PrimaryConnections®
Linking science with literacy

Stage 3
Interim research and evaluation report 11

NSW Professional Learning Facilitators Workshop: July 2007

A research report for the Australian Academy of Science

Mark W Hackling
Edith Cowan University

Research Consultant to the *Primary Connections* Project

January 2008

Australian Government
Department of Education, Employment and Workplace Relations

Australian Academy of Science

Contents   Page

Introduction and Background to the Study

Introduction
Primary Connections is an initiative of the Australian Academy of Science funded by the Australian Government through the Department of Education, Science and Training. All Australian states and territories, government, Catholic and independent school sectors, and science and literacy professional associations were represented on a project reference group that provided direction for the conceptualisation and implementation of the project.

Primary Connections aims to improve science and literacies of science learning outcomes through providing an innovative programme of professional learning supported with high quality curriculum resources based on a sophisticated teaching and learning model.

The *Primary Connections* project has been implemented in three stages. Stage 1, funded by the Australian Academy of Science sought and gained the support and involvement of all jurisdictions and sectors, and conceptualised the project. Stage 2 funded by DEST involved developing nine curriculum units and a professional learning programme and trialling the programme in 56 schools throughout Australia. The Stage 2 trial demonstrated positive impacts on teachers, students and schools (Hackling & Prain, 2005). Encouraged by these findings, DEST funded Stage 3 of the project to complete the task of developing curriculum units, training additional professional learning facilitators to provide professional learning workshops in schools throughout Australia, and to conduct workshops for university science educators to support them introduce *Primary Connections* into pre-service teacher education programmes. *Primary Connections* is unique in that it involves providing professional learning for both pre- and in-service teachers in an attempt to reform science teaching in Australian primary schools.

Professional learning
Research tells us that teacher professional learning is most effective when it: is systematic and has system and school level leadership (Sparkes & Loukes-Horsley, 1990); addresses the needs of both pre- and in-service teachers (Anderson & Michener, 1994); involves teachers working collaboratively (Ingvarson & Loughran, 1997); combines curriculum resources and professional development which is ongoing (Goodrum, Hackling & Trotter, 2003; Kahle & Boone, 2000; Tinoca, 2004) and, addresses teachers' pedagogical content knowledge, beliefs and practice (Keys, 2003; Sheffield, 2004). The *Primary Connections* professional learning model for in-service teachers combines a number of these elements.
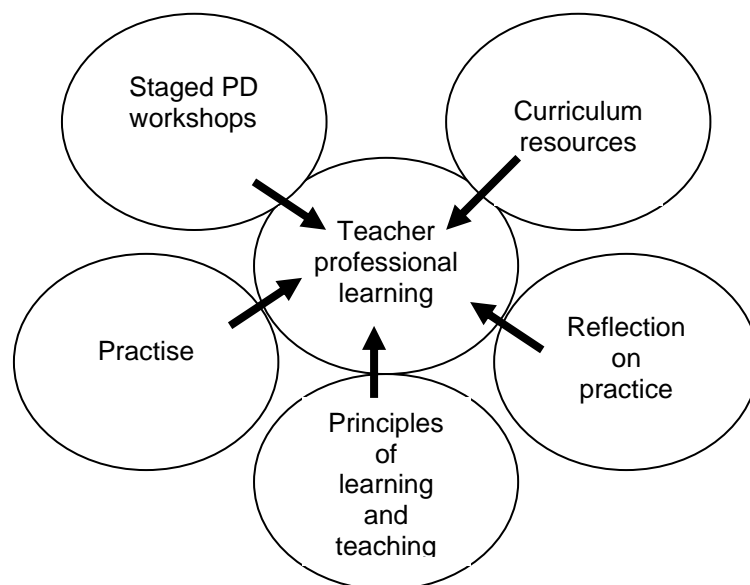

Figure 1: The *Primary Connections* professional learning model (Hackling & Prain, 2005)

Initial workshops conducted with teachers by trained professional learning facilitators (PLFs) explain and model new teaching approaches which are exemplified in the curriculum resources. Following the workshop, teachers practice teaching using these new approaches supported with the *Primary Connections* curriculum units. Follow-up workshops provide an opportunity for reflection on practice and collegial support and problem solving. The professional learning programme and resources are based on a set of principles of teaching and learning to ensure their coherence.

To provide curriculum leadership and coordination of science programmes in primary schools, two-day Curriculum Leader workshops have also been provided to an additional 550 teachers from all sectors across Australia.

To complement the provision of professional learning at the in-service level, two-day workshops have also been conducted for university science educators from all Australian universities offering teacher education courses to support them incorporate the *Primary Connections* approach and curriculum resources into their pre-service teacher education programmes.

Professional learning facilitators

To support the widespread implementation of *Primary Connections* and the reform of science teaching in primary schools, a large cohort of trained Professional Learning Facilitators (PLFs) is required to conduct workshops with teachers in schools across all jurisdictions and sectors. In January 2006 and 2007 two groups of 89 and 118 PLFs participated in three-day workshops conducted in Canberra by the Australian Academy of Science. Research indicates that: most PLFs appear highly satisfied with the training they received at the January 2006 and 7 workshops and with the professional learning resources; most PLFs have a high level of self-efficacy and confidence for facilitation; and, teachers are satisfied with the quality of workshops facilitated by the PLFs (Hackling & Prain, 2007).

At the June 2007 *Primary Connections* Reference Group meeting, representatives of the jurisdictions indicated they had a need for a larger number of trained PLFs and they indicated a desire to exercise greater ownership over PLF training. Following this, the *Primary Connections* Management Group resolved that the Australian Academy of Science would conduct PLF training workshops collaboratively with jurisdictions within jurisdictions. The first of these was conducted in Sydney in July 2007. This report outlines research findings from this workshop and benchmarks outcomes against the 2007 January PLF workshop conducted in Canberra.

Method

A total of 34 participants were recruited by the NSW Department of Education and Training and were provided with a three-day workshop in Sydney to train them as professional learning facilitators. An outline of the professional learning workshop is attached at Appendix 1.

The intended outcomes for the workshop were to develop an enhanced:

- 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;
- ability to adapt the professional learning resources and practices to meet the needs of different audiences; and,
- network of colleagues as a *Primary Connections* facilitator.

An extensive questionnaire was used to collect background and baseline data about the participants prior to the workshop. Questions included open response items, objective items and rating 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 two questionnaires are attached as Appendices 2 and 3.

Coding manuals were developed to guide the coding of data and its entry into spreadsheets that could be downloaded into SPSS for calculation of descriptive statistics. Responses to open-ended questions were categorised into categories and the frequency of responses in each category was recorded. Rating scale items were coded from 5 to 1 i.e., from the most positive to the least positive response.

Results

The results of the study report data about the background of the facilitators, their beliefs, the impact of the workshop on their confidence and self-efficacy as facilitators, their views about uptake of the programme and their roles and support needs, the extent to which workshop aims were achieved and feedback from the facilitators about the workshop and professional learning resources.

Demographic data
Thirty-four participants attended the workshop; of these only 22 completed both the initial and end of workshop questionnaires. Of the 27 who completed the initial questionnaire, 26 were based in NSW DET primary schools. The participants were drawn from metropolitan (14), regional (6) and rural (6) locations.

The very high proportion of school-based participants at this workshop was quite different to the group of PLFs trained centrally in Canberra in 2007 which comprised 36% central office staff, 34% primary school staff, 16% district office staff and 14% others (Hackling, 2007).

Qualifications
The PLFs had a range of teacher education qualifications. About one-third had completed a four-year BEd, more than one-third had completed a postgraduate diploma and the remainder were three-year trained. One of the PLFs had a masters degree.

Almost 60% had studied no science beyond Year 12 and 12% had a science major in their degree. Only one of the PLFs was currently completing further study. Forty per cent of the January 2007 group had either completed or were studying for a masters or doctoral award.

Professional roles and experience
The professional roles of PLFs and their years of experience are reported in Tables 1 and 2.

Table 1: Professional roles of facilitators (n=27)

Role in 2007	Number	Per cent
Class teacher	11	41
Deputy	8	30
Science coordinator	6	22
General education advisor	1	4
Literacy consultant	1	4

Many of the participants were classroom teachers whilst others had leadership responsibilities within their schools as science coordinators or deputy principals. Two participants were advisors/consultants. Small proportions of the participants had taught science with Primary Investigations (15%) or were a *Primary Connections* trial teacher (11%).

A majority of the participants (70%) had more than 15 years experience within education and all but one had a primary schooling background (Table 2). Four participants had five or less years of experience.

Table 2: Years in employment in education sector (n=27)

Years of employment in education sector	Number of responses	Per cent
5 or less	4	15
6 to 10	1	4
11 to 15	3	11
16 to 20	7	26
21 to 25	6	22
26 to 30	4	15
31 to 35	2	7
More than 35	0	0

Experience in facilitating professional learning for other teachers

The participants' experience with facilitating teacher professional learning is reported in Tables 3 and 4. All but one had facilitation experience and 28% had more than five days of facilitation experience. Most had facilitated professional learning in more than one learning area, while 42% had facilitated in science and 33% had facilitated in literacy. Half of the January 2007 cohort of centrally trained PLFs had more than five days of facilitation experience. The greater extent of facilitation experience for the January 2007 group is likely to be related to the higher proportion of district and central office personnel in the January group compared with this NSW group.

Table 3: Experience in facilitating professional learning for teachers (n=24)

Area of facilitation experience	Number	Per cent
Science	10	42
Literacy	8	33
Numeracy	6	25
General education	13	54
Multiple learning areas	4	17
Other primary learning areas	7	29
No experience	1	4

Table 4: Extent of facilitation experience (n=25)

Days of facilitating experience	None	1 to 5 days	> 5 days	No response
Number	1	17	7	2
Per cent	4	68	28	8

Beliefs about primary science and literacy teaching

On the pre-workshop questionnaire, teachers were asked about the purpose and characteristics of quality primary science teaching and what aspects of typical science teaching need to be improved. Similar questions were asked about literacy teaching. These data are reported in Tables 5-9.

In relation to the purpose of primary science teaching, most responses related to cognitive and affective outcomes while only one mentioned scientific literacy (Table 5).

Table 5: Participants' responses to the question "What do you believe is the main purpose of teaching science in the primary years of schooling?" (n=26)

Main purpose	Number of responses	Per cent of responses
Cognitive	25	56
Affective	19	42
Scientific literacy	1	2
Total responses	45	

When asked about the characteristics of high quality science teaching, most responses related to characteristics of the teacher, pedagogy and curriculum. Participants believed that the teacher should be knowledgeable, skilful and enthusiastic and that the pedagogy and curriculum should be inquiry-based, relevant and include higher order thinking (Table 6).

Table 6: Participants' responses to the question "What do you believe are the most important characteristics of high quality primary science teaching?"

Characteristic	Number of responses	Per cent of respondents (n=26)
Teacher knowledge and skill	17	65
Enthusiasm, engagement, motivation	16	62
Pedagogy inquiry based	14	54
Curriculum good, relevant	9	35
Includes problem solving and higher order thinking	8	31
Hands on, practical	4	15
Students communicate knowledge	3	12
Resources	2	8
Quality teaching framework	1	4
Includes group work	1	4
Total responses	**75**	

The two most frequently mentioned aspects of science teaching that the participants believed need to be improved were improved access to resources and a coherent and developmental curriculum rather than isolated lessons. Teacher confidence and knowledge for teaching science were also mentioned frequently (Table 7), however, teacher confidence (22%) and knowledge (19%) were mentioned far more frequently (76%) by the January 2007 group of PLFs (Hackling, 2007).

Table 7: Participants' responses to the question "What aspects of typical primary science teaching need to be improved?" (n=27)

Aspect of teaching to be improved	Number of responses	Per cent of respondents
Classroom resources available, access, storage	10	37
Curriculum/integrated curriculum/not isolated lessons	10	37
Active learning, transfer from doing to writing	8	30
Pedagogy inquiry based	7	26
Confidence/ability to teach/use resources	6	22
Teacher knowledge	5	19
Importance/status	4	15
More professional learning for teachers	3	11
Use/access to ICT	1	4
Assessment support for teachers	1	4
More physical science	1	4
Number of responses	**56**	

When asked about characteristics of quality literacy teaching, the most frequent responses related to it being engaging, explicit development of skills, relevance, taught in context and being taught by a knowledgeable teacher (Table 8).

Table 8: Participants' responses to the question "What do you believe are the most important characteristics of high quality primary literacy teaching?" (n=20)

Characteristic of quality literacy teaching	Number of responses	Per cent of respondents
Enthusiasm/engaging/enjoyable	14	54
Explicit development of skills	8	31
Knowledgeable teacher	8	31
Relevant to age/ability	7	27
Quality teaching strategies/framework	7	27
In context, embedded in all areas	6	23
Caters for different learning styles/abilities	5	19
Up to date interesting resources	4	15
Variety of genres covered	3	12
Encourages depth	3	12
Diagnostic assessment used to inform planning	1	4
Whole school plan for teaching	1	4
Follows first steps principles	1	4
Total responses	**68**	
No response		

The most common suggestions for improving literacy teaching were to make it more engaging, relevant and current by teaching it in context with meaningful content, which is totally consistent with the *Primary Connections* approach to science and literacy teaching.

Table 9: Participants' responses to the question "What aspects of typical primary literacy teaching need to be improved?" (n=25)

Aspects of literacy teaching to improve	Number of responses	Per cent of respondents
Relevance, meaningful content	8	32
Current and relevant resources	6	24
In context, embedded in all areas	5	20
Enthusiasm/engaging/enjoyable	5	20
Explicit development of skills	4	16
Caters for different learning styles/abilities	3	12
Variety of genres covered/text types	3	12
Ongoing professional learning on literacy development	3	12
More science literacy	3	12
Whole school programme	2	8
Critical analysis skills	2	8
Everything	1	4
More process, less busy work	1	4
Greater use of ICTs	1	4
More on speaking and spelling	1	4
More help for boys	1	4
Consistency across schools	1	4
Total responses	**50**	

Beliefs about professional learning

The participants were asked about the characteristics of high quality teacher professional learning. The most frequently mentioned aspects were relevance of topics, a balanced programme with a mix of strategies, good professional learning resources, a stimulating and engaging presentation that maximises the active participation of teachers. Following the workshop, there was a marked increase in the number of teachers who believed that the presenters need to model what they teach. This is likely to be an outcome of having experienced for themselves how the 5Es instructional model is modelled within the PLF workshop (Table 10).

The participants were also asked what aspects of typical teacher professional learning need to be improved. One-fifth of the PLFs mentioned engaging delivery, good professional learning resources, ongoing support following workshops and the need for greater access to PD in rural areas.

Table 10: Participants' responses to the question "What do you believe are the most important characteristics of high quality teacher professional learning?"

Characteristic	Pre-workshop survey (n=24)		Post- workshop survey (n=23)	
	Number	Per cent	Number	Per cent
Logistics				
Fits with schools demands (funded, in school hours)	1	4	0	0
The topic				
Topic relevant to classrooms and links to syllabus and outcomes	12	49	10	43
Based on sound pedagogy, best practice	3	13	6	26
Develops teacher pedagogy, not one offs	2	8	0	0
Teachers have input on choice of topic	2	8	0	0
The workshop				
Presenters model what they teach	0	0	10	43
Delivery is stimulating, engaging	6	25	8	35
Includes critical self-reflection	3	13	5	30
Presenters are credible, prepared	1	4	6	26
Balanced programme (talk, do, listen, network, etc)	9	38	1	4
Active participation of teachers in workshop, apply in workshop	5	21	3	13
Recognition of experience/knowledge of participants	1	4	2	9
Clear outcomes	1	4	2	9
Supportive and safe environment	0	0	2	9
Teachers/attendees need to be more willing to change	1	4	0	0
After the workshop				
Ongoing support provided	2	8	3	13
Classroom based mentoring/facilitating	3	13	1	4
Good supporting resources/handouts	8	33	1	4
Workshop is evaluated	0	0	1	4
Total responses	**60**		**63**	

Uptake of *Primary Connections* in your jurisdiction
To identify the potential barriers to uptake of *Primary Connections* in NSW, the participants were asked on the pre-workshop questionnaire about factors that would influence the uptake of the programme and their effectiveness as a PLF. These data are reported in Tables 11 and 12.

The most frequently mentioned potential barriers to uptake of *Primary Connections* were time, resources, staff interest, awareness of the programme and availability of *Primary Connections* curriculum units (Table 11).

Table 11: Participants' responses to the question "What factors will influence the uptake of *Primary Connections* by schools in your jurisdiction and sector?" (n=23)

Factor	Number of responses	Per cent of respondents
Time	11	48
Money, resources	9	39
Staff interest	8	35
Awareness/promotion	5	22
Availability of PC units	5	22
Ranking of science/school or region priority	4	17
Curriculum issues/other programmes	4	17
Support from administration	3	13
Skill as a presenter	2	9
Quality of professional learning	2	9
Staff turnover	1	4
PD on PC	1	4
Total number of responses	**55**	

Prior to the workshop, the participants were also asked what factors were likely to limit their effectiveness as PLFs. The most frequently mentioned factors were time for facilitation (48%), schools' awareness of the programme (44%), their own skills as a facilitator (24%) and their understanding of science and *Primary Connections* (24%). Given that almost all of the PLFs were based in schools, opportunity/time to conduct professional learning at other schools may be limited. The issue of awareness suggests there may be need for further promotion of the programme in NSW**.**

Table 12: Participants' response to the question "What factors will influence how effective you can be as a *Primary Connections* professional learning facilitator?" (n=25)

Stages	Number of responses	Per cent of respondents with this response
Time	12	48
Awareness/promotion	11	44
Skill as a presenter	6	24
Understanding of science and PC	6	24
Money, resources	5	20
Other commitments/availability	3	12
Ranking of science/school region priority	3	12
Support from administration	2	8
Quality of PC programme	1	4
Curriculum issues/other programmes	1	4
Number of responses	**50**	

Goals for participating in the workshop

Most of the participants' responses to a question about their goals for the workshop related to personal concerns of learning how to facilitate *Primary Connections* workshops, learning how to improve their own science teaching and to find out about the programme. It should be noted that only 11% of the participants were trial teachers with a good working knowledge of *Primary Connections*. Other had concerns about helping colleagues improve their science teaching or helping to implement the programme across the system (Table 13).

Table 13: Participants' responses to the question "What are your personal goals for participating in this workshop?" (n=25)

Goal	Number of responses	Per cent of respondents with this response
How to facilitate PC workshops	16	64
Learning for oneself	13	52
Find out about PC	11	44
Help teachers teach science better	4	16
Network	2	8
Implement PC across the system	2	8
Link to current programme	1	4
Total number of responses	**49**	

Feedback on the workshop

The PLFs gave positive responses about their achievement of the aims for the workshop. More than 90% of the PLFs indicated they had achieved four of the five aims *To a large extent* or *Quite a lot*. The PLFs were less positive about their skills and confidence for facilitation (73% in top two categories) and they were slightly less positive than the January 2007 group (78%) for this aim. Given the small sample size and modest return rate for

completion of questionnaires for the NSW workshop, any comparisons with the January workshop should be treated with caution.

Table 14: PLFs' responses to the question "To what extent do you feel the aims of the workshop have been achieved?" (n=23)

Workshop aim	Number of PLFs with this response				
	To a large extent	Quite a lot	OK	A bit	To a limited extent
Understanding of the *Primary Connections* project, teaching and learning model and curriculum resources	21	2	0	0	0
Understanding of the *Primary Connections* professional learning model and resources, and how it can be adapted to a wide variety of settings and jurisdictional structures and cultures	18	4	0	1	0
Understanding of principles of effective professional learning	10	11	1	1	0
Skills and confidence of facilitation professional learning workshops based on *Primary Connections* resources	7	10	5	1	0
Network of colleagues with whom you could discuss issues that arise as a *Primary Connections* facilitator	11	10	1	1	0

A large majority of the PLFs (87%) indicated that they were *Very well prepared* or *Well prepared* for their facilitation role which was very similar to the response of the January 2007 group (Table 15).

Table 15: PLFs' responses to the question "How well prepared do you feel for facilitating *Primary Connections* professional learning workshops?"
 (n=23)

Per cent of PLFs					
	Very well prepared	Well prepared	OK	Poorly prepared	Very poorly prepared
NSW July 07	39	48	9	4	0
Canberra Jan 07	26	58	16	0	0

Ninety-one per cent of respondents indicated that no changes were needed to improve the workshop. One PLF suggested there should be less talk of research and one suggested the workshop could be shorter.

When asked what further support they would need, the most common responses related to ongoing support from the Academy of Science, phone and email support, updates on resources and contact with other PLFs. These responses indicate how important the aim for the workshop of building a network of support is to the PLFs.

Table 16: PLFs' responses to the question "What further support will you need for your role as a *Primary Connections* professional learning facilitator?" (n=21)

Support needed	Number of responses	Per cent of respondents with this response
Academy/PC team support	8	38
Regular updates of resources	7	33
Contact/support via phone/email for when problems arise	7	33
Contact with other facilitators	5	24
District office support	2	10
Have buddy, mentor, co-presenter	2	10
More time to prepare	2	10
None (as yet)	1	5
Ongoing PD	1	5
Money	1	5
More units	1	5
Need to teach PC myself first	1	5
Total responses	**38**	

Feedback on the professional learning resources

The PLFs gave a very positive evaluation of the professional learning resources with all indicating they were excellent or good. When asked to comment on the resources, the most frequent comments were excellent, comprehensive and accessible. Two PLFs would have liked the resources to be linked to outcomes for NSW and one wanted improved organisation of the resources folder.

Table 17: PLFs' responses to the question "What is your initial evaluation of the draft *Primary Connections* professional learning resources?" (n=23)

Per cent				
Excellent	Good	Satisfactory	Poor	Totally inadequate
83	17	0	0	0

PLFs' confidence and self-efficacy

The PLFs responded to scales relating to confidence with science teaching, and confidence and self-efficacy for facilitation. The PLFs rated themselves prior to the workshop on all scales and for confidence and self-efficacy after the workshop.

Confidence with science teaching
Prior to the workshop the PLFs rated their confidence with aspects of science teaching on a five-point scale ranging from *No confidence* (1) to *Very confident* (5). The PLFs were most confident with managing hands-on group activities (4.39/5) and engaging students' interest in science (4.26). They were least confident with assessing children's learning in science (3.48/5) and using a constructivist model to plan science units of work (3.59/5). Some of the

standard deviations were large indicating a wide range in the PLFs' responses and variation within the group of PLFs. The overall mean for all items in the scale (3.89/5) was very similar to the overall mean for the January 2007 group (3.82/5). The NSW group of PLFs had a good level of confidence with their own science teaching well above the rating *OK* (3/5) and close to the rating *Confident* (4/5) but well below the rating *Very confident* (5/5).

Table 18: Mean ratings of confidence with aspects of science teaching

Aspect of teaching	Mean rating of aspect by all facilitators (/5)			
	PLF initial survey NSW 2007 (n=25)		PLF initial survey Jan 2007 (n=112)	
	Mean	sd	mean	sd
1. Engaging students' interest in science	4.26	.689	4.23	.735
2. Managing hands-on group activities in science	4.39	.656	4.13	.900
3. Managing discussions and interpretation of science observations	3.91	.733	3.88	.928
4. Explaining science concepts	3.74	1.010	3.59	.991
5. Teaching science processes	3.70	.822	3.71	.980
6. Developing literacy skills needed for learning science	3.73	.827	3.92	.840
7. Assessing children's learning in science	3.48	.947	3.70	.890
8. Using computers and ICTs in science	3.74	.864	3.45	.966
9. Using a constructivist model to plan science units of work	3.59	.959	3.79	.882
Mean of individual means of confidence ratings (/5)	3.89		3.82	

Note. NC = No confidence = 1, LC = Limited confidence = 2, OK = 3, C = confident = 4, VC = Very confident = 5

Self-efficacy as a PLF
The PLFs responded to a self-efficacy as a professional learning facilitator scale before and after the workshop to assess the impact of the workshop on the PLFs' beliefs about their perceived effectiveness as a facilitator. PLFs responded to nine items on a five-point scale and mean ratings were calculated for those who completed the pre- and post-workshop questionnaires.

Table 19: Mean self-efficacy ratings as a PLF

Aspect of self-efficacy as professional facilitator	Mean score (/5)							
	NSW July 2007 workshop (n=23)				January 2007 workshop (n=112)			
	Initial		End workshop		Initial		End workshop	
	mean	sd	mean	sd	mean	sd	mean	sd
1 I am effective in eliciting teachers' prior knowledge and beliefs and adjusting the professional learning workshop to meet the needs of the teachers	3.70	.635	3.91	.668	3.98	.690	4.03	.592
2 My science content knowledge enables me to answer teachers' science questions effectively	3.30	.822	3.96	.767	3.33	1.021	3.63	.969
3 My knowledge of effective science teaching practices enables me to answer teachers' science pedagogy questions effectively	3.61	.722	4.09	.668	3.61	.876	4.03	.729
4 I am quite comfortable with having my professional learning workshops evaluated	3.91	.668	4.18	.733	4.14	.697	4.25	.622
5 I am able to pose engaging tasks for teachers to work on in small groups in my workshops	3.61	.722	4.22	.518	4.02	.687	4.30	.613
6 My deep understanding of the culture of primary schooling enables me to give valuable advice to teachers on matters of primary science pedagogy	3.65	.775	4.04	.638	3.74	.881	4.04	.805
7 My deep understanding of the culture of early childhood education enables me to give valuable advice to ECE teachers about science pedagogy	2.87	.626	3.39	.941	3.09	.949	3.33	1.052
8 My deep understanding of literacy teaching practice enables me to give valuable advice on integrating literacy education into science education	4.09	.733	4.09	.515	3.78	.846	4.07	.771
9 I am able to choose and apply effective facilitation tools and techniques to enhance the learning of teachers in workshops	3.65	.935	4.09	.733	3.94	.730	4.28	.557
Mean of individual means of self efficacy ratings (/5)	3.60		4.00		3.74		3.99	

Note. 5 = Strongly agree, 4 = Agree, 3 = Undecided, 2 = Disagree, 1 = Strongly disagree

Prior to the workshop the PLFs had lowest self-efficacy for giving advice to ECE teachers about science pedagogy (2.87/5) and this increased after the workshop (3.39/5), however, this remained the lowest aspect of self-efficacy for the group. The January 2007 PLFs also had lowest self-efficacy for this aspect of the PLF role. This is most likely a reflection of the PLFs being drawn from a primary rather than ECE background. Prior to the workshop the PLFs had highest self-efficacy for giving advice on integrating literacy education into science education (4.09/5). This aspect remained unchanged and high after the workshop.

After the workshop PLFs had highest self-efficacy for posing engaging tasks for teachers to work on in small groups (4.22/5). Similarly, the January 2007 PLFs had highest self-efficacy for this aspect of the role (4.30/5). The workshops gave the PLFs opportunities to work with a number of small group activities that they could use with teachers and were provided with

the resources to conduct these activities. These experiences had a positive impact on the PLFs' self-efficacy with scores increasing from 3.61 to 4.22/5.

The largest increase in self-efficacy was for answering teachers' science questions effectively (3.30 to 3.96; 0.66) which suggests the workshop impacted on the PLFs' science teaching pedagogical content knowledge. The overall item mean for the nine-item scale increased from 3.60/5 to 4.00/5 after the workshop which is a slightly larger gain in overall mean than for the January 2007 workshop.

Total scale scores were calculated for each PLF by summing their scores over the nine items giving a maximum possible score of 45. These scores are reported in Table 20.

Table 20: Frequency of total scale scores for self-efficacy as professional learning facilitators for surveys at beginning and end of NSW July 2007 workshop

Total scale score for self-efficacy as a PLF	Number of NSW PLFs (n=23)	
	Pre-workshop	Post-workshop
1-10	0	0
11-20	1	1
21-30	5	0
31-40	16	20
41-45	1	2
Mean self efficacy score for all facilitators /45	32.39*	35.91*
S.D.	4.530	4.451

Note. * $p < 0.05$

Mean total scale scores for the 23 PLFs who completed both pre- and post-workshop questionnaires increased from 32.39 to 35.91. A two-tailed paired t test indicates that the difference between the pre and post mean scores is statistically significant ($p<0.05$). Of educational significance is the decrease in the number of PLFs with modest levels of self-efficacy (21-30/45) and the increase in the number with high (31-40/45) and very high 41-45/45) levels of self-efficacy.

Confidence with facilitating workshops on aspects of science and literacy teaching
The PLFs responded to a seven-item scale which assessed their confidence with facilitating workshops on aspects of science and literacy teaching. PLFs responded on a five-point scale ranging from *No confidence* (1) to *Very confident* (5) and mean scores were calculated for each item. Pre- and post-workshop mean scores are reported in Table 21.

Table 21: Mean ratings of confidence with facilitating professional learning workshops on the following aspects of primary science and literacy teaching at the beginning and end of the workshop

Aspect of facilitating	Mean score (/5)							
	NSW July 2007 workshop (n=23)				January 2007 workshop (n=112)			
	Initial		End workshop		Initial		End workshop	
	mean	sd	mean	sd	mean	sd	mean	sd
An introduction to *Primary Connections*	3.14	1.195	4.26	.689	3.23	1.152	4.22	.596
Coordinating the science programme in a primary school	3.77	.922	4.48	.730	3.73	.914	4.18	.674
Assessment of learning in primary science	3.05	1.161	4.14	.889	3.30	1.080	4.25	.651
Conducting investigations in primary science	3.82	.853	4.35	.775	3.73	.934	4.22	.719
Cooperative learning strategies	4.05	.844	4.43	.728	4.06	.766	4.31	.672
Developing literacies needed for learning science	3.41	1.008	3.91	.900	3.77	.891	4.13	.704
Using an inquiry model to plan primary science units of work	3.96	1.107	4.39	.783	3.70	.969	4.02	.838
Mean of individual mean confidence scores (/5)	**3.60***		**4.28***		**3.65**		**4.19**	

Note. * p<0.05

Prior to the workshop the PLFs had least confidence in facilitating workshops on assessment (3.05/5) and greatest confidence with facilitating workshops on co-operative learning strategies (4.05/5). After the workshop the PLFs had greatest confidence in facilitating professional learning on co-ordinating the science programme of a primary school (4.48) and least confidence for facilitating professional learning related to developing literacies needed for learning science (3.91/5). The greatest growth in confidence occurred for facilitating workshops on an introduction to *Primary Connections* (1.12) and for assessment of learning in primary science (1.09).

The overall mean scores for the seven-item scale increased from 3.60/5 before the workshop to 4.28/5 after the workshop. A two-tailed paired t test indicates that the difference between the pre and post mean scores is statistically significant (p<0.05). This increase in confidence for facilitation was of the same magnitude as that for the January 2007 PLF workshop.

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	Thirty-four participants attended the workshop; of these only 22 completed both the initial and end of workshop questionnaires. Of the 27 who completed the initial questionnaire, 26 were based in NSW DET primary schools. The participants were drawn from metropolitan (14), regional (6) and rural (6) locations.	
2	The participants had a range of teacher education qualifications. About one-third had completed a four-year BEd, more than one-third had completed a postgraduate diploma and the remainder were three-year trained. One of the PLFs had a masters degree. Almost 60% had studied no science beyond Year 12.	
3	Many of the participants were classroom teachers whilst others had leadership responsibilities within their schools as science coordinators or deputy principals. Two participants were advisors/consultants. Small proportions of the participants had taught science with Primary Investigations (15%) or were a *Primary Connections* trial teacher (11%). A majority of the participants (70%) had more than 15 years experience within education and all but one had a primary schooling background. Four participants had five or less years of experience.	Tables 1 and 2
4	All but one of the participants had facilitation experience and 28% had more than five days of facilitation experience. Most had facilitated professional learning in more than one learning area, while 42% had facilitated in science and 33% had facilitated in literacy.	Tables 3 and 4
5	Most participants believed that the purpose of primary science teaching was to achieve cognitive and affective outcomes; only one mentioned scientific literacy.	Table 5
6	When asked about the characteristics of high quality science teaching, most responses related to characteristics of the teacher, pedagogy and curriculum. Participants believed that high quality science teaching required the teacher to be knowledgeable, skilful and enthusiastic and that the pedagogy and curriculum should be inquiry-based, relevant and include higher order thinking.	Table 6
7	The two most frequently mentioned aspects of science teaching that the participants believed need to be improved were improved access to resources and a coherent and developmental curriculum rather than isolated lessons. Teacher confidence and knowledge for teaching science were also mentioned frequently, however, far less frequently than by the January 2007 group of PLFs.	Table 7
8	When asked about characteristics of quality literacy teaching, the most frequent responses related to it being engaging, explicit development of skills, relevance, taught in context and being taught by a knowledgeable teacher.	Table 8

9	The most common suggestions for improving literacy teaching were to make it more engaging, relevant and current by teaching it in context with meaningful content.	Table 9
10	The participants believed that high quality teacher professional learning is characterised by relevance of topics, a balanced programme with a mix of strategies, good professional learning resources, a stimulating and engaging presentation that maximises the active participation of teachers. Following the workshop, there was a marked increase in the number of teachers who believed that the presenters need to model what they teach. The participants were also asked what aspects of typical teacher professional learning need to be improved. One-fifth of the PLFs mentioned engaging delivery, good professional learning resources, ongoing support following workshops and the need for greater access to PD in rural areas.	Table 10
11	The potential barriers to uptake of *Primary Connections* mentioned most frequently by the PLFs were time, resources, staff interest, awareness of the programme and availability of *Primary Connections* curriculum units.	Table 11
12	The two most frequently mentioned potential factors that might limit their effectiveness as PLFs included time for facilitation (48%) and schools awareness of the programme (44%). Prior to the workshop the participants were also concerned about their own skills as a facilitator (24%) and their understanding of science and *Primary Connections* (24%).	Table 12
13	Most of the participants' responses to a question about their goals for the workshop related to personal concerns of learning how to facilitate *Primary Connections* workshops, learning how to improve their own science teaching and to find out about the programme. Other had concerns about helping colleagues improve their science teaching or helping to implement the programme across the system.	Table 13
14	The PLFs gave positive responses about their achievement of the aims for the workshop. More than 90% of the PLFs indicated they had achieved four of the five aims *To a large extent* or *Quite a lot*. The PLFs were less positive about their skills and confidence for facilitation (73% in top two categories) and they were slightly less positive than the January 2007 group (78%) for this aim.	Table 14
15	A large majority of the PLFs (87%) indicated that they were *Very well prepared* or *Well prepared* for their facilitation role which was very similar to the response of the January 2007 group. Ninety-one per cent of respondents indicated that no changes were needed to improve the workshop.	Table 15
16	When asked what further support they would need, the most common responses related to ongoing support from the Academy of Science, phone and email support, updates on resources and contact with other PLFs.	Table 16
17	The PLFs gave a very positive evaluation of the professional learning resources with all indicating they were excellent or good. When asked to comment on the resources, the most frequent comments were excellent, comprehensive and accessible. Two PLFs would have liked the resources to be linked to outcomes for NSW and one wanted improved organisation of the resources folder.	

18	Prior to the workshop the PLFs had a good level of confidence with their own science teaching well above the rating *OK* (3/5) and close to the rating *Confident* (4/5) but well below the rating *Very confident* (5/5).They were most confident with managing hands-on group activities and engaging students' interest in science. They were least confident with assessing children's learning in science and using a constructivist model to plan science units of work. The NSW PLFs' level of confidence with science teaching was very similar to the January 2007 group.	Table 18
19	The PLFs self-efficacy as professional learning facilitators increased significantly over the workshop. The overall item mean for the nine-item scale increased from 3.60/5 to 4.00/5 after the workshop which is a slightly more positive outcome than for the January 2007 workshop. Of educational significance is the decrease in the number of PLFs with modest levels of self-efficacy and the increase in the number with high and very high levels of self-efficacy. After the workshop the PLFs had lowest self-efficacy for giving advice to ECE teachers about science pedagogy and highest self-efficacy for posing engaging tasks for teachers to work on in small groups. The largest increase in self-efficacy was for answering teachers' science questions effectively.	Tables 19 and 20
20	The PLFs confidence with facilitating professional learning workshops on aspects of science and literacy teaching increased significantly over the workshop. Their increase in confidence for facilitation was of the same magnitude as that for the January 2007 PLF workshop. Prior to the workshop the PLFs had least confidence in facilitating workshops on assessment and greatest confidence with facilitating workshops on co-operative learning strategies. After the workshop the PLFs had greatest confidence in facilitating professional learning on co-ordinating the science programme of a primary school and least confidence for facilitating professional learning related to developing literacies needed for learning science. The greatest growth in confidence occurred for facilitating workshops on an introduction to *Primary Connections* and for assessment of learning in primary science.	Table 21

Discussion and Conclusions

The workshop attracted a sample of participants whom were almost all based in schools as classroom teachers, science co-ordinators or deputy principals (Key Findings 1 and 3). Being based in schools will maximise the PLFs' opportunities for providing professional learning and leadership within their own schools, however, depending on support levels it may limit their opportunities for facilitation of professional learning at other schools. A large proportion of the PLFs were highly experienced and almost all had a primary schooling background (KF3). Most had facilitation experience, however, less than a third had more than five days of experience as a facilitator. A majority of the PLFs' studies of science was limited to Year 12, and only one had completed a MEd (KF2). This group was less well qualified than the January 2007 group of PLFs. Prior to the workshop the group had a good but not high level of confidence with their own science teaching; a level of confidence very similar to the January 2007 group of PLFs (KF18). The group had appropriate background and experience to benefit from the PLF training.

The participants' beliefs about the purpose of primary science teaching, the characteristics of effective science teaching and beliefs about effective teacher professional learning were broadly consistent with the research literature (e.g. Goodrum, Hackling & Rennie, 2001; Senate Inquiry, 1998) and with the focus of the *Primary Connections* project (KFs5-10). The participants' goals for attending the workshop were strongly related to their personal needs of learning about *Primary Connections*, improving their own teaching and learning how to facilitate *Primary Connections* professional learning (KF13). Prior to the workshop, most of the participants concerns appeared to be related to the informational, personal and management stages of concern from the Concerns-Based Adoption Model of Hall and Hord (1987) rather than having concerns about system-wide implementation of the programme.

The main factors, identified by the PLFs, likely to act as barriers to the uptake of *Primary Connections* were time for professional learning, resources, staff interest, awareness of the programme and availability of *Primary Connections* curriculum units (KF11). They expected that time for facilitation and schools' awareness of the programme were most likely to limit their effectiveness as facilitators (KF12). Given that almost half of the PLFs raised concerns about time for facilitation and about schools' awareness of the programme it may suggest that further promotion of *Primary Connections* and advocacy for the importance of science teaching needs to occur in NSW and that PLFs be strongly supported by their school principals to facilitate professional learning at their own and other schools.

The PLFs self-efficacy as professional learning facilitators increased significantly over the workshop (KF19). The increase in self-efficacy appeared to be a slightly more positive outcome than for the January 2007 workshop. Importantly, there was a decrease in the number of PLFs with modest levels of self-efficacy and an increase in the number with high and very high levels of self-efficacy (KF19).

After the workshop the PLFs had lowest self-efficacy for giving advice to ECE teachers about science pedagogy and highest self-efficacy for posing engaging tasks for teachers to work on in small groups. The largest increase in self-efficacy was for answering teachers' science questions effectively. Given that most participants had a primary rather than ECE background the low self-efficacy for advising ECE teachers is to be expected and this is a similar finding to that for previous groups of PLFs. The high self-efficacy for posing engaging tasks for teachers to work on can be explained in terms of the workshop modelling suitable activities and providing resources for the activities that teachers can use in their own facilitation work. The large increase in self-efficacy for answering teachers' science questions is a pleasing outcome suggesting that the workshop may have enhanced the PLFs' science teaching pedagogical content knowledge (Gess-Newsome, 1999) and/or

their awareness of suitable sources of science background information as the workshop made them aware of the science background information in the curriculum units (Table 19).

Statistically significant gains were made in confidence with facilitating professional learning workshops on aspects of science and literacy teaching (KF20). Gains were similar in magnitude to those made by the January 2007 group of PLFs. The greatest growth in confidence occurred for facilitating workshops on an introduction to *Primary Connections* and for assessment of learning in primary science. The PLFs' made good gains in confidence for facilitating workshops on integrating literacy education into science education (Table 21), however, they had lowest self-confidence for this at the end of the workshop. The workshop introduced some new perspectives on the relationships between everyday literacies, literacies of science and scientific literacy which may take time to be integrated within the PLFs' existing conceptions of literacy education.

The workshop was evaluated very positively by the PLFs with large majorities indicating they had achieved the aims for the workshop and that they were very well prepared for their role as a PLF (KFs 14 and 15). Almost all of the PLFs indicated that there was no need for changes to improve the workshop. The professional learning resources were also rated very positively and feedback suggests no obvious areas in need of improvement (KF17). In terms of their ongoing needs for support the PLFs most frequently mentioned the support of the Academy team, phone and email support, updates of resources and contact with other PLFs (KF16). This highlights the importance of the aim for the workshop of building networks between the PLFs themselves and with the Academy team who will provide ongoing support.

Given the quality of the workshop and resources, and the richness of the professional learning that occurred for the PLFs, it is likely that they will be effective as facilitators and leaders within their own schools. Given that most of the PLFs are based in schools and will have limited flexibility in their work commitments, they will need ongoing support if they are to be effective facilitators in other schools. There would be value in providing a follow-up workshop to provide an opportunity to ascertain the extent to which they are successful as facilitators and to give them further support and update them on new resources.

Although not explicitly evaluated, it is likely that there are important benefits from conducting PLF training within jurisdictions. It provides an increased opportunity for jurisdictional ownership over the training of the PLFs, for the workshops to be tailored to the specific contexts and policy settings of the jurisdiction and for the local science policy officer to have significant input to the programme. Building jurisdictional workshops on the expertise and models developed nationally by the Australian Academy of Science ensures quality, and tailoring workshops to local contexts ensures relevance and ownership. These are important benefits of the national collaborative approach advocated by Goodrum et al. (2001) for the improvement of science education in Australian schools.

References

Anderson, R. D., & Michener, C. P. (1994). Research in science teacher education. In D. L. Gabel (Ed.), *Handbook of research on science teaching and learning* (pp. 3–44). New York: Macmillan.

Gess-Newsome, J. (1999). Pedagogical content knowledge: An introduction and orientation. In J. Gess-Newsome & N.G. Lederman [Eds.], *Examining pedagogical knowledge: The construct and its implication for science education*. Dordrecht: Kluwer Academic Publishers.

Goodrum, D., Hackling, M., & Rennie, L. (2001). *The status and quality of teaching and learning of science in Australian schools: A research report*. Canberra: Department of Education, Training and Youth Affairs.

Goodrum, D., Hackling, M. & Trotter, H. (2003). *Collaborative Australian Secondary Science* Programme*: Pilot study*. Perth: Edith Cowan University.

Hackling, M. W. (2007). Interim Research and Evaluation Report No 8: January 2007 Professional Learning Facilitators Workshop. Canberra: Australian Academy of Science.

Hackling, M. & Prain, V. (2005). *Primary Connections: Stage 2 trial - Research report*. Canberra: Australian Academy of Science.

Hackling, M. & Prain, V. (2007). *Primary Connections: A professional learning* programme*.* Paper presented at the Australasian Science Education Research Association conference held in Fremantle, Western Australia.

Hall, G. E. & Hord, S. M. (1987). *Changes in schools: Facilitating the process*. New York: State of New York Press.

Ingvarson, L. & Loughran, J. (1997). Loose connections: The context of science teachers' work. *Research in Science Education, 27*(1), 1-24.

Kahle, J.B., & Boone, W. (2000). Strategies to improve student science learning: Implications for science teacher education. *Journal of Science Teacher Education, 11*, 93–107.

Keys, P. (2003). *Primary and secondary teachers shaping the science curriculum: The influence of teacher knowledge.* Unpublished PhD thesis, Queensland University of Technology, Brisbane, Queensland.

Senate Employment, Education and Training References Committee Inquiry. (1998*). A Class Act: Inquiry into the status of the teaching profession.* Canberra: Author.

Sheffield, R. (2004). *Facilitating teacher professional learning: Analysing the impact of an Australian professional learning model in secondary science.* Unpublished PhD thesis, Edith Cowan University, Perth, Western Australia.

Sparks, D., & Loucks-Horsley, S. (1990). Models of staff development. In W. R. Houston (Ed.), *Handbook of research on teacher education* (pp. 234–50). New York: Macmillan.

Tinoca, L. F. (2004). *From professional development for science teachers to student learning in science.* Unpublished PhD thesis, the University of Texas at Austin.

Appendix 1: Workshop programme

PrimaryConnections®
Linking science with literacy

AGENDA   PROFESSIONAL LEARNING FACILITATOR
           3 DAY WORKSHOP, NSW DET

DAY 1

5Es PHASE	FOCUS
INTRO **(30mins)** 9.00-9.30	Introductions Purpose • Parking lot • Outline • Folder • Learning Pyramid • Participant expectations
ENGAGE **(75mins)** 9.30-10.45	Beliefs, concerns and scientific literacy What is *Primary Connections?* "The Bridge" Broad purpose of *Primary Connections*- Scientific literacy Setting the Scene: Individual navigation using checklist Orientation to exemplary curriculum units, science background CD, website
MORNING TEA **(30mins)** 10.45-11.15	
EXPLORE **(345mins total)** 11.15-12.10 12.10-1.30	**Cooperative learning** (55mins) Building a description of cooperative learning teams DVD Describing behaviours and roles of cooperative team members **5Es** (80mins) Engaging students and eliciting prior knowledge Building an understanding of the focus of each phase Behaviours of teachers and students at each phase DVD Reflecting on the 5Es
LUNCH **(30mins)** 1.30-2.00	Give out PLF sets of curriculum units

EXPLORE 2.00-3.00	**Investigating** (60mins) Why do investigations? A short investigation Writing questions for investigation DVD
CONCLUSION **DAY 1** 3.00-3.30	Summary Reflections Questions

DAY 2	
EXPLORE 9.00 – 9.30	Parking Lot questions/issues
9.30 -10.45	**Linking science with literacy** (75mins) Confusion between terms Producing a literacy product Literacy focuses Exploring advertisements-critical literacy exercise
MORNING TEA **(30mins)** 10.45-11.15	
EXPLORE 11.15-12.30	**Assessment** (75mins) What is assessment? Students and teachers' perspectives. What is the purpose of assessment? Assessment 'for' and 'of' learning Assessment placemats for exploration of a PC unit DVD: assessment and questioning Effective questioning 'for' learning
EXPLAIN **(60mins)** 12.30-1.30	Curriculum Unit plan and organisation (20mins) Essence of curriculum units (40mins)
LUNCH **(30mins)** 1.30-2.00	
EXPLAIN (60mins) 2.00-3.00	Origin, stages, strands, outcome levels Research report Indigenous Perspective
CONCLUSION **DAY 2** 3.00-3.30	Summary Reflection Questions

DAY 3	
INTRODUCTION (105 mins) 9.00-9.45	Interview and introduce activity Find someone who…………
9.45-10.00	2006 PLFs Acknowledgements and presentations
10.00-10.45	Introduction to the Making Connections CD PLF presentations to new group
MORNING TEA (30mins) 10.45-11.15	
IMPLEMENTING *PRIMARY CONNECTIONS* (90mins) 11.15-12.45	Planning time for NSW DET Harry Vassila
LUNCH (45mins) 12.45-1.30	
ELABORATE (120mins total) 1.30-2.30 2.30-3.30	Unit planning • Backward design • Choose an outcome • Brainstorm materials, properties (abs), variables • Investigating planner St 2 • Do investigation • Review investigation • Plan rest of unit Being a curriculum leader (60mins) OZ model of leadership
EVALUATE & CONCLUSION (30mins) 3.30-4.00	Post questionnaire Revisit expectations Correlation chart Questions Certificates

Australian Academy of Science: *Primary Connections* Programme
Professional Learning Facilitators Initial Questionnaire

Dear Colleague

We seek your views about professional learning for teachers of primary science and literacy. Data from this survey 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.

Professor Mark W Hackling
Edith Cowan University

ID number

For office use only

Your background

Your name: _____ Sex: Male / Female

State/Territory: _____   Sector: Government / Catholic / Independent / Other

Name of workplace for 2007: _____

Location of workplace: Metropolitan / Regional / Rural

Your professional role for 2007: _____

How long have you been in this role? _____ years

Your professional experience – please complete the table below

Professional role (e.g., teacher, education officer etc)	Workplace (e.g., Primary School, Secondary School, Education System Office)	Number of years

Please outline your teaching experience in science and literacy

_____

_____

_____

Were you a *Primary Connections* trial teacher in 2005?   Yes / No

Did you complete the two-day workshop *Spotlight on Primary Connections* at Brisbane or Cairns in 2006?   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 undergraduate science units	Undergraduate science major	Postgraduate science qualification e.g. MSc

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

_____

Summarise your experience in facilitating professional learning for other teachers

Topic of professional learning workshops you have facilitated	Learning area and level (e.g. primary maths, secondary science)	Total number of hours of workshops

About primary science and literacy 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?

_____

_____

_____

_____

What aspects of typical primary science teaching need to be improved?

_____

_____

_____

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

_____

_____

_____

_____

What aspects of typical primary literacy teaching need to be improved?

_____

_____

_____

_____

Confidence with aspects of science teaching

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	OK	LC	NC
1	Engaging students' 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					
8	Using computers and ICTs in science					
9	Using an inquiry model to plan science units of work					

About professional learning

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

_____

_____

_____

_____

What aspects of typical teacher professional learning need to be improved?

_____

_____

_____

_____

Your self-efficacy and confidence as a professional learning facilitator

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; UN = Uncertain;
D = Disagree; SD = Strongly Disagree

Item	Statement	SA	A	UN	D	SD
1	I am effective in eliciting teachers' prior knowledge and beliefs and adjusting the professional learning workshop to meet the needs of the teachers					
2	My science content knowledge enables me to answer teachers' science questions effectively					
3	My knowledge of effective science teaching practices enables me to answer teachers' science pedagogy questions effectively					
4	I am quite comfortable with having my professional learning workshops evaluated					
5	I am able to pose engaging tasks for teachers to work on in small groups in my workshops					
6	My deep understanding of the culture of primary schooling enables me to give valuable advice to teachers on matters of primary science pedagogy					
7	My deep understanding of the culture of early childhood education enables me to give valuable advice to ECE teachers about science pedagogy					
8	My deep understanding of literacy teaching practice enables me to give valuable advice on integrating literacy education into science education					
9	I am able to choose and apply effective facilitation tools and techniques to enhance the learning of teachers in workshops					

Please rate your confidence with facilitating professional learning workshops focusing 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	OK	LC	NC
1	Introducing *Primary Connections* and its five underpinning principles					
2	Linking science with literacy					
3	Understanding and applying the 5Es teaching and learning model in primary science					
4	Conducting investigations in primary science					
5	Using co-operative learning strategies					
6	Using embedded assessment processes and effective questioning techniques					
7	Co-ordinating the science programme in a primary school					

Primary science in your jurisdiction and sector

What factors will influence the uptake of *Primary Connections* by schools in your jurisdiction and sector?

_____

_____

_____

What factors will influence how effective you can be as a *Primary Connections* professional learning facilitator?

_____

_____

_____

Your goals for participating in this three-day workshop for professional learning facilitators

What are your personal goals for participating in this workshop?

_____

_____

_____

Thank you for responding to this questionnaire

Australian Academy of Science: *Primary Connections* Programme
Professional Learning Facilitators Workshop
Workshop Evaluation Survey

Dear Colleague
We seek your views about the professional learning facilitators workshop you have just completed. Data from this survey 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 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.

Professor Mark W Hackling
Edith Cowan University

ID number

For office use only

Your background

Your name: _____

State/Territory: _____

About professional learning

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

_____

_____

_____

_____

Your self-efficacy and confidence as a professional learning facilitator

Now that you have completed this three-day workshop, 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; UN = Uncertain;
D = Disagree; SD = Strongly Disagree

Item	Statement	SA	A	UN	D	SD
1	I am effective in eliciting teachers' prior knowledge and beliefs and adjusting the professional learning workshop to meet the needs of the teachers					
2	My science content knowledge enables me to answer teachers' science questions effectively					
3	My knowledge of effective science teaching practices enables me to answer teachers' science pedagogy questions effectively					
4	I am quite comfortable with having my professional learning workshops evaluated					
5	I am able to pose engaging tasks for teachers to work on in small groups in my workshops					
6	My deep understanding of the culture of primary schooling enables me to give valuable advice to teachers on matters of primary science pedagogy					
7	My deep understanding of the culture of early childhood education enables me to give valuable advice to ECE teachers about science pedagogy					
8	My deep understanding of literacy teaching practice enables me to give valuable advice on integrating literacy education into science education					
9	I am able to choose and apply effective facilitation tools and techniques to enhance the learning of teachers in workshops					

Now that you have completed this three-day workshop, please rate your confidence with facilitating professional learning workshops 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	OK	LC	NC
1	Introducing *Primary Connections* and its five underpinning principles					
2	Linking science with literacy					
3	Understanding and applying the 5Es teaching and learning model in primary science					
4	Conducting investigations in primary science					
5	Using co-operative learning strategies					
6	Using embedded assessment processes and effective questioning techniques					
7	Co-ordinating the science programme in a primary school					

Feedback on the three-day professional learning facilitators workshop

To what extent have the aims of the workshop been achieved for you?

Aim To develop an enhanced……..		To a limited extent		OK		To a large extent
		1	2	3	4	5
1	understanding of the *Primary Connections* project, teaching and learning model and curriculum resources					
2	understanding of the *Primary Connections* professional learning model and resources					
3	level of confidence and range of skills in facilitating *Primary Connections* professional learning workshops					
4	ability to adapt the professional learning resources and practices to meet the needs of different audiences					
5	network of colleagues as a *Primary Connections* facilitator					

How well prepared do you feel for facilitating *Primary Connections* professional learning workshops?
(Tick one box)

Very poorly prepared	Poorly prepared	OK	Well prepared	Very well prepared

What improvements could be made to the three-day workshop for professional learning facilitators?

_____

_____

_____

_____

What further support will you need for your role as a *Primary Connections* professional learning facilitator?

_____

_____

_____

Feedback on the *Primary Connections* professional learning resources

What is your initial evaluation of the draft *Primary Connections* professional learning resources?

_____

_____

_____

The draft professional learning resources are…. (tick one box)

Totally inadequate	Poor	Satisfactory	Good	Excellent

What changes would you like made to the professional learning resources?

_____

_____

_____

Any other comments

_____

_____

_____

_____

Thank you for responding to this questionnaire