during the study to become involved in the evaluation and re-evaluation required to bring a project to fruition.

Graded Assessment requires the project work to be of an extended nature, and this was just a snap-shot of how the system works coupled with the software.

The general ethos of why this type of approach is an improvement on the previous method is, I think, evident. The access to the curriculum afforded by the software allows pupils to develop an hypothesis of what an assignment should include for themselves. The emergence of a collaborative approach to problem solving by at least two of the pupils was significant.

The contrast of this year's pupils selecting individual themes, instead of the similar themes of last year's group has led to far more useful projects that address more suitable areas of the curriculum. The broader curriculum of Graded Assessment allows the pupils to use skills previously perceived as belonging to other subject areas.

■ Cross-curricular implications

The holistic approach necessary to successfully deliver the curriculum by this method has a positive effect on cross-curricular links. Methods of investigation and presentation exhibited in this simple study (DTP, data gathering, etc.) perform important parts of many subjects. They also serve to make D&T conform to the model of other disciplines. The artefacts of these projects are not the traditional ones manufactured from wood or metal, but they are artefacts, even though they in many cases may appear no different in form from the assignments of English or the humanities. The newspaper produced by Sarah and Simon resembles a newspaper produced in an English lesson, except that the focus during production and evaluation would be on process rather than content. This ability of pupils to assess process in itself is a valuable cross-curricular skill.

■ Resources

Working in this way requires specialised resources and specialist skills: the need for teachers to have a good knowledge of IT and an enthusiasm for flexible learning is essential, as is hardware and software of industry standard. As important is the resourcefulness of the teacher and the courage to allow pupils to take on the responsibility for their own learning. One major difference between last year's group and this year's was my relationship with them. Once I was confident that the software would support their enquiries and that the hardware and software were available to interpret their designs, I was more able to stand back and let them pursue their assignments. The confidence to allow pupils to take command of their own work is only available when there is some other form of support within the classroom. That support, I believe, is IT.

WinTech is one of several packages available for recording and assessment. WinTech itself is available from Trellis Software, 21 West Hill Road, Brighton, East Sussex BN1 3RT (telephone 0273 203920).