People Science & Policy

Science Small Grants Scheme Evaluation

Final Report Prepared For:

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Background

The Science Small Grants Scheme (SSGS) was launched in 2003 to support the transition of Scottish students from primary to secondary science. The scheme was a partnership activity between the Scottish Executive Education Department (SEED) and the National Endowment for Science, Technology and the Arts (NESTA). The aims of SSGS were to:

- improve children's attainment in science;
- stimulate their enthusiasm for science; and
- promote partnership working between primary and secondary teachers within school clusters.

People Science & Policy Ltd was commissioned to undertake an independent evaluation of the scheme in late April 2006. This evaluation was intended to provide evidence on the degree to which the aims had been achieved and also to identify good practice that might inform future activities sponsored by either NESTA or SEED.

Programme delivery

The SSGS programme was delivered by Careers Scotland on behalf of SEED. The total programme value was £270,000. In addition, NESTA provided £44,000 to support the costs of a scheme representative to act as an advocate for the scheme and to encourage teachers to develop innovative approaches to address transition problems.

Evaluation methodology

Four principal sources of data were identified, these were:

- application data (all successful applications were reviewed)
- evaluation reports submitted by teachers to Careers Scotland (13 available);
- follow up telephone interviews with teachers (40 completed); and
- case study visits (three completed plus one by telephone).

Funded Projects

Over three rounds of the scheme a total of 69 projects were offered support through the SSGS from various locations across Scotland. The most common types of project involved primary/secondary exchanges, electronic or virtual interactions and activities and development and production of resources. **Successful applications were effectively targeted at the scheme's aims of promoting partnerships, enthusing students and supporting learning**.

Beneficiaries

Actual beneficiaries

The project proposals set out three main classes of beneficiaries; these are schools, students and teachers. Fewer schools, teachers and students were engaged than expected

suggesting that the project leaders found it harder than they had anticipated to involve all of the schools in a cluster. At an estimated project cost of £131,101 (of which £103,281 was SSGS grant) the 48 projects analysed engaged:

- 222 schools;
- 488 teachers; and
- 6,532 students, of which at least 4,360 were primary school students.

Data on numbers of beneficiaries was not always consistent and **all the numbers of beneficiaries reported should be regarded as the minimum levels achieved by the SSGS**.

Project types

Engaging schools seems to have been more difficult when the project was centred around live activities, whether involving exchanges between schools or in students' own schools. **However, these projects were then more successful at engaging students and teachers within the participating schools**. Projects that were centred on virtual activities were more successful at engaging schools, but then less successful at engaging teachers and students within those schools.

Successes

Successful aspects

The SSGS has stimulated a variety of projects that have delivered wide-ranging benefits for teachers and pupils. Those projects that involved an interchange of students and/or teachers between primary and secondary schools had the widest range of successful aspects.

Core strengths

The four basic core strengths that underpinned a successful project were:

- Network building (for either teachers or students).
- Delivering student enjoyment/confidence.
- Delivering student skills/knowledge.
- Delivering teacher benefits.

No single strength is a dominant feature across the programme. So for good practice a project should feature at least one of these strengths, but the precise combination of strengths is likely to be driven by local needs. The strength that was most likely to be cited alongside one of the others was 'delivering student enjoyment/confidence'.

The analysis indicates that the scheme has successfully delivered against its three core aims to support learning, improve student confidence and enhance communications within cluster.

Student perceptions

There were two sources of direct student feedback, these are: the case study visits; and the interim evaluation. **The case studies highlight that students enjoy doing more practical work and as a result of the projects felt more confident about going to high school**

than they had previously. Some noted the benefits of doing this kind of investigative work in groups. Those students who had done so also thought it was beneficial to mix with students from other schools.

Continuation

The most important test of whether or not a project has been successful is whether or not it has sufficient support within the cluster to become an embedded activity after the conclusion of the grant. **By this measure the SSGS programme has been a resounding success**. Almost two thirds of the 48 projects analysed, were intending to continue the project activity in some way.

Challenges

Five main challenges were identified, these were:

- Engaging teachers
- Time
- Equipment
- Logistics
- Engaging students

Engaging teachers

Of the five main challenges faced, engaging other teachers was mentioned more times than any other. Achieving engagement was challenging at the institutional as well as the individual level. However, **there is an indication therefore that once the investment has been made in fully engaging a school; additional teachers can be drawn into the activity**.

Time

The tone of much of the feedback implies that the amount of time required to manage the project was more than had been expected. Despite the concerns over time, the high level of intent to continue the projects shows how worthwhile they were thought to be by the lead teachers.

Equipment

Challenges were categorised as being related to equipment when there was a direct reference to a technical or reliability issue. The majority of equipment related challenges were associated with projects using electronic and virtual interactions.

Logistics

Logistics were an issue for a number of the projects that involved in-school activities, whether associated with an exchange, the use of resources or in own schools. These ranged from matters of geography, through arranging support, to simple matters of finding space for the project.

Engaging students

This was only raised as a challenge by a small number of teachers.

Improvements

A number of project leaders made one or more comments about how they planned to improve the projects further. Over half said that they had allowed, or intended to allow, more time for either planning or doing activities. About a third said that they would try to ensure more collaboration and a similar number planned to change or develop the nature of activities because on feedback that was gathered during the project.

Scheme Administration

Support to grant holders

A telephone helpline at Careers Scotland was provided for potential applicants. There was also support available from the NESTA funded scheme representative. In addition pre-application workshops were run and feedback gathered at the events suggested that these were appreciated by the participating teachers. **The higher success rates of applicants that had used the advice options available indicate that these served a useful function in helping teachers to prepare better quality applications**.

During this evaluation, the funders reported that there was a significant improvement in the quality of the applications in the second round suggesting that the raft of support offered to applicants did help them, but that time was required for teachers to come to terms with the scheme's requirements. Three years does therefore seem to have been an appropriate timescale for the SSGS.

Programme management

The appraisal process appears to have been quite intensive with a panel comprised of representatives of the funders and Careers Scotland, supported by the scheme representative considering the proposals in some detail. Monitoring, however, seems to have been a lower priority. Only limited end of project data was available for this evaluation.

Conclusion

Value for money

The aims of the scheme have been met by the projects it supported. The numbers of beneficiaries are lower than expected, but putting these in the context of the project costs and the grants awarded, suggests that simply **in terms of numbers engaged these projects delivered good value for money**.

In terms of quality of project, rather than simple numbers, **the success of the individual projects and thus the SSGS is most clearly shown by the large number of project leaders indicating that the project was likely to continue**. This is a strong endorsement of the quality of the projects.

Good practice

For best practice our advice would be that successful science-based transition projects are likely to feature an element where there is an exchange of pupils or teachers between primary and secondary schools. To deliver these projects, a significant amount of time needs to be allowed for development and delivery of the project with a particular focus on engaging teachers across a cluster.

1 Introduction

1.1 Background

The Science Small Grants Scheme (SSGS) was launched in 2003 to support the transition of Scottish students from primary to secondary science. The scheme was a partnership activity between the Scottish Executive Education Department (SEED) and the National Endowment for Science, Technology and the Arts (NESTA). The aims of the scheme were to:

- improve children's attainment in science;
- stimulate their enthusiasm for science; and
- promote partnership working between primary and secondary teachers within school clusters.

People Science & Policy Ltd (PSP) was commissioned to undertake an independent evaluation of the scheme in late April 2006. This evaluation was intended to provide evidence on the degree to which the aims had been achieved and also to identify good practice that might inform future activities sponsored by either NESTA or SEED.

An interim evaluation of round 1 of the grants was made available to PSP. This evaluation was undertaken by Neil Taylor and Allen Thurston of the University of Dundee and used postal questionnaires to gather feedback from teachers, and students, involved in round 1 projects. Data from that evaluation is referenced within this report to ensure that the fullest possible picture of the scheme is presented.

1.2 Programme delivery

The SSGS programme was delivered by Careers Scotland on behalf of SEED. The total programme value was £270,000, of which almost £150,000 was distributed as grants to schools in Scotland. The remainder covered associated programme costs such as the administration of the scheme, promotional material, briefing and marketing events and the design and maintenance of a dedicated website.

In addition, NESTA provided £44,000 to support the costs of a scheme representative to act as an advocate for the scheme and to encourage teachers to develop innovative approaches to overcome transition problems. In particular, the scheme representative's role included advising potential applicants and supporting grant holders.

1.3 Evaluation methodology

In our original proposal four principal sources of data were identified, these were:

- application data
- evaluation reports submitted by teachers to Careers Scotland;
- follow up telephone interviews with teachers; and
- case study visits.

Each of these is described, briefly, in the following sections and in full in appendix 1.

1.3.1 Application data

We reviewed the applications of all the successful applicants to allow the construction of an overall picture of the nature of projects funded and their intended target audiences.

1.3.2 Evaluation reports

We had anticipated that the evaluation reports supplied by teachers following the completion of projects would provide the core of the quantitative data for this evaluation. In fact very few evaluation reports are available and only 13 were provided to PSP for analysis, even though application data suggested that 62 of the 69 projects ought to have been completed by the end of the 2006 summer term.

1.3.3 Teacher interviews

The lack of evaluation reports meant that gathering numerical data directly from teachers became a more critical task than had originally been envisaged. Between June and October 2006, we completed 40 interviews with lead teachers, some of whom had been involved with more than one project, meaning that in total we interviewed the lead teachers of 43 projects. The topic guide used for these interviews is at appendix 2.

Although 69 grants were awarded, we were only able to attempt to contact 60 project leaders. This was because the Scottish Executive asked that all contact with schools be cleared through the appropriate local authority. Despite repeated contact three local authorities failed to provide a response. In addition one local authority asked us not to contact one specific school, whilst being content that we contact the rest of the schools in that area.

Table 1 below shows that interviews were completed with almost three quarters of the project leaders, providing a relatively solid base of evidence for the evaluation.

Table 1 Interviews completed

Outcome	Reason	Number
Project interviews completed		**43**
Contact not cleared by Local Authority	No response from LA	**8**
	LA asked PSP not to contact the school	**1**
Interviews not completed	Teacher no longer at the school	**7**
	Teacher not contactable	**5**
	Refused	**5**

1.3.4 Case study visits

After completing the telephone interviews a short-list of potential case studies was selected. The short-list was selected to include a variety of types of project, in a spread of geographical locations. The common feature was that all the projects short-listed had achieved particular successes and provided potential exemplars of good practice.

Four schools agreed to participate in the case studies and visits took place in late October 2006. Unfortunately, due to severe flooding in the Highlands one school was closed, so only three visits were completed. Therefore, arrangements were made to complete the fourth case study by telephone. The case studies are written up in detail in Appendices 3-6 and topic guides provided in Appendix 7.

1.3.5 Analysis

A spreadsheet was constructed that included both data from application forms and data regarding completed projects. This spreadsheet has allowed us to sum the outputs from the scheme, compare the number of actual beneficiaries with the expected number and assess the potential of different types of project to engage beneficiaries.

The data is incomplete, for example we have instances where it is reported that pupils took part, but have no data on the number of teachers or schools that took part. On the other hand we have data saying that schools took part, but no data on the number of teachers participating. Bearing in mind these inconsistencies, **we suggest that all the numbers of beneficiaries reported should be regarded as minimum levels of achievement**.

1.4 This report

The next section provides an overview of the projects funded under the auspices of the SSGS. Section 3 focuses on the beneficiaries and in particular disparities between estimated and actual numbers of beneficiaries engaged. Section 4 then discusses successful features of the projects, while section 5 looks at the challenges faced by project leaders. Section 6 briefly discusses scheme administration and section 7 sets out our conclusions. Finally appendices 1-7 provide further details on the methodology and the case studies.

2 Funded Projects

2.1 Introduction

This section provides a brief overview of the number, and types, of projects that were supported through the SSGS.

In total 69 projects were offered support through the SSGS, 17 in the first round, 29 in the second round and 23 in the final round. The total project cost for these 69 projects was estimated at £185,437, with £147,043 being requested in grant aid.

2.2 Location

There were successful applications from across Scotland, with schools from 25 of the country's 32 unitary authorities winning support. There were a number of grants awarded in the more heavily populated central belt. For example, there were successful applications from authorities such as Edinburgh, West Lothian, South Lanarkshire and Glasgow. However, there were also many grants awarded in less populous areas, such as Dumfries and Galloway, Angus and the greatest number of successful applications came from the Highland region.

2.3 Types of project

From the descriptions provided of the project, each was allocated to a major 'type'. The five major 'types' are set out below.

- Activities based on the exchange of pupils or teachers between primary and secondary schools.
- Electronic or virtual interactions and activities.
- The development and production of resources.
- Activities largely in the students' own school.
- Activities focused on teacher training and support.

Table 2 Project types (based on 69 grants awarded)

Nature of project	Number
Primary - Secondary exchanges	30
Electronic/virtual	13
Resources	13
Own school activities	10
Teacher training	3

A number of the projects included elements from more than one of these types and where this is the case, the allocation is by principal activity.

2.4 Objectives

Just as the projects have been categorised by type, they can also be categorised by objectives. This focuses on what projects intend to achieve. The project objectives set out at the application stage across the 69 projects are shown in table 3.

Many projects have more than one objective so we have multi-coded these. It is clear that the main objectives for the funded projects were addressing the scheme's aims of improving the transition experience and supporting the work of the school clusters. Thereafter, the main foci were on providing positive experiences of science for students and providing resources and support for teachers.

Table 3 Project objectives (based on 69 projects)

Objective	No.
Improve experience of transition from primary to secondary/reduce anxiety/familiarise with new environment	36
Improve co-operation between schools/ cohesion within cluster	31
Enable staff from different schools to engage with one another	26
Enhance pupil enjoyment of/enthusiasm for/interest in science	24
Development of pupil skills/knowledge	23
Enable pupils from different schools to engage with one another	21
Develop resources	17
Improve quality of teaching/ teacher knowledge and skills	16
Improve quality of science courses/reduce repetition	13
Improve attainment levels in science	8
Enable pupils to use IT equipment	8
Other	9

2.5 Conclusion

Over three rounds of the scheme a total of 69 projects were offered support through the SSGS from various locations across Scotland. S**uccessful applications were effectively targeted at the scheme's aims of promoting partnerships, enthusing students and supporting learning**.

3 Beneficiaries

3.1 Introduction

The project proposals set out three main classes of beneficiaries; these are schools, students and teachers. The projected numbers of beneficiaries for all 69 projects were:

- 472 schools;
- 15,976 students; and
- 1,135 teachers.

3.2 Actual beneficiaries

We do not have actual beneficiary data for all 69 projects, so table 4 shows the projected and actual beneficiary numbers for the 48 projects, for which we have data.

Table 4 Beneficiaries (based on 48 projects)

Beneficiary	Projected	Actual
Primary schools	285	189
Secondary schools	62	31
Total number of schools	**347**	**222**[1]
Students (not specified)	5,921	1,138
Primary students	3,535	4,360
Secondary students	1,642	1,034
Total number of students	**11,098**	**6,532**
Teachers (not specified)	476	90
Primary teachers	172	238
Secondary teachers	163	160
Total number of teachers	**811**	**488**

Table 4 shows that in fact **only about 60% of the number of schools that were expected to participate actually did**. This had a direct knock-on in terms of both teacher and student numbers, with about 60% of the anticipated number of each benefiting. This consistency suggests that despite the minor concerns over data reported in section 1.3.5, the overall pattern of numbers is likely to be robust enough to provide clear indications of the strengths and weaknesses of the SSGS programme.

This data would suggest that the project leaders found it harder than they had anticipated to involve all of the schools in a cluster. **Feedback from the project leaders confirms that one of the key challenges was engaging peers and colleagues**, which is discussed further in section 5.2.

[1] This total includes one special school and one secure unit.

3.3 Project types

Table 2 shows the principal activity types for all of the funded projects. Table 5 below shows the principal activity types of the 48 projects that we have analysed in detail, along with the associated grant value and the reported numbers of beneficiaries.

Table 5 Project costs and beneficiaries (based on 48 projects analysed)

Nature of project	Number	Grant value	Schools	Students	Teachers
Primary - Secondary exchanges	18	£37,729	69	2,731	231
Electronic/virtual	12	£23,665	76	1,245	76
Resources	9	£21,634	41	1,691	77
Own school activities	8	£17,952	31	725	93
Teacher training	1	£2,300	5	140	11

Table 5 suggests that it is easier to get engagement at the school level for electronic or virtual activity. With only 12 projects, over 70 schools were engaged. However, recruiting the schools does not necessarily translate into greater numbers of engaged students and teachers, with averages of just over 100 students per project and only 1 engaged teacher per project.

The other types of project that are based around physical activities and exchanges on average engage fewer schools per project, but they do engage many more teachers and often more students, per project, than those that have a virtual component as the centrepiece.

It is even more revealing to compare the estimated levels of engagement for the different types of project with the actual levels as shown in table 6. This shows that **virtual projects achieved the lowest levels of engagement with teachers and students compared with the projected audience.**

Table 6 Engagement by project type (based on 48 projects analysed)

Nature of project	No. of schools estimated	Schools engaged		No. of students estimated	Students engaged		No. of teachers estimated	Teachers engaged	
		No.	%		No.	%		No.	%
Primary - Secondary exchanges	110	69	**63%**	2,965	2,731	**92%**	275	231	**84%**
Electronic/virtual	99	76	**77%**	4,699	1,245	**26%**	284	76	**27%**
Resources	69	41	**59%**	2,399	1,691	**70%**	143	77	**54%**
Own school activities	64	31	**48%**	1,035	725	**70%**	104	93	**89%**
Teacher training	5	5	**-**	0	140	**-**	5	11	**-**

These findings should not be taken to mean that there is no role for computer-based projects. Indeed, some qualitative feedback has praised the role played by electronic activities.

> "*Animations* [were] *particularly successful.*"
> "*Pupils* [were] *able to communicate directly with secondary pupils.*"
> "*E-mail helpline worked really well.*"
> Teachers

In addition in the case studies we found that teachers found ICT tools very helpful in providing support to other activities. E-mail and virtual follow-up can of course provide invaluable additional support when geography and remote locations mean that extended live contact is not a practical option.

However, to achieve high levels of student and teacher engagement within participating schools, a physical activity appears to be an important component of a successful project.

3.4 Conclusions

Fewer schools, teachers and students were engaged than anticipated.

Engaging schools seems to have been more difficult when the project was centred around live activities, whether involving exchanges between schools or in students' own schools. **However, these projects were then more successful at engaging students and teachers within the participating schools**. Projects that were centred on virtual activities were more successful at engaging schools, but then less successful at engaging teachers and students within those schools.

4 Successes

4.1 Introduction

A central requirement of this evaluation was to identify good practice. In support of this aim, it is important to consider teachers' views on what makes a project successful. This was done in two ways. Firstly teachers were asked to consider a number of potential features and say whether or not they had been amongst the project's most successful aspects. In follow-up questions we explored why they felt that particular issues had been successful in order to identify the underlying strengths that gave rise to success.

4.2 Successful aspects

The end of project report form listed nine potential aspects of projects and asked lead teachers to note whether they felt that these had been particularly successful. In the telephone interviews we did not offer the same prompted list, but allowed teachers a free response and then coded their replies against the list. Table 7, draws on both the end of project reports and the telephone interviews and shows the aspects that teachers reported as being particularly successful.

Table 7 Successful aspects (based on 48 projects analysed)

Most successful aspects	Number of times reported
Improved "cluster" communication	27
Hands on/Practical experience	21
Pupils more familiar with aspects of secondary	20
Improved practical and thinking skills	14
Improved resources/ worksheets	14
Better understanding of science	13
More teacher confidence in science	13
Increased interest and enthusiasm in science	12
Exposure to new/different science	12

Table 7 shows that projects were successfully delivering against their original objectives (set out in table 3). However, not all types of projects delivered these successful aspects in the same proportions. Table 8 shows the number of times that these aspects were reported for the different types of project described in section 2.3.

Table 8 Successful aspects of different project types (based on 47 projects)

	Primary - Secondary exchange (18 projects)	Electronic or virtual (12 projects)	Resources (9 projects)	Own school activities (8 projects)
Improved "cluster" communication	**12**	**7**	**4**	**3**
Hands on/Practical experience	**12**	**2**	**4**	**3**
Pupils more familiar with aspects of secondary	**9**	**4**	**4**	**3**
Improved practical and thinking skills	**7**	**3**	**2**	**2**
Improved resources/ worksheets	**6**	**2**	**5**	**1**
Better understanding of science	**6**	**3**	**2**	**2**
More teacher confidence in science	**8**	**2**	**2**	**1**
Increased interest and enthusiasm in science	**5**	**3**	**1**	**3**
Exposure to new/different science	**6**	**3**	**2**	**1**
Total	**71**	**29**	**26**	**19**

It is clear that **those projects that had a physical exchange (whether of teachers or students) between primary and secondary schools as the central feature yielded projects that were deemed more successful across a wide range of fronts**.

Qualitatively we tried to explore why teachers had cited particular aspects. From the (34) responses to this probing, we were able to deduce that certain core strengths led to success.

4.3 Core strengths

Analysing the responses from teachers about why the projects had been successful led us to identify four basic core strengths that underpinned a successful project. These are:

- Network building (for either teachers or students).
- Delivering student enjoyment/confidence.
- Delivering student skills/knowledge.
- Delivering teacher benefits.

Table 9 (below) shows the number of times that each of these core strengths was reported in the feedback from lead teachers. Table 9 shows that no single strength is a dominant feature across the programme. So for good practice a project should feature at least one of these strengths, but the precise combination of strengths is likely to be driven by local needs.

Table 9 Core strengths (based on 34 projects analysed)

Strengths	Number of times cited
Network building	**14**
Student enjoyment/confidence	**12**
Student skills/knowledge	**10**
Teacher benefits	**10**

The strength that was most likely to be cited alongside one of the others was 'delivering student enjoyment/confidence'. This was only cited in isolation on three occasions, suggesting that **although it is a critical feature in a successful project, it often also supports the achievement of other ends**.

Unlike table 8, which considered successful aspects of a project by project type, table 10 (below), which looks at core strengths shows no particularly high scoring project type. However, the development of new skills or knowledge is more prominent in the electronic and virtual projects, where the acquisition of new IT skills tend to be cited as a specific strength.

Table 10 Core strengths of different project types (based on 34 projects)

Project type	Student enjoyment or confidence	Student skills or knowledge	Teacher benefits	Network building	Total	Number of projects
Primary secondary exchange	4	3	4	6	**17**	13
Electronic/virtual	2	4	1	3	**10**	8
Resources	3	0	3	3	**9**	7
Own school activities	3	2	1	2	**8**	5
Teacher training	0	1	1	0	**2**	1

4.4 Student perceptions

It was impractical to attempt to gather student feedback from across the whole of the SSGS programme, so perceptions of success are largely based on teacher feedback. There are however two sources of direct student feedback, these are:

- the case study visits; and
- the interim evaluation.

4.4.1 Case study visits

The case studies highlighted that **students enjoy doing more practical work and as a result of the projects felt more confident about going to high school than they had previously**.

"It's the first proper science that we've done."
S1 student

"[Before the project] *I thought studying science was quite boring…just facts."*
S1 student

"I felt ready to come to high school."
S1 student

"It prepares you for science at secondary school."
S2 student

Some noted the benefits of doing this kind of investigative work in groups and how it was good to be able to discuss ideas, that different people bring different perspectives and that students can learn from one another.

"You need other people to help you because you come up with different ideas."
S1 student

"At first we had lots of problems making it…we couldn't get the fan to work…a boy in my class came up with the idea of fitting an elastic band in it…we had good communications."
S1 student

Those who did so also thought it was beneficial to mix with students from other schools.

"Good to mix with other students…friends with them now."
S1 student

4.4.2 Interim evaluation

The interim evaluation used postal surveys of teachers and students from participating schools to gather feedback on projects funded in round 1. Questionnaires were sent to 47 schools and responses received from sixteen, giving a total sample of 228 student responses. The key finding regarding the primary secondary transition was that even though a minority of students (about one third) felt that they knew more about the high school because of the project, about half felt more confident about going to high school. The project had a stronger impact on perceptions of science, with two thirds of students saying that they felt more confident about science as a result of the project, with a similar proportion expecting that "*science will be good*" at the high school.

4.4.3 Validation of teacher feedback

Taken together, **the small amounts of direct student feedback endorse the more in-depth data that we have from teachers about the value of the SSGS projects**.

4.5 Continuation

The most important test of whether or not a project has been successful is whether or not it has sufficient support within the cluster to become an embedded activity after the conclusion of the grant. **By this measure the SSGS programme has been a resounding**

success. Table 11 shows that **of the 48 projects analysed, almost two thirds of project leaders (31) were intending to continue the project activity in some way**. Even if practicalities and logistics ultimately reduce this number somewhat, there can be no question that the programme has left an important legacy for clusters, teachers and students.

It is perhaps not surprising that those projects where the primary activity was the development of resources are the most likely to continue as the legacy is clear. However, there are also encouraging intentions to continue or repeat activity amongst other types of project where continued input of resources will be required.

Table 11 Project likely to continue (based on 48 projects)

Nature of project	Number of projects	Likely to continue
Primary - Secondary exchanges	18	**11**
Electronic/virtual	12	**8**
Resources	9	**8**
Own school activities	8	**4**
Teacher training	1	**0**
Total	48	**31**

4.6 Conclusions

The SSGS has stimulated a variety of projects that have delivered wide-ranging benefits for teachers and pupils. Those projects that involved an interchange of students and/or teachers between primary and secondary schools had the widest range of successful aspects.

The scheme has successfully delivered against its three core aims to support learning, improve student confidence and enhance communications within cluster.

The most striking indicator of success is the number of lead teachers who reported that projects were likely to continue after completion of the grant.

5 Challenges

5.1 Introduction

The lower than expected numbers of beneficiaries shown in table 4, is a clear indication that project leaders faced challenges in bringing the activities together. These challenges were explored in the follow-up with teachers and 39 project leaders described challenges that they had faced. An analysis of the challenges reported led to the identification of five main themes.

- Engaging teachers (mentioned 19 times).
- Time, both to prepare and deliver the project (mentioned 18 times).
- Specific issues regarding equipment (mentioned 13 times).
- General issues regarding logistics (mentioned 9 times).
- Engaging students (mentioned 5 times).

5.2 Engaging teachers

Of the five main challenges faced, engaging other teachers was mentioned more times than any other. Indeed for all types of project except those using virtual activities engaging teachers was the most widespread challenge (see table 12 below).

Table 12 Challenges faced by different project types (based on 39 projects)

Project type	Engaging teachers	Time	Equipment	Logistics	Engaging students	Number of projects
Primary secondary exchange	9	7	5	6	1	**16**
Electronic/virtual	2	6	7	0	2	**10**
Resources	4	3	0	1	1	**7**
Own school activities	3	1	1	2	1	**5**
Teacher training	1	1	0	0	0	**1**

Achieving engagement was challenging at the institutional as well as the individual level.

> "[One] m*ust make sure heads and management are fully engaged as well as on side so that the appropriate support is forthcoming.*"
> "[It was difficult] *finding a time to meet the primary teachers that was suitable for everyone.*"
> "[A challenge was] g*etting other secondary teachers involved.*"
> "[A challenge was] c*ommunication between teachers, you need to put things in writing, have more meetings.*"
> Teachers

However, achieving the engagement of colleagues requires an investment of effort that is paid back.

> "[the] *primary teachers were initially daunted by the time required for children to do the project. They are OK with the workload now they have done it and have seen that it is not too onerous.*"
> Teacher

At the overall level, both the number of schools and teachers engaged were lower than anticipated, but some projects engaged more schools and teachers than expected. Five of the projects each attracted one more school than expected, but 17 projects engaged more teachers (67 in total) than anticipated. There is an indication therefore that once the investment has been made in fully engaging a school; additional teachers can be drawn into the activity.

A third of the teachers that mentioned engaging peers and colleagues as a difficulty also raised the issue of time. There is a clear link between investing in building networks and winning buy-in from peers and the time needed to deliver a project.

5.3 Time

The amount of time required to develop and deliver the project was an issue for a number of teachers. Typical comments were:

> "*Project was a large amount of work for* …[named teachers]."
> "*Finding time to manage the projects became a challenge.*"
> "*The lack of time for the project.*"
> "*Time on the day was tight.*"
> "*The large commitment needed by science staff.*"
> Teachers

The tone of much of the feedback implies that the amount of time required was more than had been expected. This is something that we have found in other evaluations of science communication and education activities. Advice to potential project managers can highlight that this type of project is demanding, but it may be that it is something that is only fully appreciated after it is experienced. Despite the concerns over time, the high level of intent to continue the projects shows how worthwhile they were thought to be by the lead teachers.

For at least one project, the grant support had helped to address the time problem, with a strength of the project being:

> "*Getting staff together. Commissioning time rather than paying for cover.*"
> Teacher

5.4 Equipment

Challenges were categorised as being related to equipment when there was a direct reference to a technical or reliability issue. Examples of equipment related challenges were:

> "[teacher] *had to learn a lot about filming from scratch.*"
> "*Use of ICT.*"
> "*Waiting for equipment to arrive.*"

"*Access to ICT facilities.*"
Teachers

Table 12 shows that the majority of equipment related challenges were associated with projects using electronic and virtual interactions. An example of an equipment related challenge that highlights the potential difficulty of taking secondary science into primary schools was described thus:

"*…33 pupils to a class with no assistant and no gas or water, so the activities needed to use everyday materials.*"
Teacher

5.5 Logistics

Logistics were an issue for a number of the projects that involved in-school activities, whether associated with an exchange, the use of resources or in own schools. These ranged from matters of geography.

"*…remoteness of the area.*"
Teacher

Through arranging support:

"*Training secondary volunteers, organising resources.*"
"*Getting things in the right place at the right time.*"
Teachers

To simple matters of:

"*Finding space for the project.*"
Teacher

As with the time required to manage science communication and education projects, the SSGS project managers are repeating feedback from other evaluation work that we have undertaken. Pre-application advice and support can help project leaders to prepare, but it is probably inevitable that individual projects will throw up their own peculiar problems, occasionally upsetting the best of plans.

5.6 Engaging students

This was only raised as a challenge by a small number of teachers. It might therefore be concluded that once teachers are fully engaged, then their students may be something of a captive audience. Issues that had occurred included slow initial take-up of activities and the need to proactively engage students. On a couple of occasions it had proved more problematic than expected to engage secondary school students in a support role.

5.7 Improvements

A number of project leaders (26) made one or more comments about how they planned to improve the projects further. Over half (15) said that they had allowed, or intended to allow, more time for either planning or doing activities. About a third said that they would try to ensure more collaboration (7) and a similar number (8) planned to change or

develop the nature of activities because of feedback that was gathered during the project. Other comments related to how the project was supported within the school (2) and improving evaluation (1).

The high level of feedback and detailed descriptions of future plans adds weight to the continuation plans reported in section 4.5.

5.8 Conclusions

In common with other science education and communication activities a critical challenge has been making, or finding, the time required to deliver the projects and especially the effort required to engage peers and colleagues. Equipment and logistics have also provided challenges for some project leaders, but only a small number reported that engaging students provided a challenge.

Set against the very positive picture of section 4, it is clear that the challenges were overcome, by the great majority of project leaders. However, the difficulty of engaging colleagues goes a long way to explaining the shortfall of beneficiaries reported in section 3.

6 Scheme Administration

6.1 Introduction

There are two facets of scheme administration. One is the support provided to applicants and grant holders, the other is the internal management of the programme, including the appraisal and monitoring of applications and awards and liaison with the funders.

6.2 Support to grant holders

6.2.1 Advice

The SSGS was designed to be a competitive scheme, this was a novel departure for SEED and not welcomed by all stakeholders. A telephone helpline at Careers Scotland was provided for potential applicants. Although the first round evaluation suggested that usage had been very low, management reports suggested some take up in the second and third rounds. There was also support available from the NESTA funded scheme representative, there is again evidence that this resource was used, of the 48 projects analysed in detail, 13 reported having used the scheme representative and all of these reported that this had been helpful.

In addition pre-application workshops were run and feedback gathered at the events suggested that these were appreciated by the participating teachers. The round 1 evaluation confirmed that the workshops had been viewed favourably by teachers who had gone on to submit successful applications.

The success rate in the first round was low (17 awards were made from 180 applications) and this exacerbated discontent with the competitive element. A common criticism of the first round was that the application process was too compressed and fell during a busy part of the school year. Clearly lessons were learned from this and applied in round 2. In the second round the number of applications fell to 71, but the number of grants made increased sharply (33).

About half of the round two applicants sought help, either by contacting the scheme representative or attending workshops. However, almost three quarters of the successful applicants had sought advice. In the third round 60 applications were received and 23 grants offered. In round 3 approximately one third of applicants sought advice, but two thirds of the successful applicants had sought help. **The higher success rates of those who had used the support mechanisms available show the value of these services**.

6.2.2 Impact of advice

During this evaluation, the funders have reported that there was a significant improvement in the quality of the applications in the second round suggesting that the raft of support offered to applicants did help them, but that time was required for teachers to come to terms with the scheme's requirements.

The quality of applications in the third round was still higher than in the first round, but the scheme funders have reported that although there were some very good proposals in the third round, the overall standard was not as high as in the second round. This suggests that the scheme had successfully brought forward a set of good projects, but that there may

be a limited number of occasions where there is the co-incidence of the project idea, the lead teacher and the institutional support lead to a good quality application. Three years does therefore seem to have been an appropriate timescale for the SSGS.

6.2.3 Scheme mechanics

The delivery of the scheme appears to have been handled to the satisfaction of teachers. We encountered no criticism of the handling of paperwork or payments.

Just over a quarter (13) of the 48 project leaders who provided feedback reported that they would have considered applying to the scheme again and the same number said that they would recommend it to colleagues. Only one teacher said that they would definitely not consider applying again, but it was reported that this project would continue in its current format with no further funding required, suggesting that it was lack of need rather than a bad experience that led to this response.

6.3 Programme management

The appraisal process appears to have been quite intensive with a panel comprised of representatives of the funders and Careers Scotland, supported by the scheme representative considering the proposals in some detail.

Monitoring however seems to have been a lower priority, with only limited end of project data made available for this evaluation. Given the positive overall nature of the evidence gathered for this evaluation, it is a shame that the monitoring data is so limited as this may have given an even more positive picture of the scheme's achievements.

6.4 Conclusions

The first round appears to have been rushed, with insufficient time given for the preparation of applications. However, as the scheme went on the support package made available to teachers helped to increase the quality of applications and the success rate for applicants.

There is a sense from the funders that the scheme was starting to lose momentum in the third round. This suggests that although the scheme had brought forward a number of good quality projects, that the initial decision to run the scheme for only three years was appropriate.

7 Conclusions

7.1 The Projects

The SSGS was launched in 2003 to support the transition of Scottish students from primary to secondary science. Over three rounds of the scheme a total of 69 projects were offered support through the SSGS from various locations across Scotland. The successful applications were effectively targeted at the scheme's aims of promoting partnerships, enthusing students and supporting learning.

The successful applications employed a variety of delivery methods. Some projects used combinations of delivery methods, although there was usually one main central feature. The most popular central feature involved the physical exchange of students and/or pupils between primary and secondary schools. Almost half of the supported projects used this approach.

7.2 Beneficiaries

Incomplete monitoring data was provided to PSP, so the total numbers of beneficiaries for the scheme as a whole cannot be estimated. However, we have collected data for the majority of the projects (48) so have been able to make estimates of the minimum number of beneficiaries reached, which were:

- 222 schools;
- 488 teachers; and
- 6,532 students, of which at least 4,360 were primary school students.

The numbers of beneficiaries were lower than had been anticipated, but are still notable. On average each project was engaging more than five schools, ten teachers and 130 students, with an average grant of only £2,150.

7.2.1 Value for money

The numbers of beneficiaries are lower than expected, but putting these in the context of the project costs and the grants awarded, suggests that simply in terms of numbers engaged these projects delivered good value for money.

At an estimated project cost of £131,101 (of which £103,281 was SSGS grant) the 48 projects analysed engaged almost 500 teachers and over six and a half thousand students. Most of the projects ran over extended time periods with a number of interventions or contacts for the participating students and teachers.

Adding in the wider costs of delivering the programme such as promotion and administration the cost of providing extended interventions with at least 7,000 students and teachers is just over £310,000. Given that there is no monitoring data available for 21 projects, it is reasonable to assume that the total number of beneficiaries is in fact considerably higher.

However, simply dividing cost by numbers of beneficiary gives a very crude measure that does not really indicate value. To assess value, it is also necessary to consider the quality of the interventions. Many of the projects entailed multiple interventions and extended

experiences for both teachers and students. The **outcomes reported by teachers indicate that they viewed the projects as successful in terms of impact on participants, not merely because of the numbers of participants**.

7.3 Outcomes

The project leaders have reported successes on a number of fronts, with the three core aims of supporting cluster communications, improving student confidence with regard to both science and the primary to secondary transition and improving science-related skills and knowledge all being achieved by many projects.

Improved cluster communication was the most often reported successful outcome, followed by practical experience and increased familiarity of pupils with aspects of secondary school. It is not practical to provide an independent measure against the aim of increasing attainment in science as any effects would be long-term and outside the scope of this evaluation. However, **many teachers reported that students had improved skills in relation to science that might be expected to underpin improved attainment in the longer-term**.

The most successful projects in terms of numbers of teachers and students reached and the breadth of successful features reported by teachers, were those where a physical exchange (whether of teachers or students) between primary and secondary schools was the central feature.

7.3.1 Core strengths

We found that in order for a project to be successful it needs to feature at least one of the following strengths:

- network building (for either teachers or students);
- delivering student enjoyment/confidence;
- delivering student skills/knowledge; and
- delivering teacher benefits.

The precise combination of strengths is likely to be driven by local needs. The development of new skills or knowledge, however, is more prominent in the electronic and virtual projects, where the acquisition of new IT skills tend to be cited as a specific strength.

7.3.2 Students

The limited direct feedback from students re-affirms the comments from teachers. The students particularly enjoyed taking part in practical work and opportunities to visit the secondary school had made them less nervous about their personal transition. They also felt more confident about science as a result of the project and valued the experience of group work and mixing with both older students and their peers from other primaries.

7.4 Challenges

The data suggest that the project leaders found it harder than they had anticipated to involve all of the schools in a cluster. Projects that were based around physical activities and exchanges on average engaged fewer schools per project than those that have an electronic component as the centrepiece. However, the virtual projects then engaged

fewer students and teachers per school. This suggests that physical activities require a higher level of institutional buy-in, but once this is achieved then it is easier to engage individuals.

Engaging other teachers was the most frequently mentioned challenge. However, achieving the engagement of colleagues requires an investment of effort that is paid back. At the overall level, both the number of schools and teachers engaged were lower than anticipated, but some projects engaged more schools and teachers than expected. Our analysis indicates that once the investment has been made in fully engaging a school; additional teachers can be drawn into the activity.

The tone of much of the feedback implies that the amount of time required was more than had been expected. This is something that we have found in other evaluations of science communication and education activities. Advice to potential project managers can highlight that this type of project is demanding, but it may be that it is something that is only fully appreciated after it is experienced.

7.5 Continuation

The success of the grants scheme is most clearly indicated by the number of project leaders indicating that the project was likely to continue. Almost two thirds of the projects are likely to continue emphasising that the teachers believe them to be worthwhile and beneficial to the students (and teachers). This is a strong endorsement of the quality of the projects, despite the challenges that had to be overcome.

In summary, for best practice our advice would be that successful projects are likely to feature an element where there is an exchange of pupils or teachers between primary and secondary schools. To deliver these projects, a significant amount of time needs to be allowed for development and delivery of the project with a particular focus on engaging teachers across a cluster.