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**LITERATURE REVIEW
OF MONITORING AND EVALUATION OF
*DISCOVER SCIENCE AND ENGINEERING***

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Executive Summary

BACKGROUND

The *Discover Science and Engineering* (DSE) programme was set up in October 2003 on foot of a recommendation in the report of the *Task Force on the Physical Sciences* that extra efforts should be made to address the decline in the numbers of students electing to study the physical sciences in second and third level education. The major objective of DSE is to co-ordinate existing science and technology awareness activities with a view to:

- Increasing the numbers of students studying the physical sciences
- Promoting a positive attitude to careers in science, engineering and technology
- Fostering a greater understanding of science and its value to society

The DSE programme is operated by Forfás on behalf of the Department of Enterprise, Trade and Employment. At the request of the Department Forfás is undertaking an evaluation of the programme for the period 2004-2007. The first phase of this evaluation is a literature review of the monitoring and evaluation activities undertaken by DSE since its inception. This report presents the findings from the review and summarises the information to date from existing reports as well as proposing improvements to the monitoring and evaluation process.

PROJECT FINDINGS

From the beginning the DSE programme management have attempted to identify programme indicators and to specify objectives and target audiences. These indicators are monitored on a regular basis. There is a general commitment to on-going evaluation of DSE activities. The results and findings from these monitoring and evaluation activities are being used by management to assess progress and to make changes to the programme in the light of audience feedback and changing circumstances.

This active approach to monitoring and evaluation from the start of the programme compares very favourably with the approach to similar programmes in other countries.

The following are the specific findings in relation to the major activities within the DSE programme:

Discover Primary Science (DPS)

DPS is designed to support the teaching of science in the revised primary school curriculum. It provides training for primary teachers and activities for the classroom. An early target was to reach all 3 300 primary schools by end 2007 and this was achieved with time to spare.

Two external evaluations, of DPS have been carried out, one in 2005 and one in 2007. Feedback from teachers was very positive and the impact on pupils considered impressive. A range of suggested improvements were made, with many taken up by DSE.

The second evaluation concluded that the DPS needs to consolidate and build on what has been achieved so that the momentum is not lost and to continue to maintain support for the teachers. DSE management are therefore developing a new strategy for the next school year.

Television

The major DSE effort for television was a series of programmes called SCOPE, developed in co-operation with RTE and aimed at school students. DSE monitored audience ratings

closely and commissioned two external reviews of SCOPE, one in 2004 and one in 2007 after the end of the last series of SCOPE. Ratings for this SCOPE 4 series were disappointing but the evaluation was quite up-beat, pointing out a number of reasons for the lower ratings compared to earlier series and reporting that students interviewed had enjoyed the programme and benefited from it.

Although the decision to discontinue SCOPE was considered the right one, it recommended the development of other TV programmes in the future which would build on what SCOPE achieved.

Science Week

Science Week has been running since 1997 and has been allocated increased funding under DSE. An in-depth review was commissioned following the 2005 event. It reported very positive responses from attendees, with primary schools the most frequent visitors. Greater efforts to attract secondary schools was one of the recommendations, together with a greater effort to use the internet for promotion and to widen the regional emphasis. A subsequent review of *Science Week* 2006 found evidence that these recommendations had been implemented by DSE.

One gap in performance monitoring is the absence of real-time feedback from attendees at the various events. It would be desirable to capture the impressions and impacts on participants at the time of the event, while memories are still fresh. This could provide more insight into how the event might be improved for greater effect.

Second Level Initiatives

Prior to 2006 DSE had no initiatives targeted exclusively at second level schools. The pupils of these schools, particularly in the junior cycle, are a key target audience for DSE. Two pilot programmes have now been introduced and a third is being developed.

The first one, *Discover Sensors*, was piloted in 90 schools in the 2006/2007 year. This pilot study was then independently assessed and received a favourable report in terms of its impact on students and teachers using sensor technology in the junior cycle. The pilot is now being extended to a further 150 schools.

While about 85% of students take the combined science curriculum in junior cycle only 30% take the physical sciences at Leaving Certificate. There is a need for more information about the numbers taking physical sciences at junior cycle level and the general attitude of students to studying science and to contemplating a career in science, engineering or technology.

Communications, Internet, PR

Ensuring an effective communications strategy is vital for the success of any awareness programme. In 2006, DSE adopted a more strategic approach to all communications aspects of the programme, using media relevant to the key audience of young people from 5 to 18 years. A new web portal went live for *Science Week 2007*. It is still too early to observe the impact of the new strategy.

Sponsorships and Partnerships

DSE operates a range of sponsorship and partnership activities, to leverage an added impact from other organisations and programmes operating in the area of science and technology awareness. In 2007 there were 49 such sponsorships, most of them relatively small. The major partnership is with the *STEPS to engineering* programme operated by Engineers Ireland to encourage more students to choose engineering as a career. About 50% of the DSE sponsorship budget of €1.12m goes to *STEPS to engineering*.

This report includes a separate chapter on *STEPS to engineering*, and the major conclusion is that substantial monitoring and evaluation activities are in place to monitor performance.

However, thus far there has been no assessment of the other sponsorships supported by DSE and this is a gap which needs to be addressed.

Findings

- DSE should continue its existing approach to monitoring and evaluation, taking into account a series of specific recommendations relating to the different activities of the programme which are detailed in Chapter 9
- There is a need for on-going surveys to monitor the attitude of a key target audience – school students in the junior cycle of second level. Their views about studying the physical sciences, and their hopes and expectation for Leaving Certificate subjects, would help DSE to adjust its activities for greater impact
- There is an information gap at the moment about the percentage of junior cycle students taking the physical sciences. DSE should address this gap, in co-operation with the educational authorities if necessary.
- Surveys should also be conducted among senior cycle students to ascertain why so many elect not to take physical science subjects in the Leaving Certificate examination.

1. Introduction

This report presents the findings of a literature review, commissioned by Forfás on behalf of the Department of Enterprise, Trade and Employment, of monitoring and evaluation activities at the *Discover Science and Engineering* (DSE) programme since its inception in late 2003.

All available and relevant reports on the programme (see Appendix for a full list of reports) were studied with a view to:

- Collecting and presenting data on the performance of the programme for the period 2004-2007
- Establishing the extent to which agreed performance indicators are being collected, analysed and used to adjust programme activities to reflect changing circumstances
- Determining the extent to which published data indicate that the programme is aligned with the strategic actions identified in the *Strategy for Science, Technology and Innovation*
- Identifying any gaps in data being collected
- Identifying any lessons from the evaluation of science awareness programmes in other countries

The remainder of the report is structured as follows:

Chapter 2 describes the changing policy context in which the programme operates;

Chapter 3 describes the activities of the programme;

Chapter 4 outlines the background to the development of performance indicators and an evaluation framework for the programme;

Chapter 5 describes the monitoring and evaluation activities undertaken by the programme in the period 2005-2007;

Chapter 6 assesses the impact of monitoring and evaluation on the operation of the programme and identifies any gaps which need to be addressed;

Chapter 7 Forfás has requested that the monitoring and evaluation activities relating to the *STEPS to engineering* programme (operated by Engineers Ireland as part of DSE) should be reported on separately, and this is done here;

Chapter 8 examines the experiences and lessons from evaluation of awareness programmes in other countries;

Chapter 9 provides a synthesis of findings.

2. Policy Context

At the time that the Government's ad hoc *Advisory Committee on Science, Technology and Innovation* (STIAC) published its report in 1995 a major policy concern was the widespread lack of appreciation of the fundamental role of science and engineering in a modern economy. The report therefore recommended the establishment of an awareness campaign to address this issue across a wide range of constituents – politicians, the public sector, enterprise and the general public. The Government White Paper on Science Technology and Innovation, published in 1996, agreed to such a campaign and STIAP (Science, Technology and Innovation Awareness Programme) was set up in 1996 with an initial annual budget of £225,000 (€280,000).

By 2002 the focus of policy concern had shifted. Science and technology were now clearly seen as major drivers of the Irish economy's strong growth for the previous decade. However, the country's ability to produce the numbers of qualified scientists and engineers needed to operate its high technology economy was coming under scrutiny. The report of the *Task Force on Physical Sciences* in 2002 expressed concern at the decrease in the numbers of students opting for the study of physical sciences at second and third level education. It recommended the establishment of an integrated national science awareness programme to raise the level of awareness of the physical sciences among school students and parents. Existing awareness activities in this area would be centrally co-ordinated by a new body. As a result the *Discover Science and Engineering* (DSE) programme was set up in October 2003.

The programme brings together the many science, engineering, technology and innovation awareness activities managed by different bodies, including:

- The Science, Technology and Innovation Awareness Programme
- The National Skills Awareness Campaign
- The *STEPS to engineering* programme
- The *Discover Science* programme

DSE's overall objectives are:

- to increase the numbers of students studying the physical sciences
- to promote a positive attitude to careers in science, engineering and technology
- To foster a greater understanding of science and its value to Irish society.

Science awareness, and DSE in particular, are discussed in Chapter 5 (Science Education and Society) of the Government's *Strategy for Science, Technology and Innovation 2006-2013*. It states that:

The *Discover Science and Engineering* programme will have a particular role to play in complementing the developments in the school system through:

- Continuing awareness measures with primary schools, accompanied by enhanced supports for second level schools;
- Increasing the number of participating primary teachers/schools in the DSE teacher training initiative;
- Extending the reach of this initiative to the second level sector in line with curricular reforms in collaboration with the second level school support service and higher education institutions as appropriate;
- Providing enhanced internet based support materials and resources for teachers at both levels of the system;
- Provision of information and guidance on careers in science, which will feed into school guidance programmes;

- Supporting pilot initiatives with schools in disadvantaged areas promoting innovative approaches to awareness initiatives and teaching methodologies in science. Experience in this area will also inform the development of further modules and short course options in science in the Transition Year Programme.

A greater awareness among students of career opportunities in science, engineering and technology is needed. The development of information brochures, guidance and resources materials and effective linking with school guidance services in this area will be promoted.

There is a clear need to find ways to stimulate interest in science before students enter senior cycle, so that they will be motivated to continue to study the subject and to choose it as a third level option. The Transition Year Programme has great potential in this regard, given its flexibility and emphasis on community, workplace and experiential learning.

The Strategy recommends developing the full range of awareness-raising activities under DSE.

3. Activities of the DSE Programme

While the establishment of DSE was announced in late 2003 it inevitably took some time to begin operating. A Director was appointed in July 2004. This filled an important gap, as highlighted in the Drury review of *STIAP*, because the Director of the *STIAP* had left in 2000 and had not been replaced. During 2004 the *STIAP* continued as before while a series of planning initiatives for the new programmes was undertaken by the Director and the DSE Steering Committee appointed by the Department of Enterprise, Trade and Employment. A key element of this planning was the development of performance indicators for the programme. This is discussed further in Chapter 4.

Over the three-year period 2005-2007 the activities supported by DSE evolved in line with the programme's own strategic plan for the period and also in response to monitoring and evaluation efforts conducted by the programme. The purpose of this study is to determine from the available literature how precisely the programme evolved and the role of monitoring and evaluation activities in this evolution.

Table 3.1 shows the DSE budget and staffing levels for the period 2004-2008.

Year	DSE Budget (€M)	Staff (FTE)
2004	1.6	5
2005	2.5	7
2006	4.0	8
2007	5.0	8
2008	5.2	9

Table 3.1 DSE Budget and Staffing

Table 3.2 shows the level of the various DSE activities for 2007 and the associated reviews/reports which were carried out for each activity for the period 2004-2007.

Details of these activities and their monitoring and evaluation are presented in the following chapters of this report. One very important element of the programme's monitoring and reporting activities is not included in the table. These are the regular monthly reports produced by management and which demonstrate an increasing sophistication over time. By 2007 these reports were noting specific objectives and targets for each activity, and monitoring progress against targets throughout the year. Information from these reports constitutes an important element of this review.

ACTIVITY	2007 BUDGET	RELEVANT REPORTS
Discover Primary Science	€800 K	Project evaluation 2004/2005 Feedback from Trainers 2004/2005 Project Evaluation 2006/2007
Television	€480 K	Evaluation of SCOPE programme (2004) Ratings Analysis of SCOPE (various) Television Strategy (2006) Review of SCOPE TV (2007)
Science Week	€400K	Review of <i>Science Week</i> and the <i>Science Week</i> Guide (2006) Review of <i>Science Week</i> and Nano Quest (2007)
Communications	€800K	Brand Strategy (2006) Communications Review (OMD 2007) Online Strategy (2006)
Second Level Initiatives	€900K	Evaluation of 'Discover Sensors' Pilot Project
Sponsorships and Partnerships	€1.12m	Various reports on the <i>STEPS to engineering</i> programme
Young Scientist	€150K	-

Table 3.2 Reviews of DSE Activities

4. Programme Objectives and Indicators

4.1 Identifying Objectives and Indicators

In the second half of 2004 DSE programme management, at the request of their Steering Committee, commissioned evaluation consultants to assist them in drawing up a set of performance indicators. A workshop in August 2004, involving the Steering Committee, DSE staff and DSE advisors, was convened to discuss programme objectives, target audiences and potential performance indicators. The consultants synthesised the outcomes of the workshop in a report.

It was agreed that the primary target audiences for DSE activities should be primary and secondary school students. This reflected the views of the *Task Force on Physical Sciences* and also the thinking of the Steering Committee. Teachers and parents were also seen as key audiences because of their influence on students. Other wider audiences were viewed as not so critical to the primary objectives of increasing the numbers studying science in school and thereby increasing the potential pool available for taking third level science and engineering courses.

A number of broad, overarching indicators for the DSE programme as a whole were identified. These were:

- Increased awareness of science and technology and its importance to everyday life (pupils, teachers, parents, media, general public)
- Improved perception of science and technology (pupils, teachers, parents, media, general public)
- Increased uptake of science and technology subjects (students at all levels and girls and women in particular)
- Increased numbers opting for science and technology careers (students at all levels and women in particular)
- Integration of various DSE initiatives

In addition, a range of output (short-term) and impact (longer-term) indicators were identified for each of the programme activities at that time. For example, the list of indicators for *Science Week* was as follows:

Indicator Type	Indicators Identified
Output	<ul style="list-style-type: none"> - Number of events and trend over time - Number of participants at events and trend over time - Media coverage of events at national and regional level - Feedback from event organisers
Impact – short term	<ul style="list-style-type: none"> - Positive feedback from participants - Positive feedback from organisers - Increased awareness of DSE initiatives - Increased take up of science at second level (junior and senior cycles) - Increased interest in science by pupils
Impact – long term	<ul style="list-style-type: none"> - Greater awareness and appreciation of the value of science and technology and how it affects everyday life - Improved image and positive perceptions of industry, science and technology - Increased numbers at third level in science and technology

Table 4.1 Suggested Indicators for *Science Week* Ireland

The workshop addressed a key problem with trying to measure the effects of an awareness programme such as DSE. The ultimate aim of the programme is to increase the numbers of young people taking up science and engineering careers in Ireland. But it is unrealistic to expect that the programme's effects in this area can be quantified or that meaningful targets can be set. The time frame is very long – ten to fifteen years for activities aimed at primary school students – so any target setting would not provide useful feedback for programme-related decisions. It is, however, reasonable to assume that the long-term aim will be achieved if the more specific objectives of the programme activities are successful – raising awareness of science and engineering among school students, increasing their disposition and potential for studying these subjects at third level and choosing an associated career, and fostering a more positive attitude among others who can influence these career choices, particularly teachers and parents. It is therefore reasonable to set specific targets for the activities aimed at achieving these effects.

4.2 Refining Key Performance Indicators

A further workshop took place in November 2004 to agree on the key target audiences for the programme and on the performance indicators. The broad approach of the earlier workshop was accepted, with some minor changes to the list of indicators, and the problems of sourcing indicator data discussed. Among the suggestions agreed this were:

- Feedback from event organisers and participants should be gathered on a regular basis
- Undertake a series of awareness and attitudinal surveys, to monitor trend over time

- Internal review of inputs, outputs and costs on an annual basis

4.3 An Evaluation Framework for DSE

In 2005 DSE management commissioned Siobhan Phillips, a research and evaluation psychologist, to design an evaluation framework for measuring the programme objectives and to identify and analyse relevant attitudinal data. Her report emphasised the need to complement quantitative data about numbers taking science subjects, attending DSE events, etc., with qualitative methods such as interviews, focus groups and other approaches which explore the context and underlying body of influence for the views expressed. It also drew a number of lessons from international literature and research, including the insight that attitudes to science and actual behaviour in relation to studying science are two very different things. 'School science' and 'science in society' are distinct entities that provoke very different responses from target groups and need to be explored separately. A British *Attitude to Science* study found that, in promoting science to school students, it is equally important to emphasise the opportunities foregone by not studying science (e.g. opportunity to study medicine) in addition to the opportunities presented by a science career.

The report recommended that DSE should monitor second level data on a yearly basis:

- Proportion and numbers taking science subjects at Junior and Leaving Certificate levels
- Proportion and numbers of CAO preferences in science and engineering
- Proportion and numbers studying first year science and engineering at third level

Complementary contextual research should include:

- Focus groups with junior and senior level school students, exploring a range of attitudes and behaviour
- An analysis of the background qualifications of science teachers, as international experience has identified the role of such teachers as a key determining factor for future career choices.

5. Monitoring and Evaluation of DSE Activities 2005-2007

5.1 Discover Primary Science

5.1.1 Introduction

In September 2004 the Primary Science Clubs activity was re-branded as *Discover Primary Science* (DPS). Its main objective is to support the teaching of science in the revised primary school curriculum. DPS has four main activities:

- Training in DPS for teachers at about 40 centres around the country in higher education institutes and in education centres
- A classroom pack containing six activities linked directly to the science section of the Social, Environmental and Scientific Education (SESE) curriculum and 25 that support the curriculum without a direct link
- A number of Discover Science Centres (25 by 2007) around the country, which the schools are encouraged to visit
- An Award for Excellence for those schools which progressed beyond basic participation in the programme.

Table 5.1 summarises the achievements of DPS under a number of indicator headings:

Year	Budget €000	Total Schools Registered	Total Teachers Trained	Annual Awards of Excellence	Discover Science Centres
2005	800	560	528	108	7
2006	920	1 700	2 200	303	18
2007	800	3 100	3 500	585	25

Table 5.1 DPS Performance Indicators

Beginning in 2006 DSE set targets for the year for a number of indicators (schools registered, teachers trained, awards for excellence) and progress was monitored and reported periodically in the DSE monthly reports. An early target was to cover all primary schools (approximately 3 300) as soon as possible, and by 2007 DPS had been offered to all the schools with an uptake of over 90% (3,100).

Other activities promoted by DPS were visits to schools by external speakers, intended to stimulate interest in science and its applications, and 'science events' in schools. In 2006/2007 there were 353 such visits and 505 events took place.

5.1.2 External Reviews

Two external evaluations of DPS were commissioned, one for 2004/2005 and one for 2006/2007, including a questionnaire sent to all participating teachers. The response rate was 31% for the first survey of 528 teachers and 23% for the second survey of 2,386 teachers, with responses slightly biased towards the more enthusiastic participants (as measured by application for an Award for Excellence). In 2004/2005 about 43% of all pupils in the schools participated in the programme, while 58% did so in 2006/2007. This shows a wider impact in the schools than originally expected.

The following are some important comments originating in the returned questionnaires:

- Almost all (97%) of teachers rated the DPS impact on pupils' interest or awareness of science as 4 or 5 on a five point scale
- A similar percentage gave it a 4 or 5 rating for learning and skills development
- The Activity Pack is excellent but needs to be more durable and to be updated regularly
- The training activity should be held earlier in the school year (January is too late)
- 53% of responding schools visited a Discover Science Centre in 2005 and 40% in 2006. The main reasons for not visiting a centre were 'too far away' and 'too costly'. A sizeable number of schools 'never got around to it' but would be interested in doing so
- The website for DPS is popular and useful. The 2004/2005 survey stated that it needed further development

The second DPS evaluation noted that many of the suggestions made in the earlier report had been addressed by DSE (for example, teacher training was brought forward to October).

The final conclusion of the second evaluation was that the programme needs to consolidate and build on what has been achieved so that the momentum and excitement is not lost. It is particularly important to maintain some support for the registered teachers (most of whom are not science graduates) to avoid the impression that they have been abandoned once the target number of schools had been reached.

5.2 Television Activities

5.2.1 Introduction

The use of TV to reach a wide audience with the message that science is useful, relevant and rewarding was a primary strategy of STIAP, the awareness programme preceding DSE. This approach continued to be paramount in the strategy of DSE and its Steering Group. The approach has evolved over the years and this is discussed in the two sections below.

Table 5.2 shows the DSE budget allocation to TV programming for the period 2005-2007.

Year	Budget (€000)
2005	400
2006	400
2007	480

Table 5.2 – TV Programming Budget

5.2.2 TV Series

A dedicated series, SCOPE, produced in conjunction with RTE and aimed mainly at the younger audience, began in 2003. After the first series a market survey of school-aged viewers was undertaken through four focus groups of 13/14 year olds and 15/16 year olds. While the students enjoyed the videotapes of the programmes that were given to them, very few had watched the programmes live and low awareness was the major problem identified. The students supported its continuation but suggested a greater connection to the second-level curriculum so that teachers would be encouraged to recommend it to pupils.

A second series of SCOPE was aired in 2004 and a third in 2005. Ratings from SCOPE Series 3 averaged just over 78,000, of which about a third were children aged 4 to 14. In early 2006 DSE appeared concerned about the returns from their investment in SCOPE and decided to review the project. However, over the following Summer RTE decided at short notice to produce a SCOPE 4 series and requested DSE support, which was granted. A 12-episode series was scheduled to start in March 2007 and DSE set a target average viewership of 80,000, much the same as achieved by SCOPE 3. Viewership data were monitored regularly throughout the series and averaged 70,000 after five programmes. This fell to 62,000 after eight episodes and additional promotional efforts were undertaken. By the end of the twelve episodes viewership averaged 58,000 and a decision was taken not to support another series and to commission a fundamental review of the SCOPE programme. A reallocation of €280 0000 was made from the TV budget to *Science Week*.

5.2.3 Review of SCOPE

In response to what was seen as disappointing viewership figures for SCOPE 4, DSE commissioned an external review of SCOPE TV in general and Series 4 in particular. The review included focus groups involving:

- > 10 to 12 year olds
- > 13 to 14 year olds
- > Secondary school science teachers
- > Third level science students

It also involved in-depth interviews with representatives of second level education, co-sponsors of DSE and other science promotion representatives, and programme makers and television critics.

The findings were interesting and perhaps surprising. They supported the strategic view that television is an area that DSE should be involved in because of its ability to connect with key segments of the DSE target audience. Reactions to the series itself, particularly Series 4, were very positive. A number of explanations were offered for the low ratings, including:

- > Lack of awareness of the programme due to limited promotional efforts

- > The later time slot of 7.00pm was unsuitable for the 10 to 12 year olds who were the primary target
- > There was a lack of continuity in scheduling because some weeks were missed for sporting events and for Easter
- > Absence of web presence

The lack of investment in promotion was considered to be SCOPE's biggest weakness. Nevertheless, despite the positive impressions of those who viewed it, SCOPE was considered to have run its natural course. However, the lessons learned from the experience should be used to develop future TV programming which would build on what SCOPE achieved. A number of useful suggestions and recommendation for the future were made.

5.2.4 Opportunistic TV Events

The second strand of DSE's TV strategy was to use external consultants to increase coverage of science and technology stories and events on television. In May 2005 Agtel were awarded a one-year contract to do this.

The approach adopted was one of close contact and lobbying of TV personnel to persuade them of the desirability (in terms of audience interest) of airing more items with science content. The consultants developed 'stories' with such content and attempted to sell them to the networks. Monitoring of their activities from May 2005 to January 2006 showed:

- Total airtime for science stories 7.5 hours
- Combined audience viewership 11.5 million
- Number of stories developed 126
- Number of stories broadcast 38 (30% hit)

In view of this success the approach was continued and, after a competition, a second contract was awarded in September 2006 to pitch stories to TV news desks.

For 2007 a target was set for this 'opportunistic' TV approach of obtaining a 40% pitching success rate.

5.3 Science Week

5.3.1 Introduction

Science Week Ireland was inaugurated in 1997 with about 50 events throughout the country over one week in November. Since then it has been an annual event. In their evaluation of DSE's predecessor campaign STIAP in 2002, Drury Research commented on the lack of any objective data on attendance levels at *Science Week* events. The situation has not changed that much since then.

Table 5.3 shows the budget for *Science Week* for 2005 to 2007.

Year	Budget (€000)
2005	350
2006	350
2007	400

Table 5.3 – *Science Week* Budget

5.3.2 External Reviews

Following the 2005 event DSE commissioned OCS Consultants to provide an improved understanding of the views of the general public and key target audiences for the *Science Week* initiative and for the *Science Week* Guide published in 2005. The consultants undertook four focus groups with

- Secondary teachers
- Transition year students
- Parents
- People aged 18-24, in work, not in third level

They also interviewed 18 event organisers as well as inserting two broad questions about the awareness of *Science Week* into an omnibus national survey.

The major findings from this study were:

- positive responses from attendees and organisers
- Events targeted at primary schools are most popular, in terms of visitor numbers and recoded satisfaction. Primary teachers have greater flexibility in being able to arrange attendance and are very supportive
- Second level schools are more challenging in a number of ways. It is difficult for teachers to schedule class visits without upsetting the school timetable and maximum notice is needed of the *Science Week* event list. Also, second level students are a very challenging audience to interest and excite.
- A small cohort within the large body of event organisers has developed very considerable expertise in running events. Others need help with finding and funding a location for their event. Almost all find it impossible to obtain the skilled facilitator (of whom there would be only a handful in the country) needed to organise successfully an event targeted at the 'general audience'.
- The awareness of *Science Week*, at 48%, scored quite well among the general population, compared to other national awareness programmes as measured in a national survey. Among 15-24 year olds the awareness level was 63%.

The consultants recommended:

- *Science Week* is less successful with secondary schools and they should be the target of a new approach

- Teachers are the key influences determining whether *Science Week* events are attended and the DSE programme should develop closer relationships with secondary teachers
- Organisers could be helped by promoting better communication and co-operation between them and by providing training in group facilitation to increase the numbers and skill levels of event facilitators
- Most organisers believe *Science Week* would benefit from a higher national profile and some promotional ideas were suggested, including more use of the internet.

A similar external review of *Science Week* 2006 was undertaken in 2007. The focus groups this time involved transition year students, post-transition year students, secondary school teachers and third level science students.

Evidence was found that the recommendations from the review of *Science Week* 2005 had been implemented by DSE. These included more help for organisers, greater use of the internet, a greater regional emphasis and improvements to the calendar of events.

Suggestions for the future included:

- Ability to expand the activity, with higher participation levels, is now limited by capacity in the existing venues. Organisers are unwilling to target new schools in their areas because of the lack of space to accommodate additional audiences. A key question for the future of the event is what can be done to provide greater capacity and to involve more schools in *Science Week*. One suggestion is that some schools might host events on the school grounds.
- There should be a focus on developing long term relationships with schools and young audiences.
- More support for event organisers, including event facilitation
- Greater effort to involve and influence parents at events, partly because of their role in subject selection by their children
- Attitudes to, and opinions towards, science tend to be formed at Junior Certificate level. This should be taken on board when preparing communications material for *Science Week* and other awareness activities

The consultants updated the national survey on general awareness of *Science Week* in the population. This held steady at around 49% of the population, the same as in the 2005 survey. Well established awareness programmes tend to have a fairly consistent level of recognition among the public.

5.3.3 DSE Reaction

Following the review of the 2005 *Science Week* DSE made a number of changes for the 2006 event. These included greater use of the internet for promotion and a higher regional presence. More emphasis was placed on activities for younger teenagers. About 300 events were planned for the week.

Following *Science Week* 2006 it was announced that almost 400 events took place and total participation was estimated at 90,000.

For *Science Week* 2007 a target of 400 events and 90,000 participants was set at the beginning of the year. Greater regional presence and better audience targeting were also sought.

5.4 Second Level Initiatives

5.4.1 Introduction

Many of the studies and research undertaken by DSE, referred to in earlier sections, pointed to the need for DSE to focus more on second level teachers and students. Prior to 2006 there were

no initiatives targeted exclusively at that audience. But in its annual plan and budget for 2006 DSE added a new element to its work – second level initiatives – with a budget of €400,000 that year. Planning began on a number of concepts.

During 2006 two pilot projects were introduced. One, called *Discover Sensors*, aims to support the Junior Certificate science curriculum by enabling teachers and pupils to maximise the use of data logging equipment. A target of 50 schools was set. By end 2006 this pilot was operational in 90 schools, The plan for 2007 was to review the results of the pilot and to extend the initiative to a further 150 schools, taking on board the recommendations from the review, discussed in 5.4.2 below. By end 2007 the target of 150 new schools had been reached with 18 others on the waiting list.

The second pilot, operated in conjunction with Engineers Ireland, is called *Career Choice*, and its objective is to promote the attractiveness of careers in the ICT industry and to encourage third level study of computer sciences and electronic engineering. During 2006 this project led to 400 school visits by young workers in the ICT industry to discuss their careers with students.

During 2007 a third 'second level initiative' was developed, a transition year hub project called *Project Blogger*. It is being piloted in ten schools from Autumn 2007.

The budget for second level initiatives is shown below:

Year	Budget (€000)
2006	400
2007	900
2008	950

Table 5.4 Budget for Second Level Initiatives

5.4.2 Evaluation of Discover Sensors Pilot Project

A comprehensive review of the experiences of teachers and students in the *Discover Sensors* pilot project was completed in June 2007. It found that the project had been highly successful in achieving its main aim of supporting the use of sensor technology at Junior Certificate level. Teachers felt that their participation had been beneficial to their teaching and the students had no difficulty using the equipment.

The planned expansion to 150 additional schools should continue during 2007/2008 and the lessons learned about the use of ICT in science teaching should be reflected in the second phase of the pilot project.

5.5 Communications, Internet and PR

Communications lie at the heart of every awareness programme and ensuring an effective and coherent communications strategy is vital for success. In 2006, therefore, the DSE Steering Group took steps to develop a more strategic approach to communications for the DSE programme. A number of external studies were commissioned. Based on their findings the Steering Group approved a three-pronged approach to a communications strategy:

- A Brand Definition Strategy relating to communications and internet presence. Brand strategy consultants had recommended that DSE focus on the internet as the most appropriate point of contact for audiences and partners, although there is a

need to align on-line and off-line activities to create a more effective brand. They recommended the consolidation of DSE activities behind a single brand name.

- An Internet Strategy. Internet strategy consultants reinforced the recommendation about the development of a comprehensive on-line strategy with a greater and more focused presence.
- A PR programme for enhanced communications effort. Ability to reach target audiences could be improved with greater audience specification and prioritisation. Also, a strategic approach to communications should tie together all the individual communications associated with the various DSE activities.

The branding exercise concluded that DSE needed to focus, communicate and use media more relevant to its key audience of young people aged 5-18. The DSE programme plan for 2007 consequently set targets to

- Increase visitor numbers to Discover Science Centres
- Increase communications indicators (e.g. *Science Week* to improve its position from fourth place in the 'league table' of awareness programmes)
- Develop and introduce a new internet portal to enable more coherent and easier access to DSE internet sites

A new *Discover-Science.ie* portal went live for *Science Week* in November 2007, and the promotion of *Science Week* was more internet-based than before.

Table 5.5 shows the trend in both the PR and total communications budgets from 2005 to 2008.

Year	PR (€000)	Total Budget (€000)
2005	150	290
2006	248	660
2007	248	800
2008	412	800

Table 5.5 Communications, Internet and PR Budget

5.6 Sponsorships and Partnerships

Since the DSE programme administration is relatively small, with currently around eight staff, an important element of its overall strategy is to develop partnerships with other organisations and programmes operating in the same space so as to leverage an added impact.

From 2005, DSE introduced a dedicated budget for these sponsored projects. It funds up to a maximum of 50% cost of a sponsored project up to a total cost of €100,000. It also supports the awareness activity of Engineers Ireland – **STEPS to engineering** – which has as its objective encouraging more people to choose engineering as a career.

Most of the sponsored projects are relatively small but there are a few large ones. *STEPS to engineering* is the major project and is discussed separately in Chapter 7. A significant partnership has also been developed with the Cork Electronic Industries Association. And in 2006 DSE became a 'gold partner' with BT for the Young Scientist and Technologist Exhibition.

Table 5.6 shows the trend in the sponsorship activity.

Year	Budget (€000)	Number of Partnerships	Young Scientist Support (€000)
2005	500	35	0
2006	800	59	150
2007	1 120	49	150
2008	1 225	40	

Table 5.6 – Sponsorship Activity

In 2006 and 2007 annual targets were set of achieving two additional significant partnerships. As a result the Galway Education Centre and the Cork Discovery Group have become partners.

6. Impact of Monitoring and Evaluation on the DSE Programme

6.1 Introduction

Chapter 5 outlined a very extensive range of monitoring and evaluation activities undertaken by DSE programme management and steering committee since its inception. Taking into account the recommendations of external consultants in 2004-2005 on potential performance indicators, DSE management decided that each main activity of the programme should be evaluated regularly. These evaluations would make use of both quantitative data and qualitative attitudinal information determined by focus groups and other opinion gathering exercises. The results of the evaluations would be used by management to drive change on an on-going basis.

These early workshops and reports contributed to the development of measurable objectives for the programme together with clearly identified target audiences and suggested performance indicators. These have led, in conjunction with the activity evaluations undertaken, to the gradual evolution of annual performance metrics and targets which are set at the beginning of the year and monitored in the monthly reports throughout the year. This approach applies to most, but not all, of the DSE activities. The situation by activity is discussed in the following sections.

6.2 Discover Primary Science

The two evaluations of DPS, one for the 2004/2005 school year and the other for 2006/2007, made use of questionnaires to obtain feedback on the impact of the activity on attitudes to science and on learning science. In addition, targets were set each year, and monitored, for the number of schools and teachers signed up for DPS and for the number of teachers trained.

This monitoring and evaluation has formed the basis for continuous change and improvement to DPS over the years and is the foundation for a new strategy which will commence in the 2008/09 school year.

One possible gap in the monitoring activity is the absence of any direct feedback from the students themselves. This could add to the insights provided by teacher feedback.

6.3 Television

6.3.1 SCOPE TV

Viewership figures for SCOPE have been monitored for the series covered by DSE (i.e. SCOPE 2, 3 and 4). A review by Lansdowne Market Research in 2004, based on focus groups with second level students, identified the very low awareness of SCOPE as a major problem, although the show content rating was generally positive and overall it was both entertaining and educational. Relevant, focused advertising was recommended to improve the awareness levels. It is not clear to what extent this happened, but viewership figures failed to improve by much and, following poor ratings for SCOPE 4, a decision to discontinue SCOPE was taken in July 2007. The subsequent review of SCOPE 4 by OCS Consulting broadly confirmed this decision. However, the findings from both SCOPE reviews were not negative and the development of similar programmes in the future was recommended, taking on board the various lessons from the SCOPE experience.

6.3.2 Opportunistic TV

While this activity was monitored, in terms of airtime and viewership, the absence of independent assessment is a concern. The *Review of Television Strategy* in 2006 was

undertaken by the company operating the activity on behalf of DSE. The findings of their report are encouraging but another opinion would strengthen the case.

6.4 Science Week

External, independent reviews of *Science Week* have been in place since the 2005 event. The findings have been used by DSE management to improve the next year's event. Recently, targets for number of events and attendance levels have been set in advance of the event.

While the reviews made use of focus groups to obtain the views of older school students, secondary teachers and parents, there is an absence of immediate feedback from those attending *Science Week* events. It is desirable to capture the impact of the events at the time, while memories are still fresh. Against this has to be balanced any additional workload involved for the organisers.

Using number of attendees as a performance indicator is complicated by the issue of lack of space for events, which is certainly something limiting the potential expansion of attendance numbers.

6.5 Second Level Initiatives

These initiatives got underway in 2006. To date, targets have been set for the roll-out of the three initiatives. The *Discover Sensors* project is the most advanced and the pilot study of 90 schools was comprehensively evaluated by external consultants in 2007.

It is expected that these initiatives will be monitored and evaluated in line with the practice in primary schools for DPS. Students in pre-Junior Certificate classes are a vital target for DSE activities. Around 85% take science at this stage but it is not clear whether they all take physical sciences or mostly the biological sciences. It is known that only 30% take physical sciences at Leaving Certificate. DSE should begin monitoring, insofar as is possible, the trend in numbers taking physical sciences pre-Junior Certificate. Occasional attitude surveys of students in this age group would be desirable, to track their attitudes to studying science post-Junior Certificate and their thinking on the subject of a career in science or engineering. Their views on DSE activities should also be monitored.

6.6 Communications and PR

Three external studies contributed to the re-orientation of the whole communications effort in the period 2006-2007 (see Table 3.2), while the communications budget increased from €660,000 in 2006 to €800,000 in 2007. A greater emphasis was placed, as recommended, on the internet as a means of communicating with target audiences, particularly school students.

This literature survey was unable to form an opinion, at this early stage, as to whether a more focused and strengthened communications effort has been put in place as a result of these studies. No doubt this will form a key element of the main DSE evaluation, of which this review is the first part. In view of the size of the communications budget, and reflecting on the central role of communications to any awareness activity, this will be an important task to undertake.

6.7 Sponsorships and Partnerships

DSE receives many applications for sponsorship from a wide mix of applicants, all of whom are pursuing some aspect of science and engineering promotion or support in their own areas.

As already noted, the *STEPS to engineering* (discussed in more detail in Chapter 7), the Cork Electronic Industries Association and the Young Scientist and Technologist Competition receive the bulk of support. But during 2006, for example, 23 other organisations received funding totalling about €120,000. These included projects such as DCU's Science Bus, the Royal Irish

Academy's *Science Open Doors*, the Tallaght Youth Theatre for *Gene Quest* and Killarney National Park Education Centre for a project for Kerry Primary Schools.

The *STEPS to engineering* project accounts for nearly 50% of the sponsorship. This is reported on in detail through quarterly reports to DSE and operates a range of detailed monitoring and evaluation activities discussed in the next chapter.

The other sponsorship activities do not appear to be assessed as closely as *STEPS to engineering*, presumably because there are so many of them. Nevertheless, the absence of an evaluation of the overall sponsorship activity is an obvious gap in the system.

7. STEPS to engineering

7.1 Introduction

In 2000 the Institution of Engineers of Ireland (now Engineers Ireland) established a promotional programme named STEPS (Science, Technology and Engineering Programme for Schools) to encourage primary and secondary students to explore the world of science and engineering with the ultimate aim of increasing the numbers studying engineering at third level. During 2005 the programme was given a high profile as part of Engineers Ireland's new marketing strategy *Promoting the Profession*. STEPS was re-named *STEPS to engineering* at the end of 2005 and DSE became a major partner in 2006 with funding of €250,000 from its sponsorship budget. Others providing financial support are the Department of Education and Science, FAS, and industry.

Table 7.1 shows the budget for 2004-2007

Year	STEPS Budget (€000)	DSE Contribution (€000)
2004	220	-
2005	260	-
2006	540	250
2007	750	500

Table 7.1 STEPS Budget 2004-2007

The revised objectives for *STEPS to engineering* are:

- Raise awareness among students about engineering as a career
- Encourage a positive attitude towards careers in engineering, science and technology
- Promote a greater understanding of the contribution of engineering to society and of how engineering is relevant to everyday life
- Highlight the opportunities and rewards of an engineering career
- Introduce students to science and show the links with engineering.

The major target audience for the programme is primary and second level students.

A key aim of *STEPS to engineering* is to address the widespread misunderstanding and lack of information about engineering and engineering careers. Third level students interviewed by Engineers Ireland as part of a 2005 study expressed a wish that they had known about the different engineering disciplines, and the possibilities that existed, before completing their CAO applications. The study also drew attention to the continuing decline in the numbers studying engineering at Level 8 Honours Degree. In 2005 there were 1,533 students in First Year engineering courses and 1,655 in Final Year, a drop of 17% when expected attrition rates are factored in.

7.2 Primary School Activities

7.2.1 K'NEX Challenge

This activity is designed to introduce primary school students to engineering, design and technology by the use of model kits. It is linked to the Design and Make element of the primary curriculum. The prize winners from each school progress to regional finals and thence to national finals and the award of 'Junior Engineers for Ireland'. Beginning in 2003 in fifteen schools it is expected to have reached 1000 by 2008.

Table 7.2 shows the trend in the activity since 2005:

Year	No. of Schools	No. of Students Involved
2005	218	6 500
2006	500	15,000
2007	750	28,000

Table 7.2 K'NEX Challenge 2005-2007

Feedback was obtained from participating schools, teachers, parents and the volunteer engineers involved. The feedback was positive, with a range of suggestions for improving the activity. One of the engineers recommended getting feedback directly from pupils (as well as via teachers) at each school as a valuable evaluation tool.

7.2.2 Magical Science and Engineering Show

The aim of this show is to provide a fun and exciting introduction to the world of science and engineering, and to create a positive attitude to these subjects before the children enter second level. The format is a lecture cum demonstration at a number of locations around the country. It was introduced in 2003 and, like the K'NEX Challenge, is linked to the SESE curriculum.

Table 7.3 shows the trend in activity since 2005:

Year	No. of Locations	No. of Attendees
2005	9	5,730
2006	14	10,290
2007	21	14,500

Table 7.3 Magical Show 2005-2007

As with K'NEX, the rapid growth in activity in 2006 and 2007 was made possible by DSE funding. At each show the teacher was given a feedback form and a response rate of 30% obtained. Responses were very positive.

7.3 Second Level School Activities

7.3.1 Engineering-as-a-Career Seminars

The seminars take place in higher education institutions throughout the academic year and are open to teachers, parents and second level students. The aim is to provide information about the different fields of engineering and the seminars are given by recent graduate engineers.

About 5,000 students attended the events in 2005 and 2006.

7.3.2 Engineer to School Visit

This initiative was established in 2005 and brought graduate engineers to visit schools in their locality to talk about the diversity of the engineering profession. In 2005 over 200 engineers and 7,000 students were involved.

In 2006 this activity was combined with ICT Ireland's *ICT Champion Programme* to become the *Engineering and Technology Champion Visits*. It was designed to explain both engineering and ICT courses to the target audience. 400 schools, involving 8,200 students, took part in 2006 and a target of 10,000 students was set for 2007.

7.3.3 ICT Campaign

This campaign, *Are you up for it*, was introduced in 2006 to address the continuing drop-off in ICT students in third level. It took the form of an on-line competition to inform, help and encourage students to consider studying ICT.

7.3.4 Explore Engineering Summer Camps

This was established in 2002 in the University of Limerick and in 2006 extended to UCD and DCU. It gives students an insight into engineering study options and careers. It takes the form of all-day classes. Almost one-third of participants were female, higher than the 22% studying engineering or the 11% of engineers in industry who are women.

7.4 Engineering Week

In response to a suggestion in Engineers Ireland's corporate plan 2003-2006, an Engineering Week was introduced in 2007. It was called *Engineered! A Week of Wonder* and took place in February.

The target audience for the event was 8-14 year olds and their parents. It involved all engineering organisations and third level institutions in Cork, Dublin, Galway and Athlone. It cost €180,000, a significant proportion of the *STEPS to engineering* budget. It aims to emulate *Science Week*, while offering a similar audience a different experience and giving engineering an identity of its own.

A target of 5,000 attendees was set in advance but in fact 11,400 attended 75 events during the week.

Feedback was obtained from forms distributed to parents at the events and from a follow-up survey of organisers. 500 forms were returned and 22 out of 29 event organisers responded. Respondents reported high scores for enjoyment (5/5) and educational value (4/5).

The key recommendations from the subsequent evaluation of the event were:

- Have a 'Week of Wonder' in 2008
- Expand the audience to 14-17 year olds
- Aim for greater industry involvement

7.5 Monitoring and Evaluation

Ex post reviews were undertaken by *STEPS to engineering* management of the following activities:

- K'NEX Challenge 2006
- K'NEX Challenge 2007
- Magical Science and Engineering Show 2006
- Engineered! A Week of Wonder 2007

Quarterly reports are prepared for DSE, which monitor targets and outcome for each activity and also provide details of all press, TV and radio coverage of the programme's activities.

Thus far, no evaluations have been undertaken of the second level school activities described in section 7.3.

In 2006, a detailed analysis was prepared of CAO applications and Leaving Certificate and Junior Certificate results. The major findings were:

- Percentage of students taking the physical sciences in the Leaving remained at the 2005 level of 30%
- Percentage of students taking Engineering in the Leaving was up to 12.5% from 8.4% in 2005
- Percentage of Junior Certificate students taking science remained steady at 86%
- Percentage of Junior Certificate students taking Honours science increased from 64% to 67.3%
- A total of 13% of all CAO applications were for Level 8 engineering/technology courses – a slight decrease over the last three years.

It is intended to repeat this survey every year.

8. Overseas Experience – A Short Literature Review of Other Countries

There are a number of science awareness programmes and networks active in other countries. The UK and Australia have two of the longest-standing activities. There are at least three international networks in this area, two confusingly with the same name. COPUS (Coalition on the Public Understanding of Science) is a US-based network of organisations and individuals with a common goal of engaging the public in science and increasing their appreciation and understanding of what science does. COPUS (Connecting People with Science) was funded by the Office of Science and Technology in the UK until 2004 and supported science communications projects. Finally, PCST (Public Communications in Science and Technology) is a network of individuals around the world who are active in the area of public awareness of science. PCST hosts international conferences, electronic discussions and other activities to foster dialogue between network members. It will be holding its 10th International Conference in Sweden in June 2008, supported by the Swedish Research Council, VINNOVA and other bodies. The general theme of the conference is *Bridges to the Future* and one of the four sub-themes will be the assessment of impacts and outcomes of awareness programmes.

8.1 United Kingdom

The major player in science awareness in the UK is '*the BA*'. It organises major initiatives including the annual BA Festival, the annual National Science and Engineering Week, regional and local events, and an extensive programme for school students. Details are available on its website. The website gives a listing of events and also includes a useful feature for event organisers, which allows them to register, log-in and enter details about their events. DSE could consider this approach as part of its on-line strategy development.

After each of its *Science and Engineering Weeks* (formerly called *National Science Week*), the BA commissions an external evaluation which provides an analysis of:

- Number of events
- Geographic distribution
- Organiser profile
- Attendee profile / estimate of numbers
- Marketing and target audience information
- Measurement of public awareness of *Science Week*
- Media coverage
- Conclusions and recommendations for next year.

Incidentally, a national survey indicated that about 30% of the population had heard of *Science Week*, compared to about 50% for the Irish equivalent.

the BA also undertake an evaluation of their annual Festival of Science. There is no on-line evidence of how their other activities are monitored or evaluated.

There have been three relevant guidelines issued in the UK in relation to science awareness activities. In 1996 COPUS published *So Did It Work*, which is a guide on good practice use of questionnaires, interviews and focus groups to obtain the views of participants about events. COPUS also published *Good Practice in Science Communication Project Management* in November 2003. The UK Research Councils (RCUK) have also published an evaluation guide for science and society projects. The emphasis is heavily on the use of SMART (simple, measurable, achievable, realistic, time-bound) objectives, which should be built into the programme at the outset and then used to measure performance and make adjustments as necessary.

8.2 Australia

In a paper published in 2001 Gascoigne (a leading figure in PCST) and Metcalfe examined how the Australian Science and Technology Awareness Programme had been evaluated since its inception in 1989. Regular reviews were conducted in 1991, 1994, 1997, 1998 and 1999. These reviews were based mainly on interviews with stakeholders and on written submissions. The earlier reviews focused on information gathering that enabled the Australian Government to track changes in public attitudes on questions such as:

- The perceived importance of science in everyday life
- The importance of science and technology for the future
- The career prospects for people studying S&T
- The suitability of careers and study in S&T for women

The authors identified a number of flaws in the review process.

Firstly, the reviews focused to a large extent on the views of the scientific community. Secondly, they tried to measure changes in awareness but not the extent to which they were caused by the Awareness Programme. Thirdly, it was clear that evaluation had not been a fundamental design element of the programme from the outset and reliance was placed on superficial measures such as attendances at events to justify the programme. Nevertheless, the authors commended the programme for its efforts in evaluation and remarked that, at the time (2001), there was no evidence that awareness programmes in other countries (UK, New Zealand, South Africa and Ireland were cited) had programmes of evaluation in place.

The authors proposed a model for the evaluation of awareness programmes and how a programme should prepare for evaluation. It included:

- Evaluation should be built in from the start
- Identify clear objectives, using the SMART approach. Many programme objectives are really mission statements
- Identify the audience to be influenced and establish baseline data
- Identify the most appropriate method to assess change (focus groups, interviews, questionnaires, surveys, opinion polls, etc.)
- Carry out ongoing assessment during a project as a way to shape the programme and improve effectiveness
- Carry out post project assessment

8.3 More General Findings

A study of the international literature on attitudes to science has shown that attitudes and behaviour, particularly to school science, can be quite different things. Behaviour can be affected by the perceived content and relevance of the science curriculum together with the quality of science teaching, even if students have an intrinsically positive attitude to science itself. One UK study concluded that the reason three times as many post-16 year olds study physics in Scotland as in England is because Scottish schools have graduate physicists to teach physics while English ones do not.

These findings show the complexity of the problem about declining numbers choosing to study science, a problem by no means confined to Ireland, and the need for a multi-faceted approach to solving it.

9. Synthesis and Findings

9.1 Major Findings

It is clear from this review of DSE documents that the issue of monitoring and evaluation has been high on the agenda of the Steering Committee and programme management from the outset. This is very desirable and is, as noted in Gascoigne and Metcalfe's paper (2001), quite rare for science awareness programmes internationally.

From the beginning, an effort was made to identify performance indicators for the programme and to specify objectives and target audiences. The original set of objectives did not always conform to the SMART ideal (simple, measurable, achievable, realistic, time-bound) so that it took management a while to develop indicators which could be measured and monitored relatively easily. To a large extent they are now doing so, with targets and outcomes reported in the DSE monthly reports. There is scope for further development in this area and this is discussed further in the recommendations below for the specific activities.

A general commitment to regular evaluation of DSE activities is also discernible and this is most notable in relation to *Discover Primary Science*, *Science Week*, Television and Communications. Evaluation is being introduced for the relatively new Second Level initiatives.

STEPS to engineering has a comprehensive monitoring and evaluation system in place. Quarterly reports to DSE monitor targets and outcomes for each of its activities, including details of media coverage.

The results and findings from these monitoring and evaluation activities are being used by DSE management to adjust the programme to changing circumstances.

DSE can be said to be achieving the aims for it set out in the Government's *Strategy for Science, Technology and Innovation*, although there is no clear evidence of efforts to support initiatives with schools in disadvantaged areas.

9.2 Findings

9.2.1 Overarching Findings

- DSE should continue its existing approach to monitoring and evaluation, taking into consideration our specific recommendations below for the various activities of the programme.
- The major gap identified in this review is in relation to attitudinal surveys of the key target audience – school students in pre-Junior Certificate second level classes. From now on, many of these students will have benefited from DSE initiatives under *Discover Primary Science* and *Science Week*. It is important to obtain their views about studying physical science subjects and about their hopes and expectations for Leaving Certificate subjects and even subsequent studies and careers. The surveys could also monitor the students' views about the effect of DSE activities on their attitudes and behaviour.
- DSE and *STEPS to engineering* have been monitoring Leaving Certificate results and CAO applications in relation to science and engineering subjects. However, it is equally important to monitor the trend in numbers studying physical sciences pre Junior Certificate. DSE should attempt to do this, if the information is currently available; if it is not, DSE should work with the educational authorities to collect this important statistic.
- Senior cycle students are an equally important audience and surveys should be used to ascertain why so many elect not to take the physical sciences in the Leaving Certificate

examination. This would update and elaborate on the findings reported in the *ROSE* report.¹

9.2.2 Specific DSE Activities

- ***Discover Primary Science (DPS)***

DPS has now been rolled out to all primary schools. It is time to take stock and undertake a fundamental review of DPS in the light of experience and the two evaluations to date. This is planned for 2008. It will be particularly important to provide on-going support for the teachers and to continue to adapt the activity over time.

An effort should be made to obtain direct feedback from the primary school students themselves, as well as from their teachers as at present.

- **Television Programming**

While audience ratings for SCOPE 4 were disappointing, some excellent experience was gained and useful lessons learned over the years that SCOPE was being planned and broadcast. DSE management should look again at the decision to discontinue TV programming, if this is indeed the intention. The OCS Consulting report makes some good recommendations for building on the SCOPE experience.

The 'opportunistic' placing of science stories and reports will continue in 2008 under the Communications heading. It would be desirable to have an independent review of this activity and of its impact on key audiences for the DSE programme.

- ***Science Week***

Attempts should be made to get more data about individual *Science Week* events – attendance levels, number of school visits, real-time feedback from attendees.

- **Second Level Initiatives**

These initiatives are still at an early stage. The first one, *Discover Sensors*, has had its pilot phase evaluated. The other initiatives should be similarly assessed in due course in line with the way *Discover Primary Science* has been regularly reviewed.

- **Communications and PR**

Changes introduced since 2007, including an increased budget, should be independently assessed to ensure they are having the desired effect of delivering a more focused and strengthened communications effort for the programme.

- **Sponsorships and Partnerships**

STEPS to engineering, which accounts for nearly 50% of DSE's Sponsorships and Partnerships budget, is being comprehensively monitored and evaluated. **The other sponsorship activities of DSE should receive an in-depth review of their performance and impacts.**

¹ *The Relevance of Science Education in Ireland*. Royal Irish Academy (2007)

9.2.3 Steps to engineering Activities

- Ireland now has an annual *Science Week* and, since 2007, an annual *Engineering Week*. DSE and *STEPS to engineering* should examine carefully the benefits and the drawbacks of holding two similar events.
- Activities relating to second level schools should be evaluated in the same way as many of the programme's other activities have been.

APPENDIX

Documents Reviewed in this Study

Discover Science and Engineering

Evaluation of <i>SCOPE TV</i> Programme.	Lansdowne Market Surveys. (April 2004)
Development of Performance Indicators for DSE.	Evaltec/Eustace Patterson. (August 2004)
Prioritisation of Audiences and Indicators	Eustace Patterson Ltd. (October 2004)
DSE Strategic Plan 2005-2007	June 2005
Evaluation of <i>Discover Primary Science</i> 2004-2005	Motherway Begley Consultants. (July 2005)
Priority Indicators for DSE	S. Phillips. August 2005
Feedback from Trainers in <i>Discover Primary Science</i> , 2004-2005	2005
Report on Television Strategy	Agtel. (February 2006)
Review of <i>Science Week</i> 2005	OCS Consulting. (June 2006)
DSE : Online Strategy	AMAS Ltd. (July 2006)
SCOPE TV Ratings Analysis	2006
Brand Strategy for DSE	Zero-G. (August 2006)
Review of <i>Science Week</i> 2006	OCS Consulting. (May 2007)
Evaluation of <i>Discover Sensors</i> Pilot Project	Dr. D. Kennedy, UCC. (June 2007)
Evaluation of <i>Discover Primary Science</i> 2006-2007	July 2007
Communications Review of the DSE Programme	OMD Ireland. (2007)
Review of SCOPE TV	OCS Consulting. (September 2007)
DSE Monthly Reports	January 2005 – January 2008

STEPS to engineering

Presenting Engineering as a Career	Engineers Ireland. (December 2005)
Your Guide to <i>STEPS to engineering</i>	2005-2006
Evaluation of <i>K'NEX Challenge 2006</i>	July 2006
Analysis of Junior and Leaving Certificate and CAO Results	October 2006
Review of <i>Magical Science and Engineering Show 2005/06</i>	October 2006
Engineering a Knowledge Island 2020	Monitoring Report, Engineers Ireland. (November 2006)
Evaluation of <i>Engineered! A Week of Wonder</i>	April 2007
Evaluation of <i>K'NEX Challenge 2007</i>	September 2007
Your Guide to <i>STEPS to engineering</i>	2006-2007
Submission to Department of Education and Science Strategy Statement 2008-2010	<i>STEPS to engineering</i>
Progress Reports to DSE	Quarters 1, 2 , 3 2007

Other Documents

Evaluation of the <i>STI Awareness Programme 1996-2001</i>	Drury Research. (February 2002)
Strategy for Science, Technology and Innovation 2006-2013	Government Publications. (June 2006)
Evaluation of National Programs of Science Awareness	Gascoigne and Metcalfe, SAGE Publications. (2001)
Evaluating European Public Awareness of Science Initiatives	Edwards. Science Communications Vol. 25 No. 3 (2004)
Guidelines to Evaluation of Science and Society Projects	Research Councils UK. (2005)
Evaluation of UK National Science Week 2006	<i>the BA</i> . (2006)
<i>the BA</i> Festival of Science 2006 – Evaluation of Young People's Programme 8-13 years	<i>the BA</i> . (2006)