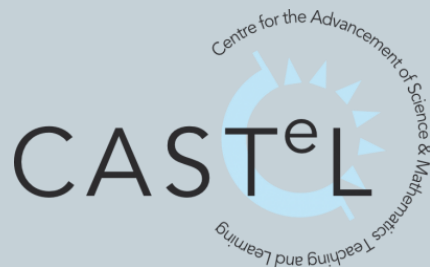


An Evaluation of a National CPD Programme in Science Education for Irish Primary School Teachers.



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Concerns about Primary Science in Ireland



Teaching

- Tendency to adopt more traditional approaches to teaching science;
- Inadequate time being devoted to Inquiry-Based Science Education (IBSE);
- Teachers' lack of competence and confidence in using IBSE methodologies;
- Insufficient provision of hands-on pedagogical courses at both pre-service and in-service levels for teachers;
- Insufficient time to teach science.

Learning

- Infrequent engagement with IBSE;
- Development of scientific skills;
- Scientific content not particularly relevant to students;
- Attainment in science.



**Effective
Sustained CPD**

(Cheevers, Eivers & Sheil, 2006; DES, 2008, 2012; Eivers & Clerkin, 2013; ICSTI 2005; Mullis et al., 2012). Murphy 2013; 2015; Murphy & Smith 2012; Murphy et al 2015; Varley et al.2008,2012)

Overview of CPD in Primary Science in Ireland

Government led CPD

Prior to implementation of PSC in 2003

- DES provided 2 in-service days
- Further support via PCSP and PPDS
- Website including resources
- Since 2010 PPDS and other support agencies merged to PDST – currently focus in areas of literacy and mathematics

PCSP (*Primary Curriculum Support Project*)

PPDS (*Primary Professional Development Support*)

PDST (*Professional Development Service for Teachers*)

Other CPD

Since roll out of PSC in 2003

- In-service days
- 20 hour summer courses
- ‘Croke Park’ CPD
- Post graduate courses
- National and international funded projects. E.G.
 - RDS STEM Learning
 - The Fibonacci Project

Whole schools and individual teachers have participated in these initiatives to varying degrees

Discover Primary Science and Mathematics (DPSM)



- **2003:** Primary science clubs
- **2004:** 2 hour 'training' session for 1-2 teachers per school
- **2009:** 2 hour 'training' sessions held in schools – whole staff participation
- **Feedback:**
 - Teachers focussing on students' content knowledge rather than skill development
 - Hands on but not necessarily IBSE
- **2014 – 2015 :** Pilot a new CPD programme

DPSM / ESERO 2014 -2015

Pilot CPD programme



- Move away from ‘once off 2 hour workshop’ model
- 3 X 2 hour workshops in school
 - Part of ‘Croke Park’ hours
- Drew on Desimone’s (2009) core features of effective PD
 - Active participation
 - Content relevant to participants
 - Afford participants opportunities to implement new methods between CPD sessions
 - Time to reflect on implementation of new methods with colleagues

Aim of CPD



- Afford teachers with opportunities to: *engage with, reflect on and implement* inquiry-based approaches while implementing the PSC
- Use Framework for Inquiry (FFI)

Evaluation:

- Examined the *impact* the DPSM / ESERO CPD programme and resources had on teachers':
 - Experiences of teaching science
 - Confidence in teaching science

Research Design



Survey

- Questionnaire designed to evaluate
 - ✦ Approaches to teaching science
 - ✦ Changes in confidence in content knowledge
 - ✦ Changes in confidence in methodologies/pedagogy
 - ✦ Overall impressions of components of the programme
- Administered prior to the first and after the last workshop
- 220 initial and 194 exit questionnaires were returned

Interview

- 12 teachers from 6 of schools prior to first and after the last workshop

Profile of participating schools



24 schools participated in the full programme.

- Rural (12) Urban (12)
- DEIS (8) Non-DEIS (16)
- Boys (4) Girls (2) Mixed (18)

Participants

- **220 responded to initial questionnaires**
 - ✦ Female (82%) Male (18%)
 - ✦ CPD in science: 38% **Yes**; 62% **No**
 - ✦ Highest qualification in science: 75% **LC**; 9% **Degree**
 - ✦ Teaching years: 1 – 5 (23%) 6- 10 (30%) 11 – 15 (16%) >15 years (31%)

Interviews

- ✦ Female (11) Male (1)
- ✦ Class: Junior (4) Senior (6) Resource (2)

Follow Up - April 2016



- **Survey**

- Online questionnaire (voluntary participation)
- Telephone interview with principals

- **Participants**

- 16 principals interviewed
- 36 teacher on-line survey responses (18.6% of original participants)

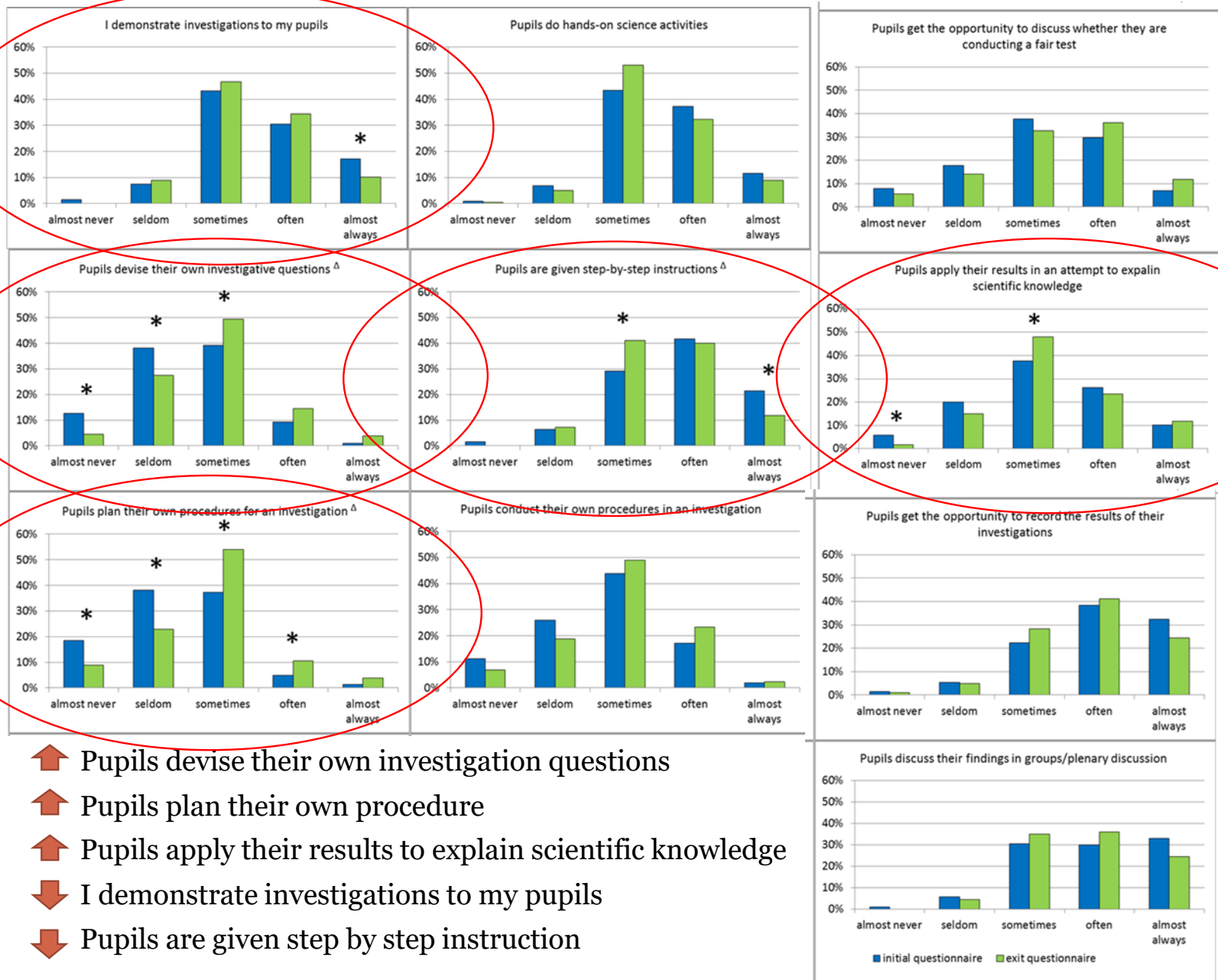
Time spent teaching



Time spent teaching science per month			
Time spent teaching science	Initial Questionnaire Response	Exit Questionnaire Response	Follow-up Survey
≤ 60 minutes	18.2%	18.6%	22.9%
65 – 120 minutes	64.1%	56.2%	45.7%
> 125 minutes	3.6%	16.0%*	<u>31.4%</u>

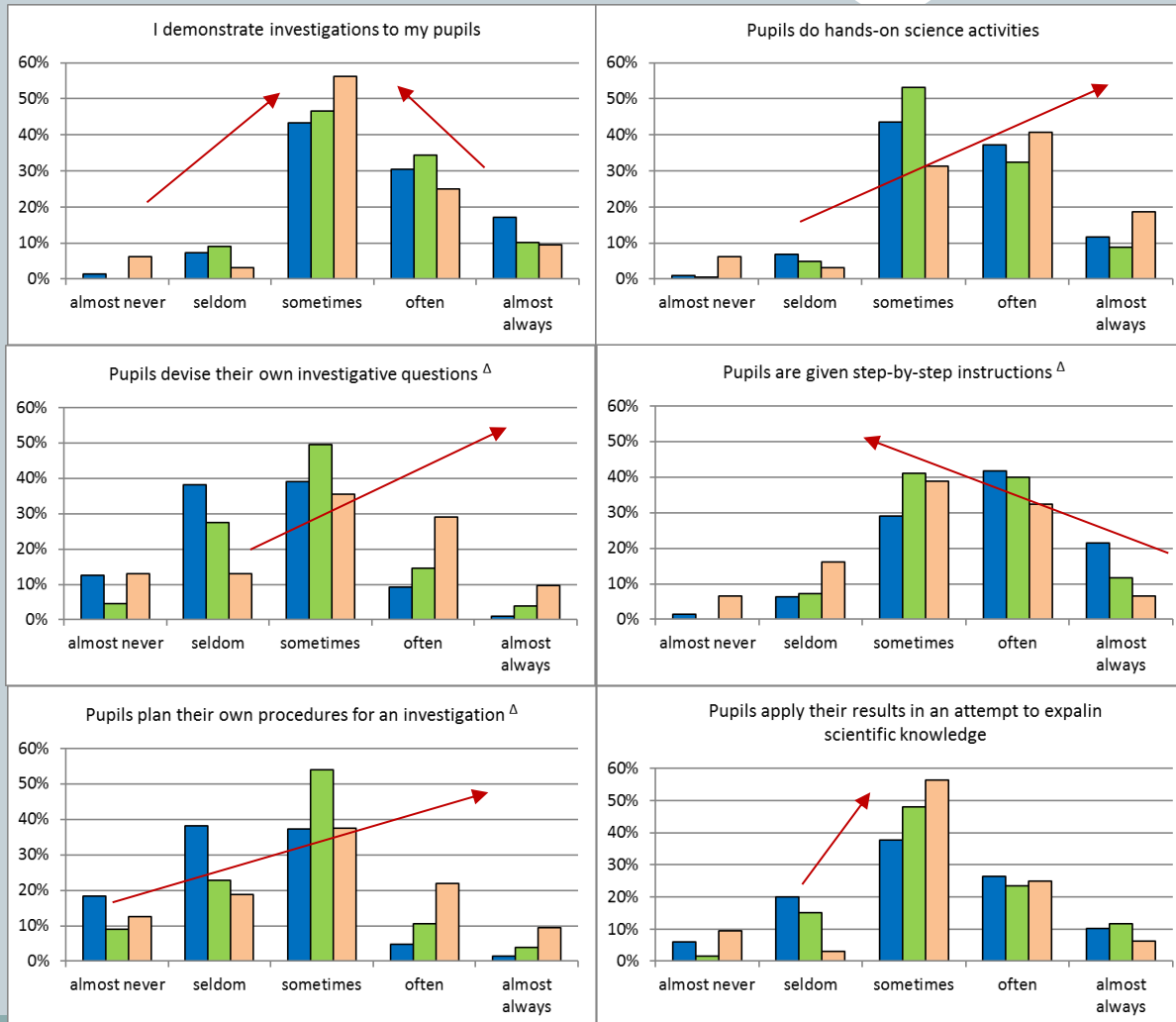
Now it's not just a half an hour lesson, I can expand on it into an hour or whatever. I can go on to something else. I was very limited. (Teacher 2)

"I have done more science than I have for a long time in the past few months and I intend teaching it more from now on" (Teacher 1)



Approaches to teaching Science

Follow-up results

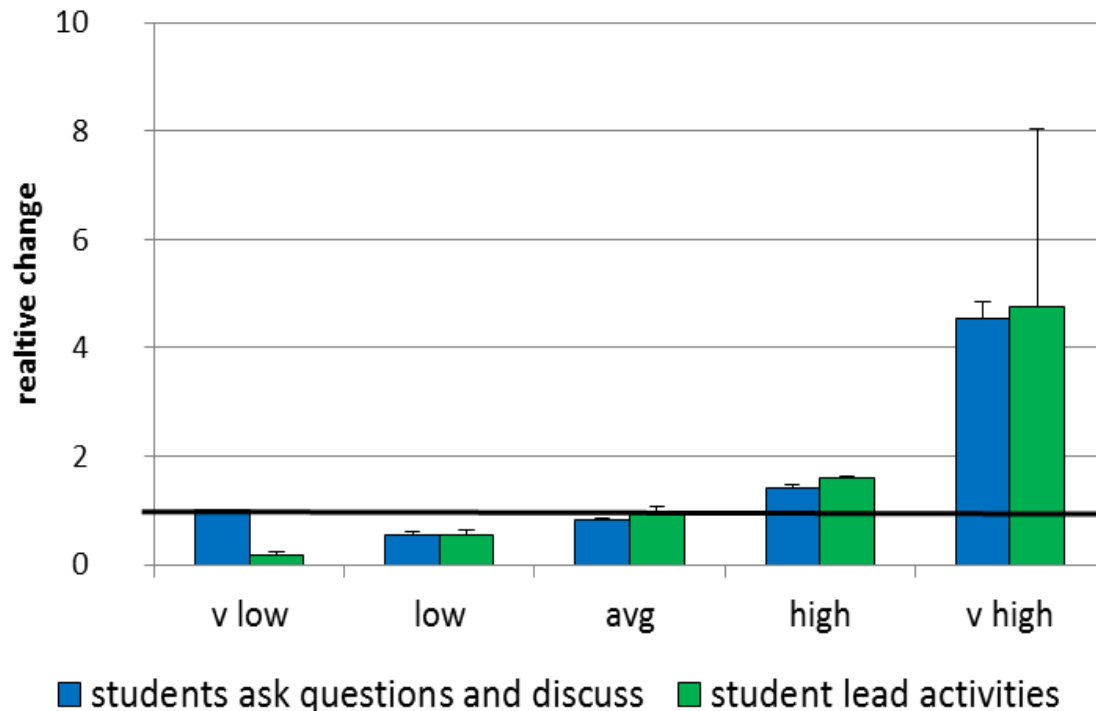


**continued shift
toward spending
more time using
Inquiry-based
approaches**

- Initial questionnaire
- Exit questionnaire
- Follow-up survey

Confidence in using IBSE

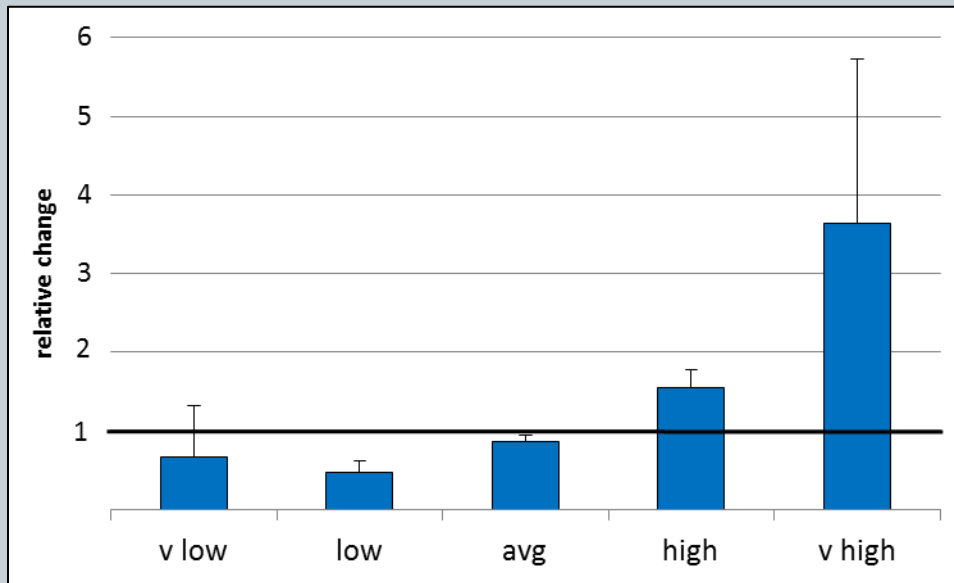
- Increase in overall confidence in IBSE
- Biggest increase in confidence in *allowing pupils to plan their own investigations*



“It’s more enjoyable for me now. it’s very inspiring to hear them coming out with it rather than me spoon-feeding them. (Teacher 3)

Confidence in teaching science content

- Teachers' confidence in content increased



The greatest increase in the 'very high' category

Little change in higher categories (but high to start)

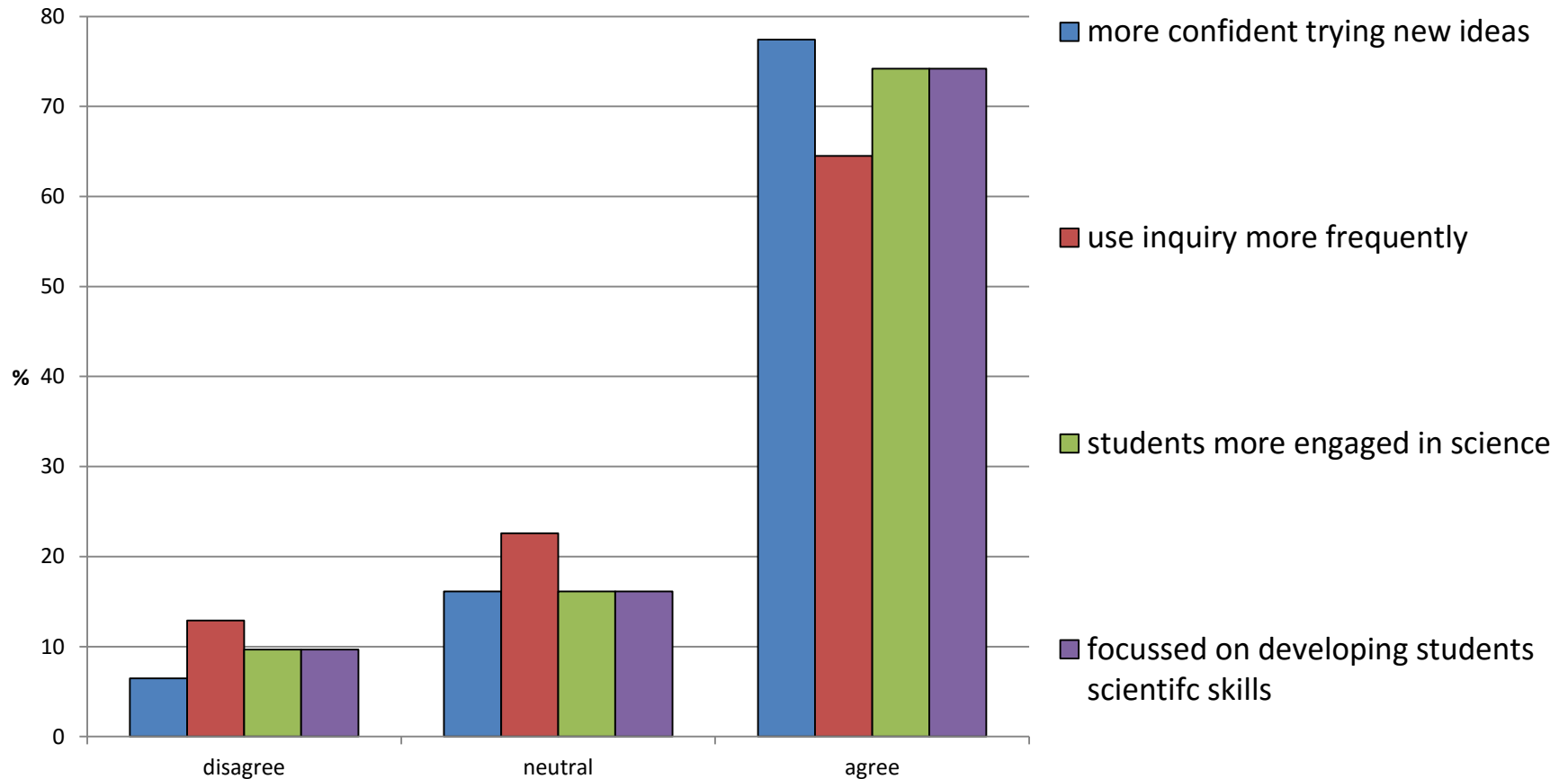
Likert Statements Relating to Confidence in Teaching Scientific Content

Likert item	Your confidence in teaching the following content
C1	Push and pull forces
C2	How forces act on objects
C3	How objects and materials can be moved
C4	Effect of friction on movement
C5	Gravity as a force
C6	How objects are slowed down by air resistance
C7	Inquiries to do with Space
C8	Grouping materials according to properties
C9	Investigating absorbency
C10	Cross curricular approach to science

Confidence follow-up



Follow-up



Summary on effectiveness



- Teachers increased their confidence in child-led and inquiry-based approaches to teaching science
- Engagement with the DPSM programme resulted in overall increase in confidence in content knowledge especially in areas specifically targeted by the workshops (gravity, resistance, space)
- This appeared to continue to increase over the following year

“I’m definitely more confident in teaching science now and I know where I’m going and I know that it’s not the big bad science world I thought it was. So definitely [the workshops] helped me in that respect” (Teacher 2)

Not for everyone



- 4% of participants found the programme did not meet their expectations. Issues identified were:
 - Science content
 - Too basic OR Background science missing
 - Pedagogical content
 - pitched to the wrong class level, not enough activities, examples
 - infant class teachers had most difficulty with the concept
 - Facilitator delivery:
 - Lack of engagement/enthusiasm OR Lack of confidence in content (flustered when asked content questions)



Over 85% of participants found the workshops to be enjoyable and beneficial

They especially liked the hands-on approach and the whole-school involvement

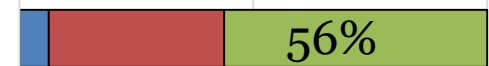
Long-term positive effects from participation have been noted by principals on a whole-school level and by participants in their personal approach to teaching science

Overall, how much did the DPSM/ESERO CPD help to:

improve the overall quality of teaching science



improve the sharing of effective practice and resources



meet science and maths priorities and objectives in your school



raise the profile of science in your school



0% 50% 100%

■ very little ■ to some extent ■ to a great extent

Final key points



- Well received and effective programme
- Facilitators approach can help ensure the success of the workshops
- Focused content within CPD leads to increased confidence in those topics
- Model what is being taught: student-led, inquiry-based had lasting impact on participants