Recognising Pupils' Attainment when Using ICT

Abstract

This article deals with two important aspects: assessing pupils' work, and how this might raise new issues when ICT is involved, and reviewing and evaluating the effectiveness of using ICT to achieve learning objectives. Some new techniques will be required to assess pupils' design portfolios and their made products. Designing on screen happens very quickly and little evidence of changes is seen compared with drawing on paper where several copies are kept to show development work. Pupils are able to access designs by others and manipulate them as their own. Teachers have to encourage pupils to develop ways to record their thinking and collect evidence of it. Pupils are also able to make sophisticated products using CAM – the quality of the product looks like one that you might buy in the shop. It is even more important than ever not to assess merely the outcome, but to assess how well this is supported by design thinking.

Why do we assess?

- to measure what students have learned and to what extent they can apply this

- to identify students' strengths and weaknesses

- to diagnose the appropriate next steps in their learning

- to evaluate the effectiveness of the teaching

- to provide feedback on progress to the learner and other interested parties, e.g. parents, other teachers.

The aim for any school and department should be to develop systems and procedures for assessment which are reliable, valid and manageable, as well as informative for students, parents and teachers. These are the success criteria against which a department's assessment system might usefully be measured.

Assessing and evaluating

There are a number of issues you should consider when assessing pupils' work. Throughout designing and making there will be many opportunities for pupils to enhance their learning using ICT. The teacher will play a crucial role here, not only in making appropriate resources available at appropriate times, but also by helping and encouraging pupils making their own judgements as they develop their thinking.

For the above reasons it is inappropriate to assess only the outcomes (i.e. finished products) of pupils' work. Instead you will need to be part of the process, assessing individuals as you go along.

Some general things teachers need to do when assessing are:

- listening to pupils while they are designing and making

- observing and responding to pupils while they are designing and making

- reflecting on the products that pupils create during their designing and making (at every stage, not just the finished products)

- involving pupils in their own assessment and encouraging them to generate evidence that helps them show what they can do

- exercising judgements about what pupils do, or intend to do, and keeping a record of this

- encouraging pupils to exercise their own judgements and observing what they actually do.

Recognising pupils' attainment when they use ICT

Recognising what your pupils achieve will mean being clear in your own mind about what you expect from the inclusion of ICT in lessons and schemes of work. You should be clear about particular outcomes pupils could produce, e.g. being able to transfer computer generated images to other materials, such as textiles, using silk printing screens or NC embroidery equipment.

You may also have planned your scheme of work to take account of particular computer functions, which could be beneficial to your pupils or mean that they can go about tasks in certain ways. This is not quite the same thing as just giving access to computers or encouraging the use of particular applications such as word processors or databases, e.g. in the production of portfolio materials.

Giving consideration to the following issues will help you to be clearer:

How will access to computer functions affect what I expect of pupils?

An early consideration will be to exercise care in the choice of software. Give attention to how relevant the content of the package may be as well as how it can be used to support particular process skills, e.g. modelling software can be used to create representations of a finished product, but some software allows more realistic representation or allows a model to be explored and manipulated in more useful ways.

What we can expect of pupils might be altered by access to computers. This goes further than making computers available to pupils when they might be useful, e.g. in serving tasks that may or may not require computers. ICT tends to challenge the way we did things before.

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CURRICULUM

THE GEORGE WARD SCHOOL - INDIVIDUAL EDUCATION PLAN			
Name of Student:	**Tutor Group: 8CC**	**Date: December 1998**	**Stage Number: 3**
Priority Areas	**RECORDING OF WORK**		**MATHS**
Current Level of Functioning	James is coping well with written work by using his laptop.		Level 3/4. Working hard to improve number skills and learn tables.
Educational Objective:	Continue to deal with written recording efficiently.		To be able to work more independently in Maths.
Review Date:	Easter 1999		Easter 1999
Criteria for success	Continued praise and merits for efforts and results		Greater accuracy in classwork and tests.
Individual Education Programme: a. Steps	1. Use laptop for recording work where appropriate.		1. Sit with supportive peers.
	2. Use mind-mapping to record information/facts etc and for revision of tests.		2. Develop 'Hear/Say' approach to tables already started.
	3. Teachers to give James plenty of time to record homework.		3. Have a go at problems (don't worry about making mistakes).
b. Strategy/Approach			
c. Materials/Equipment	Laptop computer (James's own)		
d. Who will implement	All staff		TN
e. Frequency and time of day	Every lesson		Mathematics lessons 3 times per week
f. Social grouping and location	Every lesson		Mathematics lessons (Set 3/5)
g. Reward\programme	Merits and praise for written work which is well-organised and presented etc.		Merits and praise
h. Parents role	Praise and agreed rewards for merits and positive comments in journal.		
I. Monitoring the implementation	LR/CC		TN/CC/LR
In-class support:	James receives support in DT x 2 pw, Art x 1 pw, Geography, History and RE		
How is the Pupil given regular, encouraging feed back on their progress in relation to the targets?	From CC in Tutorials/PDP's. LR in SpLD monitoring sessions.		From TN in Mathematics lessons. From LR in SpLD monitoring sessions. From CC in tutorials/PDP's

Figure 1: IEP pupil targets: George Ward School.

A challenge to pupils might be to deal with tasks in improved ways or to learn more thoroughly, e.g. to more accurately predict the consequences of a particular choice of materials, ingredients or decision through the use of a spreadsheet. A challenge to the teacher is constantly to reflect upon pupils learning and to accept new possibilities for future work. For example you might decide that an assignment for 14 year-olds could be introduced earlier, say with 12 year-olds, because access to computers and software can allow the pupils to learn previously difficult tasks more easily.

Pupils can produce some surprising results when they use ICT e.g. they are able to print rendered 3D images to a standard beyond their own capability with hand methods, using 3D modelling software.

Avoid being overly-impressed by a piece of work which has been well finished, especially through the use of computer aided means. There has always been a need to advise pupils against over embellishing their work, e.g. of decoration to pages in pupils' design portfolios that contribute little to the task in hand. 'Less is more' remains a useful motto for pupils.

All pupils are individuals and have individual strengths and weaknesses. It will be important to think in advance about how to cater for different pupils' ability. Are there any pupils with Individual Education Plans (IEPs), and if so what special targets have been identified for them? Can you think of ways that access to computers will help here?

Being clear about your expectations will help you decide what criteria you intend using to mark or evaluate work, as well as how you might monitor pupil progress and give feedback. For example, if you intend pupils to retrieve pre-drawn system elements from databases to assemble control procedures of their own, how will you judge the difference between a simple, elegant procedure and an overly complex one?

How will you determine the achievement of individual pupils in collaborative work?

An important feature of ICT is that it can allow and encourage collaborative learning, as in the case of pupils who share ideas by e-mail or access the work of others for their own use from an Internet website. When pupils access an Internet website to procure existing designs for use in their own projects, it can at first seem that they have they evaded the brief. On reflection this may mean they have simply gone about the challenge in a different way.

There will be an increasing need for careful observation and periodic reviews to identify individual pupils' progress. It is for you to arrange the most cost-effective means of carrying this out during lessons. There are many ways in which this can be done, e.g. requiring pupils to keep a log of their own development to help you with summative judgements. A useful strategy is to ensure that such recording is a normal part of each lesson, rather than an add-on, and that you can provide feedback with the minimum of effort.

For example, one teacher made extensive use of teacher observed evidence and witness statements coming from the pupils and verified by those they were working with, as well as hard copy evidence. So, for example, when a group of pupils undertook some data logging work using a plate freezer, they shared the setting up, including siting the thermocouples, and shared the collection of the data. As individuals they entered it into a spreadsheet and produced individual graphs. They handed in hard copy and also saved it onto a disk, which the teacher observed. On another group project, when they worked together to run a display company they were all assigned tasks using ICT. They prepared and signed a witness statement to explain what they had done and then the rest of the group signed it to verify that it was honest. The teacher then made a judgement as to what the level of capability they had achieved, having already set the task to enable them to achieve certain levels.

Pupils who arrange for manufacturing to be carried out on their behalf by others, as in remote manufacturing, may have delegated some of their own responsibilities. But what additional responsibilities fall upon them as a result and how well have they coped? Are these perhaps even more challenging?

When planning or assessing collaborative work, be clear about how individual progress will be documented and what traces you will expect pupils to leave as they work. This can be managed by the pupils themselves if they are encouraged to look for assessment opportunities while they work, as well as to take pride in creating assessment evidence, e.g. supporting documentation or witness statements from others.

How can lessons be devised so that pupils can best demonstrate what they know and understand through using ICT? You can make arrangements that will simplify assessment tasks and make them enjoyable for those involved, rather than a chore. The following are some useful guidelines:

* encourage pupils to make frequent savings as their work develops, and to put a date or comment on their work, so that they can explain the process more clearly later when they reflect on their work

* encourage pupils to build up a portfolio which acts as an assessment tool for you as a teacher and a reference or guide for them as the learner. The evidence contained within it will help you assess pupils' understanding of scientific, mathematical or social concepts, which underpin their design or product, or if they have just used CAD/CAM to produce something, which looks acceptable.

Figure 2: Using Logicator.

* talk to pupils about their work and listen to their views and opinions. This will assist you in making assessment judgements later.

* develop an understanding of the importance of pupils reviewing their work, defending specific actions taken and reflecting on how these actions led to improvement

* annotate pupils' portfolios to remind you of activities or achievements that are not written down but are significant.

Evaluating the contribution, appropriateness and effectiveness of using ICT to achieve teaching and learning objectives
ICT challenges our thinking about previous modes of working and it is increasingly important that you are aware of what is possible and can recognise ways in which less can best be more. The many powerful ICT tools now available can encourage the opposite from pupils.

Revised practices and expectations also need to be planned into the annual school cycle so that schemes of work are continuously improved and that the whole curriculum develops in a balanced way, enhanced through ICT.

How useful is ICT to pupils' learning in your lessons?
Were there times when it was more useful/appropriate than others? Were your teaching objectives well served by the use of

CURRICULUM

UNIT 17: COMPUTER AIDED DESIGN AND MANUFACTURE (ADVANCED)

ELEMENT 17.2: INVESTIGATE CAD TO MODIFY DESIGN PROPOSALS

Found within this report are a number a CAD drawing that illustrate much of the below performance criteria. Most of the CAD work found here was completed while designing the Airfoil wing section for the 1998 British aerospace Engineering challenge, or while undertake and in school project to design an outdoor tennis facility.

PERFORMANCE CRITERIA	EVIDENCE/COMMENT	GRADE
Manipulate and alter images on a computer screen using a CAD package	TENNIS COURT PROJECT PHASE DEVELOPMENT	Merit
Change the dimensions of a CAD image on screen	TENNIS COURT 'W BLOCKS' AND WING SECTION	Merit
Use the tool section of a CAD package to modify an object	TENNIS COURTS & WING PROJECT	Pass
Generate a simple 2D or 3D parametric design for a product or component in a manufacturing setting	BRITISH AEROSPACE PROJECT.	Distinction

Signature of assessor:

Figure 3: Sample of pupil log, Year 13 Advanced GNVQ manufacturing, George Ward School.

ICT? Do your teaching objectives now need to be reconsidered in any ways?

Review ways in which you interact with pupils when they are using computers during designing and making. You will need to adjust and adopt varied ways to find out more of pupils' progress, and find out whether and how working with computers enhances learning in relation to the task in hand.

Be prepared to review your own thinking, during and after tasks are completed:

- are your original objectives being well served?

- is the use of computers fully justified for this task?

- if not, do you need to change the way computers are being used or do you need to change the task?

- are you getting the full potential from the software?

- some kinds of software, e.g. CAD/CAM, have been developed for specific work practices in industry, e.g. just-in-time approaches or concurrent engineering. How can these conditions best be simulated in school so that pupils can best

understand the advantages of using ICT to support designing and making?

- would an industry visit help to develop clearer understanding for pupils by providing a more relevant context?

- how well does your use of ICT encourage follow-up activities at home and beyond the classroom?

How can you ensure that your pupils can review their own work in the light of the usefulness, or otherwise, of ICT?

To what extent have you helped them to become independent learners? Encourage independent learning in pupils through the use of ICT. This will improve pupil performance through encouraging a more active engagement with tasks. Independent learning also allows you more time to concentrate those who most need help at any particular time.

At the same time, encourage pupils to ask questions of themselves about their own use of ICT, for example:

- What particular ICT skills were used?

- What new ICT skills were learned?

- What is still left to be learned?

- What particular advantages arose out of using ICT for this task?

- Did it make the job easier, quicker, improve quality or increase efficiency?

- Did it make the task easier to understand or offer increased prospects for success?

- Could other ways could have been used to achieve a similar result but without ICT?

- How could work be further improved in future?

It is important for pupils to understand how ICT has contributed to their work in order that they can make considered judgements about its future use. This form of self-evaluation is part of the 'culture of purposeful and discriminating use of ICT'.

This article is based upon a document in the Learning Schools Programme material for the NOF ICT initiative. This larger document deals with the planning and implementation of ICT in D&T. Each D&T teacher will receive a folder of resources, including a CD-ROM of exemplars of teachers planning, implementing, and assessing and evaluating the use of ICT in D&T. In addition there is face-to-face and on-line support. For more details contact Learning Schools Programme on 01235 826908 or http:\\www.learningschools.net

Figures 1 and 3 were taken from Teaching in Design and Technology, published by The Open University 1999

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