Promoting Attainment of Responsible Research & Innovation in Science Education

Institute of Education

Socio-Scientific Inquiry Based Learning (SSIBL): gearing social action to scientific knowledge

Ruth Amos
&
Ralph Levinson (Both UCL-IOE)

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r.levinson@ucl.ac.uk

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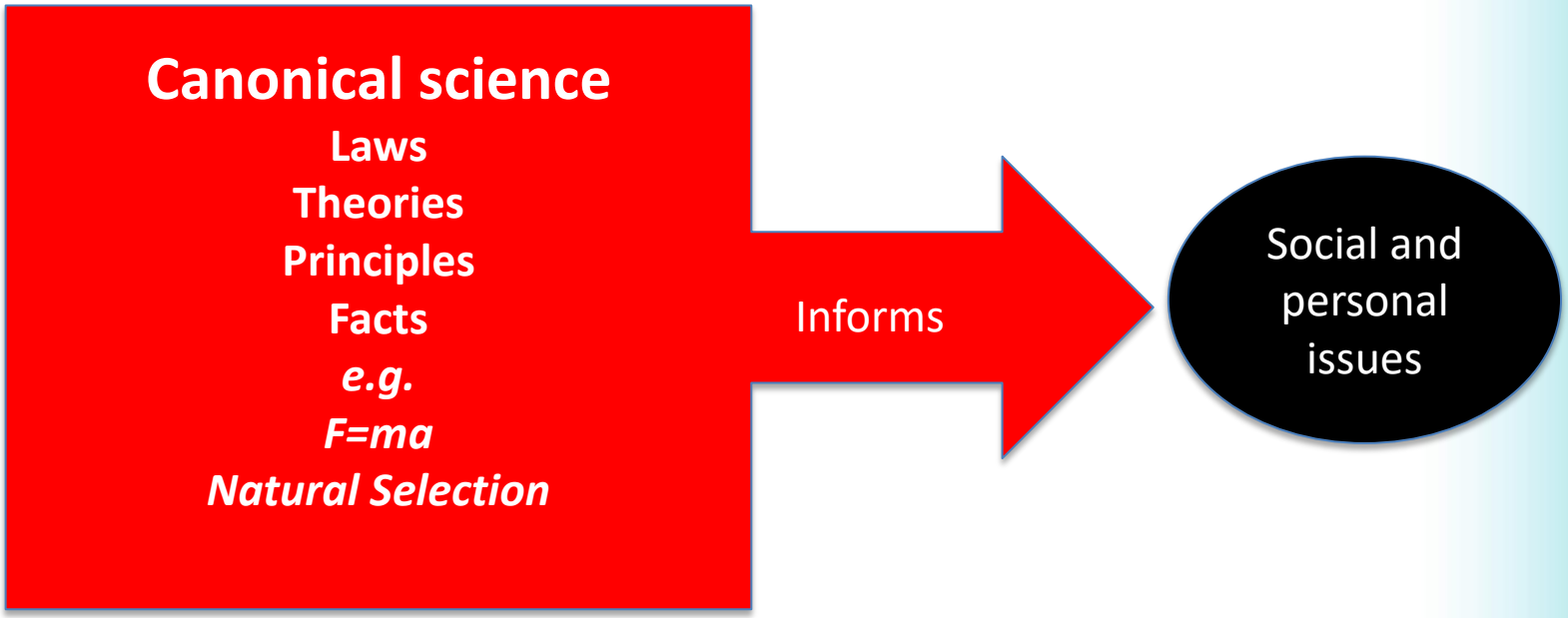
Vision I/Vision II approaches



Knowledge: *stabilised, essentialised*
Role of SSIs: *illustrative*
Curriculum purpose*: Supporting stabilised (substantive) knowledge*

‘. . . science can fairly accurately judge the consequences of bringing together a number of sub-critical masses of U-235 above a densely populated

Vision I curricula: the problem of empiricism

Science can fairly accurately judge the consequences of bringing together a number of sub-critical masses of Uranium-235 above a densely populated geographical area. It can say absolutely nothing, however, about whether such an action would be right or wrong. (Hall, 1999)

This is a predominantly positivist/empiricist view where facts sit separately from values, i.e. they are dichotomous

Positivism/Empiricism and detached values underpin most science curricula

Towards epistemological change

- **Empiricism**
- Nuclear reactions can be explained through critical masses etc but can say nothing about how we should act.

Humean Fact-value dichotomy

- **Critical realism**

Our knowledge of nuclear reactions explains their power to destroy all organic life therefore we need to understand how we can organise to prevent such an outcome.

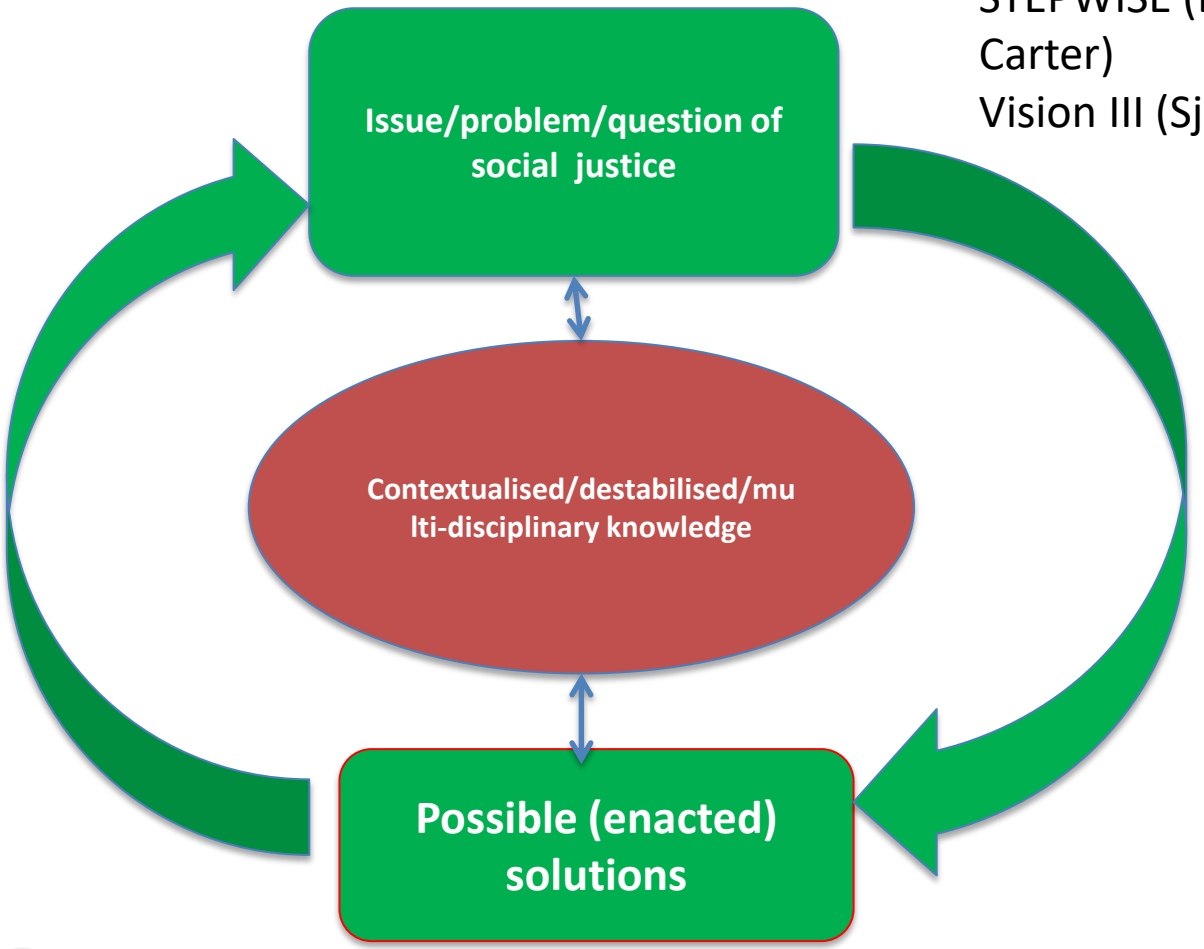
Vision I/Vision II problematised by . . .

- Layton *et al.* (1993)
- Roth & Lee (2002)
- Roth & Barton (2004)
- Roth (2009)
- Ryder (2002)

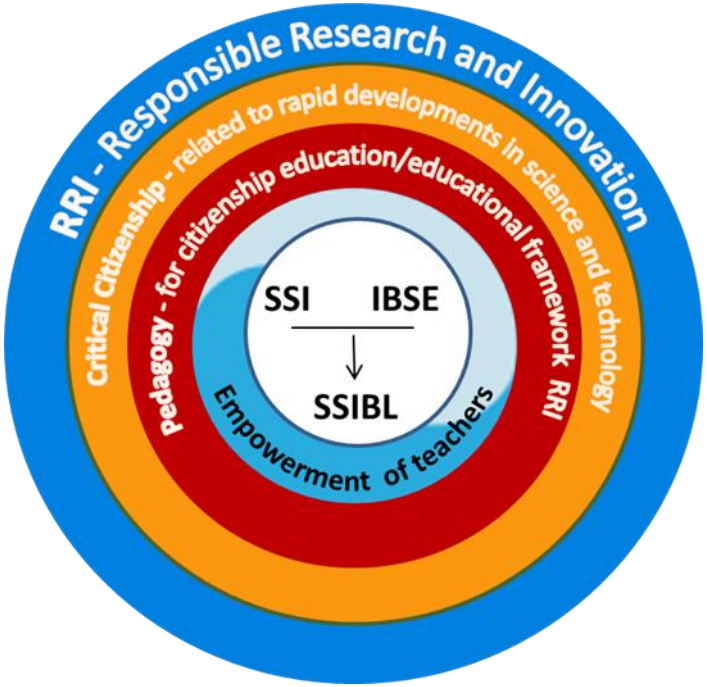
- **Science needs to be recontextualised for SSIs**
- **Expert knowledge is fallible**
- **Technoscientific knowledge fails to take account of socio-cultural contexts**
- **Technoscience is entrenched in power relations and vested interests**

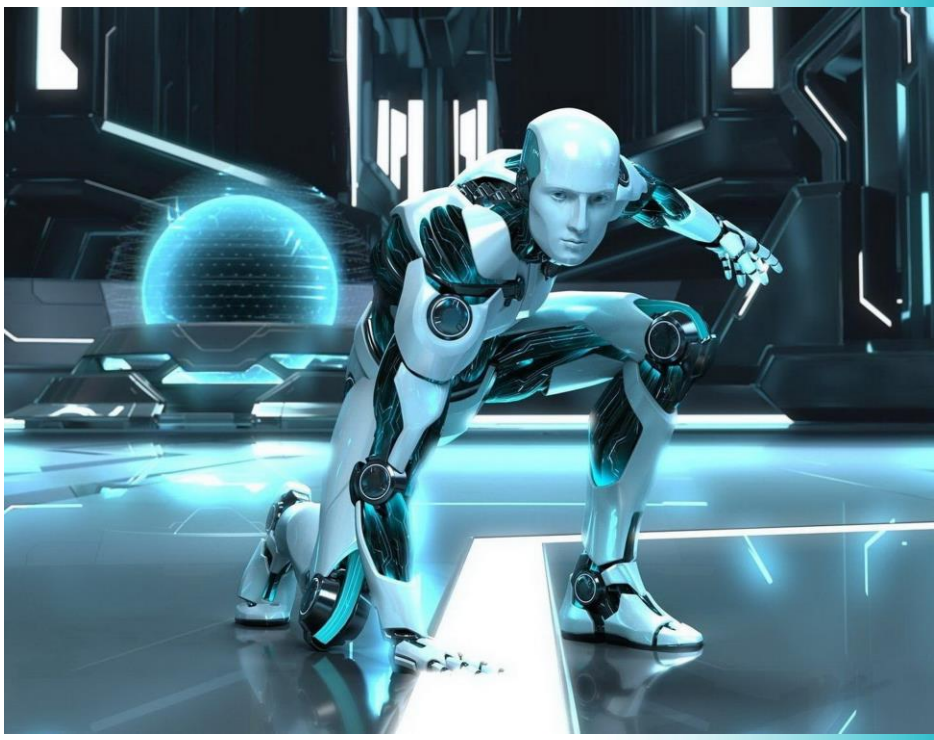
Another approach

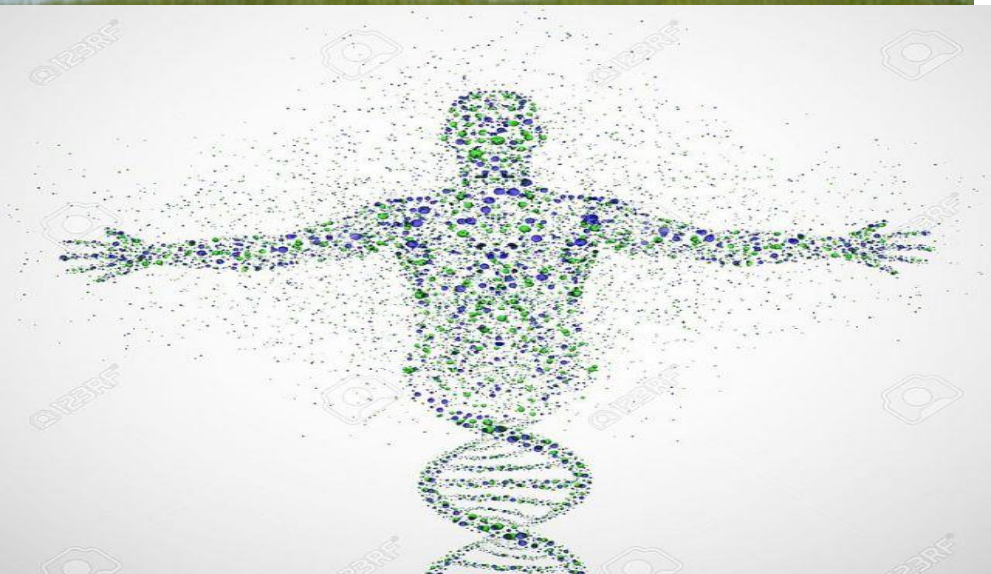
SAQs (Legardez & Simonneaux)
STEPWISE (Bencze & Carter)
Vision III (Sjostrom)



PARRISE project – Socio-scientific Inquiry Based Learning (SSIBL)








we know where
you are
Options
Exit

Aims of SSIBL

- Encourage young people to *participate* in research and innovation issues influenced by science and technology
- *Promote interest* in science, mathematics and technology so they can become scientific researchers of tomorrow
- Encourage young people to act as *informed social agents* through scientific inquiry informing responsible research and innovation

RRI

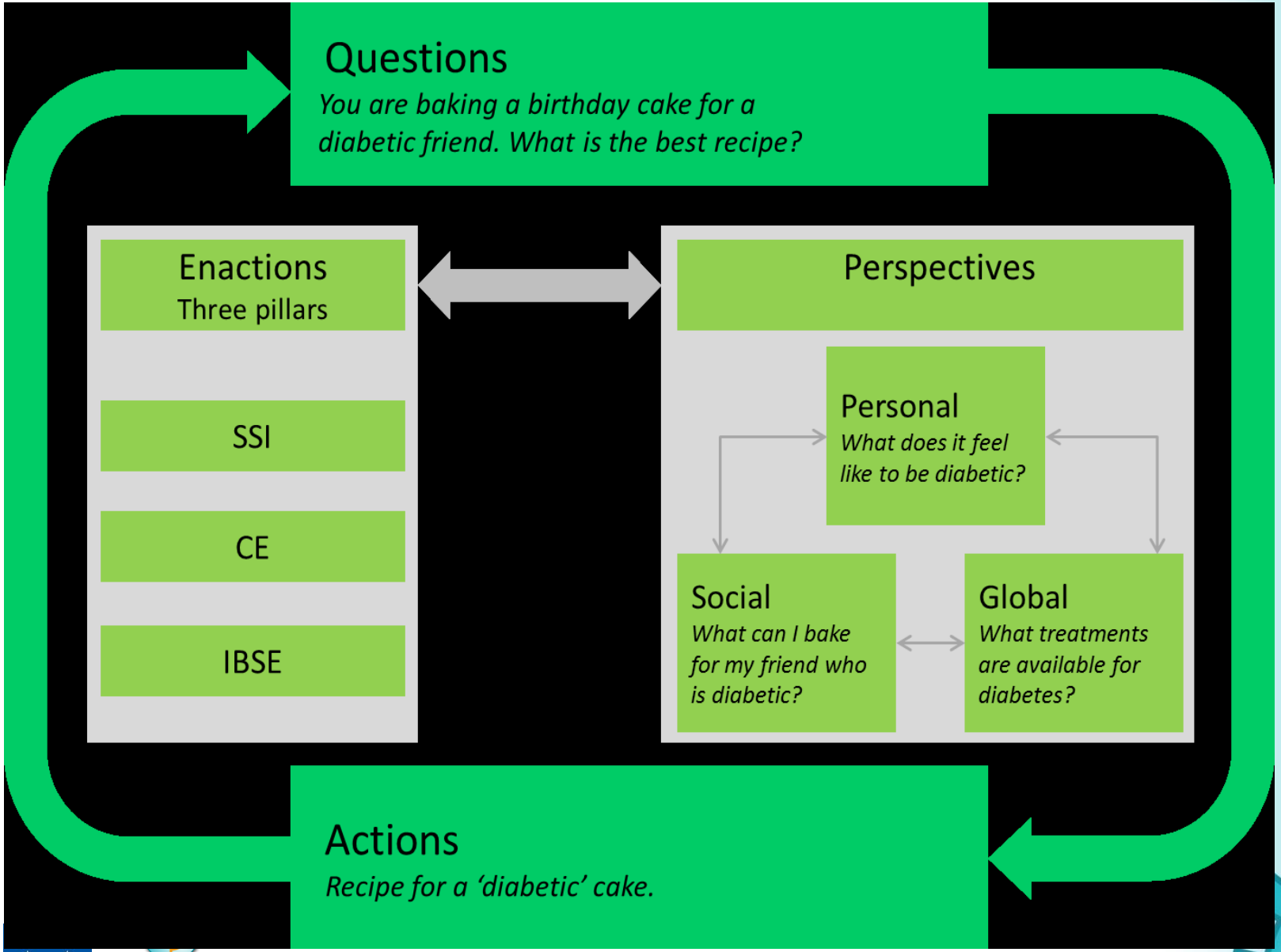
Science with and for society

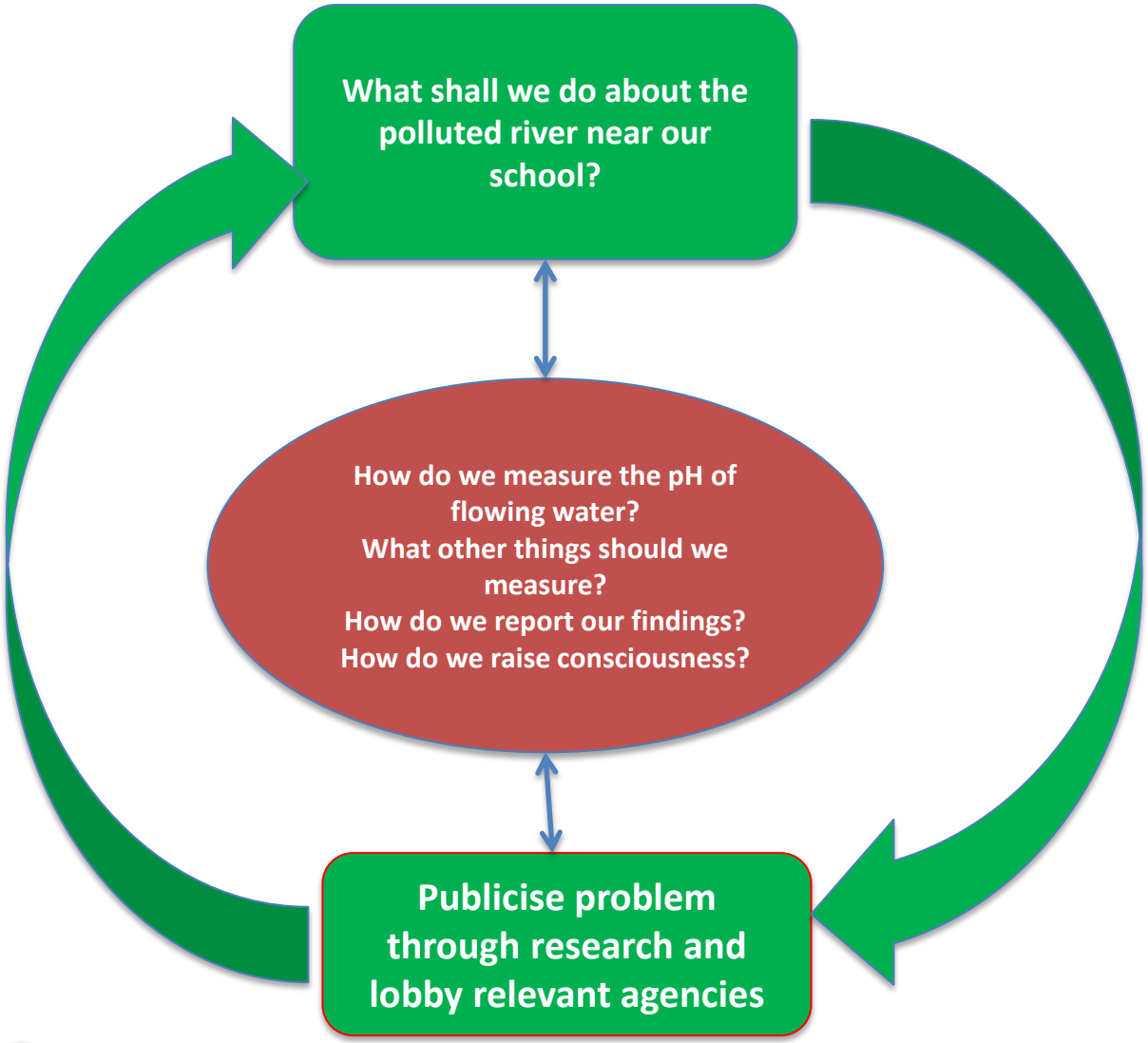
Aims

- Ethical Acceptability

(e.g. products sourced do not depend on slave labour; equal distribution of products throughout diverse sectors of society)

- Social Desirability of products (e.g. promote health and wellbeing)
- Sustainability (no damage to biosphere)


Questions
You are baking a birthday cake for a diabetic friend. What is the best recipe?
Enactions
Three pillars
SSI
CE
IBSE
Perspectives
Personal
What does it feel like to be diabetic?
Social
What can I bake for my friend who is diabetic?
Global
What treatments are available for diabetes?
Actions
Recipe for a 'diabetic' cake.

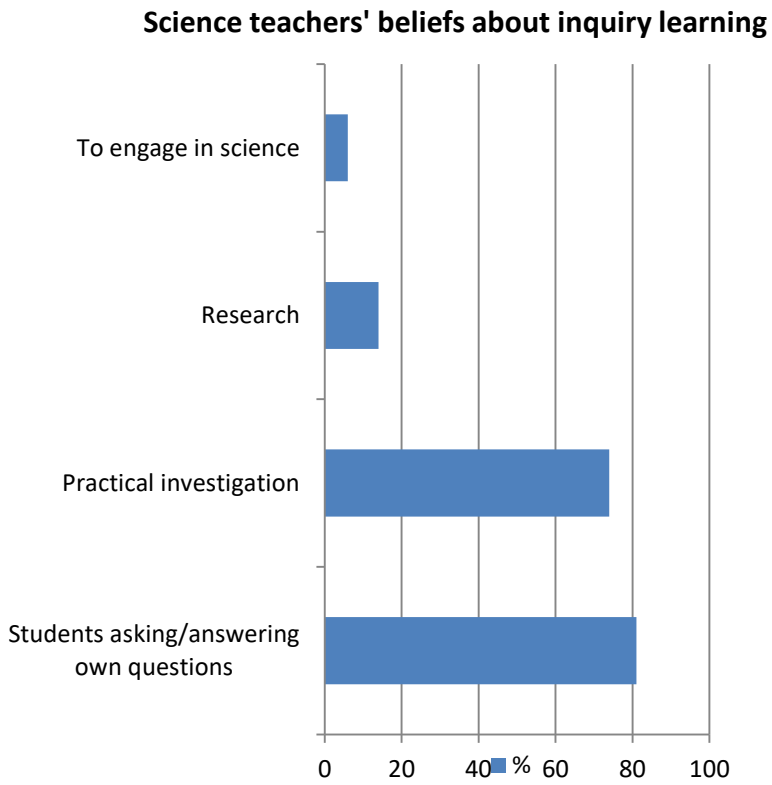

What shall we do about the polluted river near our school?
How do we measure the pH of flowing water?
What other things should we measure?
How do we report our findings?
How do we raise consciousness?
Publicise problem through research and lobby relevant agencies

Research approach

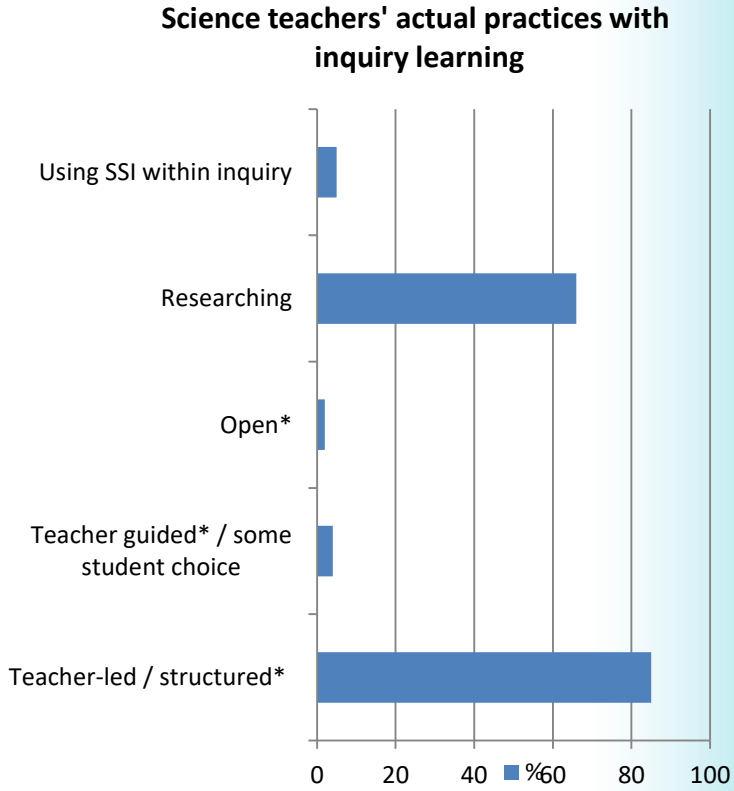
- Student teachers engage in thinking about scientific ideas in terms of social justice
- Study carried out across 110 *different* schools with 177 teachers.
- Student teachers set the task of finding out about contemporary practise of inquiry in science lessons particularly in relation to socio-scientific issues
- Create their own approaches after intervention
- Identification of promoting and inhibiting factors

Science teachers' beliefs and practices about inquiry learning

Beliefs about inquiry learning



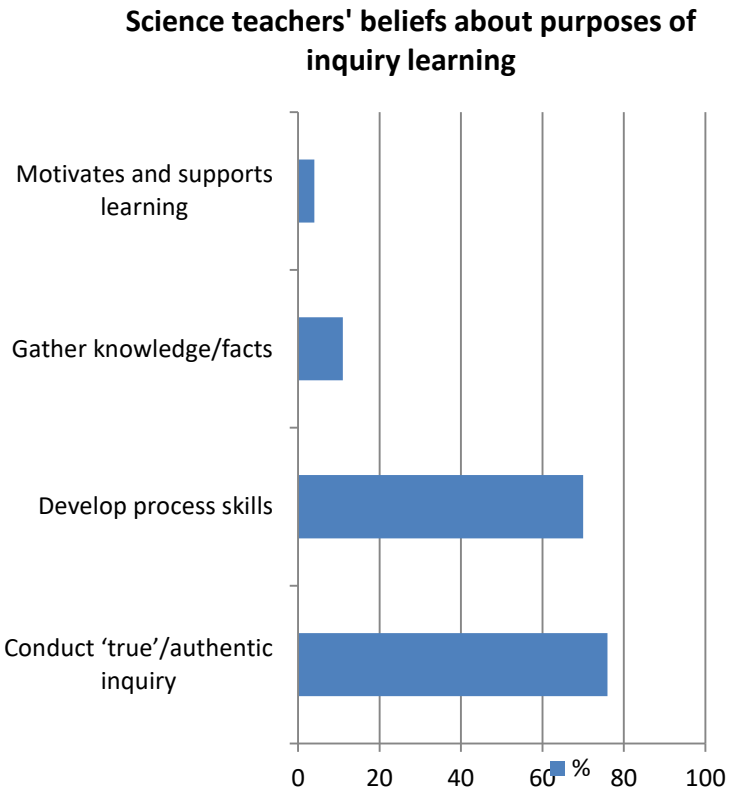
- *Actual* practice in inquiry learning



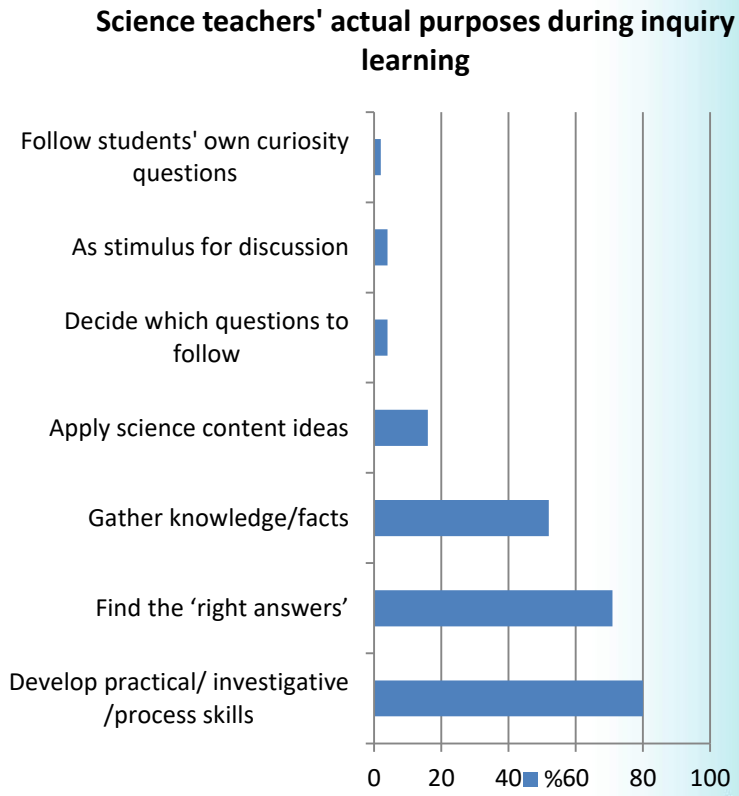
* Banchi, H., & Bell, R. (2008). The many levels of inquiry. *Science and children*, *46*(2), 26

Purposes of inquiry learning

Beliefs about purposes

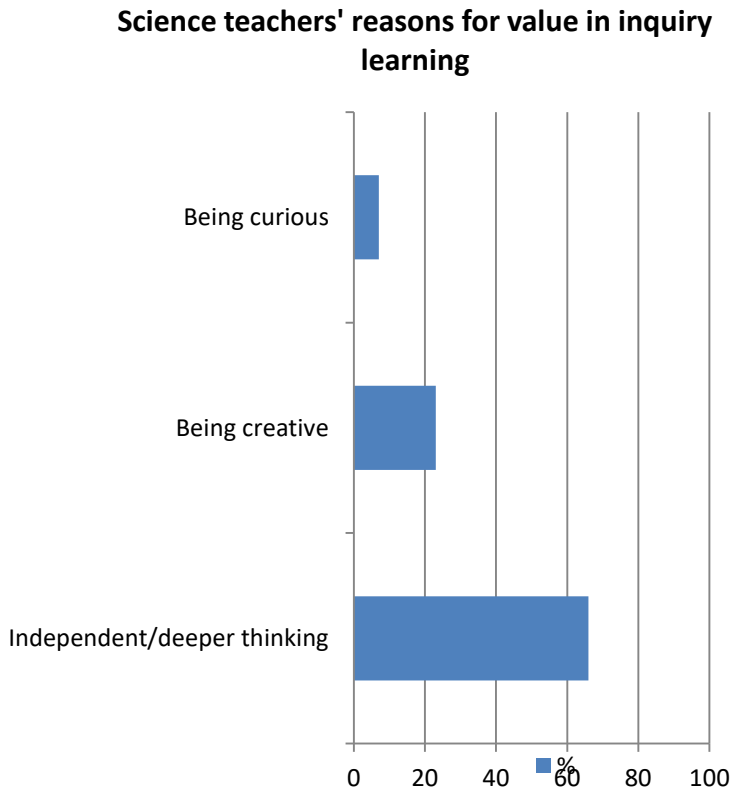


- *Actual* purposes during inquiry

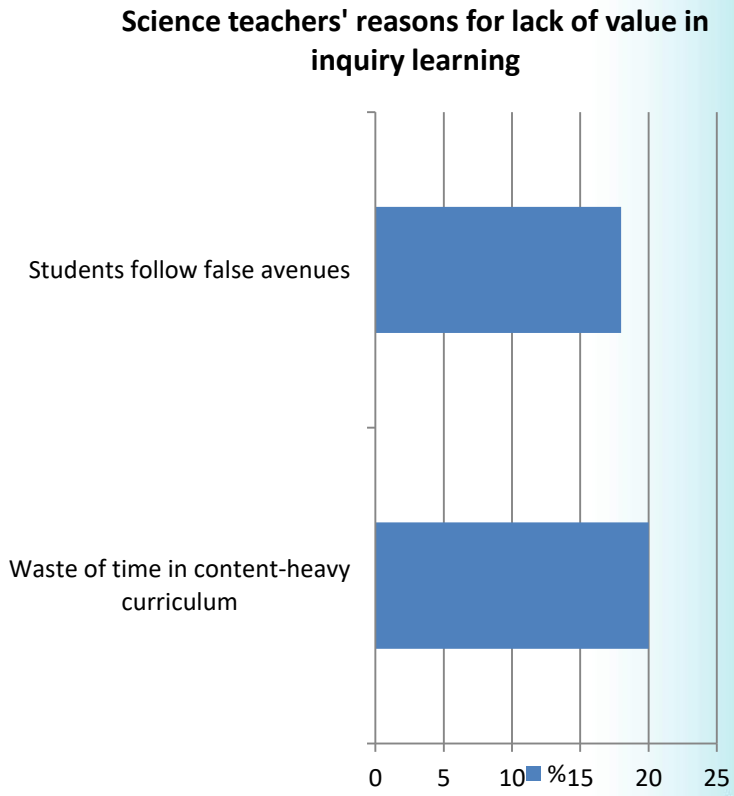


Values in inquiry learning

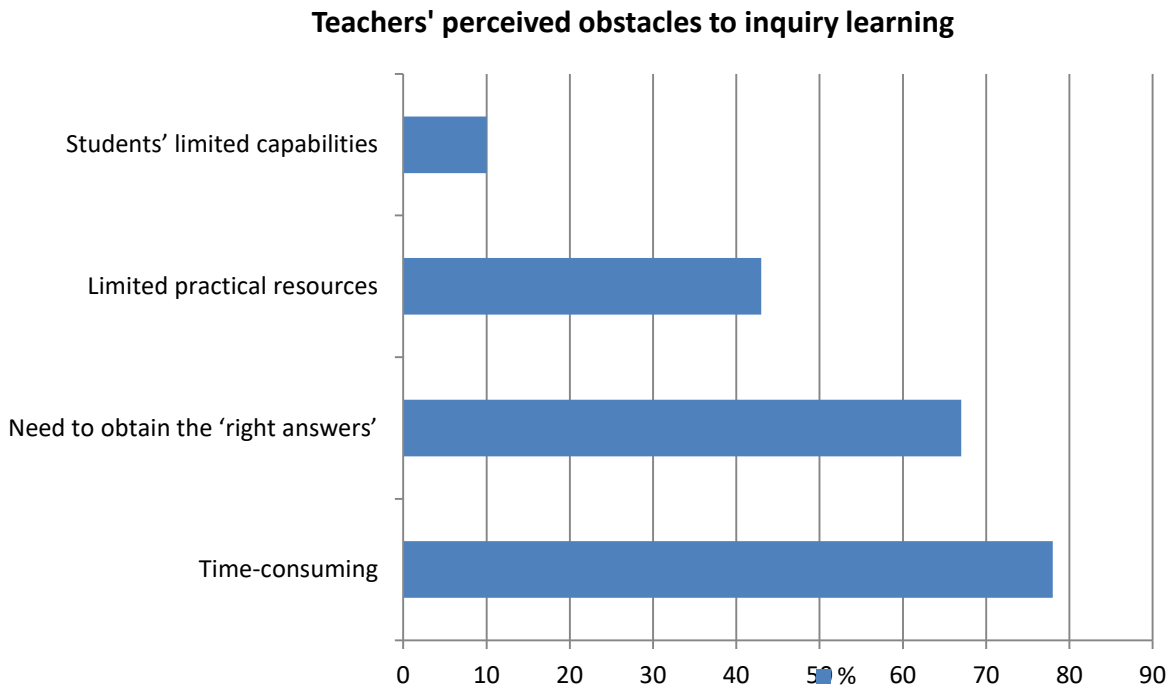
Reasons *for*

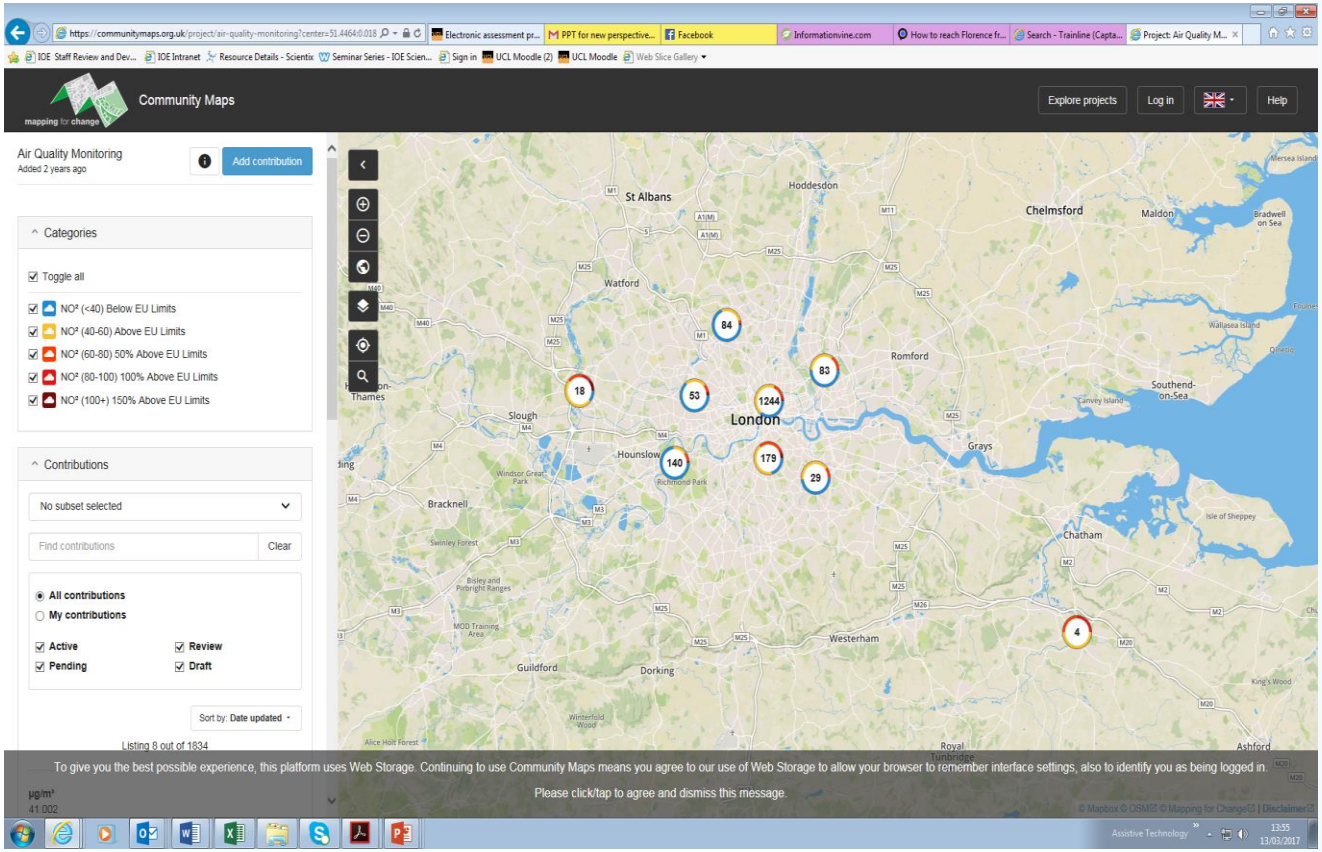


- Reasons *against*



Perceived obstacles for inquiry




Community Maps
Explore projects
Log in
Help
Air Quality Monitoring
Added 2 years ago
Add contribution
Categories
Toggle all
NO² (<40) Below EU Limits
NO² (40-60) Above EU Limits
NO² (60-80) 50% Above EU Limits
NO² (80-100) 100% Above EU Limits
NO² (100+) 150% Above EU Limits
Contributions
No subset selected
Find contributions
Clear
All contributions
My contributions
Active
Pending
Review
Draft
Sort by: Date updated
Listing 8 out of 1834
St Albans
Hoddesdon
Chelmsford
Maldon
Watford
Romford
Slough
London
Hounslow
Grays
Bracknell
Chatham
Westerham
Guildford
Dorking
Southend-on-Sea
84
83
18
53
1244
140
179
29
4
To give you the best possible experience, this platform uses Web Storage. Continuing to use Community Maps means you agree to our use of Web Storage to allow your browser to remember interface settings, also to identify you as being logged in.
Please click/tap to agree and dismiss this message.

How is this generated?
How much does it cost?
What impact does it have?

Where does it come from?
How is it made?
Who makes it?
What impact does it have?

What happens to Al?
Can it be recycled?
How?
Who gains? Who loses?


TPD session at UCL IOE: Some grand challenges of the 21st century
2:43 / 16:48
Do you want to view youtube.com in full screen? (Press Esc to exit.)
Allow once
Options for this site

Planned project

What do we need to know?

What are the alternatives?

Why do it?

What are the health risks?

Other questions . . .

Martha's approach – smoking/e-cigarettes

- Year 9 group (13/14 years old)
- Drew on what they had learned about the respiratory system affected by smoking to create survey questions.
- Distributed survey to 15 friends and family
- Analysed and reflected on findings
- Created a school campaign based on findings to deter other students from smoking.

Issues from Martha's lesson

- Quality of survey questions
- Difficulty in analysing data
- Difficulty in critiquing reliability of data
- Good support from science department who are now using Martha's plans.

Javed's lesson – products of crude oil/degradation of plastics

- Chemistry of plastic degradation
- Learned about links between molecular structure and rate of degradation.
- Use of plastic bottles in schools.
- Question: Why does school canteen continue to sell drinks in plastic bottles knowing the problems of their disposal?
- Carried out initial survey

Issues from Javed's lesson

- Students very keen
- Supported by school tutor
- Students too concerned about reactions of canteen staff and senior management.
- Less 'controversial' had they focussed on their own practise in recycling.

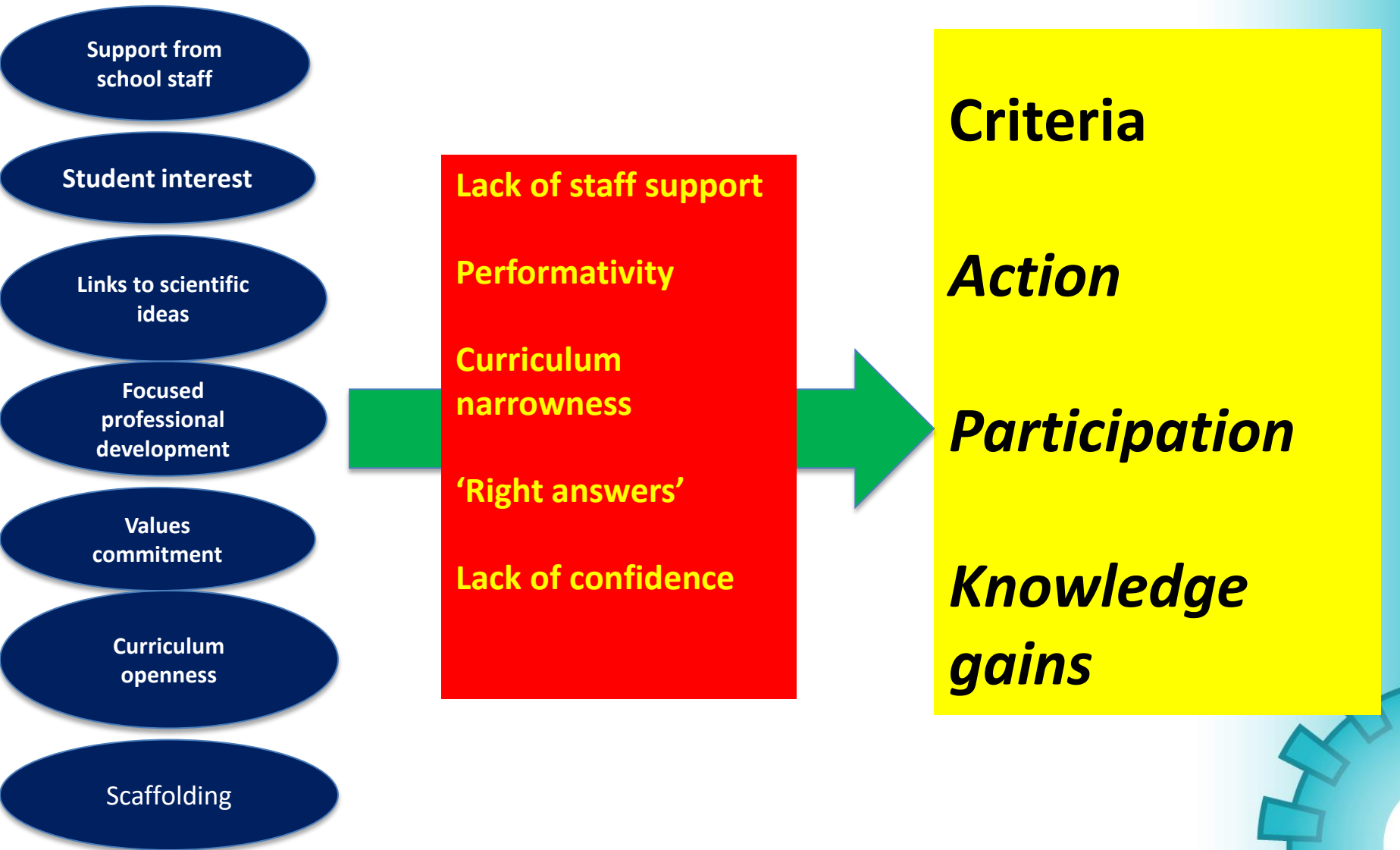
Caroline's lesson – cycling to school

- Only 0.02% of students cycle to school X. Why?
- Discussed physiological and health benefits of cycling
- Students explored three categories:
  - Danger
  - Expense
  - Lack of incentive

Issues from Caroline's lesson

- Lack of support and interest from other science staff
- Reluctance to do activity outside of school grounds, e.g. looking at road safety for cyclists.

Promoting factors for SSIBL



Grazie