Symposium: Evaluation of Public Engagement with Science in Australia

Experiences and Challenges – an evaluator's perspective

AES 2012, Adelaide

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1. Examples of evaluation projects informed by Inspiring Australia

Keyword = ENGAGEMENT

2. Evaluation purpose - What the Key Stakeholders want to know

3. Key Evaluation Questions

4. Challenges and learnings -
What does ‘engagement’ look like? How do you evaluate it?

Recommendation 15:
Developing an evidence base

Australia requires a strategic research and evaluation capability to design, target and review effective science engagement activities and to guide future investment.

That the national initiative support a program of research in science engagement—such as baseline and longitudinal attitudinal and behavioural studies, activity audits, program evaluations and impact assessments - to inform future investment decisions by government and its partners.

1. Examples of evaluation projects informed by Inspiring Australia

Keyword = ENGAGEMENT

CSIRO Education

SCIENCE BY EMAIL

Carbon Kids

Climate Science Workshops

Questacon Outreach

Questacon Maths Squad

Western Sydney Region Organisation of Councils (WSROC)

WATER in the Landscape

1. Examples of evaluation projects informed by Inspiring Australia

Keyword = ENGAGEMENT

CSIRO Education

SCIENCE BY EMAIL

Carbon Kids

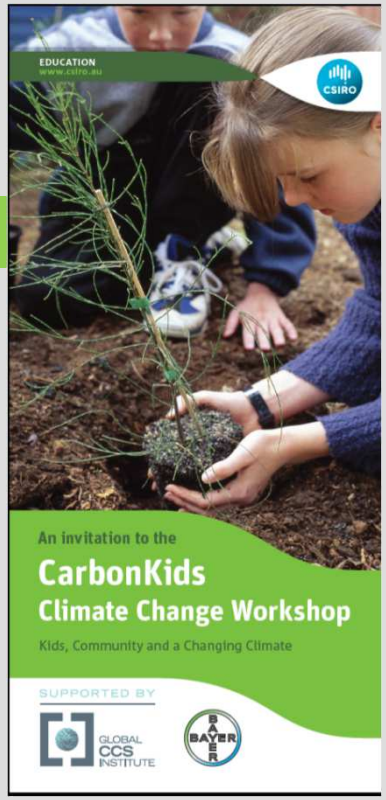
Climate Change Workshops

- a free email science newsletter
- began in 2001 has over 40,000 subscribers, primarily in Australia, but also worldwide.
- Target audience Upper Primary school students and their teachers
- aim - **'to *communicate that science is making a valuable contribution to the community, is relevant, beautiful, interesting and enjoyable and provides many employment opportunities*.'**
- Sponsors

CSIRO invite

the
CarbonKids coordinator
and 16 students

to join
CSIRO scientists, Bayer and
the Global CCS Institute
to be involved in a
CarbonKids
Climate Change Workshop
and introduction to
new carbon capture and storage
educational materials.



1. Examples of evaluation projects informed by Inspiring Australia

Keyword = ENGAGEMENT

Questacon Outreach

- Mathematics engagement program began in the early 1990's
- Target audience school students from Year 3 to Year 8 and their teachers in rural, regional and remote communities.
- Operates as a 'road show' or live video conference into classrooms. Also includes pre-service sessions for trainee teachers.
- QMS aims ***to inspire young Australians to appreciate the important role that maths plays in our everyday lives and to change negative attitudes towards maths to a more positive view.***
- Sponsors – a range over the years

Secret Maths Agents (SMA) vs The Count!

− + × =

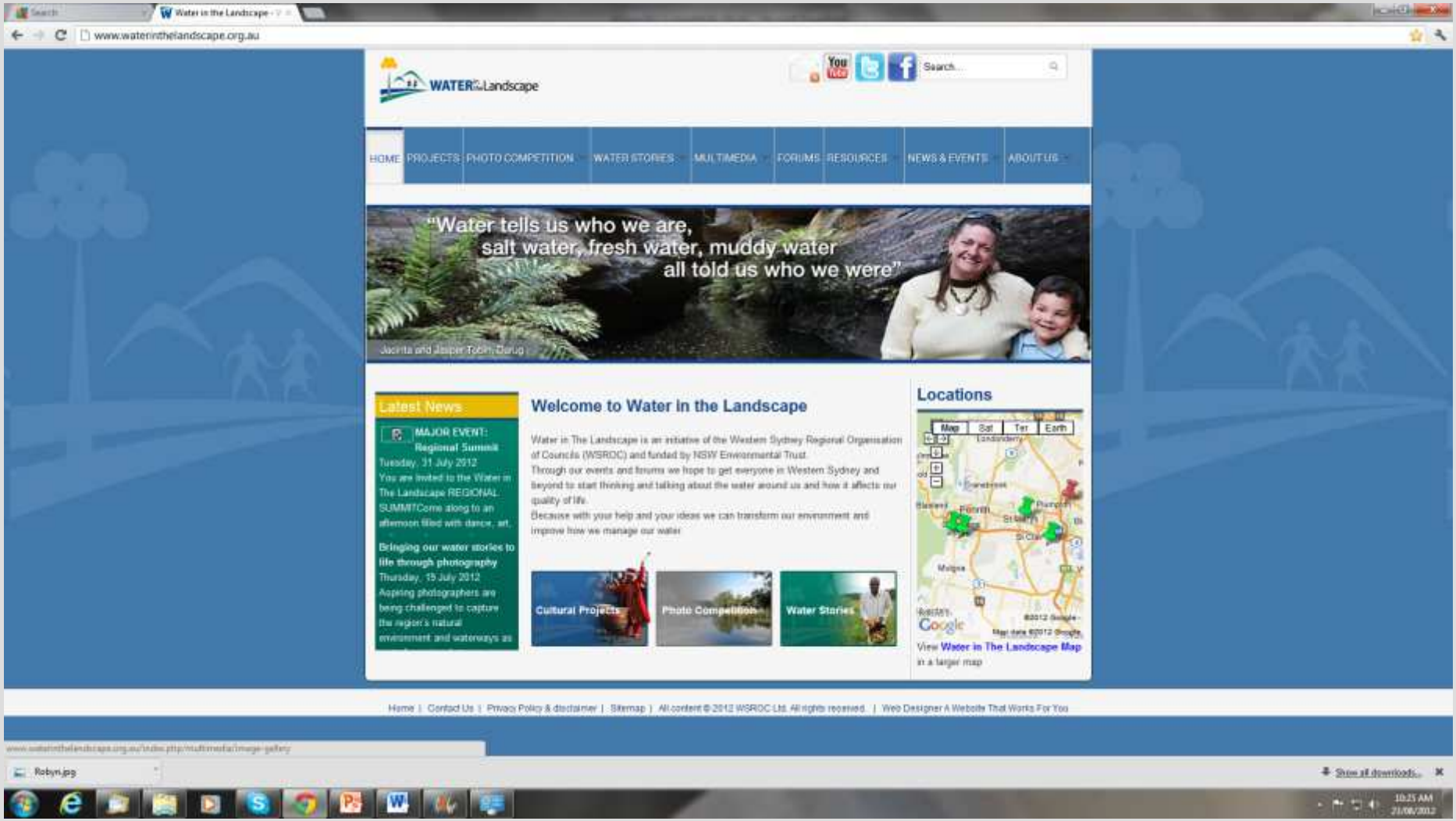
1. Examples of evaluation projects informed by Inspiring Australia

Keyword = ENGAGEMENT

Western Sydney Region Organisation of Councils (WSROC)

WATER in the Landscape

- funded by NSW Environmental Trust
- a 3 year, community awareness program for Western Sydney
- Aims ***to engage the Western Sydney community in the management of water resources and the environment through a multiple pronged approach:***
  - cultural events,
  - an interactive website and
  - local and regional “conversations” through Forum / Workshop style events
- The Western Sydney community is very large (1.7 million people) and very diverse in terms of cultural background, income, education and occupation


www.waterinthelandscape.org.au
WATER in the Landscape
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ABOUT US
"Water tells us who we are,
salt water, fresh water, muddy water
all told us who we were"
Jacinta and Jasper Tobin/Darug
Latest News
MAJOR EVENT: Regional Summit
Tuesday, 31 July 2012
You are invited to the Water in The Landscape REGIONAL SUMMITCome along to an afternoon filled with dance, art,
Bringing our water stories to life through photography
Thursday, 15 July 2012
Aspiring photographers are being challenged to capture the region's natural environment and waterways as
Welcome to Water in the Landscape
Water in The Landscape is an initiative of the Western Sydney Regional Organisation of Councils (WSROC) and funded by NSW Environmental Trust.
Through our events and forums we hope to get everyone in Western Sydney and beyond to start thinking and talking about the water around us and how it affects our quality of life.
Because with your help and your ideas we can transform our environment and improve how we manage our water.
Cultural Projects
Photo Competition
Water Stories
Locations
Map
Sat
Ter
Earth
Google
View Water in The Landscape Map in a larger map
Home | Contact Us | Privacy Policy & disclaimer | Sitemap | All content © 2012 WSROC Ltd. All rights reserved. | Web Designer A Website That Works For You
Robyn.jpg
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21/08/2012

2. Evaluation purpose - What the Key Stakeholders want to know

Has QMS achieved its objective in <u>inspiring young Australians to appreciate maths and to change negative attitudes towards mathematics to a more positive view</u>?

… '*how well is the current model addressing <u>target audience needs now</u>, and how these findings inform future directions in order to meet changes in society and audience interests'*.

… consider the, 'content and structure of the project, the efficacy of SbE from users' perspectives <u>and the longitudinal influence (if any) of SbE</u>.'

the effectiveness of these <u>in inspiring and engaging students.</u>

CS ducation

Climate Science Workshop

Has it achieved its Outcomes??

<u>Outcome 1 (of 7):</u>
Improved community knowledge of urban water management issues and policies that encourage more sustainable supply and usage patterns for the region in the context of ongoing urban development and Climate Change.

ney Region Organisation of Councils (WSROC)

3. Key Evaluation Questions

CSIRO Education

User characteristics - Current and past users, their usage, and whether SbE is/has influenced them in any way

Format and structure - The usefulness and effectiveness of the newsletter and appropriateness of using e-mail:

- *How useful and effective are the various components of the newsletter? What are the most valued sections of the newsletter and why e.g. the story, activity, quiz?* ***Which lead to the most 'engagement' in the view of users?***
- *How appropriate is the delivery mechanism? Is e-mail still relevant and what if any other strategies should SbE use?*

Short and longer-term impacts - The influence of SbE on users compared to non-users:

- *Are SbE users more likely to* ***feel positively towards science and scientific research*** *such as CSIRO research than comparable non-SbE users?*
- *Are SbE student users more likely to continue science studies at upper secondary and tertiary levels than comparable students who didn't use non-SbE?* ***What if any impact has SbE had on user attitudes towards science generally and as a career choice***

Climate Science Workshops

… know the ways in which the workshops are helping to engage students in the science of climate change.

data that contributes to an understanding about:

- the degree to which students are **engaged** in the sessions; and
- the ways in which the workshops are helping to **engage students in the CCS / low emissions technologies / science of climate change**.

Are children more likely to **consider careers in the sciences as a result of their participation in CarbonKids? Are they inspired, and motivated?**

What are participant's attitudes to the sciences? Do they see the sciences as working for a better life for all?

3. Key Evaluation Questions

Active engagement:

Are students *enthusiastically engaged in the QMS* activities i.e. happy, excited, noisy, sharing, collaborative, joyful, do not want to stop / want to do more

Shift in attitudes from negative to positive, and increase in receptivity / readiness:

- Are students **disengaged from maths** before QMS **and do their attitudes to mathematics shift from negative to positive**; **from disengaged to engaged**? What, if anything do students say or ask about in relation to maths after a QMS event?
- Has there been any change in the readiness of students and their teachers to do mathematics? Are students more teachable and/or receptive?
- Do teachers *gain confidence, resilience and want to do more?*
- Are teachers disengaged from maths and is there an improvement in teacher's ability in mathematics education?

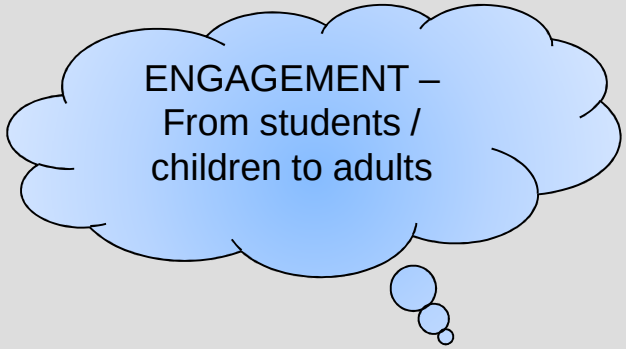
Changes in teacher professional practice:

Do teachers actively participate and then integrate the activities and methods into the teaching and learning practice i.e.

- ❑ shift from didactic to cooperative learning strategies,
- ❑ kinaesthetic involvement, promotion of the idea that 'maths is more than numbers',
- ❑ techniques for lessening maths anxiety and promoting positive experiences with maths through play, fun, problem solving, spatial ability skill exercises;
- ❑ Shifting motivation to do maths from extrinsic to intrinsic.

3. Key Evaluation Questions

Western Sydney Region Organisation of Councils (WSROC)



WATER in the Landscape

In what ways have these **activities increased receptivity of participants to be interested in water management issues** that are not focussed on household efficiency or consumption reduction?

What opportunities were there for **deeper engagement in sustainability or community**? i.e. with respect to environmental, economic, social and political impacts?

Did the community participants:

- feel that their views were heard
- *know that their ideas were considered and there were ways that their views would be integrated into Council planning processes?*
- learnt anything about water management
- *have a better understanding about how Councils work towards improving waterways?*
- now expect different water management in their local environment e.g. in terms of water quality, stormwater management?
- *have ideas about the role of Councils and the community to better manage water?*

4. Challenges and learnings -
What does ‘engagement’ look like? How do you evaluate it?

Literature review

Student engagement

- extensive research base,
- highly complex and multi-faceted construct (Makar & Fielding-Wells, 2008).
- a causal link between motivation and engagement, and the two together influence learning and achievement i.e. engagement can enhance achievement (Frydenberg, Ainley, & Russell, 2005).
- three commonly accepted domains of engagement

Behavioural engagement:

- positive conduct, rule following, adhering to norms,
- involvement in learning tasks, effort, persistence, attention, class participation, and
- participation in school-related activities.

Emotional engagement:

- affective reactions in the classroom: interest, boredom, happiness, anxiety; and
- affective reactions to the school and/or teacher, identification with the school (i.e. a sense of belonging).

Cognitive engagement:

- investment in learning, learning goals, intrinsic motivation, and
- self-regulation, being strategic.

School factors that have been found to influence student engagement

(summarised in Frydenberg et al, 2005, pp 7-11) include:

The nature of the task:

- ✓ students have been found to engage most with tasks they find interesting, challenging, and important.
- ✓ No one solution fits all students and tailored solutions are required to match the abilities, needs and interests of specific groups of students.
- ✓ This is best done by motivated and competent teachers working within supportive school communities.

The classroom context: where,

- ❑ **teacher-student relationships are characterised by** features of teacher responsiveness (e.g. fairness, respect, involving students in decision-making) and enjoyment of teaching (i.e. of both the students themselves and the subject).
- ❑ **the pedagogy involves** an active experiential process that is varied, challenging, individualise, and designed to involve the students in decision-making.
- ❑ **the classroom climate encourages** a process of social collaboration that is supportive, safe and emphasises positive emotions.

Research methods fell into two distinct approaches:

- small-scale studies of specific students in relation to aspects of learning processes (often as part of an intervention) using qualitative approaches such as direct observation of students in the classroom with strategies including video capture, interview, focus groups e.g. Attard (2009); or
- larger studies involving sampling of large populations using surveys and focus groups e.g. see Maths? Why Not? (McPhan, Morony, Pegg, Cooksey, & Lynch, 2008).

Frydenberg et al (2005, p 5) in their summary of the research literature about measurement of engagement say that,

The measurement instruments used depend on the aims of the investigation….

Specific types of engagement lend themselves to different forms of measurement.

*Although **behavioural engagement** can be measured by questionnaire, more objective indicators can also be used. Attentiveness, for example, can be measured by an external observer; participation in school-related activities might be quantified from school records.*

***Emotional engagement and cognitive engagement** are more likely to be assessed by questionnaire, usually of the self-report type.*

4. Challenges and learnings -
What does ‘engagement’ look like? How do you evaluate it?

Focussed on …

Affective / emotional engagement

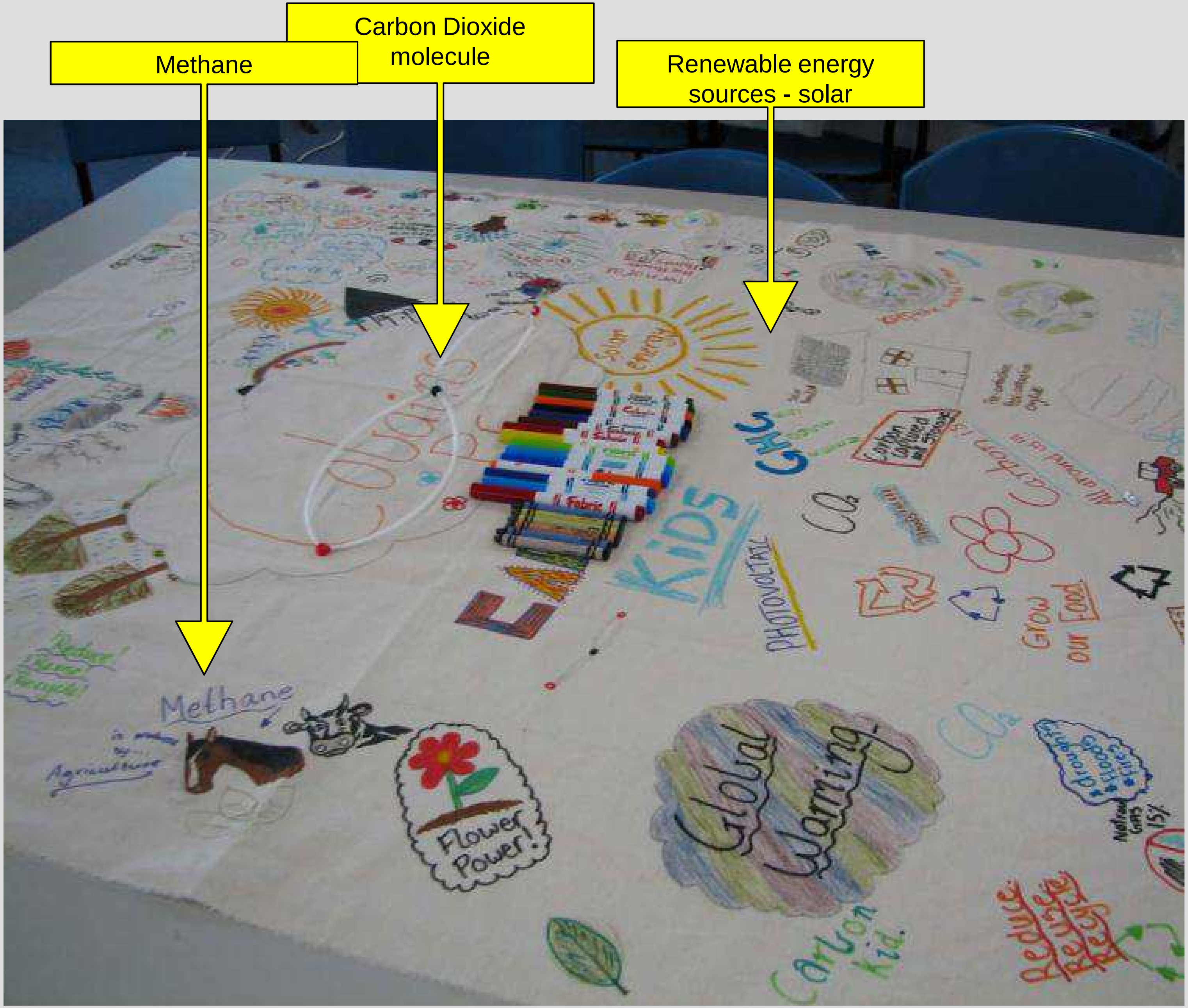
interest, boredom, happiness, anxiety

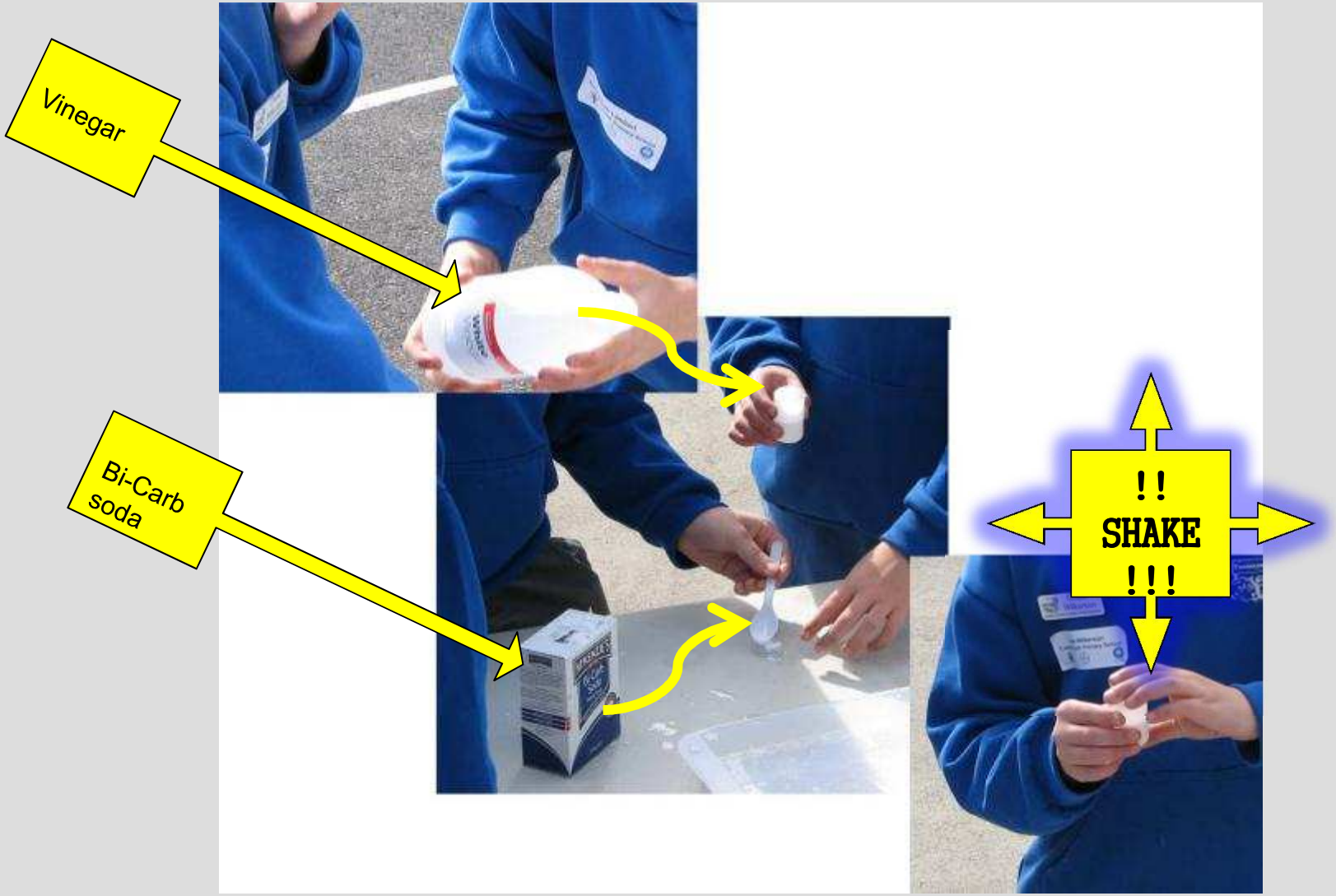
Behavioural engagement

attentiveness, persistence, participation

Data collection strategies used:

- Evaluator observation – *video, digital pics*
- Teacher feedback – *their observations of student engagement*
  focus group, online survey
- Observations of Presenters – *debrief*
- Participant feedback
  - ❑ Students –
    ‘Engage with the Evaluator’ workshop using ‘Photolanguage’ to trigger deeper responses, Online surveys, Student work samples and ‘digital stories as investigative journalists’
  - ❑ Adults –
    Feedback questionnaires, Online surveys


Carbon Dioxide molecule
Methane
Renewable energy sources - solar
Methane
Flower Power!
Global Warming
KiDS
PHOTOVOLTAIC
Carbon kid.
Reduce Reuse Recycle
GROW our Food


Vinegar
Bi-Carb soda
!!
SHAKE
!!!

Please write your Year Level here: 5F

Can you remember a time when something really special happened that tuned you in to science or the environment?

Please use this space to describe it – you could draw a picture as well as using words.

probably today When the scientist was talking about things like atoms

bush

6

Thinking about how you feel about science right now, in this moment at the CarbonKids Climate Change Workshop.

1. *choose a picture that somehow explains this feeling.*

Now, please use the space below to write why you feel this picture explains your feeling about 'science right now'.

Remember, you can use pictures as well as words.

This Picture describes how I feel about science because science is fun and I get excited about science just like Luna Park.

Over all it was a great fun day. I really enjoyed it.

My Picture was Luna Park.

Page 2

Methodology / Approach / Tools …

- Evaluator as both facilitator and objective expert
- Participatory and capacity building
- Program Logic – eliciting & making explicit the program theory of action
- Appreciative Inquiry – to help design the data collection instruments
- Social Software tools
- Photolanguage


thank you