

# Working Lunch Science Education

Walter Whitelaw, Chair, Science Review Group

Kath Crawford, SAPS Biotechnology Project Scotland

RESPONSIBLE CITIZENS



EFFECTIVE CONTRIBUTORS

# A Curriculum for Excellence

The Science Communication Conference  
Our Dynamic Earth, 6&7 April



*Walter Whitelaw*  
*Professional Adviser*

*Scottish Executive Education Department*  
*Curriculum for Excellence Programme*

SUCCESSFUL LEARNERS

CONFIDENT INDIVIDUALS



SCOTTISH EXECUTIVE

# ***Purpose of meeting***

## Engagement

- Brief you on *A Curriculum for Excellence*
- Share work of the science review group
- Seek your views on progress and direction of travel
- Begin to identify your collective and individual contribution to ACfE



a curriculum for excellence  
The Curriculum Review

# The Curriculum Review in Context

National debate

Ambitious Excellent Schools

A Curriculum for Excellence



# More freedom for teachers

- **Scary!**
- How brave do you want to be?



# Our remit

- base work on existing documents
- write outcomes at 5 levels
- test against set of evaluative questions
- use research



## **The bigger picture - Curriculum 3-18**

Emphasis on literacy, numeracy, health & wellbeing, citizenship, enterprise, creativity

- Ethos and life of a school/establishment as a community
- Curriculum areas & subjects
- Interdisciplinary projects and studies
- Additional planned experiences



# What shaped our thinking?

- The 4 capacities and 7 principles of curriculum design
- HMIE and SEED reports
- Other reports - SSAC, STEM-ED etc
- Research
- The bigger picture
- Common sense



# What are we saying?

- The most important goal for science education is to stimulate, nurture and sustain the curiosity, wonder and questioning of our young people



# What are we saying?

- The twin purposes of science education are to prepare young people for their future lives and careers by:
  - developing them as scientifically literate citizens
  - preparing them for later more specialised learning



# What are we saying?

“There will be freedom to teach in innovative ways and to make the most of digital learning and expertise outwith the school sector.”



# What's the same?

- The organisers for learning
  - Our living, material and physical world
- Much of the content



# What's different?

- Fewer outcomes - 'I can' statements
- Less specific outcomes
- Opportunity taken to build in possibility of updating
- A new skills set
- Outcomes integrate KU, citizenship and skills



# Styles of outcome

- Outcomes that describe the development of big ideas
  - knowledge and understanding
- Summarising outcomes
  - capturing learning that has gone before
- Citizenship outcomes
  - inviting pupils to express informed views
- Updating outcomes



# Sample outcomes - KU

work in progress

- I can make observations in my local environment over time and represent these in a variety of
- I can construct food chains from observations in my local environment
- I can construct a food web and predict the consequences of change
- I can explain the importance of biodiversity to humans



# Sample outcomes - KU

work in progress

- I can match and sort materials based on properties
- I can recognise and name materials from living and non-living sources
- I can talk about the differences between solids, liquids and gases
- I can describe the particulate nature of solids, liquids and gases



# Sample outcomes - KU

work in progress

- I can talk about how to stop and start objects moving
- I can investigate how far objects travel over different surfaces
- I can describe how to measure the speed of an object
- I can explain the safety features of cars



# Proposed outcomes

## Citizenship

work in progress

- I can research, debate and present information on a local environmental issue
- I can research, discuss and present information on the recycling of plastics in my own community



# Proposed outcomes

## Updating

work in progress

- I can describe the features of modern biotechnology
- I can describe the features of a modern communications system
- I can research and present information on sustainable polymers



## Implications for teaching and learning

- Promoting more experiential learning, particularly in early years
- Encouraging more collaborative work, more discussion and debate, the use of digital learning
- Moving from a broad sweep of knowledge to a deeper understanding of big ideas
- Encouraging a wider range of challenges and investigations and experiences
- Encouraging more cross curricular work at all stages
- Accessing a wider range of evidence, and the adoption of proven formative strategies to judge pupil progress



# *Current Challenges*

- Management of change
- Varying levels of awareness
  - Understanding of purposes and principles
  - Readiness of staff to interpret and use simplified guidance
- Nature of and extent of CPD & resources
- Focus on external accountability and qualifications



# What you can be doing now

- Consider how well your current approaches match the 4 capacities and the 7 purposes
- Continue work with thinking skills
- Introduce discussion of moral and issues related to science
- Develop practical work that allows pupils to consider strength and validity of evidence
- Offer opportunities for challenges and collaborative work



# *Activities*

1. Carousel activity relating to the 4 capacities and principles of curriculum design
2. Responding to outcomes
3. Recognising achievement



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*SUPPORTING SCOTTISH SCIENCE  
EDUCATION THROUGH CPD*

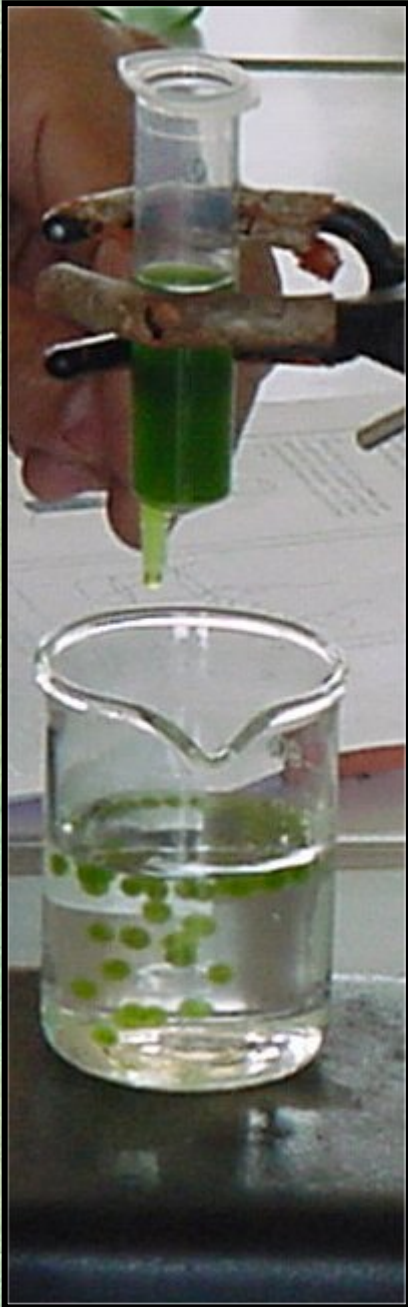


For teachers & trainee teachers, experiential centres on innovative, reliable, trialled, reasonably priced practical work & other active learning resources that support the curriculum




CPD from  
SAPS & partners

# *Photosynthesis using algal balls*



with:

self-respect



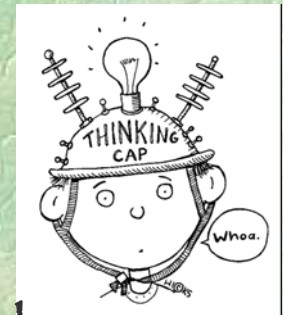
**TO  
ENABLE ALL YOUNG  
PEOPLE TO BECOME:**



Experiential – centres on innovative, reliable, trialled, reasonably priced practical work & active learning resources that support the curriculum



CPD from  
SAPS & partners



Integrates learning & teaching strategies

# Odd One Out?

mould

decomposer

beneficial



mould

decomposer

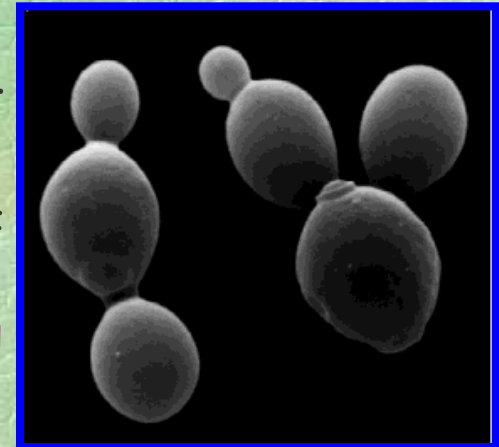
beneficial



yeast

foodstuff

beneficial



mould

decomposer

harmful

with:

self-respect



able to:

apply critical thinking in  
new contexts



Experiential – centres on innovative, reliable, trialled, reasonably priced practical work & active learning resources that support the curriculum



CPD from  
SAPS & partners



Integrates learning & teaching strategies

Applies the science



# Harmful effects of microorganisms

## MICROORGANISMS AND FOOD HYGIENE

### Food poisoning



In the table below, there is information about the number of cases of food poisoning reported in Scotland from 1980 until 2000.

Year	1980	1985	1990	1995	2000
No of cases of food poisoning reported in Scotland	2,700	4,200	6,800	9,300	9,300

- Figures simplified from the Scotland's Health on the Web website see: [www.show.scot.nhs.uk](http://www.show.scot.nhs.uk)

able to:

use literacy, communication and numeracy skills

with:

self-respect



able to:

apply critical thinking in  
new contexts



Experiential – centres on innovative, reliable, trialled, reasonably priced practical work & active learning resources that support the curriculum

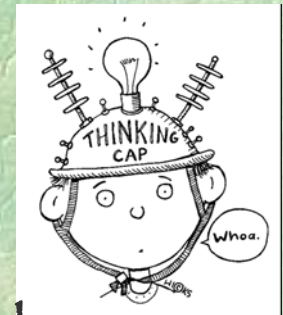


# CPD from SAPS & partners



Raises associated Societal issues

Applies the science



Integrates learning & teaching strategies



Waste disposal,  
landfill, etc.

able to:

use literacy, communication and numeracy skills

with:

self-respect



able to:

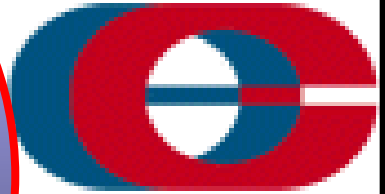
evaluate environmental, scientific and technological issues

able to:

apply critical thinking in new contexts

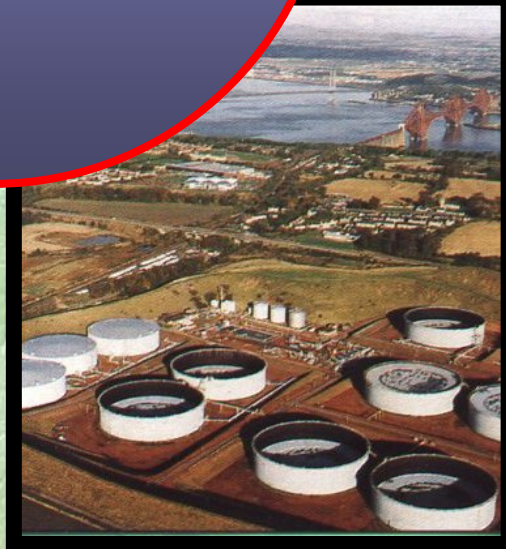
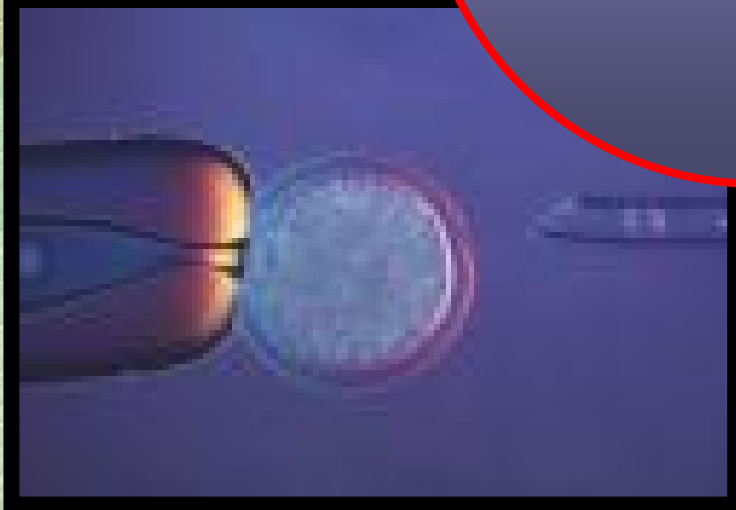


*Fusion days*



CENTRE FOR STUDIES IN

DEVELOPMENT & WORK



Kylie and Posh are great friends who agree about nearly everything. They are both twenty-two years old. Recently, they saw in a newspaper that a company called 'KNOW-YOUR-GENES' was offering to screen for changes in the BRCA1 'breast cancer' gene by taking a simple blood test.

**KYLIE**

No way will I  
have the test.

Posh's mum was also 45 years old when she was diagnosed with breast cancer. Her disease was not diagnosed early and she died two years later.

?

Kylie's mum was 45 years old when she was diagnosed with breast cancer. Her disease was diagnosed early; she had surgery and recovered fully.

**WOULD YOU  
TAKE THE  
TEST IF YOU  
WERE**

**POSH**

I'm going  
to have the  
test.

?

## successful learners

### with

- enthusiasm and motivation for learning
- determination to reach high standards of achievement
- openness to new thinking and ideas

### and able to

- use literacy, communication and numeracy skills
- use technology for learning
- think creatively and independently
- learn independently and as part of a group
- make reasoned evaluations
- link and apply different kinds of learning in new situations

## confident individuals

### with

- self respect
- a sense of physical, mental and emotional wellbeing
- secure values and beliefs
- ambition

### and able to

- relate to others and manage themselves
- pursue a healthy and active lifestyle
- be self aware
- develop and communicate their own beliefs and view of the world
- live as independently as they can
- assess risk and take informed decisions
- achieve success in different areas of activity

To enable all young people to become

## responsible citizens

### with

- respect for others
- commitment to participate responsibly in political, economic, social and cultural life

### and able to

- develop knowledge and understanding of the world and Scotland's place in it
- understand different beliefs and cultures
- make informed choices and decisions
- evaluate environmental, scientific and technological issues
- develop informed, ethical views of complex issues

## effective contributors

### with

- an enterprising attitude
- resilience
- self-reliance

### and able to

- communicate in different ways and in different settings
- work in partnership and in teams
- take the initiative and lead
- apply critical thinking in new contexts
- create and develop
- solve problems

ACE  
ACE

# Biotechnology and Biosciences Summer School

To enable all young people to become:

Successful  
Learners

Responsible  
Citizens

Confident  
Individuals

Effective  
Contributors



26th June-30th June 2006

## AIMS OF THE SUMMER SCHOOL

The principal aims of the Summer School are to offer to delegates opportunities to:

- ✦ Explore activities that will support the aims of 'A Curriculum for Excellence'
- ✦ Raise their levels of knowledge and confidence in the teaching of biotechnology and biosciences throughout the curriculum
- ✦ Update their knowledge and skills in molecular biology and plant science through a range of interactive sessions that include:
  - group tasks • practical activities • discussions • lectures • visits



Daniel Rutherford Building, King's Buildings  
University of Edinburgh



**SUMMER SCHOOL JUNE 2006 -  
PROVISIONAL PROGRAMME**

*SUCCESSFUL LEARNERS*

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*EFFECTIVE CONTRIBUTORS*

*RESPONSIBLE CITIZENS*

<b>Monday 26th June</b>	Registration	Introduction, welcome ACfE	Laboratory session: Photosynthesis in the classroom	Group activity: Investigations	SAPS team activity	Evening: New and emerging resources
<b>Tuesday 27th June</b>	Laboratory session: Environmental effects on DNA	Visits to: A range of biosciences companies and institutes		Group activities	Evening: Bio-Rad evening	
<b>Wed 28th June</b>	Lecture: Obesity and health	Laboratory session: Glucose testing	Discussion: Diabetes and its implications	Societal issues	Evening: Healthy dinner	
<b>Thursday 29th June</b>	Royal Botanic Garden, Edinburgh	Lecture: Biodiversity	Group practical activities	Tour of RBGE	Societal issues	Evening: Group activities and social event
<b>Friday 30th June</b>	Laboratory session: DNA results	Group activity: Feedback	Primary-secondary transition activity	Closing remarks		



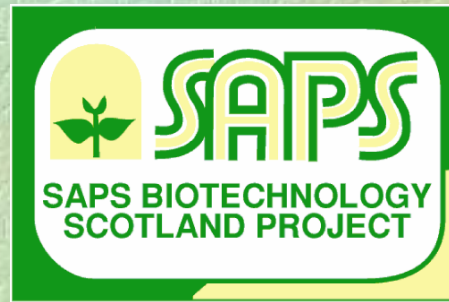
## Another CPD Activity

*The*  
**Royal Society**  
*of* **Edinburgh**

**Royal Society of Edinburgh  
Teacher Fellowships**

*Becky Sutherland Shiell @ RBGE - phenology*



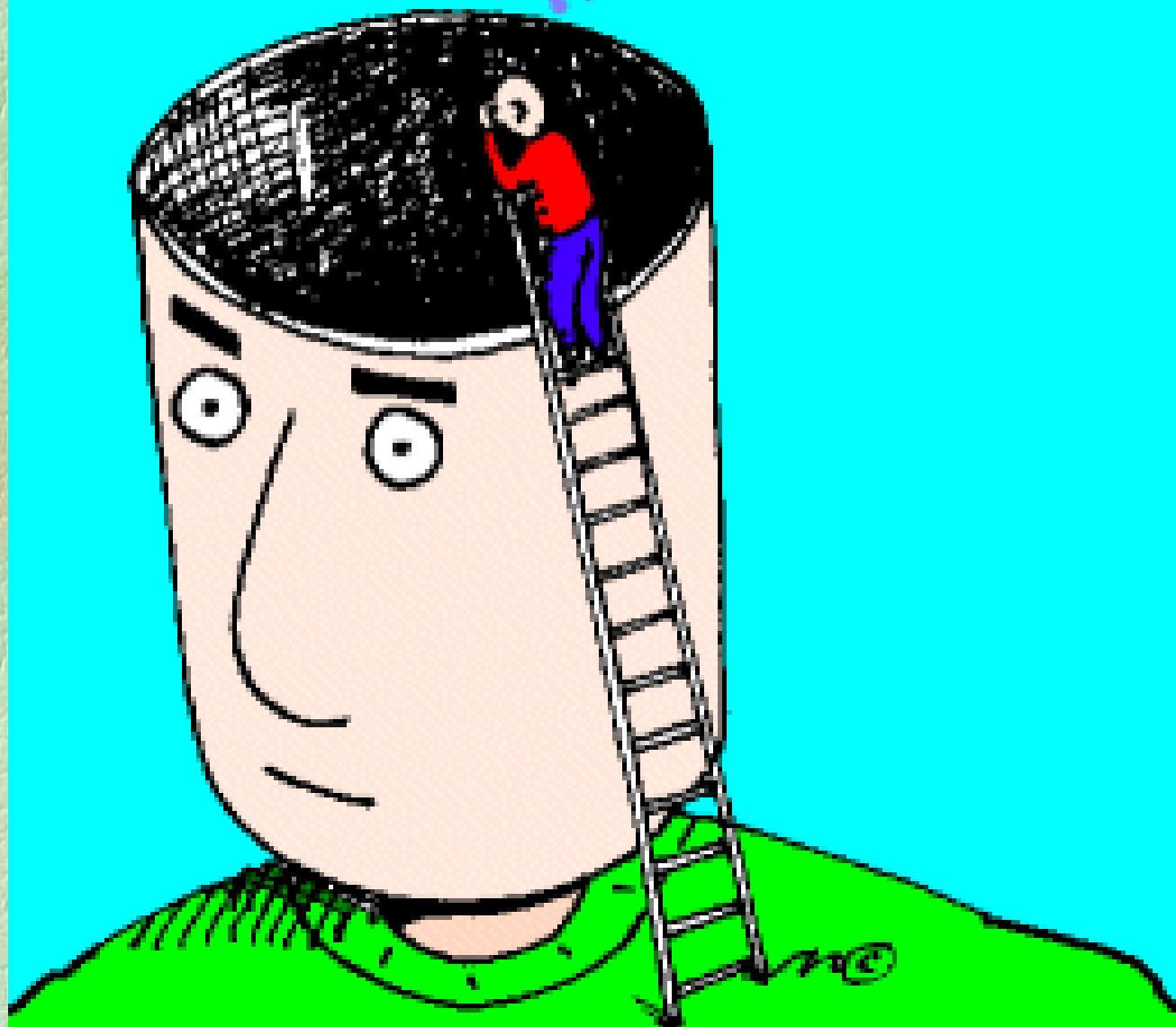


## *Current Core Partners*



We are also keen to work with others actively engaged in CPD for science educators (both teachers and technical support staff). Presently we have some collaborative arrangements in place with ASE Scotland, the Institute of Physics and the Royal Society of Chemistry.

HELLO HELLO





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