PrimaryConnections®
Linking science with literacy

Stage 3
Interim research and evaluation report 3

Trial school principals' expectations of the programme and perceptions of its impact

A research report for the Australian Academy of Science

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The enthusiastic support of the *Primary Connections* programme by the principals in trial schools and their cooperation in completing questionnaires for this research is acknowledged. This trial of the programme has provided valuable data that will be used to inform further development of the curriculum resources and the professional learning programme.

The coding and collation of data was efficiently completed by Barbara Bowra, which has contributed significantly to the quality of this report.

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, Science and Training. The author accepts responsibility for the views expressed and all errors and omissions in this report.

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Introduction

The implementation of any new initiative in primary schools requires the strong support of the principal and strong leadership from leader teachers or coordinators in that learning area. Research with professional learning programmes at secondary and primary schools (Goodrum, Hackling & Trotter, 2003; Goodrum, Hackling & Sheffield, 2003; Hackling & Prain, 2005; Lewthwaite, 2006) indicate that the provision of professional learning workshops and exemplary curriculum resources, opportunities for collegial interaction and reflection on practice, support of the principal and strong leadership by leader teachers/coordinators are required for successful implementations. The growth and effectiveness of teacher leaders depends on their personal attributes (e.g., motivation, self-efficacy), microsystem factors such as collegial and external supports, mesosystem factors such as the priority placed on the subject by their school and the schools openness to change, exosystefactors such as parent and community expectations, and macrosystem factors such as state and national curriculum agendas (Bronfenbrenner, 1989; Lewthwaite, 2006).

Research into the perceptions of principals regarding the implementation of *Primary Connections* in their schools and in particular, on the trial teachers who are the leader teachers leading the implementation of the programme is required to understand how principals and trial teachers can be further supported to ensure a successful implementation.

Purpose

The purpose of this study was to elicit from principals of trial schools information about: their expectations of *Primary Connections*; its impact on the school, trial teachers and their students; professional learning needs of their schools; and factors likely to limit further implementation of the programme.

Method

A questionnaire based survey method was adopted to seek the views of school principals about the *Primary Connections* programme in their schools. Questionnaires are effective and economical for gathering information from large numbers of participants and the data gathered are relatively easy to code and analyse. Telephone interviews may be used at a later date to gather more in-depth information from a sample of the principals.

The questionnaire included a mix of open response questions and closed objective items. A copy of the questionnaire is attached as Appendix 1.

Sample

The entire population of trail school principals was surveyed N = 56). Principals were emailed a copy of the questionnaire which could be printed-out, completed and then faxed back to the Australian Academy of Science. Reminder emails were sent to maximise the return rate. The last of the surveys returned to the Academy were received in March of 2006.

Table 1: Responses to principals' survey by state.

State	Number of schools involved in trial	Number of schools where principals responded to survey
ACT	2	2
NSW	15	9
NT	1	1
QLD	9	4
SA	8	6
TAS	2	2
VIC	9	7
WA	10	5
TOTAL	**56**	**36**

Response rates in Western Australia and Queensland were low (~50%), however, they were much higher in the other six jurisdictions (73%). The overall response rate was 64% which is adequate and does provide reasonably representative data from the sampled population.

Data analysis
The questionnaire responses were read and re-read by an experienced and informed researcher who identified categories of responses for all open-ended items. The senior researcher reviewed the proposed codes, some new codes were added and others collapsed to minimise overlap between code categories. A coding manual was developed to guide the coding of both open-ended and objective items. Codes were assigned to responses and these were entered into SPSS spreadsheets for analysis. Simple descriptive statistics were calculated using SPSS. A representative sample of responses was recorded to illustrate response categories.

Data have been aggregated across jurisdictions during the analysis as the research was not designed to distinguish between jurisdictions' success with the programme.

Results

Data are reported in three main sections: expectations and impact of the programme; professional learning needs; and constraints on further implementation. Key findings are identified from data which are then discussed in a later section of this report.

Expectations and Impact of the Programme
Principals were asked a series of open-ended questions about their reasons for participating in the project in terms of the outcomes they hoped to achieve for their school, their trial teachers and for their students. These questions were followed with further open-ended questions that asked about their perceptions of the impact of the programme on their school, trial teachers and students. These data are reported in Tables 2-7.

The open-ended questions allowed Principals to respond freely about their expectations of the programme and to report the main impacts of the programme. Many principals provided more than one category of response for a given question. Each of the following tables, therefore, indicated the number of respondents (e.g. n = 36), the number of responses in

each category and the percentage of respondents who provided each category of responses.

School

The 55 responses to the question "What outcomes were you hoping to achieve for your school?" were sorted into seven categories. The most frequent categories of response were to improve science teaching, raise the profile of science in the school, increase the amount of science taught in the school and to have a good science programme. Other responses related to better integration of science with literacy and other learning areas and to improve learning outcomes.

Table 2: Responses to the question "What outcomes were you hoping to achieve for your school?" (n=36)

Outcomes for school	**Number of responses**	**Per cent of respondents with this response**
Better/up to date science teaching	16	44.4
Raise profile of science	11	30.6
More science taught in school	8	22.2
Have a good science programme	7	19.4
Better science/literacy links	5	13.9
Better outcomes in science	3	8.3
Science more integrated	3	8.3
Total number of responses	**55**	

When asked "What impact has *Primary Connections* had on your school?" the most frequent response was the increased profile of science in their schools. Other frequent responses included whole school involvement and greater collegiality, improved science teaching and more science being taught in the school. In four schools, at that time, the impact had not extended beyond the trial teachers.

Table 5: Responses to the question "What impact has *Primary Connections* had on your school?" (n=36)

Impact on school	**Number of responses**	**Per cent of respondents with this response**
Raise profile of science	19	52.8
Whole school is involved	8	22.2
Better/up to date science teaching	7	19.4
More science taught in school	7	19.4
Minimal beyond Trial Teachers	4	11.1
More resources for science	4	11.1
More sharing between teachers	3	8.3
Better science/literacy links/integration	2	5.6
Invalid or no response	2	5.6
Improved outcome levels in science	1	2.8
Total number of responses	**55**	

It should be noted that some impacts of the programme would be more evident to school principals than others, for example, principals would be more aware of changes to the profile of science in the school than of changes to teaching practices.

Key finding 1: Principals were expecting *Primary Connections* to improve science teaching, raise the profile of science in the school, increase the amount of science taught in the school and to have a good science programme. At the time of the survey Principals perceived that the programme had delivered an increased profile of science in their schools, whole school involvement and greater collegiality, improved science teaching and more science being taught in the school.

Teachers

When asked "What outcomes were you hoping to achieve for your trial teachers?" the most frequent responses were to change/improve teachers' pedagogy and confidence with teaching science and this was related to the schools' access to good professional development for the teachers through the programme. Principals were also hoping that the trial teachers would help other teachers improve their science teaching.

Table 3: Response to the question "What outcomes were you hoping to achieve for your trial teachers?" (n=36)

Outcomes for trial teachers	**Number of responses**	**Per cent of respondents with this response**
Increased confidence teaching science	16	44.4
Change pedagogy, way of teaching	16	44.4
Can help others teach science	11	30.6
Access to good PD	10	27.8
Better knowledge of science	4	11.1
Can link science and literacy	4	11.1
Invalid or no response	2	5.6
Total number of responses	**63**	

The most frequent response (75% of respondents) about actual impacts of the programme on trial teachers was an increase in teachers' confidence with science teaching. Other impacts related to improved pedagogy, increased status of the trial teachers within their schools, improved links between science and literacy and trial teachers had developed skills of supporting the professional learning of their colleagues.

Table 6: Response to the question “What impact has *Primary Connections* had on your trial teachers?” (n=36)

Impact on trial teachers	Number of responses	Per cent of respondents with this response
Increased confidence teaching science	27	75.0
Change pedagogy, way of teaching	10	27.8
Raised the standing of Trial Teachers in school	5	13.9
Can better link science and literacy	4	11.1
Developed facilitating skills	4	11.1
Teaching more science	3	8.3
Science discussed more	3	8.3
Know science outcome levels better	2	5.6
More use of ICT	1	2.8
More work for teachers	1	2.8
Invalid or no response	2	5.6
Total number of responses	**62**	

The most frequently reported impact of the programme was an increased confidence of the trial teachers with science teaching. Data collected from the trial teacher themselves and from teachers at case study schools corroborates this finding and indicates that self-efficacy and science teaching time also increased (Hackling & Prain, 2005; Hackling, 2006). Another significant response was the increased standing or status of the trial teachers within their schools. This enhanced status of the trial teachers would support and sustain them in their role as teacher leaders (Lewthwaite, 2006) and coordinators of the *Primary Connections* programme in their school

Key finding 2: Principals were expecting *Primary Connections* to improve trial teachers’ pedagogy and confidence with teaching science through access to good professional development. Principals were also hoping that the trial teachers would help other teachers improve their science teaching. A large majority of principals reported improved confidence with teaching science. Other impacts related to improved pedagogy, increased status of the trial teachers within their schools, improved links between science and literacy and trial teachers had developed skills of supporting the professional learning of their colleagues.

Students

Principals were also asked what outcomes they hoped to achieve for their students, and what impacts the programme had had on their students at the time of the survey.

Table 4: Response to the question "What outcomes were you hoping to achieve for your students?"

Outcomes for students	Number of responses	Per cent of respondents with this response
Better cognitive learning outcomes	27	75.0
Increased interest/excitement/attitudes towards science	17	47.2
Do more science	9	25.0
See science as important in life	4	11.1
Invalid or no response	3	8.3
Total number of responses	**60**	

The large majority of principals indicated they were seeking enhanced cognitive learning outcomes. Other frequent responses included enhanced affective outcomes (interest in science, excitement), and the opportunity to do more science.

Table 7: Response to the question "What impact has *Primary Connections* had on your students?" (n=36)

Impact on students	Number of responses	Per cent of respondents with this response
Motivated, like science	24	66.7
Better scientific literacy	7	19.4
Done more science	8	22.2
Improved problem solving/higher order thinking	8	22.2
Better general literacy skills	4	11.1
Done new/different activities	2	5.6
Very little	2	5.6
Invalid or no response	2	5.6
Total number of responses	**57**	

Principals reported that the main impact on students was an increase in their motivation to learn science and more positive attitudes towards science. Other impacts were that students had done more science and had achieved enhanced cognitive learning outcomes and enhanced scientific literacy.

Key finding 3: Principals expected *Primary Connections* to deliver enhanced cognitive and affective outcomes for students and an increased opportunity to learn science. The main impact on students was perceived to be on affective outcomes. Other impacts were enhanced cognitive outcomes and opportunity to study science.

In addition to open questions about expected and perceived impacts of the programme, principals were asked to rate impacts on science and literacy teaching and learning on a five point scale (strong improvement to far worse). Principals' responses to these rating scale items are reported in Table 8.

Table 8: Principals assessment of the extent to which the goals of *Primary Connections* have been achieved for their trial teachers and their classes. (n=36)

***Primary Connections* goal**	**Number of responses**				
	Strong improvement	Some improvement	No change	Worse	No response
Teachers' confidence and competence for teaching science	24	11	0	0	1
Teachers' confidence and competence for teaching literacy	10	17	8	0	1
Students' learning outcomes in science	16	19	1	0	0
Students' learning outcomes in literacy	6	25	5	0	0

Principals indicated that the programme had impacted positively on the trial teachers' confidence and competence for teaching science and literacy, and on the learning of science and literacy by their students. All principals who responded, indicated that the teachers' confidence and competence for science teaching had improved, and 69% reported a strong improvement. Ninety-seven per cent of principals reported improvement in science learning outcomes, and of these 44% reported a strong improvement. Impacts on literacy teaching and learning were perceived to be positive, but less positive than for science. For example, 77% reported a positive impact on literacy teaching and 86% reported a positive impact on literacy learning.

Key finding 4: A large majority of principals reported a positive impact of the programme on trial teachers' confidence and competence for teaching science and literacy and on students' learning of science and literacy.

Professional Learning Needs

Principals were asked to identify their schools' needs for professional learning workshops to support the implementation of *Primary Connections* in their schools. Principals responded in relation to a list of available *Primary Connections* professional learning modules. These data are reported in Table 9.

Table 9: Response to the question "What professional learning support will you be requiring next year to support the implementation of *Primary Connections*?" (n=36)

Professional learning need	Number of responses	Per cent of respondents with this response
One-day workshop for new *Primary Connections* school coordinators	10	27.8
One-day, whole-school workshop: An introduction to *Primary Connections*	13	36.1
90-minute, after school workshop: Conducting science investigations	21	58.3
90-minute, after school workshop: Developing literacies for science	16	44.4
90-minute, after school workshop: Cooperative learning	11	30.6
90-minute, after school workshop: Improving assessment	17	47.2
90-minute, after school workshop: Auditing school practice and identifying professional learning needs	11	30.6
Other – please specify*	3	8.3

* whole day to include developing literacies for science; 2 hour workshop 'An introduction to *Primary Connections*'

Principals more frequently nominated 90-minute workshops than one-day workshops which indicates the difficulty of providing pupil-free days for professional learning, or the relative priority they place on science professional learning compared to other professional learning needs. Only a third of the principals nominated to the one-day Introduction to *Primary Connections* workshop which the project directors believe is a key to whole school implementation of the programme. Of the 90-minute workshops; science investigations, assessment and literacies of science were most frequently nominated.

Key finding 5: Only one-third of principals indicated their schools required the one-day Introduction to *Primary Connections* workshop, while the science investigations, assessment and literacies of science 90-minute workshops were required by more schools.

Constraints on Further Implementation

Principals were asked to identify, if any, factors that will constrain further implementation of *Primary Connections* at their school. Principals' responses are summarised in Table 10.

Table 10: Response to the question "What, if any, factors will constrain further implementation of *Primary Connections* at your school?" (n=36)

Constraint/barrier	Number of responses	Per cent of respondents with this response
None	8	22.2
Time for planning and training	9	25.0
Money/funding	7	19.4
Crowded curriculum	5	13.9
Too much PD this year	4	11.1
Changes in staff	3	8.3
Management of materials for classes	3	8.3
Teacher resistance/willingness	3	8.3
Availability of new PC units	1	2.8
Leadership issues	1	2.8
Invalid or no response	2	5.6
Total number of responses	**46**	

The most common response was time for planning and training (25%) which relates to two other categories of response 'crowded curriculum' and 'too much PD this year' which indicates there are many competing demands within the primary school curriculum and as indicated in Table 9, only one third of trial schools were considering the one-day Introduction to *Primary Connections* workshop. On a positive note, 22% of respondents indicated there were no factors that would constrain further implementation which indicates that *Primary Connections* has been given a high priority in these schools.

Key finding 6: Time for planning and training was reported by 25% of principals as the factor constraining further implementation of *Primary Connections* at their schools. On a positive note, 22% of principals indicated there were no factors that would constrain further implementation of *Primary Connections*.

Discussion and Conclusions

The interpretation of the findings from this study is limited by the survey return rate (64%) and by the extent to which principals are informed respondents about matters questioned in the survey. It can be argued that the sample is reasonably representative of the population of trial schools, however, some principals who did not respond to the survey may have been less committed to the programme. Principals are more likely to be informed respondents in relation to matters such as teacher confidence and interest, professional learning needs of staff and constraints on further implementation of the programme, than in relation to matters such as teachers' practice and student's cognitive learning outcomes.

The key findings of the study are summarised in Table 11.

Table 11: Summary of key findings

	Key finding
1	Principals were expecting *Primary Connections* to improve science teaching, raise the profile of science in the school, increase the amount of science taught in the school and to have a good science programme. At the time of the survey, principals perceived that the programme had delivered an increased profile of science in their schools, whole school involvement and greater collegiality, improved science teaching and more science being taught in the school.
2	Principals were expecting *Primary Connections* to improve trial teachers' pedagogy and confidence with teaching science through access to good professional development. Principals were also hoping that the trial teachers would help other teachers improve their science teaching. A large majority of principals reported improved confidence with teaching science. Other impacts related to improved pedagogy, increased status of the trial teachers within their schools, improved links between science and literacy and trial teachers had developed skills of supporting the professional learning of their colleagues.
3	Principals expected *Primary Connections* to deliver enhanced cognitive and affective outcomes for students and an increased opportunity to learn science. The main impact on students was perceived to be on affective outcomes. Other impacts were enhanced cognitive outcomes and opportunity to study science.
4	A large majority of principals reported a positive impact of the programme on trial teachers' confidence and competence for teaching science and literacy and on students' learning of science and literacy.
5	Only one-third of principals indicated their schools required the one-day Introduction to *Primary Connections* workshop, while the science investigations, assessment and literacies of science 90-minute workshops were required by more schools.
6	Time for planning and training was reported by 25% of principals as the factor constraining further implementation of *Primary Connections* at their schools. On a positive note, 22% of principals indicated there were no factors that would constrain further implementation of *Primary Connections*.

Principals' expectations of *Primary Connections* for their schools, trials teachers and students in trial teachers' classes included: an enhanced status of science within their schools, more science being taught and to have a good science programme; enhanced trial teachers' science teaching confidence and competence, and the ability of trial teachers to support their colleagues' science teaching; and, enhanced cognitive and affective student learning outcomes and an increased opportunity to learn science. The most frequently reported impacts of the programme on the school, trial teachers and students included: enhanced status of science in their schools; improved confidence with teaching science; and, enhanced affective student outcomes. Principals reported stronger impacts on science teaching and learning than on literacy teaching and learning.

Principals' responses to the question about the professional learning needs for their schools indicated only one-third required the one-day, whole school Introduction to *Primary Connections* workshop. Interestingly, higher percentages of principals indicated their staff required the 90-minute workshops on investigating, assessment and literacies of science. While the project directors would consider the Introduction to *Primary Connections* workshop to be crucial for a whole-school implementation of the programme, two-thirds of principals did not consider it would be needed. The fact that this workshop is designed to be implemented as a whole school workshop on a pupil-free day, may be a barrier to implementation given the competing demands for pupil-free days. As 25% of principals reported, time for planning and training are constraints on implementation. To allow schools to implement this workshop without dependence on a pupil-free day it should be made

available in two formats; as a one-day workshop and as a sequence of two 90-minute workshops.

Much of the previous research cited in this report indicates how influential principals and leader teachers are in the successful implementation of professional learning initiatives. The *Primary Connections* project team needs to ensure principals and trial teachers are regularly provided with updates on project developments and are given the supports they need to ensure a successful implementation and that science remains a priority in these schools.

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Appendix

Trial School Principal Questionnaire
December 2005

FAX TO: **Ms Shannon Newham, Australian Academy of Science**

Fax No: **(02) 6257 4620**

We request your name and school details for follow-up purposes only. Your responses will contribute to our overall evaluation of Primary Connections and our planning for 2006. No Principal or School will be identified in any report based on this survey.

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.

ID number

For office use only

Principal and school information

Principal's name: _____

State/Territory: _____

Name of school: _____

School type: Government / Catholic / Independent

Motivation for participating in the *Primary Connections* trial

What outcomes were you hoping to achieve for your:

(a) school

_____

_____

(b) trial teachers

_____

_____

(c) students

_____

_____

Impact of the *Primary Connections* trial

What impact has *Primary Connections* had on your:

(a) school

_____

_____

_____

(b) trial teachers

_____

_____

_____

(c) students

_____

_____

_____

Has the program achieved its goals?

Primary Connections was developed to improve teachers' confidence and competence for teaching science and literacy, and to improve learning outcomes in science and literacy. To what extent have these goals been achieved for your trial teachers and their classes? ***In each case, please tick one box***.

Teachers' confidence and competence for teaching science

Strong improvement	Some improvement	No change	A little worse	Far worse than before

Teachers' confidence and competence for teaching literacy

Strong	Some	No change	A little worse	Far worse than

improvement	improvement			before

Students' learning outcomes in science

Strong improvement	Some improvement	No change	A little worse	Far worse than before

Students' learning outcomes in literacy

Strong improvement	Some improvement	No change	A little worse	Far worse than before

Professional learning needs for 2006

What professional learning support will you be requiring next year to support the implementation of *Primary Connections*? ***Tick boxes as appropriate***.

Types of professional learning support	**Tick**
One-day workshop for new *Primary Connections* school coordinators	
One-day, whole-school workshop: An introduction to *Primary Connections*	
90-minute, after school workshop: Conducting science investigations	
90-minute, after school workshop: Developing literacies for science	
90-minute, after school workshop: Cooperative learning	
90-minute, after school workshop: Improving assessment	
90-minute, after school workshop: Auditing school practice and identifying professional learning needs	
Other – please specify	

Constraints/barriers to implementation

What, if any, factors will constrain further implementation of *Primary Connections* at your school?

_____

_____

_____

Do you need further information?

Would you like the *Primary Connections* Managing Director to telephone you to provide further information? **Yes / No**

If Yes, please provide your phone number: ( ) _____

Thank you for providing this feedback; it will be extremely valuable as we plan for 2006