Technology
in UK schools (k-12)

Professor Richard Kimbell
Technology Education Research Unit (TERU)
Goldsmiths College: London University
r.kimbell@gold.ac.uk
key stage 1: 5 - 7 yrs

design from stories

...the three little pigs

..the old lady who lived in a shoe
key stage 2: 7-11 yrs

**can-power!**

**formula one coke**

**all-terrain trundler**
LEGO modelling systems

electronics & control (8-14)
key stage 2/3/4: 8-16 yrs

robotics ... 
- swimmers
- dancers
key stage 4: 14-16 yrs

automatic fish-feeder
key stage 4: 14-16 yrs

canoe foot-rest (adjustable)
rucksack into...
bivouac tent

key stage 5: 16-18 yrs
key stage 4: 16-18 yrs

arrow-flight analyser
one-handed can opener

key stage 5: 16-18 yrs
massage seating

key stage 5: 16-18 yrs
key stage 5: 16-18 yrs

‘growing’ seating....

.... for growing children
• the self-bailing dinghy
  by (and for) a fanatical Cornish sailor

• the intelligent lobster pot
  for a shell fishery - to prevent lobster theft

• the adjustable climbing wall
  for schools gyms by a trainee rock climber

• the one-handed can opener
  for a disabled grandmother

• the safe learning environment
  for a blind 3 yr old

• the moorland (9 hole) golf-course
  for a country hotel
design & technology
a nationally mandated ‘programme of study’

<table>
<thead>
<tr>
<th>age group</th>
<th>knowledge:</th>
<th>skills:</th>
<th>processes:</th>
</tr>
</thead>
<tbody>
<tr>
<td>5-7yrs</td>
<td>systems (eg electronic/mechanical) materials social &amp; environmental factors</td>
<td>drawing/communicating planning manufacturing</td>
<td>enquiry / investigation ideation and exploration design</td>
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<tr>
<td>7-11yrs</td>
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<td>11-14yrs</td>
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<td>14-16yrs</td>
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design & technology
activities

pedagogy is active, task-focused, and increasingly personalised

- identify and specify a task
- generate and explore ideas
- model and detail their solution
  - manufacture a prototype
  - evaluate it in use
“The designer does not need to know all about everything so much as to know what to find out, what form the knowledge should take, and what depth of knowledge is required for a particular purpose” 

(DES 1981)
a testing experience?
formal assessment points and purposes

<table>
<thead>
<tr>
<th>Year</th>
<th>K</th>
<th>1</th>
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NC assess key stage 1
NC assess key stage 2
NC assess key stage 3
GCSE
AS level
A level

formative
transfer to secondary school
guiding the choice of (8) GCSE subjects
employment or entry to 6th form
3 subjects for access to higher education
technology demands ‘performance’ assessment

• technological knowledge and skill *as resources for action*.

• students’ ability to *bring about change* in the made world

• **project assessment** is therefore critical
  - normally at least 50% of any examination

  - the *portfolio* is evidence of the development process

  - the *outcome* is evidence of the ‘made-world change’
the portfolio tells the story of the project

concept sketches

exploring components

sometimes using CAD systems to define details
the solution emerges through models
.... and a final prototype

which is tested in context
Bell & Edison
and the development of the telephone

...the innovation process is characterised as a recursive activity in which inventors move back and forth between ideas and objects..... the interplay of mental models with mechanical representations. (Gorman and Carlson 1990)

The act of expression pushes ideas forward.....concrete expression (by whatever means) allows us to see our ideas...to be clear what our ideas are. (Kimbell et al 1991)
## Project Assessment Rubric (1980s)

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Performance Descriptors</th>
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<tbody>
<tr>
<td><strong>A</strong></td>
<td>How much skill was needed to achieve the project?</td>
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<tr>
<td><strong>B</strong></td>
<td>No significant omission of major issues.</td>
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<tr>
<td><strong>C</strong></td>
<td>Tight control of current target.</td>
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<tr>
<td><strong>D</strong></td>
<td>Widest possible range of factors and experiments conducted.</td>
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<tr>
<td><strong>E</strong></td>
<td>Range of possibilities explored; available evidence carefully assessed.</td>
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<tr>
<td><strong>F</strong></td>
<td>Quality of manufacture, assembly, and presentation of the project.</td>
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<td><strong>G</strong></td>
<td>As a whole, how well the project was presented.</td>
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<tr>
<td><strong>H</strong></td>
<td>Quality of presentation.</td>
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<tr>
<td><strong>I</strong></td>
<td>Evidence of learning and understanding applied.</td>
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<tr>
<td><strong>J</strong></td>
<td>Evidence of teacher involvement.</td>
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<td><strong>K</strong></td>
<td>Evidence of teacher help.</td>
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**Weighting**

<table>
<thead>
<tr>
<th>Importance</th>
<th>Very Important</th>
<th>Important</th>
<th>Least Important</th>
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<tbody>
<tr>
<td>A</td>
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**Teacher Involvement**

- **A** (very important)
- **B** (important)
- **C** (least important)
teachers assessing portfolios

..... surveying the big picture

then digging into the detail ....
National standards in technology?

**School-based assessment**
- with agreement trials across teachers

**Local authority (school district) moderation**
- groups of schools examine grade boundaries

**National (QCA) moderators**
- ensuring national standards

The side-benefit of this process is teacher development - helping them to see what qualities are critical, and what counts as good evidence of performance.
“Among the multitude of animals that scamper, fly, burrow and swim around us, man is the only one who is not locked into his environment.”

“His imagination, his reason, his emotional subtlety and toughness make it possible for him not to accept the environment but to change it. And (this) derives from the ability to visualise the future, to foresee what might happen and plan to anticipate it, and to represent it to ourselves as images that we project and move about inside our heads.”

“Man has what no other animal possesses, a jigsaw of faculties which alone, over three thousand million years of life on earth made him creative.”

(Bronowski 1973)
“Design and technology prepares pupils
...to intervene creatively to improve the quality of life
...to become autonomous and creative problem solvers
...to combine practical skills with an understanding of aesthetics,
   social and environmental issues and industrial practices.
...to reflect on and evaluate present and past design and
   technology, its uses and effects.

Through design and technology, all pupils can become
   discriminating and informed users, and can become
   innovators.”
(QCA / DfEE 2000)
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