

# Design and Technology

In the National Curriculum in Wales 2008

The personal thoughts and reflections of


Rhys Evans

Head of Technology


Ysgol Dinas Brân, Llangollen, Denbighshire.

# NC Order Curriculum 2000

“to create, test, modify and store instructions to control events, *e.g. use logo to control a screen turtle, enter and store instructions in a programmable toy*”.

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# NC Order Curriculum 2000

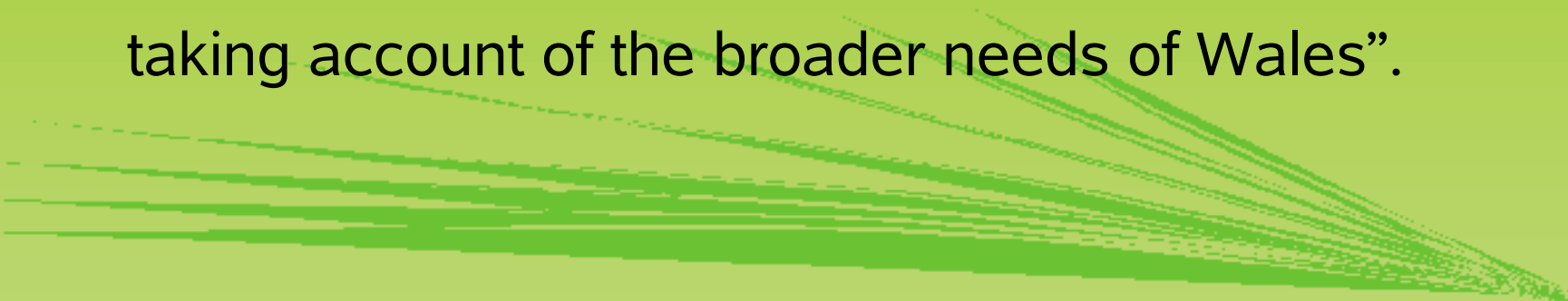
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  - Too great an emphasis on making
  - Creativity, Innovation, Sustainability and the study of Design are for the most part only implied
  - Did implying these points effectively get the message across?
- 

The emphasis of the revised curriculum in Wales is on developing skills as opposed to merely transferring facts. It has an increasing focus on developing creative and critical thinking – design and technology is ideally placed to promote such development.



# A revised curriculum for Wales


“In revising the curriculum, the challenge was to establish a curriculum for the twenty-first century that meets the needs of individual learners whilst taking account of the broader needs of Wales”.

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# A revised curriculum for Wales

- focus on the learner
- skills development is woven throughout the curriculum
- reduced subject content with an increased focus on skills
- focus on continuity and progression 3-19
- flexible
- support Government policy, including: bilingualism, Curriculum Cymreig/Wales, Europe and the World, equal opportunities, food and fitness, sustainable development and global citizenship, and the


# Points for consideration.

- Up to level 5 has to be accessible for delivery in a Primary Classroom
  - No reference to CAD/CAM until level 6 in the orders
  - Creativity is not specifically referred to in the level descriptors until level 7.
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# A revised curriculum for Wales


The revised curriculum comprises the following six areas:

Foundation Phase  
skills development  
national curriculum  
personal and social education  
careers and the world of work  
religious education.

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# Skills across the curriculum

- **Developing thinking;** through the iterative process of creating and developing ideas
  - **Developing communication;** by explaining, writing, sketching, using detailed technical drawings and three-dimensional models
  - **Progression;** concrete to abstract; simple to complex; personal to the ‘big picture’; familiar to unfamiliar; and supported to independent and interdependent.
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# Skills across the curriculum

## Developing ICT

In **design and technology**, learners research and develop their ideas by using ICT to find information from databases and the internet

They communicate and present their ideas using word processors, presentation software, computer-aided design (CAD) and computer-aided manufacture (CAM).

# Skills across the curriculum


## Developing number

In **design and technology**, learners use mathematical information and data, presented numerically and graphically, to research and develop their ideas. They use number to measure and calculate sizes, fits and materials

**‘The only ones who do what we do’.**


# Curriculum Cymreig (7–14) and Wales, Europe and the World (14–19)

In **design and technology**, learners should be given opportunities to use the rich characteristics and resources of Wales as a source of inspiration and a context to design and make products.

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# Progression in design and technology at Key Stage 2

## **Learners should be taught:**

- to design and make simple products
  - knowledge and understanding in contexts
  - How to develop their understanding of the made world
  - They should be made aware of human achievements and the big ideas that have shaped the world
  - They should be encouraged to be creative and innovative in their designing and making
  - Be made aware of issues relating to sustainability and environmental issues in the twenty-first century.
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# Progression in design and technology – Key Stage 3


Learners should be taught to design and make products by combining their designing and making skills with knowledge and understanding in contexts that allow them to make decisions based on the values that underpin society, helping them become active and informed citizens.




# Progression in design and technology – Key Stage 3

Learners should be made aware of human achievements and the big ideas that have shaped the world

They should be encouraged to be enterprising and innovative in their designing and making, while having regard for sustainability and environmental issues in the twenty-first century.




# Things I Like About the New Orders

- The range statement is much clearer
  - Creativity, Innovation, Sustainability and the environment are given emphasis
  - The work of designers, architects, inventors and chefs are identified as areas of study
  - The emphasis of Systems and Control at KS3 is on incorporating technology into products.
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# Careers and World of Work

**D&T** contributes to learners' awareness

- by providing opportunities for them to understand how consumer products and services are developed and brought to the marketplace
  - by raising their awareness of the range and diversity of careers associated with manufacturing in the wider world.
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# Careers and World of Work

Design and technology also allows learners to engage with the design and manufacturing technologies that are increasingly used in the workplace.



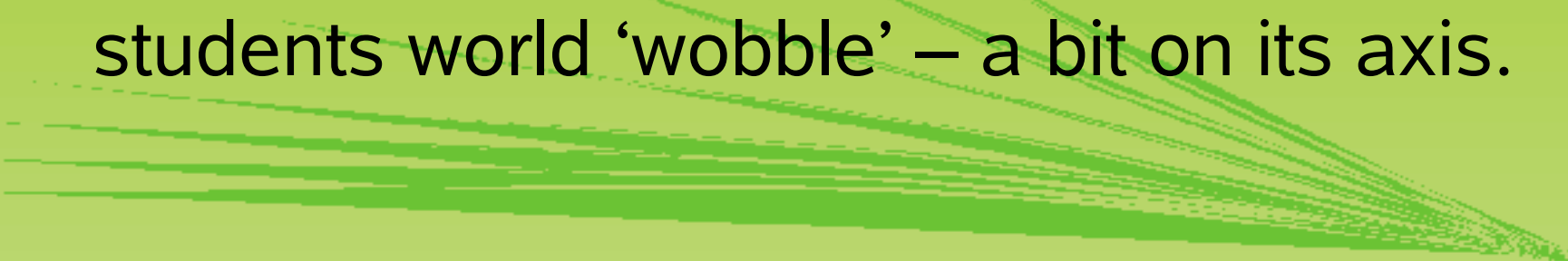
# Next Steps

- We are redesigning our KS3 curriculum from the ground up
- We are designing it as an ‘experience’
- The transition will be characterised by a shift from being object-centred to experience-centred

As Bill Buxton put it:

“Overall the objective is to build the notion of informed design moulding emerging technology into a form that serves our society and reflects our values”.

# Why Are We Doing It?

- To spark our imaginations and those of our students
  - To breath new life into the curriculum
  - To teach the important difference between ‘Getting the Design – Right’ and ‘Getting the Right – Design’
  - To provide an experience that makes our students world ‘wobble’ – a bit on its axis.
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“The only true voyage of discovery  
is not to go to new places,  
but to have other eyes”

Marcel Proust

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# NC Order Curriculum 2000

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Joining the advisory group to write the new NC Order gave me cause to look once more at the current Order.

It was like visiting an old and familiar friend who you haven't called in a while – and after a few minutes in their company suddenly remembering why you hadn't called!

The only place in the Programme of Study where I could find 'create' referred to was in KS2 under knowledge and understanding and this was it?

Isn't creativity, innovation, sustainability, thinking skills and the study of design itself the very essence of design and technology?

So why weren't they at the heart of the document?

These statements are the only references I could find that relate directly to thinking skills and creativity!

## **Problem-Solving Skills**

“Pupils should be given opportunities, where appropriate, in their study of design and technology to develop and apply their skills of asking appropriate questions, making predictions and coming to informed decisions”.

## **Creative Skills**

“Pupils should be given opportunities, where appropriate, in their study of design and technology to develop and apply their creative skills, in particular the development and expression of ideas and imagination”.

# NC Order Curriculum 2000

- Did not aid transition between KS2 and KS3
- Too great an emphasis on making
- Creativity, Innovation, Sustainability and the study of Design are for the most part only implied
- Did implying these points effectively get the message across?

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## Focus Statement

“At Key Stage 3 pupils should be given opportunities to build on the knowledge, understanding and skills acquired at Key Stage 2. They should be taught to design and make products, working with a wide range of tools, materials and components. They recognise and explore needs and wants that can be met through design and technology activities.

They draw on a growing understanding of product development and apply an increasing repertoire of skills and knowledge in generating ideas and products. They use ICT applications in their designing and making. They should be taught to develop their design and technology capability through combining their Designing and Making skills with Knowledge and Understanding in order to design and make products”.

It is generally accepted that there has been too great an emphasis on making and not enough attention paid to designing perhaps when we look at the 2000 order we can see why!

We may argue that creativity, innovation, sustainability and the study of design itself is implicit in the wording of the order.

But the evidence suggests implying these points did not effectively get the point across.

As a group we felt passionately these things had to be made explicit in the revised document.



The emphasis of the revised curriculum in Wales is on developing skills as opposed to merely transferring facts. It has an increasing focus on developing creative and critical thinking – design and technology is ideally placed to promote such development.

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This statement makes clear the focus of the revised NC Order. To contrast there was little mention of these things in the previous order.

# A revised curriculum for Wales

“In revising the curriculum, the challenge was to establish a curriculum for the twenty-first century that meets the needs of individual learners whilst taking account of the broader needs of Wales”.

# A revised curriculum for Wales

- focus on the learner
- skills development is woven throughout the curriculum
- reduced subject content with an increased focus on skills
- focus on continuity and progression 3-19
- flexible
- support Government policy, including: bilingualism, Curriculum Cymreig/Wales, Europe and the World, equal opportunities, food and fitness, sustainable development and global citizenship, and the

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The revised school curriculum aims to:

- focus on the learner – to me this means we must be experience-centred and look from the learners view point at what is a great learning experience
- ensure that appropriate skills development is woven throughout the curriculum
- offer reduced subject content with an increased focus on skills– in my opinion a reduction in unnecessary content will give more space for focused skill-sets and ‘just in time learning’
- focus on continuity and progression 3-19, by building on the Foundation Phase and linking effectively with the 14-19 Learning Pathways programme
- be flexible
- support Government policy, including: bilingualism, Curriculum Cymreig/Wales, Europe and the World, equal opportunities, food and fitness, sustainable development and global citizenship, and the world of work and entrepreneurship – It is clear D&T has a significant role to play in delivering this statement and I fully intend to draw this point to the attention of senior management, the LEA and anyone from the Welsh Assembly Government I can get to listen so that I can point out the unique contribution D&T can make and ask for the funding to make it happen.
- continue to deliver a distinctive curriculum that is appropriate for Wales.

## Points for consideration.

- Up to level 5 has to be accessible for delivery in a Primary Classroom
- No reference to CAD/CAM until level 6 in the orders
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### The new orders have to:

- Ensure access to level 5 at KS2 i.e. up to level 5 must be appropriate and accessible to being taught by non-specialists in non-specialist facilities. In the core subjects attainment of level 4 and even level 5 at KS2 has been a common feature for many years but this has not been the case in D&T
- This is why there is no reference to CAD/CAM until level 6 in the orders – **THIS DOES NOT MEAN THAT ALL CAD/CAM IS LEVEL 6** – obviously there will be many examples of CAD/CAM that are below level 6 and these will be assessed against the criteria for designing and making (as will those above and for any other product). What it does make clear that in a balanced design and technology experience at key stage 3 it is required that the pupil will have accessed CAD/CAM (achieving an contemporaneous level of designing and making) if they are being assessed as attaining a consistent level 6 or above
- This in my opinion is an oversight and must be addressed in the next order. However, even though creativity is not mentioned until level 7 it is to be expected that work below this will demonstrate creativity. The point is that work awarded a level 7 or above should demonstrate creative thinking or it cannot achieve more than level 6. It is likely that a level 4 or 5 at KS2 will demonstrate creative thinking while a level 5 at KS3 may demonstrate superior making but predictable designing with little originality.

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# Skills across the curriculum

- **Developing thinking;** through the iterative process of creating and developing ideas
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## Developing thinking

In **design and technology**, learners design and make products through the iterative process of creating and developing ideas, designing products, planning, making and reflecting on their decisions and outcomes in terms of their finished product – I feel we often talk about **design iteration** and then carry out **development iteration**. How often do we see a few 'Initial Design Ideas' and perhaps some 'Development' drawings and a lot of redesigning 'on the bench'? In industry this is regarded as at best bad practice and at worst commercial suicide – so why do we teach it/allow it?

## Developing communication

In **design and technology**, learners ask questions and seek out information to develop and support their design ideas. They communicate and record their ideas and intentions by explaining, writing, sketching, using detailed technical drawings and three-dimensional models. – I feel the exemplification of the orders will need to give due emphasis to all these aspects and support a more narrative approach to the D&T Experience. The full exploration of the term 'sketching' must be redefined as more than just a visual drawing if it is to support 'Getting the Right – Design'

## Progression

Progress can be seen in terms of the refinement of these skills and by their application to tasks that move from: concrete to abstract; simple to complex; personal to the 'big picture'; familiar to unfamiliar; and supported to independent and interdependent.

## Implications

There is a change in emphasis and we will need to show the pupils how to connect to these things. We will need to show them how we all live in an interconnected and interdependent world and in the words of Steven Covey teach them how to search for 'Synergistic' Win/Win solutions.

# Skills across the curriculum

## Developing ICT

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Since this statement was written I feel the world has moved on and it sounds – old fashioned.

I believe that we are not going anywhere near far enough with this statement and it will need to be pushed way beyond what has been written to stay relevant for the life of this order.

Industry is moving beyond CAD to Digital Prototyping and beyond Rapid Prototyping to Rapid Manufacturing.

What is a Digital Prototype? I only learned this term last November.

‘A Digital Prototype is a CAD model that interacts with other models

and reacts to forces and loads the same as physical parts’.

# Skills across the curriculum

## Developing number

In **design and technology**, learners use mathematical information and data, presented numerically and graphically, to research and develop their ideas. They use number to measure and calculate sizes, fits and materials

**‘The only ones who do what we do’.**

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I find the wording of this statement rather cumbersome – however, it must be seen as central to a quality D&T experience.

Design and Technology has moved into the centre of the STEM agenda. We must ensure we do not overlook the opportunity to demonstrate how effectively we address scientific and mathematical education and how our D&T approach offers a dynamic and different way for the pupils to access this important area of the curriculum. I feel it is important that we do not allow the STEM agenda to define the part D&T can play rather that we define the **unique contribution** we can make and build the case why government and the senior management in schools allocate significant investment to D&T as **‘The only ones who do what we do’.**



## Curriculum Cymreig (7–14) and Wales, Europe and the World (14–19)

In **design and technology**, learners should be given opportunities to use the rich characteristics and resources of Wales as a source of inspiration and a context to design and make products.

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I would expect everyone is already doing things to address this but it remains an important point to include when SoW are rewritten.

## Progression in design and technology at Key Stage 2

### **Learners should be taught:**

- to design and make simple products
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I am painfully aware of the mismatch between the requirement to encourage creative and innovative designing and making at KS2 and the Level Descriptors.

At our last meeting we discussed this point but it was too late in the process to make the changes.

On a positive note I would say this is NOT a requirement to 'work to rule' and the 'spirit' of this order consistently shines through.

## Progression in design and technology – Key Stage 3

Learners should be taught to design and make products by combining their designing and making skills with knowledge and understanding in contexts that allow them to make decisions based on the values that underpin society, helping them become active and informed citizens.

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I have concerns as to how we are to deliver this. What Values and which Society?

## Progression in design and technology – Key Stage 3

Learners should be made aware of human achievements and the big ideas that have shaped the world

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Which Human Achievements and which 'Big Ideas'? These cannot be assumed, we will have to teach this and in order to be consistent we may well need a National Scheme.

We **can** create communities (we have a D&T one here) but each must have 'shared' knowledge so that all the stakeholders share a Vocabulary and Experiences.

Anne MacGarry at CAT has taught me a lot about Sustainability and Environmental Issues and some of her questions have made me think long and hard about what I teach and how I teach.

Fundamentally, I come down to the importance of moving from an 'Object – Centred' curriculum to an 'Experience – Centred' curriculum and refocusing from

'Getting the Design – Right' to 'Getting the Right – Design'.

## Things I Like About the New Orders

- The range statement is much clearer
- Creativity, Innovation, Sustainability and the environment are given emphasis
- The work of designers, architects, inventors and chefs are identified as areas of study
- The emphasis of Systems and Control at KS3 is on incorporating technology into products.

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### Things I Like About the New Orders

I hope the emphasis on products in System and Control provokes the end of 'bolt on' units of 'mechanisms, structures (yes they are still in the order they just no longer have there own column), electronics and CAD/CAM'

It has to be about 'Getting the Right Design' and utilising the appropriate technology.

# Careers and World of Work

**D&T** contributes to learners' awareness

- by providing opportunities for them to understand how consumer products and services are developed and brought to the marketplace
- by raising their awareness of the range and diversity of careers associated with manufacturing in the wider world.

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Things I Like About the New Orders.

The careers and world of work statement. Generally, I like the statement – it moves toward our planning for our new KS3 curriculum. It does not go quite as far as I would like such as the place of emotion, interaction and experience design – but it is a big step toward it.

**Design and technology** contributes to learners' awareness of careers and the world of work by providing opportunities for them to understand how consumer products and services are developed and brought to the marketplace and by raising their awareness of the range and diversity of careers associated with manufacturing in the wider world. Design and technology also allows learners to engage with the design and manufacturing technologies that are increasingly used in the workplace.

# Careers and World of Work

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Things I Like About the New Orders.

The last paragraph shown here is I hope a statement of intent by the Welsh Assembly government to invest in the subject. We have had ten very successful years of the CAD/CAM in Schools Initiative but it has focused on CAD. We need to continue to do this but also balance the CAM aspect. All schools should have access to Rapid Prototyping technologies if we are to fulfil the last part of the statement.

# Next Steps

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- We are designing it as an 'experience'
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