

The use of information technology to unify the secondary curriculum – a new model for secondary education

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Abstract

The paper is in four broad sections:

A Theoretical Framework

This first section looks briefly at what sort of curriculum we need, as we approach the new millennium - how we prepare students to become active participants in a highly technological world. The need for a cross-curricular model.

The Development of the Model

This section explains how the model came to be developed at Holy Cross School. It is included to show a possible route for other institutions to follow, beginning as a project embracing English and Dance, widening to include Music and Drama, and eventually covering every aspect of the school curriculum, through the Caribbean Project.

Present Project Work

Here I outline the highly successful Science-based Project on Light. The Project created many links between different subjects on the curriculum:

For “Science” homework, the girls wrote the text for a Drama which they created for the Shadow Theatre which they made in their Science lessons. Circuits drawn in Science were made in Technology lessons. They sang songs about light, for which they had written the words in English lessons, created the Music in their Music lessons, and processed the Music in the Computer rooms. Photographs of Drama were imported into the computer and linked with religious education. Work on colour in Science was developed in Art lessons.

Recommendations for Institutions wishing to follow this model

I shall end by giving some guide-lines for others to use, when creating similar Projects.

The Paper

This paper has three main aims:

First, to show how one school made a steady and continuous development in its use of IT across the curriculum. Secondly, to outline some specific examples of our practice (which can be followed up through other related papers). Thirdly, to suggest a cross-curricular model of working which not only uses IT to support all aspects of the curriculum, but attempts to unify that curriculum, by opening windows between subjects, while retaining the integrity of individual subject specialisms.

The model which we have developed at Holy Cross is based on a philosophical position which regards knowledge as a seamless fabric, a belief written into our Mission Statement. It makes no sense to us to abandon the excellent, integrated approach of our Primary schools (ages 5 to 11 years) in order to deliver our National Curriculum, so that, to parody the secondary curriculum only slightly: "History never happened anywhere - that's Geography. Places don't have a history - that's a separate subject." And worst of all, as far as our examination system is concerned: "Shakespeare didn't write English, he wrote English Literature, and you must not confuse the two!"

To quote Alan Cribb in "Philosophy of Education"

"We do not experience the world separated into ingredients. If we want to understand or change it, we must be able to integrate different forms of knowledge."

How else can we ensure that our children emerge equipped to participate as active members in a highly technological world?

We start, then, from this belief - that children learn better when links are made between different subjects, and that the computer provides us with an immensely powerful set of tools, which enable us to develop a model of learning which serves this purpose.

Our model developed in response to a number of challenges which faced the school during the last three years, and by adopting a positive stance in each case, we were able to turn two problems into a solution, and thereby advance the learning of our pupils.

The first problem concerned the restricting effect which our National Curriculum was having on the development of Expressive Arts in the school. Dance and Drama were reduced in curriculum time to a risible amount. The second problem was how to teach a programme of English Literature designed by a government committee. I'm sure you can imagine the result.... Accordingly, we devised a system where Dance and Drama were concentrated into useful, practical blocks of time. Then, in English, we studied the particular literary extracts, highlighting the metaphors and similes in the text. Next, we went to the Dance Studio and explored how these images could be set to music, illustrating the effects which Shakespeare and other writers had created. We recorded these dance performances onto video tape, exported digitised still images into our desk-top publishing program, and word-processed articles about the performances, in the role of newspaper reporters. The quality of the finished work was astonishing. By using the desk-top environment to unite English and Dance, new standards of achievement were set. Here are some of the comments which the pupils made:

"When I first heard that we were going to have dance lessons during English, I thought to myself, What has dance to do with English? Now I can see that dance is another way of expressing yourself. It also becomes useful in explaining the poem and making it become alive."

"Putting the poem into dance helped the poem actually come alive. It wasn't a poem to me - it was a real situation" and

"I learnt things in dance that I had never thought about before."

I find these perceptions astonishing for students aged thirteen.

The computer had led us to a new way of approaching learning. This was an exciting beginning.

The second project was also the solution to two problems:

How do you teach a Shakespeare play meaningfully to thirteen year olds?

How do you develop the use of the new digital camera which we had purchased as a result of the success of the Dance Project?

The solution was to unite the two. Our main aim was to develop an understanding of "Romeo and Juliet", as was required for a national test. This would then expand into a study of "West Side Story" and Prokofiev's "Romeo and Juliet", so that we could build on the earlier dance work. We planned to produce a dance assessment, a drama assessment and a word-processed English Literature assessment, as well as developing our understanding of how the ion camera could be usefully deployed as a supporting tool for drama.

The advantage of the ion camera is that images can be fed directly into a t.v. monitor and viewed instantly. This has obvious applications in drama. The students prepared the text, chose a scene to dramatise, and then selected a moment from their performances to "freeze frame". Two images were taken with the camera, and these two images could be discussed immediately in class with regards to their visual effectiveness. By moving from, say picture three to four, and then back again, a useful and otherwise impossible comparison could be made. Of course, since the image was digitised, it could now be imported back into the desk-top, and word-processed text could be added. This was done with a prepared page of four frames, available on the school network - to save time and effort- a quotation was added below the picture, a summary of the scene followed this, and an in-role response finished the assignment. Once again, the response of the students was staggering. The sensitivity of the writing was amazing, and it was clearly the integration of the various elements of the process which had brought this about. This marked another step in our journey.

The next problem arose out of a school inspection. The school was highly praised for its work, and was named as one of the most improved in the UK, but (and there is always a "but") the inspectors suggested that we should more actively celebrate the cultural diversity of the pupils. We took this challenge seriously, and embarked on what was to prove to be a turning point in the academic success of the school - The Caribbean Project.

This was to be a detailed study of every aspect of Caribbean life, studied across the whole curriculum, and using as many IT tools as possible - word-processing, desk-top publishing, spreadsheets, databases, clip art, scanned images, ion camera work, draw files, graphics packages - and would be completed in a single school term by all of the lower school (some 400 pupils). Each Department contributed ideas appropriate to its own needs in meeting the requirements of the National Curriculum, and the students moved from subject to subject, building on their knowledge of the topic. It is important to note that there is no pressure for Departments to contribute particular amounts of time or resources, only that which arises naturally out of existing schemes of work. Looking back at the scale of this Project, it was clearly complete madness on my part, and my only defence is that the pupils made it completely successful in every way. I was grateful for this. The creative energy which it released was colossal. They visited libraries, consulted CD Roms, searched the Internet, went to travel agents for brochures, telephoned Trinidad (I was relieved to learn that they had parental permission to do this). They danced to the music which they had recorded onto audio-tape, took photographs of the dances with the ion camera, imported the images into the desk-top, and added word-processed comment. They used their IT lessons (once a week), time before school, lunch time, time after school (often until 6 o'clock), their computers at home, where possible, and simply poured information into their project folders. An outline of aims was given, but this was completely ignored as they sailed graciously past every assessment marker devised. The finished folders were of such a high standard, displaying knowledge, skill and creative energy that they were demanded by colleges and universities in the UK and the USA, and

were used to support a Race Relations Conference, because of the harmonious multi-cultural dimension they gave to the school. Again, the use of computers to create the folders had proved a triumph.

Such was the impact of the Caribbean Project that we decided to take a further step. There were two faults in the Caribbean Project work. One was that much of the work, though well researched and stunningly presented, was copied from books or down-loaded from CD Rom, with no evidence of some of it having actually passed through the brain.... Secondly, scientific work was poorly represented.

So, the next Project was designed to solve these two problems. I realised that I had, in fact, created the model inside out. However, by restructuring the model, these two problems could be solved simultaneously. Instead of an Expressive Arts based project, with science and technology added on, as it were, we would start, instead, with solid scientific content and ensure that the students word-processed their own experiments, undertaken in the laboratories, and create The Light Project.

The project was therefore initiated by the Science Department with Year 8. The topics covered would have cropped up in the syllabus later in the year, but they were brought together in the Autumn Term. The topics included the following:

- The eclipse of the sun and the partial eclipse
- How to view a partial eclipse with a pin-hole camera
- Colour and colour chemistry
- Fibre optic light and cable
- Neon lighting and gas discharge lamps
- Holograms
- Shadows / shadow theatres
- Light detectors
- Camouflage
- Radiation
- Reflection
- Refraction
- Lenses
- Photosynthesis
- Fuels
- The changing seasons

In Drama, by now a familiar partner in all our work, the pupils improvised short scenes on the theme of good and evil (light and darkness). The Drama teacher used the ion camera to take a picture of a freeze-frame from the play, which the students then imported into the computer. They then wrote up what the play was about underneath the picture. Although the picture would only be printed in black and white in their Project folders (colour printing is horribly expensive!) the students discussed what colour of light could be used in the staging of their performances. Red was seen as an appropriate colour for evil and anger, and white or blue was thought to represent goodness and 'calmness'. Some word-processed a play to go with their Science Shadow Theatre. The moral dimension of the characters in the plays was broadened in the Religious Studies lessons into moral and spiritual aspects of good and evil. The symbolism of light and dark recurs throughout the Bible and the liturgy, so the pupils studied this, too, and presented attractive work as part of the Light Project.

When the Art Department started working on the Project the pupils already had a far greater understanding of colour, light and shadow than would normally be expected. The subject was infinite when it came to painting and drawing. In English, they spent two double periods in the computer room. They scanned through a slide-show of 100 high quality images installed on the network, and chose the one they most liked to write a poem about light on. They then printed the poem together with the picture. A student teacher was helping with this lesson, and was amazed to see how easily they found it to write something which would have been quite abstract as a normal classroom task. Obviously the finished product gave them a great deal of satisfaction, and they proudly showed her their work the following day. They also used a graphics package to create decorative "light" vocabulary, and explored the uses of the thesaurus to find more words. Some groups did the same in French.

Later in the Term, the new music software "Sibelius" was deployed on the school network, a music keyboard was added (for faster input), and the pupils were soon able to write both the words and the music for some Christmas songs to do with light, using the pentatonic scale - required for the National Curriculum in Music.

In Mathematics, they studied enlargement, reflection, and mirror images. In Technology, they made circuits, created stained glass mirror effects, used computer-aided design to make T-shirts with computer-embroidered candles on them. In Geography, they studied the sun, the seasons, starlight using CD Roms. A group which went to Germany returned and wrote about the Christmas lights they had seen there. The Project culminated in a beautiful Advent Service in the Church, with carols, dance, and drama, all linked to the theme of Light, and a fitting conclusion to a busy and successful term's work.

Some pupils' comments:

"I like using computers. It gives me more confidence."

"It made me go to the library more than I normally do... I didn't use to stay in the computer room after school, but now I do."

"I could use a lot of resources on the computer. Talk to other people."

"I really understand science better now, and enjoy it more."

"I enjoyed doing this project, and I find the research to be fun, as there are so many different sources of information, and it was inspiring."

"It showed how different subjects can be linked up."

Other projects had centred on the creative use of the Internet. We completed a writing project with a High School in the USA, and another project with Deakin University, in which we had an Australian drama student teaching our Year 11 students, but without leaving Australia! He sent us stories, poems and JPEG files over the Internet, shaped the drama, and commented on the students' responses to the stimulus material which he had sent. We, in turn, helped him with his drama assignments. The whole process was video-taped by our Media Studies pupils. Grades continued to rise.

So what of the future?

The aim for the summer term is to develop another Project, centred this time on Japan, for our Year 9 pupils, and drawing together all of the experience outlined here. Each Department will contribute as much as is appropriate to the topic, as shown on the curriculum model available for the Light Project. We aim to use the model this time, however, to target specific teaching Departments, so

that their training needs can be met. For example, Science teachers will be developing their skills in data-logging, and the Art Department will use a new graphics package for computer controlled calligraphy work. I, personally, want to send music files in midi format to Japan, so that the accuracy of our attempts to write Japanese music can be monitored at source! The model can thus be used as a professional development tool, as well as for inspiring the pupils.

Some Guide-lines

Confidence - Approach this model of work with confidence. The model works extremely effectively, and has considerable educational research supporting it.

Enthusiasm - No-one will follow you if you are half-hearted in your leadership.

Build a team - Begin by working in small ways with people who share your vision. This might, at first, be just one colleague in a different subject area. Expand the team as your success grows. This may take months or years. Be sensible in your expectations concerning change. At Holy Cross this process took nearly three years.

Keep others informed - If you want more equipment, resources, time, then let people know of early successes, so that they are encouraged to support your work.

Display good work - Publish your pupils' success by displaying their work prominently everywhere (not just in the computer rooms). Give copies to your Senior Management Team.

Work within the right framework - Don't do ANYTHING which distorts good practice, or which distracts others from their own responsibilities. Let others work with you to develop their own skills, and meet their own agendas, within your over-all framework.

The Framework - Create a framework (an outline, a set of goals, a set of tasks) and then let the students have freedom to explore for themselves. They will ALWAYS surprise you by exceeding your most ambitious expectations!

Above all - Ask yourself WHY you are using a computer. If the answer is not convincing, use a pencil!