PrimaryConnections®
Linking science with literacy

Stage 3
Interim research and evaluation report 13

NSW and QLD Curriculum Leader Workshops: June, July and September 2007

A research report for the Australian Academy of Science

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January 2008

Australian Government
Department of Education, Employment and Workplace Relations

Australian Academy of Science

Acknowledgements and disclaimer
This project is funded by the Australian Government Department of Education, Employment and Workplace relations as a quality teacher initiative under the Australian Quality Teacher Programme. Website: **www.qualityteaching.dest.gov.au/Content/**

The enthusiastic support of the *Primary Connections* professional learning facilitators and their cooperation in completing questionnaires for this research is acknowledged.

The views expressed in this report do not necessarily represent the views of the Australian Academy of Science nor the views of the Australian Government Department of Education, Employment and Workplace Relations. The author accepts responsibility for the views expressed and all errors and omissions in this report.

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Introduction and Background to the Study

Introduction

Primary Connections is an innovative approach to teaching and learning which aims to enhance primary school teachers' confidence and competence for teaching science. A partnership between the Australian Academy of Science and the Australian Government Department of Education, Employment and Workplace Relations (DEEWR), *Primary Connections* promotes linking the teaching of science with that of literacy to enrich the learning experience for students.

Primary Connections provides an innovative programme of professional learning supported with high quality curriculum resources which model the teaching and learning approach. *Primary Connections* has trained Professional Learning Facilitators in all jurisdictions and territories across Australia. They support schools in implementing *Primary Connections,* and run workshops on the educational and pedagogical principals underpinning the teaching and learning approach.

Research shows that providing professional learning workshops, exemplary curriculum resources, and opportunities for collegial interaction and reflection of practice is essential for successful implementation of a new program (Goodrum, Hackling & Trotter, 2003; Goodrum, Hackling & Sheffield, 2003; Hackling & Prain, 2005; Lewthwaite, 2006). However the research suggests it is also essential for teachers to have strong leadership by leader teachers and coordinators in that learning area, and to be supported by their principal.

Primary Connections designed and executed a series of workshops designed to promote the development of Curriculum Leaders in Primary Science, in collaboration with the state Professional learning Facilitators in Queensland and NSW. The growth and effectiveness of teacher leaders depends on:

- their personal attributes (e.g., motivation, self-efficacy);
- whether they receive support from colleagues and external organisations;
- the priority placed on the subject by their school;
- the schools openness to change;
- parent and community expectations;
- and state and national curriculum agendas.

(Bronfenbrenner, 1989; Lewthwaite, 2006). The *Primary Connections* workshops were designed to increase teachers' confidence and self-efficacy as leaders of science in their school, to promote the formation of support networks between the Curriculum Leaders (CLs), and to provide an opportunity of how to work within their school and jurisdiction.

This report summarises the findings from the following Curriculum Leader workshops:

- North Sydney Region workshops (June and September 2007) conducted by the Australian Academy of Science in partnership with the NSW Department of Education and Training.
- A workshop conducted by the Australian Academy of Science in partnership with Education Queensland (June 2007).
- A workshop conducted by the Australian Academy of Science in partnership with the Catholic and Independent sectors jointly (July 2007).

Purpose

The purpose of this study was to evaluate the confidence and self-efficacy of participants as Curriculum Leaders before and after the workshops were conducted.

Method

The intended outcomes for the workshops were for participants to develop:

- understanding of the *Primary Connections* project, teaching and learning model and curriculum resources;
- understanding of the *Primary Connections* professional learning model and resources;
- confidence and skills in facilitating *Primary Connections* professional learning workshops;
- and a network of colleagues as a *Primary Connections* Curriculum Leader.

The agenda for the professional learning workshops is attached at Appendix 1.

A questionnaire was used to collect background and baseline data about the participants prior to the workshop. Questions included open response items and agreement scale items. At the end of the workshop participants completed a second questionnaire which collected data to evaluate the impact of the workshop and data that could be used to improve future workshops and the professional learning resources.

The questionnaires used to evaluate the workshop outcomes were similar to those used to assess the effectiveness of previous workshops for Professional Learning Facilitators. The agreement scale no longer contains a midpoint, so means and standard deviations were not calculated. Not all participants who completed a pre-workshop questionnaire also completed a post-workshop questionnaire. The authors of the questionnaires were not identifiable, so the pre and post-workshop questionnaires were treated as separate samples of the participants. Change is measured by the percentile difference of participants responding that they are confident or very confident before and after the workshop.

The questionnaires collected data regarding the background of the participants, their beliefs, the impact of the workshop on their confidence and self-efficacy as Curriculum Leaders, the extent to which workshop aims were achieved and feedback about the workshop and professional learning resources.

The two questionnaires are attached as Appendices 2 and 3 respectively.

Results for the Northern Sydney Region Curriculum Leader Workshop 4 and 5 June 2007

Demographic data

Of the 50 participants who attended the workshop, 38 completed both the pre and post-workshop questionnaires.

Qualifications

The Curriculum Leaders (CLs) had a range of science qualifications. The majority (94%) had at least completed Year 12 level of science, and almost a third (30%) had completed at least a science unit at university. Four respondents had an undergraduate science major, one of whom also had a postgraduate qualification in science.

Table 1: Highest level of science content/discipline studies (not science education; n=38)

Year 10	Year 12	1 –3 undergrad science units	Undergrad science major	Postgrad science e.g. MSc
6%	64%	18%	9%	3%

Confidence with science teaching

The CLs rated their self-efficacy and confidence for science teaching before and after the two-day workshop. The CLs were asked to rate their confidence with aspects of science teaching on a four-point scale. As this scale does not include a mid-point, statistical tests have not been performed. The effect of the workshop is measured by the increase of the percentage of respondents indicating that they are 'very confident' or 'confident' with the statement. Table 2 summarises the feedback from participants regarding their confidence with aspects of teaching science, and this is displayed visually in the accompanying column graph.

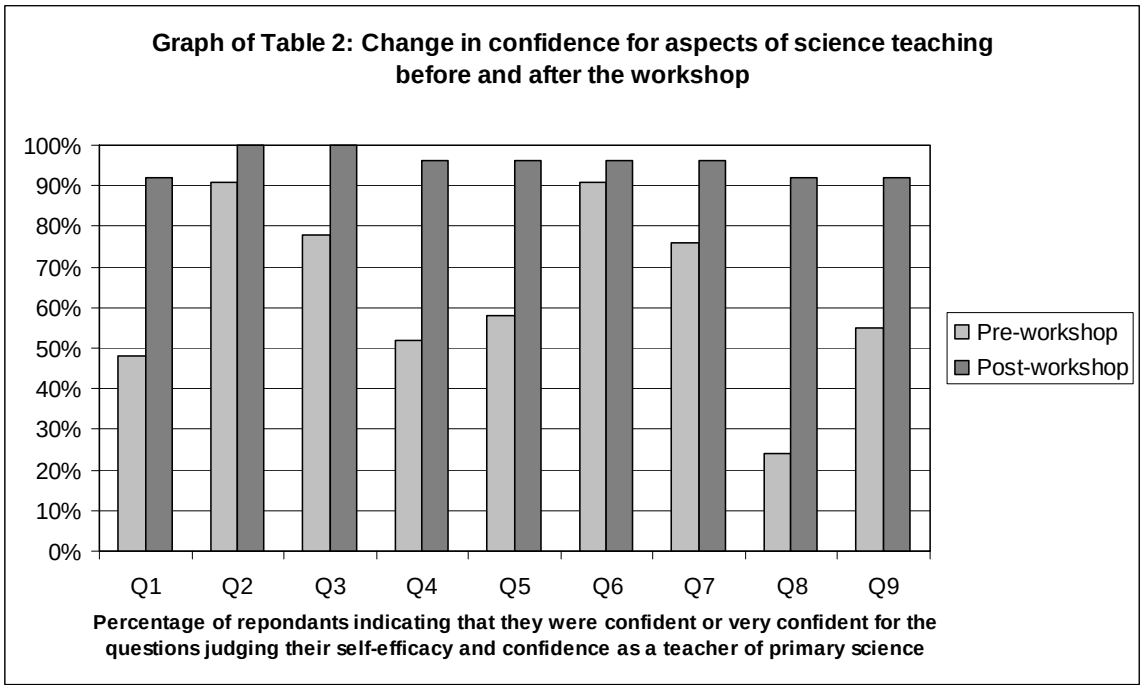
Before the workshop 91% of CLs indicated that they were confident or very confident about managing hands-on group activities in science and developing literacy skills needed for learning science. Over 75% were also confident or very confident about managing discussions and interpretation of science observations and about assessing children's learning in science.

By the end of the workshop, at least 92% of all participants were confident or very confident for each aspect of teaching. The greatest gain in confidence was using an inquiry model to plan science units of work (from 24% confident to 92%). Large gains were also achieved for explaining science concepts and processes, and engaging teachers' interest in science.

Table 2: Mean ratings of confidence for aspects of science teaching (n=38)

Aspect of teaching		Pre-workshop				*Post-workshop*				% diff.
		VC	C	LC	NC	*VC*	*C*	*LC*	*NC*	top 2
Q1	Engaging teachers' interest in science.	-	48%	50%	1%	*4%*	*88%*	*8%*	-	**+44%**
Q2	Managing hands-on group activities in science.	18%	73%	9%	-	*8%*	*92%*	-	-	+9%
Q3	Managing discussions and interpretation of science observations.	-	78%	22%	-	*4%*	*96%*	-	-	+22%
Q4	Explaining science concepts.	-	52%	45%	3%	*8%*	*88%*	*4%*	-	**+44%**
Q5	Teaching science processes.	-	58%	42%	-	*4%*	*92%*	*4%*	-	**+38%**
Q6	Developing literacy skills needed for learning science.	-	91%	9%	-	*11%*	*85%*	*4%*	-	+5%
Q7	Assessing children's learning in science.	-	76%	24%	-	*4%*	*92%*	*4%*	-	+20%
Q8	Using an inquiry model to plan science units of work.	-	24%	70%	6%	-	*92%*	*8%*	-	**+68%**
Q9	Answering scientific questions.	-	55%	42%	3%	-	*92%*	*8%*	-	**+37%**

VC = Very confident; C = Confident; LC = Limited confidence; NC = No confidence



Self-efficacy and confidence as a Curriculum Leader

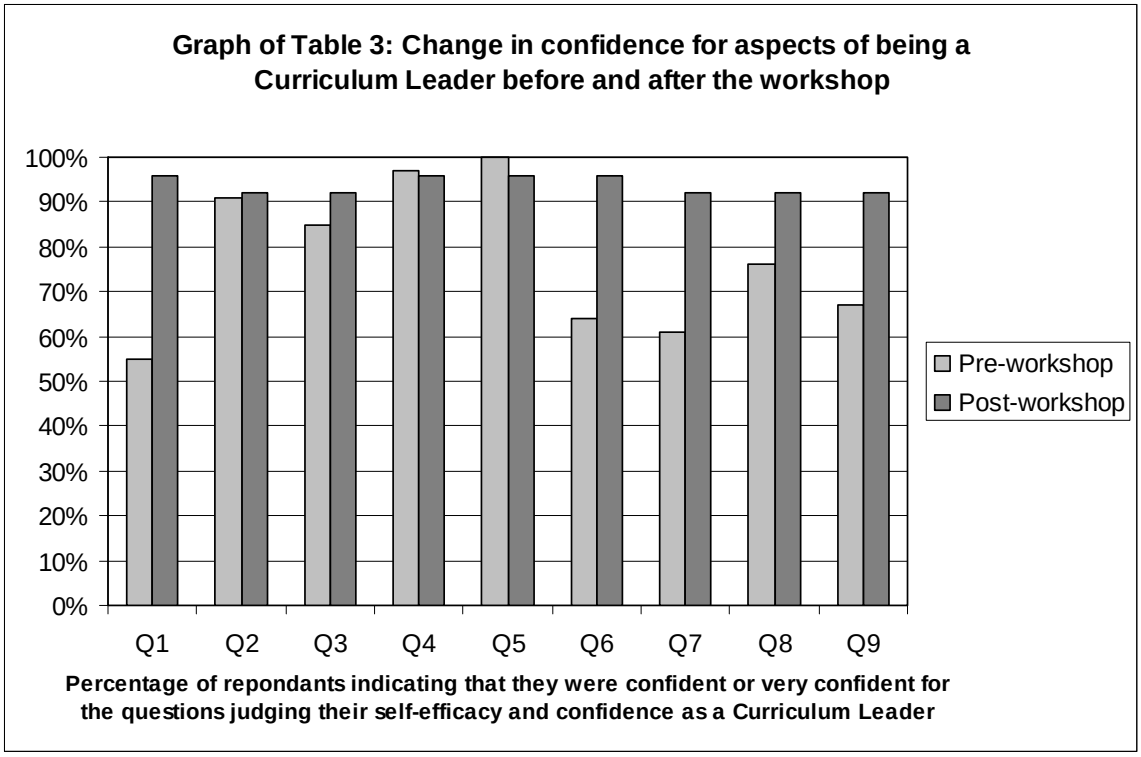
The CLs rated their self-efficacy and confidence as Curriculum Leaders before and after the two-day workshop, on a four-point agreement scale. As this scale does not include a mid-point, statistical tests have not been performed. Table 3 summarises the feedback from participants regarding their confidence as a Curriculum Leader, and this is displayed visually in the accompanying column graph.

Prior to the workshop all of the CLs indicated that they agreed or strongly agreed with the statements 'I encourage experimentation. I enjoy encouraging teachers to tackle 'new ideas'. However, only 55% indicated that they had a clear understanding of their role as a Curriculum Leader. This rose to 96% after the workshop. CLs' belief that their deep understanding of the culture of primary schooling enables them to give valuable advice to teachers on matters of primary science and literacy practice also improved after the workshop (from 61% to 92%). After the conference over 90% of respondents indicated that they strongly agreed with all the statements, indicating a confidence in their understanding of the role of being a CL and in their ability to perform it.

Table 3: Mean ratings of confidence for aspects of being a Curriculum Leader (n=38)

Aspect		Pre-workshop				*Post-workshop*				% diff. top 2
		SA	A	D	SD	*SA*	*A*	*D*	*SD*	
Q1	I have a clear understanding of my role as a curriculum leader.	16%	39%	33%	12%	*12%*	*84%*	*4%*	-	**+41%**
Q2	I would like to further develop my leadership skills.	21%	70%	9%	-	*12%*	*80%*	*8%*	-	+1%
Q3	My knowledge of effective teaching practices enables me to answer teachers' pedagogy questions effectively.	16%	69%	6%	9%	*15%*	*77%*	*8%*	-	+7%
Q4	Primary teachers will need support to adopt the *Primary Connections* program	45%	52%	-	3%	*25%*	*71%*	*4%*	-	-1%
Q5	I encourage experimentation. I enjoy encouraging teachers to 'tackle' new ideas.	42%	58%	-	-	*16%*	*80%*	*4%*	-	-4%
Q6	I am able to organise engaging tasks for teachers to work on in small groups in my workshops.	6%	58%	21%	5%	*12%*	*84%*	*4%*	-	+4%
Q7	My deep understanding of the culture of primary schooling enables me to give valuable advice to teachers on matters of primary science and literacy practice.	16%	45%	33%	6%	*8%*	*84%*	*8%*	-	**+31%**
Q8	I am keen to participate in regular communication with other curriculum leaders.	18%	58%	18%	6%	*16%*	*76%*	*8%*	-	+16%
Q9	My deep understanding of literacy teaching practice enables me to give valuable advice on integrating literacy education into science education.	13%	54%	24%	9%	*4%*	*88%*	*8%*	-	+25%

SA = Strongly Agree; A = Agree; D = Disagree; SD = Strongly Disagree



The CLs also rated their confidence with facilitating the professional learning of teachers on seven aspects of primary science and literacy teaching on a four-point confidence scale ranging from no confidence to very confident. Table 4 summarises the feedback from participants regarding their confidence for delivering workshops on aspects of *Primary Connections*, and this is displayed visually in the accompanying column graph.

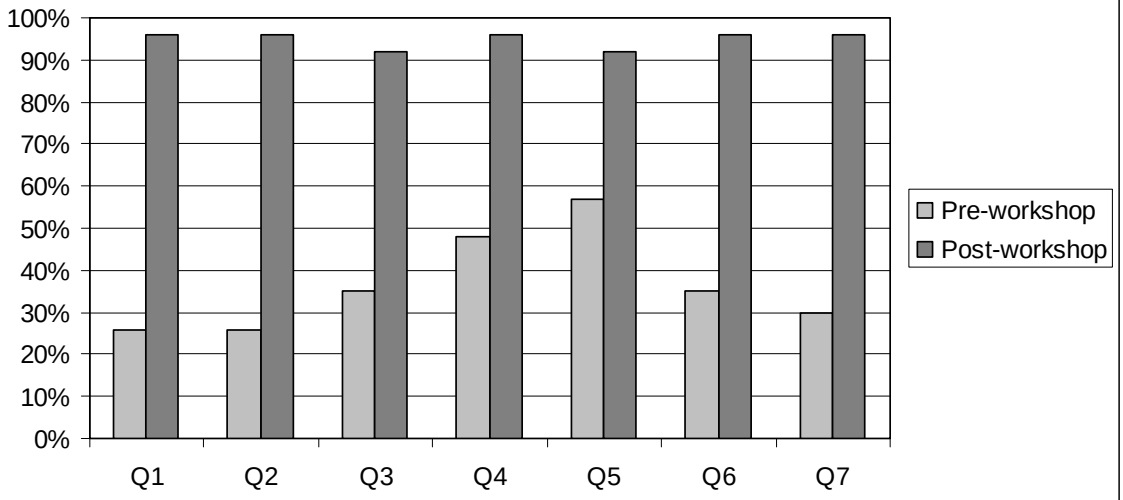
Before the workshop some CLs indicated they were confident to facilitate workshops on aspects of the *Primary Connections* teaching and learning approach, especially on cooperative learning (57% indicating confidence). By the end of the workshop dramatic gains in confidence were achieved for all aspects of the *Primary Connections* teaching and learning approach, since at least 92% of respondents indicated that they felt confident or very confident about facilitating workshops on each aspect.

Table 4: Mean ratings of confidence for delivering workshops on aspects of *Primary Connections* (n=38)

Aspect		Pre-workshop				*Post-workshop*				% diff. top 2
		VC	C	LC	NC	*VC*	*C*	*LC*	*NC*	
Q1	An introduction to *Primary Connections*	-	26%	48%	26%	*4%*	*92%*	*4%*	-	**+70%**
Q2	Integrating *Primary Connections* into the science program in a primary school.	-	26%	49%	25%	*4%*	*92%*	*4%*	-	**+70%**
Q3	Assessment of learning in primary science.	-	35%	35%	30%	-	*92%*	*8%*	-	**+57%**
Q4	Conducting investigations in primary science.	-	48%	18%	34%	-	*96%*	*4%*	-	**+48%**
Q5	Cooperative learning strategies.	-	57%	18%	25%	*8%*	*84%*	*8%*	-	**+35%**
Q6	Developing literacies needed for learning science.	-	35%	35%	30%	*8%*	*88%*	*4%*	-	**+61%**
Q7	Using an inquiry model to plan primary science units of work.	-	30%	36%	34%	*4%*	*92%*	*4%*	-	**+66%**

VC = Very confident; C = Confident; LC = Limited confidence; NC = No confidence

Graph of Table 4: Change in confidence for delivering workshops on aspects of *Primary Connections* before and after the workshop



Percentage of repondants indicating that they were confident or very confident to deliver workshops on different professional learning workshops on primary science and literacy teaching

Results for the Education Queensland Curriculum Leader Workshop June 2007

Demographic data

Of the 150 participants who attended the workshop, 122 completed the pre-workshop questionnaire and 108 completed the post-workshop questionnaire.

Qualifications

The Curriculum Leaders (CLs) had a range of science qualifications. The majority (81%) had at least completed Year 12 level of science, and 34% had completed at least a science unit at university. 20% of respondents had an undergraduate science major, and 1% also had a postgraduate diploma in science.

Table 5: Highest level of science content/discipline studies (not science education; n=122)

Year 10	Year 12	1 –3 undergrad science units	Undergrad science major	Postgrad science e.g. MSc	Unanswered
13%	47%	14%	19%	1%	6%

Confidence with science teaching

The CLs rated their self-efficacy and confidence for science teaching before and after the two-day workshop. The CLs were asked to rate their confidence with aspects of science teaching on a four-point scale. As this scale does not include a mid-point, statistical tests have not been performed. The effect of the workshop is measured by the increase of the percentage of respondents indicating that they are 'very confident' or 'confident' with the statement. Table 6 summarises the feedback from participants regarding their confidence with aspects of teaching science, and this is displayed visually in the accompanying column graph.

Before the workshop participants were most confident with managing hands-on group activities in science, with 85% indicating they were confident or strongly confident. Over 75% were also confident or very confident about managing discussions and interpretation of science observations, and developing literacy skills needed for learning science.

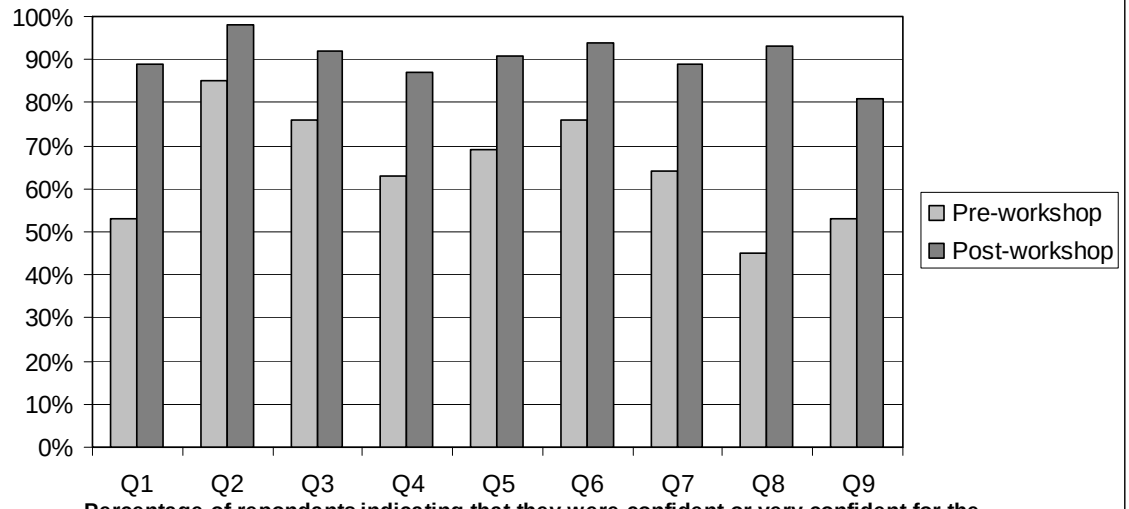
By the end of the workshop, at least 91% of all participants were confident or very confident for each aspect of teaching. The greatest gain in confidence was using an inquiry model to plan science units of work (from 45% confident to 93%). A large gain was also achieved for engaging teachers' interest in science.

Table 6: Mean ratings of confidence for aspects of science teaching

Aspect		Pre-workshop (n=122)					*Post-workshop (n=108)*					% diff. top 2
		VC	C	LC	NC	NA	*VC*	*C*	*LC*	*NC*	*NA*	
Q1	Engaging teachers' interest in science.	7%	46%	43%	-	4%	*19%*	*70%*	*10%*	*1%*	-	**+36%**
Q2	Managing hands-on group activities in science.	25%	60%	12%	1%	2%	*42%*	*56%*	*2%*	-	-	+13%
Q3	Managing discussions and interpretation of science observations.	16%	60%	19%	3%	2%	*23%*	*69%*	*7%*	*1%*	-	+16%
Q4	Explaining science concepts.	12%	51%	34%	2%	1%	*24%*	*63%*	*12%*	-	*1%*	+24%
Q5	Teaching science processes.	11%	58%	26%	2%	3%	*28%*	*63%*	*8%*	-	*1%*	+22%
Q6	Developing literacy skills needed for learning science.	17%	59%	22%	1%	1%	*36%*	*58%*	*6%*	-	-	+18%
Q7	Assessing children's learning in science.	6%	58%	33%	2%	1%	*25%*	*64%*	*11%*	-	-	+25%
Q8	Using an inquiry model to plan science units of work.	6%	39%	50%	3%	2%	*31%*	*62%*	*7%*	-	-	**+48%**
Q9	Answering scientific questions.	11%	42%	43%	3%	1%	*17%*	*64%*	*19%*	-	-	+28%

VC = Very confident; C = Confident; LC = Limited confidence; NC = No confidence

Graph of Table 6: Change in confidence for aspects of science teaching before and after the workshop



Percentage of repondants indicating that they were confident or very confident for the questions judging their self-efficacy and confidence as a teacher of primary science

Self-efficacy and confidence as a Curriculum Leader

The CLs rated their self-efficacy and confidence as Curriculum Leaders before and after the two-day workshop, on a four-point agreement scale. As this scale does not include a mid-point, statistical tests have not been performed. Table 7 summarises the feedback from participants regarding their confidence as a Curriculum Leader, and this is displayed visually in the accompanying column graph.

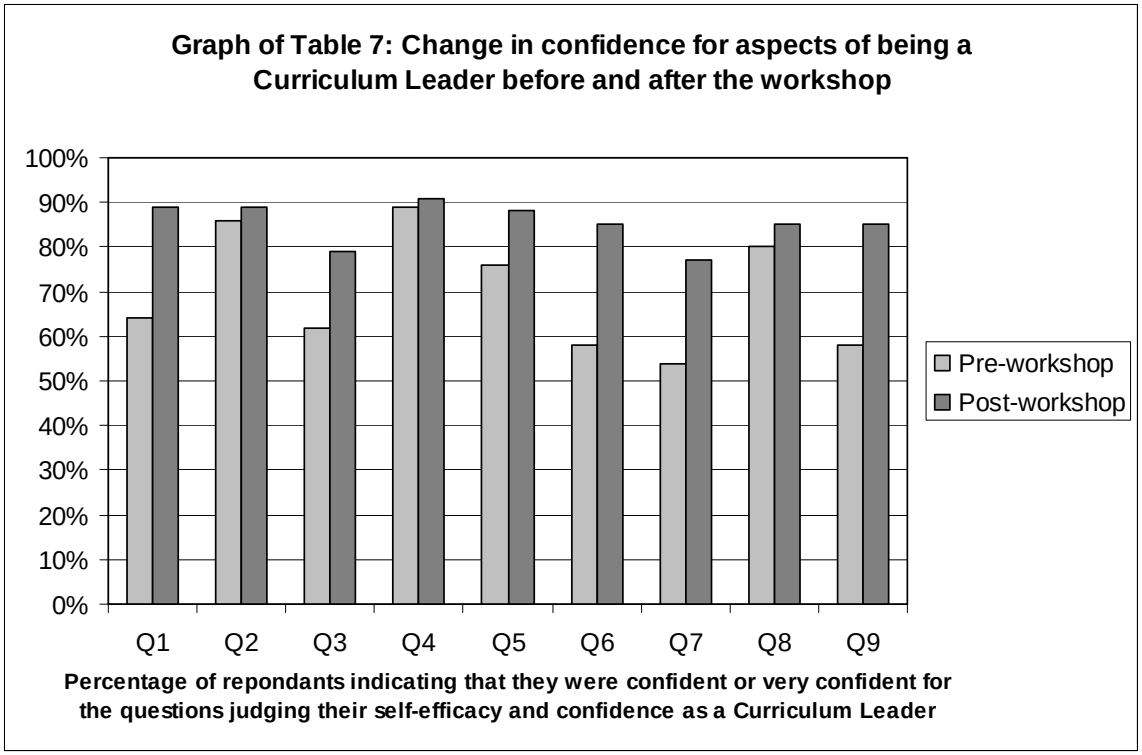
Prior to the workshop 86% of CLs indicated that they wanted to further develop their leadership skills. 76% of participants agreed or strongly agreed with the statements 'I encourage experimentation. I enjoy encouraging teachers to tackle 'new ideas'. Less than 60% of participants felt that they could give valuable advice to teachers on matters of primary science and literacy practice, or on integrating literacy education into science education. This rose to over 78% after the workshop.

After the conference over 90% of respondents indicated that they strongly agreed with the statements 1,2,5,6 and 8 which indicates a confidence in their understanding of the role of being a CL and in their ability to perform it. 89% clearly understood their role as a Curriculum Leader (as opposed to 64% before the conference).

Table 7: Mean ratings of confidence for aspects of being a Curriculum Leader

Statement		Pre-workshop (n=122)					*Post-workshop (n=108)*					% diff. top 2
		SA	A	D	SD	UA	*SA*	*A*	*D*	*SD*	*UA*	
Q1	I have a clear understanding of my role as a curriculum leader.	15%	49%	24%	4%	8%	*29%*	*60%*	*6%*	*1%*	*4%*	+25%
Q2	I would like to further develop my leadership skills.	36%	50%	6%	-	8%	*40%*	*49%*	*9%*	-	*2%*	+4%
Q3	My knowledge of effective teaching practices enables me to answer teachers' pedagogy questions effectively.	10%	52%	27%	3%	8%	*14%*	*65%*	*16%*	-	*5%*	+17%
Q4	Primary teachers will need support to adopt the *Primary Connections* program	45%	44%	3%	-	8%	*47%*	*44%*	*4%*	-	*5%*	+2%
Q5	I encourage experimentation. I enjoy encouraging teachers to 'tackle' new ideas.	37%	39%	11%	1%	12%	*41%*	*47%*	*8%*	-	*4%*	+12%
Q6	I am able to organise engaging tasks for teachers to work on in small groups in my workshops.	9%	49%	25%	3%	14%	*20%*	*65%*	*10%*	*1%*	*4%*	+27%
Q7	My deep understanding of the culture of primary schooling enables me to give valuable advice to teachers on matters of primary science and literacy practice.	6%	48%	30%	3%	13%	*14%*	*63%*	*13%*	*1%*	*9%*	+23%
Q8	I am keen to participate in regular communication with other curriculum leaders.	27%	53%	9%	1%	10%	*37%*	*48%*	*11%*	-	*4%*	+5%
Q9	My deep understanding of literacy teaching practice enables me to give valuable advice on integrating literacy education into science education.	6%	52%	29%	2%	11%	*23%*	*62%*	*8%*	*1%*	*6%*	+27%

SA = Strongly Agree; A = Agree; D = Disagree; SD = Strongly Disagree



The CLs also rated their confidence with facilitating professional learning of teachers on seven aspects of primary science and literacy teaching on a four-point confidence scale ranging from no confidence to very confident. Table 8 summarises the feedback from participants regarding their confidence for delivering workshops on aspects of *Primary Connections*, and this is displayed visually in the accompanying column graph.

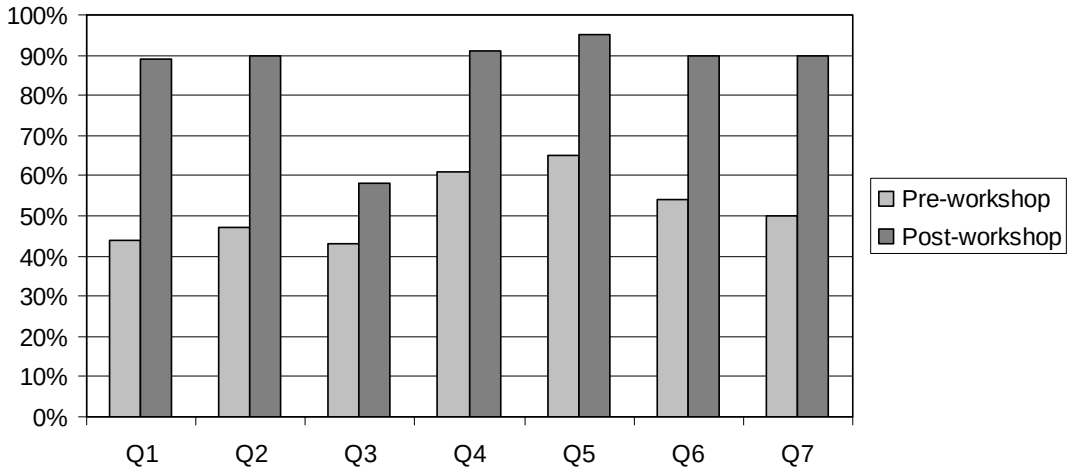
Before the workshop some CLs indicated they were confident to facilitate workshops on aspects of the *Primary Connections* teaching and learning approach, especially on cooperative learning (65% indicating confidence). By the end of the workshop dramatic gains in confidence were achieved for all aspects of the *Primary Connections* teaching and learning approach, since at least 92% of respondents indicated that they felt confident or very confident about facilitating workshops on each aspect. Even confidence in conducting investigations in cooperative learning increased since before the workshop 12% of CLs were very confident in their ability and after the workshop 35% were very confident.

Table 8: Mean ratings of confidence for delivering workshops on aspects of *Primary Connections*

Aspect		Pre-workshop (n=122)					*Post-workshop (n=108)*					% diff. top 2
		VC	C	LC	NC	UA	*VC*	*C*	*LC*	*NC*	*UA*	
Q1	An introduction to *Primary Connections*	7%	37%	31%	14%	11%	*33%*	*56%*	*3%*	*1%*	*7%*	**+45%**
Q2	Integrating *Primary Connections* into the science program in a primary school.	4%	43%	35%	11%	7%	*24%*	*66%*	*6%*	-	*4%*	**+43%**
Q3	Assessment of learning in primary science.	5%	38%	41%	9%	7%	*22%*	*63%*	*14%*	-	*1%*	**+42%**
Q4	Conducting investigations in primary science.	12%	49%	23%	8%	8%	*31%*	*60%*	*6%*	-	*3%*	**+30%**
Q5	Cooperative learning strategies.	12%	53%	24%	4%	7%	*35%*	*60%*	*4%*	-	*1%*	**+30%**
Q6	Developing literacies needed for learning science.	9%	45%	33%	7%	6%	*31%*	*59%*	*9%*	-	*1%*	**+36%**
Q7	Using an inquiry model to plan primary science units of work.	11%	39%	35%	9%	6%	*25%*	*65%*	*9%*	-	*1%*	**+40%**

VC = Very confident; C = Confident; LC = Limited confidence; NC = No confidence

Graph of Table 8: Change in confidence for delivering workshops on aspects of *Primary Connections* before and after the workshop



Percentage of repondants indicating that they were confident or very confident to deliver workshops on different professional learning workshops on primary science and literacy teaching

Results for the QLD Independent/Catholic Curriculum Leader Workshop July 2007

Demographic data

Of the 34 participants who attended the workshop, 34 completed the pre-workshop questionnaire and 32 completed the post-workshop questionnaire.

Qualifications

The Curriculum Leaders (CLs) had a range of science qualifications. The majority (79%) had at least completed Year 12 level of science, and 44% had completed at least a science unit at university. A quarter (24%) of respondents had an undergraduate science major, over a third of which also had a postgraduate qualification in science.

Table 9: Highest level of science content/discipline studies (not science education; n=34)

Year 10	Year 12	1 –3 undergrad science units	Undergrad science major	Postgrad science e.g. MSc	Unanswered
15%	35%	20%	15%	9%	6%

Confidence with science teaching

The CLs rated their self-efficacy and confidence for science teaching before and after the two-day workshop. The CLs were asked to rate their confidence with aspects of science teaching on a four-point scale. As this scale does not include a mid-point, statistical tests have not been performed. The effect of the workshop is measured by the increase of the percentage of respondents indicating that they are 'very confident' or 'confident' with the statement. Table 10 summarises the feedback from participants regarding their confidence with aspects of teaching science, and this is displayed visually in the accompanying column graph.

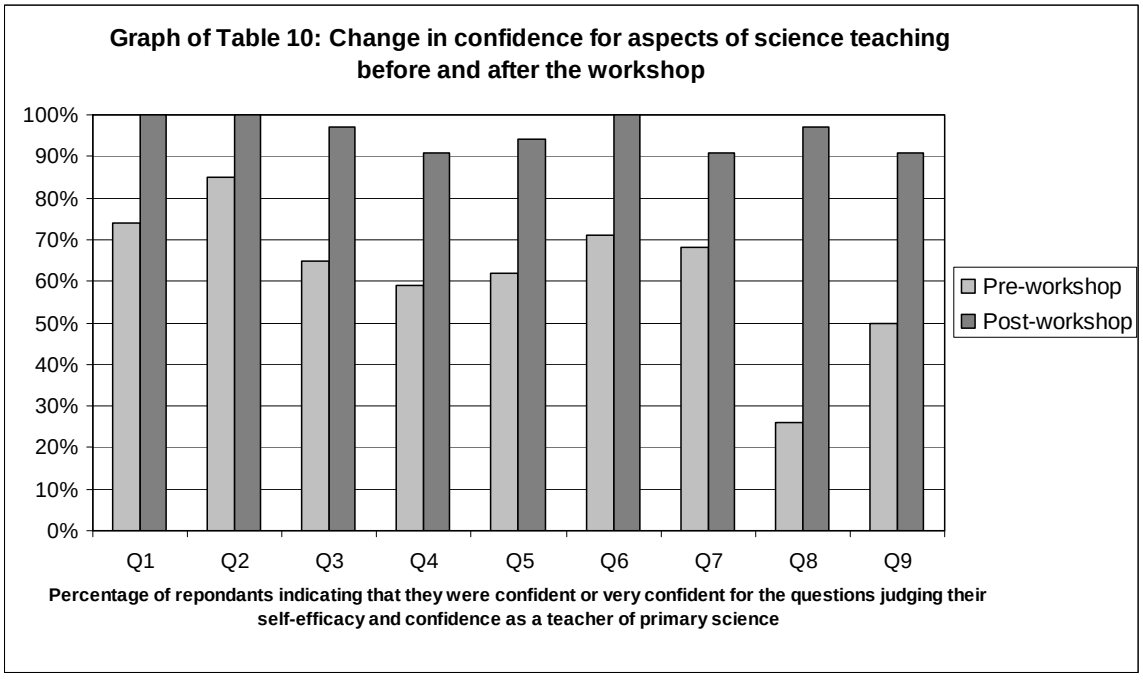
Before the workshop participants were most confident with managing hands-on group activities in science, with 85% indicating they were confident or strongly confident. Over 70% were also confident or very confident about engaging teachers' interest in science and developing literacy skills needed for learning science.

By the end of the workshop, at least 91% of all participants were confident or very confident for each aspect of teaching. The greatest gain in confidence was using an inquiry model to plan science units of work and answering scientific questions (from 56% confident to 97%). Large gains were also achieved for explaining science concepts and processes, and managing discussions and interpretation of science observations.

Table 10: Mean ratings of confidence for aspects of science teaching

Aspect		Pre-workshop (n=34)				*Post-workshop (n=32)*				% diff. top 2
		VC	C	LC	NC	*VC*	*C*	*LC*	*NC*	
Q1	Engaging teachers' interest in science.	9%	65%	23%	3%	*22%*	*78%*	-	-	+26%
Q2	Managing hands-on group activities in science.	17%	68%	9%	6%	*28%*	*72%*	-	-	+15%
Q3	Managing discussions and interpretation of science observations.	12%	53%	26%	9%	*22%*	*75%*	*3%*	-	**+32%**
Q4	Explaining science concepts.	15%	44%	35%	6%	*19%*	*72%*	*9%*	-	**+32%**
Q5	Teaching science processes.	12%	50%	32%	6%	*22%*	*72%*	*6%*	-	**+32%**
Q6	Developing literacy skills needed for learning science.	9%	62%	26%	3%	*22%*	*78%*	-	-	+29%
Q7	Assessing children's learning in science.	6%	62%	29%	3%	*32%*	*59%*	*9%*	-	+23%
Q8	Using an inquiry model to plan science units of work.	12%	44%	35%	9%	*31%*	*66%*	*3%*	-	**+41%**
Q9	Answering scientific questions.	12%	38%	41%	9%	*25%*	*66%*	*9%*	-	**+41%**

VC = Very confident; C = Confident; LC = Limited confidence; NC = No confidence



Self-efficacy and confidence as a Curriculum Leader

The CLs rated their self-efficacy and confidence as Curriculum Leaders before and after the two-day workshop, on a four-point agreement scale. As this scale does not include a mid-point, statistical tests have not been performed. Table 11 summarises the feedback from participants regarding their confidence as a Curriculum Leader, and this is displayed visually in the accompanying column graph.

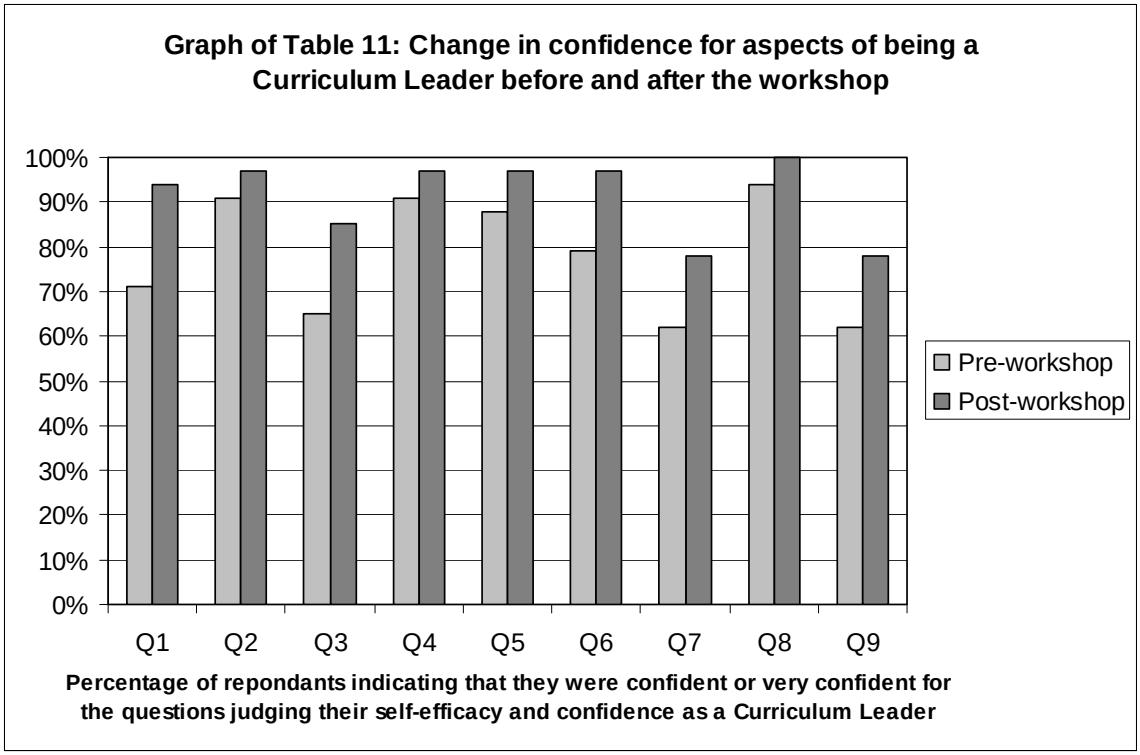
Prior to the workshop 91% of CLs indicated that they wanted to further develop their leadership skills. 88% of participants agreed or strongly agreed with the statements 'I encourage experimentation. I enjoy encouraging teachers to tackle 'new ideas'. Only 52% of participants felt that they could give valuable advice to teachers on matters of primary science and literacy practice, or on integrating literacy education into science education. This rose to over 78% after the workshop.

After the conference over 90% of respondents indicated that they strongly agreed with the statements 1,2,5,6, and 8 which indicates a confidence in their understanding of the role of being a CL and confidence in their ability to perform it. 94% clearly understood their role as a Curriculum Leader (as opposed to 71% before the conference).

Table 11: Mean ratings of confidence for aspects of being a Curriculum Leader

Statement		Pre-workshop (n=34)					*Post-workshop (n=32)*					% diff. top 2
		SA	A	D	SD	NA	*SA*	*A*	*D*	*SD*	*NA*	
Q1	I have a clear understanding of my role as a curriculum leader.	15%	56%	17%	3%	9%	*19%*	*75%*	*3%*	-	*3%*	+23%
Q2	I would like to further develop my leadership skills.	38%	53%	3%	-	6%	*34%*	*63%*	*3%*	-	-	+6%
Q3	My knowledge of effective teaching practices enables me to answer teachers' pedagogy questions effectively.	21%	44%	29%	-	6%	*16%*	*69%*	*15%*	-	-	+20%
Q4	Primary teachers will need support to adopt the *Primary Connections* program	41%	50%		-	9%	*41%*	*56%*	*3%*	-	-	+6%
Q5	I encourage experimentation. I enjoy encouraging teachers to 'tackle' new ideas.	47%	41%		-	12%	*47%*	*50%*	-	-	*3%*	+9%
Q6	I am able to organise engaging tasks for teachers to work on in small groups in my workshops.	20%	59%	12%	-	9%	*19%*	*78%*	*3%*	-	-	+18%
Q7	My deep understanding of the culture of primary schooling enables me to give valuable advice to teachers on matters of primary science and literacy practice.	15%	47%	26%	3%	9%	*16%*	*62%*	*19%*	-	*3%*	+16%
Q8	I am keen to participate in regular communication with other curriculum leaders.	41%	53%	-	-	6%	*47%*	*53%*	-	-	-	+6%
Q9	My deep understanding of literacy teaching practice enables me to give valuable advice on integrating literacy education into science education.	21%	41%	26%	6%	6%	*12%*	*66%*	*19%*	-	*3%*	+16%

SA = Strongly Agree; A = Agree; D = Disagree; SD = Strongly Disagree



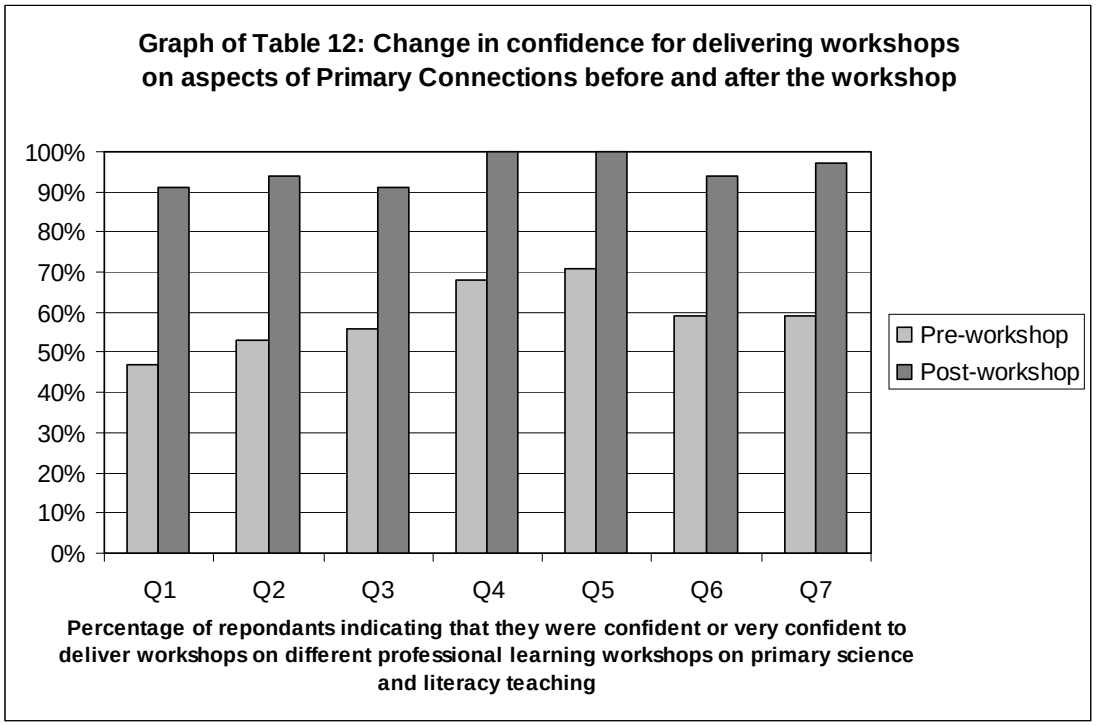
The CLs also rated their confidence with facilitating professional learning of teachers on seven aspects of primary science and literacy teaching on a four-point confidence scale ranging from no confidence to very confident. Table 12 summarises the feedback from participants regarding their confidence for delivering workshops on aspects of *Primary Connections*, and this is displayed visually in the accompanying column graph.

Before the workshop some CLs indicated they were confident to facilitate workshops on aspects of the *Primary Connections* teaching and learning approach, especially on cooperative learning strategies (71% indicating confidence), and conducting investigations in primary science (68%). By the end of the workshop large gains in confidence were achieved for all aspects of the *Primary Connections* teaching and learning approach, since at least 94% of respondents indicated that they felt confident or very confident about facilitating workshops on each aspect. Even confidence in cooperative learning strategies increased to 100%, with 12% of CLs were very confident in their ability before the workshop, and 28% after the workshop.

Table 12: Mean ratings of confidence for delivering workshops on aspects of *Primary Connections*

Item	Aspect	Pre-workshop (n=34)					*Post-workshop (n=32)*					% diff. top 2
		VC	C	LC	NC	NA	*VC*	*C*	*LC*	*NC*	*NA*	
Q1	An introduction to *Primary Connections*	9%	38%	29%	9%	15%	*28%*	*63%*	*6%*	-	*3%*	**+44%**
Q2	Integrating *Primary Connections* into the science program in a primary school.	12%	41%	29%	3%	15%	*22%*	*72%*	-	*3%*	*3%*	**+41%**
Q3	Assessment of learning in primary science.	12%	44%	32%	-	12%	*13%*	*78%*	*3%*	*3%*	*3%*	**+35%**
Q4	Conducting investigations in primary science.	15%	53%	20%	-	12%	*28%*	*72%*	-	-	-	**+32%**
Q5	Cooperative learning strategies.	12%	59%	14%	-	15%	*28%*	*72%*	-	-	-	+29%
Q6	Developing literacies needed for learning science.	9%	50%	26%	3%	12%	*22%*	*72%*	*3%*	*3%*	-	**+35%**
Q7	Using an inquiry model to plan primary science units of work.	18%	41%	26%	3%	12%	*22%*	*75%*	-	*3%*	-	**+38%**

VC = Very confident; C = Confident; LC = Limited confidence; NC = No confidence



Results for the Northern Sydney Region Curriculum Leader Workshop 19 and 20 September 2007

Demographic data

Of the 38 participants who attended the workshop, 37 completed the pre-workshop questionnaire and 36 completed the post-workshop questionnaire.

Qualifications

The Curriculum Leaders (CLs) had a range of science qualifications. The majority (81%) had at least completed Year 12 level of science, and 43% had completed at least a science unit at university. 8% of respondents had an undergraduate science major.

Table 13: Highest level of science content/discipline studies (not science education; n=37)

Year 10	Year 12	1 –3 undergrad science units	Undergrad science major	Postgrad science e.g. MSc	Unanswered
11%	38%	35%	8%	-	8%

Confidence with science teaching

The CLs rated their self-efficacy and confidence for science teaching before and after the two-day workshop. The CLs were asked to rate their confidence with aspects of science teaching on a four-point scale. As this scale does not include a mid-point, statistical tests have not been performed. The effect of the workshop is measured by the increase of the percentage of respondents indicating that they are 'very confident' or 'confident' with the statement. Table 14 summarises the feedback from participants regarding their confidence with aspects of teaching science, and this is displayed visually in the accompanying column graph.

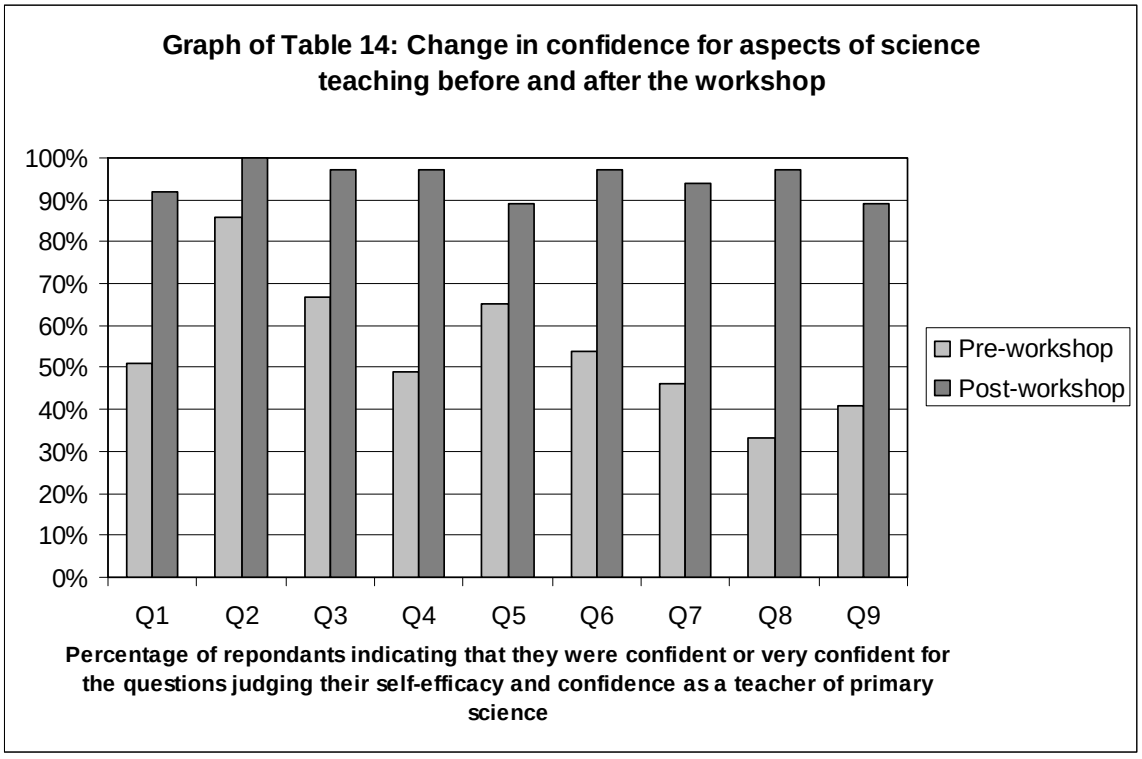
Before the workshop participants were most confident with managing hands-on group activities in science, with 86% indicating they were confident or strongly confident. Over 60% were also confident or very confident about managing discussions and teaching science processes.

By the end of the workshop, at least 89% of all participants were confident or very confident for each aspect of teaching. The greatest gain in confidence was using an inquiry model to plan science units of work (from 33% confident to 97%). Large gains were also achieved for explaining science concepts, answering scientific questions, and assessing children's learning in science.

Table 14: Mean ratings of confidence for aspects of science teaching

Aspect		Pre-workshop (n=37)					*Post-workshop (n=36)*				% diff. top 2
		VC	C	LC	NC	UA	*VC*	*C*	*LC*	*NC*	
Q1	Engaging teachers' interest in science.	8%	43%	32%	14%	3%	*34%*	*58%*	*8%*	-	**+41%**
Q2	Managing hands-on group activities in science.	40%	46%	14%	-	-	*42%*	*58%*	-	-	+14%
Q3	Managing discussions and interpretation of science observations.	27%	40%	30%	3%	-	*25%*	*72%*	*3%*	-	**+30%**
Q4	Explaining science concepts.	14%	35%	43%	5%	3%	*17%*	*80%*	*3%*	-	**+48%**
Q5	Teaching science processes.	8%	57%	32%	3%	-	*28%*	*61%*	*11%*	-	+24%
Q6	Developing literacy skills needed for learning science.	16%	38%	46%	-	-	*47%*	*50%*	*3%*	-	**+43%**
Q7	Assessing children's learning in science.	-	46%	51%	3%	-	*27%*	*67%*	*6%*	-	**+48%**
Q8	Using an inquiry model to plan science units of work.	8%	25%	62%	5%	-	*33%*	*64%*	*3%*	-	**+64%**
Q9	Answering scientific questions.	8%	33%	51%	8%	-	*20%*	*69%*	*11%*	-	**+48%**

VC = Very confident; C = Confident; LC = Limited confidence; NC = No confidence



Self-efficacy and confidence as a Curriculum Leader

The CLs rated their self-efficacy and confidence as Curriculum Leaders before and after the two-day workshop, on a four-point agreement scale. As this scale does not include a mid-point, statistical tests have not been performed. Table 15 summarises the feedback from participants regarding their confidence as a Curriculum Leader, and this is displayed visually in the accompanying column graph.

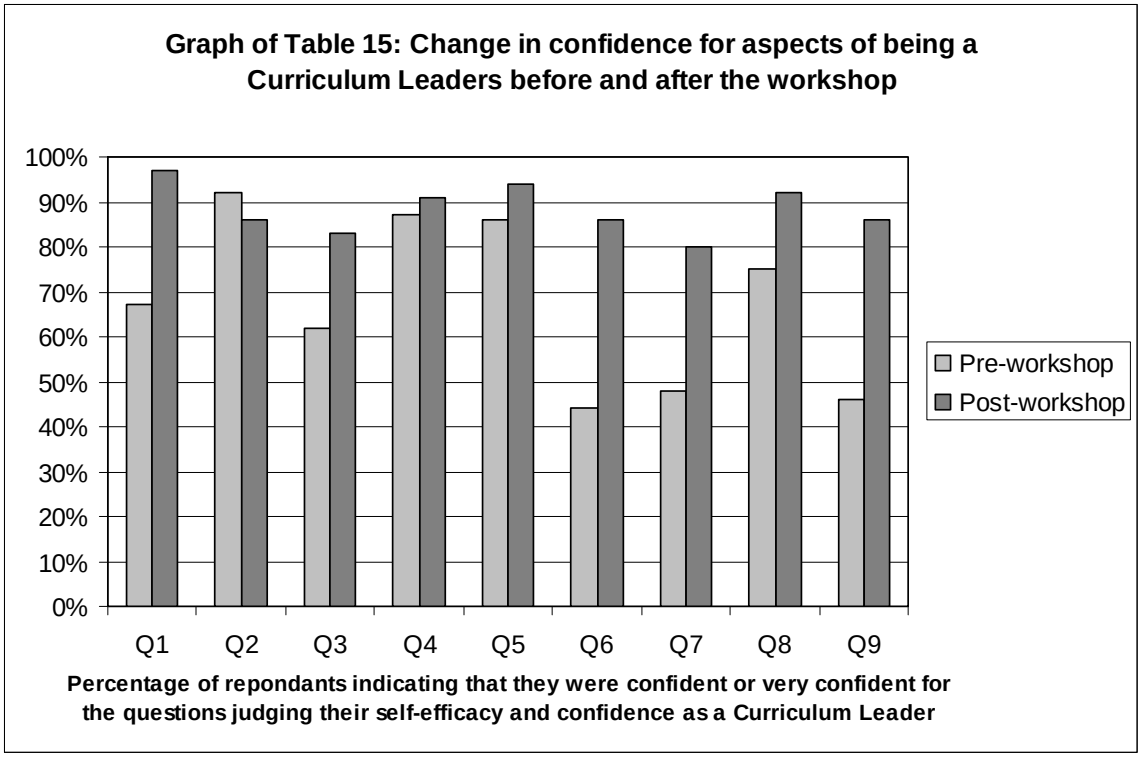
Prior to the workshop over 92% of CLs indicated that they wanted to further develop their leadership skills. 86% also agreed or strongly agreed with the statements 'I encourage experimentation. I enjoy encouraging teachers to tackle 'new ideas'. Less than 50% of participants felt that they could give valuable advice to teachers on matters of primary science and literacy practice, or on integrating literacy education into science education. This rose to over 80% after the workshop.

After the conference over 90% of respondents indicated that they strongly agreed with all statements, indicating a confidence in their understanding of the role of being a CL and confidence in their ability to perform it. 97% clearly understood their role as a Curriculum Leader (as opposed to 67% before the conference).

Table 15: Mean ratings of confidence for aspects of being a Curriculum Leader

Aspect		Pre-workshop (n=37)					*Post-workshop (n=36)*					% diff. top 2
		SA	A	D	SD	UA	*SA*	*A*	*D*	*SD*	*UA*	
Q1	I have a clear understanding of my role as a curriculum leader.	11 %	56%	22%	3%	8%	*39%*	*58%*	*3%*	-	-	**+30%**
Q2	I would like to further develop my leadership skills.	38 %	54%	-	-	8%	*36%*	*50%*	*14%*	-	-	-6%
Q3	My knowledge of effective teaching practices enables me to answer teachers' pedagogy questions effectively.	5 %	57%	27%	-	11%	*11%*	*72%*	*17%*	-	-	+21%
Q4	Primary teachers will need support to adopt the *Primary Connections* program	33 %	54%	5%	-	8%	*47%*	*44%*	*6%*	-	*3%*	+4%
Q5	I encourage experimentation. I enjoy encouraging teachers to 'tackle' new ideas.	19 %	67%	3%	-	11%	*44%*	*50%*	*3%*	-	*3%*	+8%
Q6	I am able to organise engaging tasks for teachers to work on in small groups in my workshops.	-	44%	35%	5%	16%	*25%*	*61%*	*11%*	-	*3%*	**+42%**
Q7	My deep understanding of the culture of primary schooling enables me to give valuable advice to teachers on matters of primary science and literacy practice.	3 %	45%	35%	3%	14%	*19%*	*61%*	*14%*	*3%*	*3%*	**+32%**
Q8	I am keen to participate in regular communication with other curriculum leaders.	16 %	59%	11%	-	14%	*42%*	*50%*	*8%*	-	-	+17%
Q9	My deep understanding of literacy teaching practice enables me to give valuable advice on integrating literacy education into science education.	8 %	38%	40%	-	14%	*19%*	*67%*	*11%*	-	*3%*	**+40%**

SA = Strongly Agree; A = Agree; D = Disagree; SD = Strongly Disagree



The CLs also rated their confidence with facilitating professional learning of teachers on seven aspects of primary science and literacy teaching on a four-point confidence scale ranging from no confidence to very confident. Table 16 summarises the feedback from participants regarding their confidence for delivering workshops on aspects of *Primary Connections*, and this is displayed visually in the accompanying column graph.

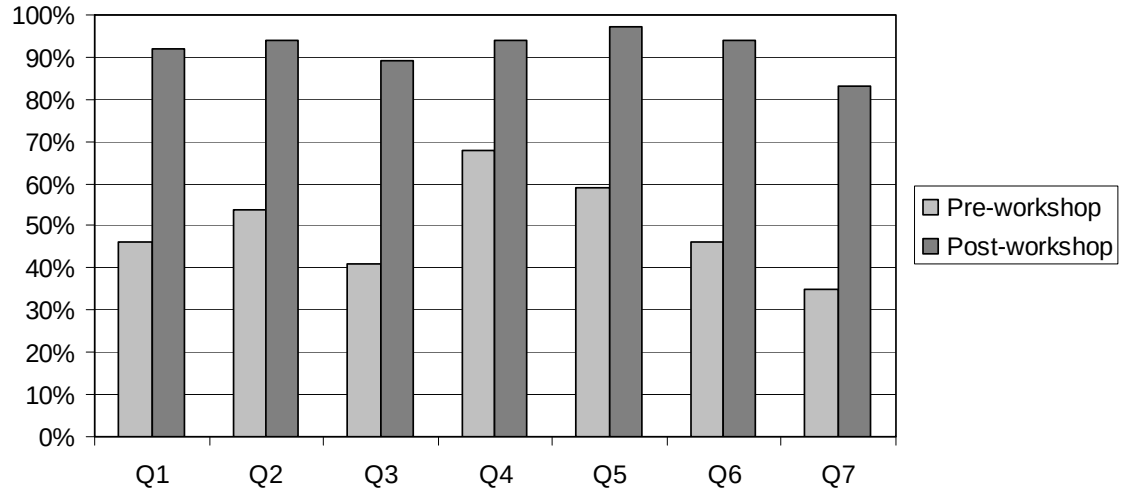
Before the workshop some CLs indicated they were confident to facilitate workshops on aspects of the *Primary Connections* teaching and learning approach, especially on conducting investigations in primary science (68% indicating confidence). By the end of the workshop large gains in confidence were achieved for all aspects of the *Primary Connections* teaching and learning approach, since at least 97% of respondents indicated that they felt confident or very confident about facilitating workshops on each aspect. Even confidence in conducting investigations in primary science increase since before the workshop 8% of CLs were very confident in their ability and after the workshop 31% were very confident.

Table 16: Mean ratings of confidence for delivering workshops on aspects of *Primary Connections*

Aspect		Pre-workshop (n=37)					*Post-workshop (n=36)*					% diff. top 2
		VC	C	LC	NC	UA	*VC*	*C*	*LC*	*NC*	*UA*	
Q1	An introduction to *Primary Connections*	11%	35%	30%	8%	16%	*36%*	*56%*	*5%*	-	*3%*	**+46%**
Q2	Integrating *Primary Connections* into the science program in a primary school.	8%	46%	24%	8%	14%	*25%*	*69%*	*6%*	-	-	**+40%**
Q3	Assessment of learning in primary science.	3%	38%	38%	10%	11%	*20%*	*69%*	*11%*	-	-	**+48%**
Q4	Conducting investigations in primary science.	8%	60%	16%	5%	11%	*31%*	*63%*	*3%*	-	*3%*	+26%
Q5	Cooperative learning strategies.	5%	54%	27%	-	14%	*36%*	*61%*	*3%*	-	-	**+38%**
Q6	Developing literacies needed for learning science.	3%	43%	43%	-	11%	*36%*	*58%*	*6%*	-	-	**+48%**
Q7	Using an inquiry model to plan primary science units of work.	5%	30%	46%	5%	14%	*22%*	*61%*	*17%*	-	-	**+48%**

VC = Very confident; C = Confident; LC = Limited confidence; NC = No confidence

Graph of Table 16: Change in confidence for delivering workshops on aspects of *Primary Connections* before and after the workshop



Percentage of repondants indicating that they were confident or very confident to deliver workshops on different professional learning workshops on primary science and literacy teaching

Key Findings

Analysis of data presented in this report reveals a number of key findings. These are listed in the following table

Number	Key finding	Supporting data
1	The science education background of participants of the different workshops was diverse with the majority having completed Yr 12 science. Around a third had post-graduate experience, and several had an undergraduate science major. A few had a postgraduate degree.	Tables 1, 5, 9, and 13
2	The CLs' confidence with the different aspects of science teaching increased after every workshop, with over 90% of all participants being confident or very confident on all aspects after the workshops. Consistently, the ability to use an inquiry model to plan science units of work had the largest gain. Before the workshops participants were most confident about managing hands-on group activities in science, and this confidence also increased after the workshops.	Tables 2, 6, 10, and 14
3	The participants made strong gains in confidence and self-efficacy for being Curriculum Leaders. Generally large gains were achieved in the participants' understanding of their role as a Curriculum Leader.	Tables 3, 7, 11, and 15
4	The CLs' confidence for facilitating workshops on aspects of the *Primary Connections* teaching and learning approach increased, with over 90% of participants indicating they were confident or very confident in facilitating the different aspects after the workshop.	Tables 4, 8, 12 and 16

Discussion and Conclusions

The Curriculum Leader workshops increased the confidence and self-efficacy of participants for being Curriculum Leaders (CLs). At the end of the workshop only ten per cent on average had low or modest self-efficacy. Very strong gains were made in confidence with facilitating *Primary Connections* workshops. Given the quality of the workshop and resources, and the richness of the professional learning that occurred for the CLs, it is likely that the CLs will be effective as school leaders.

The workshops also increased the confidence and self-efficacy of the CLs as teachers of science. Although generally confident when entering the workshops, especially of their ability to manage hands-on group activities in science, participants indicated much higher overall confidence in their ability to run effective science lessons after the workshops. The highest gain in confidence was the ability to use an inquiry model to plan science units of work, a central element of the *Primary Connections* teaching and learning approach.

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Appendix 1: Workshop programme

DAY 1	
5Es PHASE	**FOCUS**
INTRO (30mins) 9.00-9.30	• Purpose • Participant expectations
ENGAGE **(50mins)** 9.30-10.20	What is *Primary Connections?* "The Bridge" Broad purpose of *Primary Connections*- Scientific literacy
EXPLORE (220mins total) 10.20-10.45	Cooperative learning (25mins)
MORNING TEA (30mins) 10.45-11.15	
11.15-12.15 12.15-1.00	5Es (60mins) Investigating (45mins)
LUNCH(30mins) 1.00-1.30	Distribute sets of curriculum units (7 units)
EXPLORE 1.30-2.15 2.15-2.30 2.30-3.00	 Linking science with literacy (45mins) Intro to curriculum units(15mins) Assessment for and of learning (30mins)
CONCLUSION **DAY 1** 3.00-3.30	Summary Reflections Questions
DAY 2	
EXPLAIN **(90mins)** 9.00-10.30	Curriculum unit plan and organisation (30mins) Essence of curriculum units (30mins) Indigenous perspective (30mins)
MORNING TEA (30mins) 10.30-11.00	
ELABORATE (120mins total) 11.00-12.00 12.00-1.00	 Unit planning (60mins) Being a curriculum leader (60mins) [OZ model of leadership]
LUNCH (30mins) 1.00-1.30	
IMPLEMENTING *PRIMARY CONNECTIONS* (60mins) 1.30-2.30	Jurisdiction planning time
EVALUATE (30mins) 2.30-3.00	Reflection: Dialogue for meaning
CONCLUSION **(30mins)** 3.00-3.30	Summary Evaluation Correlation Chart Post Questionnaire

Appendix 2: Initial questionnaire

Dear Colleague

As a curriculum leader you have a key role in framing and supporting the development of learning and teaching practice within your school. You have been invited to participate in the 2 day leadership program focussing on *Primary Connections*. Two questionnaires will be used to gauge the effectiveness of this training program. One is to be completed prior to the workshop and the other one will be completed after the workshop.
Data from these surveys will be aggregated and summarised so that it will not be possible to identify any respondent in any reports of this research. Data will be used for research purposes only. We request your name and workplace details for follow-up purposes only.

Please answer this questionnaire honestly and frankly. Respond in the way that it is, rather than portraying things as you would like them to be seen.

Your background

Your name: _____ Sex: Male / Female

Name of workplace for 2007: _____

Your professional role for 2007: _____

How long have you been in this role? _____ years

Leadership in Primary Education _____years

Please outline your teaching experience in science and in literacy
_____

_____

_____
Have you previously taught a *Primary Connections* unit? Yes / No

Have you previously taught science using Primary Investigations? Yes / No

Qualifications
List all of your completed post-secondary qualifications e.g. Bed / BA, Dip Ed / MEd

Highest level of science content/discipline studies (not science education). Tick box.

Year 10	Year 12	1 –3 undergrad sci units	Undergrad sci major	Postgrad sci e.g. MSc

List any current studies e.g. Graduate Certificate (Computer Education)
_____

About primary science teaching

What do you believe is the main purpose of teaching science in the primary years of schooling?

What do you believe are the most important characteristics of high quality primary science teaching?

In your opinion, what aspects of typical primary science teaching need to be improved?

What do you think are the most important characteristics of quality literacy teaching?

Self-efficacy and confidence as a teacher of primary science

Please rate your confidence with the following aspects of science teaching
VC = Very confident; C = Confident;
LC = Limited confidence; NC = No confidence

Item	Aspect	VC	C	LC	NC
1	Engaging teachers' interest in science.				
2	Managing hands-on group activities in science.				
3	Managing discussions and interpretation of science observations.				
4	Explaining science concepts.				
5	Teaching science processes.				
6	Developing literacy skills needed for learning science.				
7	Assessing children's learning in science.				
9	Using an inquiry model to plan science units of work.				
10	Answering scientific questions.				

About professional learning

What do you believe are the most important characteristics of high quality teacher professional learning?

What aspects of professional learning for primary teachers need to be improved?

Your self-efficacy and confidence as a Curriculum Leader

Please indicate the degree to which you agree or disagree with each statement below by ticking the appropriate box to the right of each statement:

SA = Strongly Agree; A = Agree; D = Disagree; SD = Strongly Disagree

Item	Statement	SA	A	D	SD
1	I have a clear understanding of my role as a curriculum leader.				
2	I would like to further develop my leadership skills.				
3	My knowledge of effective teaching practices enables me to answer teachers' pedagogy questions effectively.				
4	Primary teachers will need support to adopt the *Primary Connections* program				
5	I encourage experimentation. I enjoy encouraging teachers to 'tackle' new ideas.				
6	I am able to organise engaging tasks for teachers to work on in small groups in my workshops.				
7	My deep understanding of the culture of primary schooling enables me to give valuable advice to teachers on matters of primary science and literacy practice.				
8	I am keen to participate in regular communication with other curriculum leaders.				
9	My deep understanding of literacy teaching practice enables me to give valuable advice on integrating literacy education into science education.				

Please rate your confidence with facilitating professional learning workshops for your colleagues on the following aspects of primary science and literacy teaching
VC = Very confident; C = Confident; LC = Limited confidence; NC = No confidence

Item	Aspect	VC	C	LC	NC
1	An introduction to *Primary Connections*				
2	Integrating *Primary Connections* into the				

	science program in a primary school.				
3	Assessment of learning in primary science.				
4	Conducting investigations in primary science.				
5	Cooperative learning strategies.				
6	Developing literacies needed for learning science.				
7	Using an inquiry model to plan primary science units of work.				

Primary science in your school

What factors will influence the uptake of *Primary Connections* in your school?

What factors will influence how effective you can be as a Curriculum Leader in your school?

Your goals for participating in this two-day workshop for curriculum leaders

What are your personal goals for participating in this workshop?

Thank you for responding to this questionnaire

Appendix 3: Post-workshop Questionnaire

Dear Colleague

As a curriculum leader you have a key role in framing and supporting the development of learning and teaching practice within your school. You have been invited to participate in the 2 day leadership program focussing on *Primary Connections*. Two questionnaires will be used to gauge the effectiveness of this training program. One is to be completed prior to the workshop and the other one will be completed after the workshop.
Data from these surveys will be aggregated and summarised so that it will not be possible to identify any respondent in any reports of this research. Data will be used for research purposes only. We request your name and workplace details for follow-up purposes only.

Please answer this questionnaire honestly and frankly. Respond in the way that it is, rather than portraying things as you would like them to be seen.

Your background

Your name: _____ Sex: Male / Female

Self-efficacy and confidence as a teacher of primary science

Please rate your confidence with the following aspects of science teaching:

VC = Very confident; C = Confident;
LC = Limited confidence; NC = No confidence

Item	Aspect	VC	C	LC	NC
1	Engaging teachers' interest in science.				
2	Managing hands-on group activities in science.				
3	Managing discussions and interpretation of science observations.				
4	Explaining science concepts.				
5	Teaching science processes.				
6	Developing literacy skills needed for learning science.				
7	Assessing children's learning in science.				
9	Using an inquiry model to plan science units of work.				
10	Answering scientific questions.				

About professional learning

What do you believe are the most important characteristics of high quality teacher professional learning?

What aspects of professional learning for primary teachers need to be improved?

Your self-efficacy and confidence as a Curriculum Leader

Please indicate the degree to which you agree or disagree with each statement below by ticking the appropriate box to the right of each statement:

SA = Strongly Agree; A = Agree; D = Disagree; SD = Strongly Disagree

Item	Statement	SA	A	D	SD
1	I have a clear understanding of my role as a curriculum leader.				
2	I would like to further develop my leadership skills.				
3	My knowledge of effective teaching practices enables me to answer teachers' pedagogy questions effectively.				
4	Primary teachers will need support to adopt the *Primary Connections* program				
5	I encourage experimentation. I enjoy encouraging teachers to 'tackle' new ideas.				
6	I am able to organise engaging tasks for teachers to work on in small groups in my workshops.				
7	My deep understanding of the culture of primary schooling enables me to give valuable advice to teachers on matters of primary science and literacy practice.				
8	I am keen to participate in regular communication with other curriculum leaders.				
9	My deep understanding of literacy teaching practice enables me to give valuable advice on integrating literacy education into science education.				

Please rate your confidence with facilitating professional learning workshops for your colleagues on the following aspects of primary science and literacy teaching
VC = Very confident; C = Confident; LC = Limited confidence; NC = No confidence

Item	Aspect	VC	C	LC	NC
1	An introduction to *Primary Connections*				
2	Integrating *Primary Connections* into the science program in a primary school.				

3	Assessment of learning in primary science.				
4	Conducting investigations in primary science.				
5	Cooperative learning strategies.				
6	Developing literacies needed for learning science.				
7	Using an inquiry model to plan primary science units of work.				

Primary science in your school

What factors will influence the uptake of *Primary Connections* in your school?

What factors will influence how effective you can be as a Curriculum Leader in your school?

Your goals for participating in this two-day workshop for curriculum leaders

What are your personal goals for participating in this workshop?

Thank you for responding to this questionnaire