
The Winston Churchill Memorial Trust

Churchill Fellowship 2006



The Northern Districts Education Centre (Sydney)
Churchill Fellowship to investigate best practice in
Science and Technology in Primary Education in
United Kingdom, New York and Canada.

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Project Description: To investigate best practice in the teaching and learning of Science and Technology in Primary Education in the United Kingdom, New York and Canada.

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Margaret Malone

Churchill Fellowship Report 2006 (Northern Districts Education Centre)

Investigating best practice in Science and Technology in Primary Schools

Or “My Heart is Singing”

The response by Stevie a Year 1 Boy (age 7) to his teacher when asked about going on an excursion to study rock pools

This report outlines key findings from my Churchill Fellowship visit to, England, Scotland, Wales, Northern Ireland, New York and Canada to investigate best practice in the teaching of Science and Technology in Primary Schools.

Introduction

The Churchill Fellowship (Northern Districts Education Centre) enabled me to have the opportunity to travel to other countries to study best practice in Science and Technology in primary schools. It also provided the opportunity to promote the Churchill Trust wherever I travelled.

I am most indebted to the Northern Districts Education Centre for providing this scholarship that allowed me to expand my knowledge and understanding of the teaching and learning of Science and Technology. I am also most appreciative of the encouragement from the President of the NSW Board of Studies, Professor Gordon Stanley, the General Manager, Dr John Bennett, the Director, Curriculum John O'Brien and my colleagues in the Curriculum Branch.

The following findings from this valuable experience will impact directly on 650 000 students and over 40 000 teachers using the NSW Board of Studies syllabuses – both in NSW and in overseas schools where NSW syllabuses are used particularly in South East Asia and the Middle East.

Highlights of Educational Experiences

- Educational consultants in United Kingdom:
 - Gaynor Weavings – Wales
 - Stuart Naylor – UK, Scandinavia – New Zealand – Australia
 - Brenda Keogh – UK, Scandinavia – New Zealand – Australia
- York Science Festival – National Science Centre - York University
 - Professor John Holman
 - GlaxoSmithKline
 - British Association for the Advancement of Science
- Cardiff – Dr Anne Goldsworthy
- Educational Excellence – Virtual Learning Environment – Lancastershire
- Irlam School visit - Manchester
- Wakefield Professional Development Day with teachers
- Tyneside School visit – Newcastle
- Science Learning Centre – Durham
- Professor Wynne Harlan – Scotland
- Dr Bob Kibble – Edinburgh University
- Cath Crawford – Scottish Council for Educational Research
- Mary Smith – Scottish Qualifications Association
- Heriot Watt University – Thinking Conference
- Dr Carolyn Yates – Chair of Science Teachers Association
- Professor Carol McGuinness – Sustainable thinking classrooms
- Manchester Metropolitan University – post graduate pre-service teachers; lecturers in primary Science & Technology
- Rebecca Edwards – Qualifications & Curriculum Authority – London
- Professor Colette Murphy – Queens University Belfast
- Dr Jim Beggs – Queens University School Belfast
- Peter McAllister – South Eastern School Education Board – Belfast
- Dr Linda Curtis-Bey; Roy Harris – New York City Education Dept
- Chatham Elementary School visit – New Jersey
- Chatham Swamp Environmental Centre – New Jersey
- Jill Snider – Ontario Ministry of Education
- Professor Erminia Pedretti – Ontario Institute of Studies in Education
- Dr Jane Forbes – University of Toronto
- Catherine Little – Toronto Board of Education
- Vancouver Island – Goldstream Environmental Centre

Preparation

The current New South Wales Kindergarten to Year 6 syllabus for Science and Technology was developed in the late 1980's, printed in 1991 with outcomes and indicators added in 1999. This syllabus is mandatory for all students and teachers in government and non government schools in NSW.

Before leaving on the Fellowship, there was consultation with many primary teachers across the State of New South Wales - and some secondary – on the current K-6 Science and Technology syllabus.

Almost 500 teachers returned written surveys and over 300 primary and secondary teachers attended after school meetings across the state. Written and oral submissions were taken from key stakeholder and interest groups eg parent organizations, government and non-government education sectors, principal councils, university academics and professional associations. Almost 600 students also participated in discussions on the current teaching of Science and Technology in their classrooms. A symposium for all the major stakeholders was held prior to my departure. All who participated in these discussions were most interested in the Churchill Fellowship experience – and its findings.

Preparations for the Fellowship took many months to ensure that there was a balance of consultations with teachers, principals, university academics, teacher educators, researchers, curriculum developers and teacher professional developers plus the opportunity to attend conferences, visit schools, universities, science learning centres and environmental centres.

All of the people generously gave of their time and expertise and were also most interested in how syllabuses are developed in NSW. Wonderful contacts and networks were made that will continue to enhance lifelong friendships and professional learning. This was truly a life long learning experience for me.

It was anticipated that a visit in Paris to the AstroZeneca sponsored Xplora project would occur. Unfortunately the English speaking co-ordinator was unavailable due to illness during my time there, but I do have some research documents on this European initiative that provide interesting information in this area.

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Recommendations

There were a number of common issues that emerged in each of the countries visited in the area of Science and Technology for primary students which will have a direct impact on the development of the review and revision of the K-6 Science and Technology syllabus at the NSW Board of Studies.

The following major findings and recommendations will be tabled at the Board's K-6 Science and Technology Curriculum Committee for consideration in the development of the K-6 Science and Technology syllabus and also at a formal presentation to member of the Board of Studies in December 2007 and other professional development presentations across the state in 2008.

These common issues and their significance will have important implications for best practice in the development of the K-6 Science and Technology syllabus :

The importance of:

- **the uniqueness of primary education**
- **professional development to improve teacher confidence and competence**
- **pedagogy in teaching/learning/assessing Science and Technology**
- **the place of environmental/global issues in the primary curriculum**
- **catering for the needs of all students**

Major Findings

The uniqueness of primary education

Research in the United Kingdom, Canada and Australia has identified the uniqueness and importance of how students learn in primary schools. From observations in classrooms and discussions with academics, teachers and professional developers, all emphasised the interconnected nature of children's real life experiences which must be reflected in the curriculum. The total learning environment in primary education should foster and encourage students' curiosity and motivation to learn. The way in which children learn in a primary classroom should complement and build on the way they learn naturally. They need to experience success and feel confident to take risks with learning.

In formal and informal meetings over the duration of the Fellowship, an important statement of fact emerged ***that primary students learn differently to secondary students. Also primary teachers teach differently to their secondary colleagues because of the nature of the learners*** in their classrooms and the expectation that they will teach six different Key Learning Areas without having to specialise in any one of those areas. Within the primary years of schooling, students beginning school at age 5 have different learning needs to those in Year 6 about to enter secondary education. The total learning environment of a primary classroom fosters the development of positive social values and attitudes. This is an important aspect for consideration in development of the K-6 Science and Technology syllabus.

From discussions with academic researchers in the United Kingdom, Canada and Northern Ireland concerns were raised that **children's attitudes towards science** are declining (Harlen, Murphy, Beggs, Goldsworthy, Pedretti). Research in the UK and Ontario revealed that too much emphasis has been placed on scientific content at the expense of skills and enjoyment and that teachers have not been adequately supported in professional development and resources to provide a positive learning experience for their students.

The issue of national assessment also raised some issues in teaching and learning of Science and Technology –, namely, ***what is tested is taught*** – with an interesting solution to this being offered in New York. The greatest danger of national assessment or standardised testing is the reduction of teaching to only what is tested resulting in non motivating activities for students' learning and their teachers' teaching. This in turn is a major factor and a possible reason for the decline in students' attitude to science and selecting science subjects in secondary schools. This research will have important implications for development of syllabuses in NSW and Australia.

A report just released in the United Kingdom on the **review of Primary Education (R. Alexander, Cambridge University 2007)** found that the increase in test results from 1995 – 2000 was largely a result of teaching to the test and not an improvement in learning. The report also found that there has been a rise in test-induced stress among primary students and the gap between the lowest and highest achievers in the UK is wider than ever before.

Another area of discussion on the Fellowship was **scientific and technological literacy** – a topic that I wanted to expand with researchers. Developing skills that will assist students to become active and informed citizens as well as equipping them with underpinning conceptual knowledge is part of this concept. Whilst few teachers referred directly to it, all teachers spoken to agreed that science and technology need to be relevant to students' everyday lives. Research conducted in a national and international literature review completed prior to my departure from other countries also supported the importance of the concept of scientific literacy as well as technological literacy. The most recent 2006 OECD PISA report has important information on this area for consideration when developing the syllabus.

Resources

The teachers I spoke to agree that primary students are naturally curious about the world around them and enjoy actively investigating with hands on activities rather than passive teacher-talk lessons. They also spoke about the need to implement strategies that allow the students to 'talk more' and engage them through fun, hands-on practical activities based on the world around them. Creating a more student-centred classroom rather than a teacher-dominated one was a universal theme. There were two outstanding strategies, in particular, which allowed this to happen. The first was the use of puppets as a teaching aid in Science and Technology and the second was the use of concept cartoons which allowed the students to work through problem solving scenarios and arrive at a conclusion free of the teacher input.

Primary teachers are generalist teachers and not Science and Technology specialists – they teach all Key Learning Areas and understand the nature of teaching and learning in a primary classroom. They see and build upon their students' natural curiosity and sense of wonder, enthusiasm and interest about the world around them. From discussions with teachers and researchers all agreed that primary students learn best when they see meaning and purpose in their learning.

There appears to be consensus in discussions that due to the fact that primary teachers are generalist teachers and not Science and Technology specialists they are not always aware of the specific subject knowledge associated with this subject.

As in New South Wales the importance of the learning continuum from K -12 was stressed but Professor Murphy in Northern Ireland will be presenting a paper in February 2008 stating that primary Science and Technology should reflect the uniqueness of primary students not necessarily the link with the specialist area in secondary school.

This is an important area for consideration in developing syllabus support documents for primary teachers.

Starting age for primary students:

The New South Wales Board of Studies writes curriculum for students from Kindergarten to Year 12 (aged 5 -18 years). Other educational jurisdictions (United Kingdom and Canada) start their curricula at age 3 years. This has important implications for curriculum developers and educators in New South Wales to further investigate and indeed important for the developers of a national curriculum.

Organization of the Curriculum

The place of Science and Technology in the primary curriculum was an interesting topic for discussion in each country along with the time allocation given across the weekly lessons

In some countries Science is separate to (Design and) Technology (New York, England, British Columbia) in others Science and Technology are together (Ontario), in Alberta it's Science, Technology and Society and in the National Curriculum of the United Kingdom it's part of The World Around Us. The place of environmental education and outdoor education was raised at the Ontario Institute of Studies in Education (OISE) in Toronto as an important inclusion in their revised syllabus.

In Ontario the 1998 Science and Technology syllabus is for Grades 1-8 with a major revision currently happening to ensure that "Making Connections" with other learning areas in the primary curriculum is addressed as the first component of the syllabus followed by Developing Skills and Developing Knowledge. What the syllabus *looks like to teachers* will be an important part in the revision of the K-6 Science and Technology syllabus.

The National Curriculum in the UK is organised in three distinct areas:

What are we trying to achieve?

How do we organise learning?

How well are we achieving our aims?

The Curriculum **aims** are *successful learners, confident individuals and responsible citizens; that every child be healthy, stay safe, enjoy and achieve, make a positive contribution, achieve economic wellbeing*; focus for learning **attitudes and attributes** eg *determined, adaptable, confident, risk taking, enterprising*; **Skills** eg *literacy, numeracy, ICT, personal, learning and thinking skills*; **knowledge and understanding** eg *big ideas that shape the world*. This will be an important area for consideration in New South Wales and Australia.

Time allocation

No system or country had a 'mandatory' time allocation for Science and Technology in their primary schools. However, the issue of National testing ensured that what was on the tests was taught – usually from text books or photocopied sheets from text books. Talking with teachers in all countries visited, most taught Science with Technology on average for 1-2 hours a week – sometimes as a unit in itself but more usually integrated with other learning areas. Those teachers who were focusing on HOW Science and Technology was taught using students' talk/discussions and other resources eg puppets, taught more Science based units. Teachers, particularly in the UK, articulated the Technology aspect as designing and making as distinct from ICT.

The issue of time allocation will have implications when writing the K-6 Science and Technology syllabus in NSW.

National Testing

Testing was undertaken in the UK and New York State. It would appear that how well students did on the test was more important than the idea that Science needs to be 'meaningful and enjoyable'. Academics and teachers agreed that it was important to test the students as it indicated how well they understood what they had learnt. But they all agreed that the publishing of league tables had a negative effect. Sample testing was a possible solution in order to demonstrate accountability about the effectiveness of the syllabus and how well children are learning. Professor Wynne Harlan has already done much research in this area and is currently being funded by the Wellcome Trust to look at assessment in the early years of schooling. She believes that testing stifles teaching and that not all students need be tested. Random sampling will provide similar information and not hinder good teaching practice.

Professional Development to Improve Teacher Confidence and Competence

An interesting sub title could have been *the place of corporate philanthropy in promoting the teaching of science and technology.*

This was a fascinating area to study – particularly in the United Kingdom - and the area of biggest difference in approach and funding. In the UK large companies are involved in corporate philanthropy – encouraged by the government organization **British Association for the Advancement of Science** – sponsoring professional development and teaching resources for primary/secondary schools eg CREST – Creativity in Science and Technology – a nationally recognised accreditation scheme for Science and Technology projects. CREST Investigators enables primary students to solve scientific problems through practical investigations.

The professional development activities focus on thinking about ... talking about ... doing Science. Teachers were most enthusiastic about this useful resource – with some schools providing after school activities in this area.

The Wellcome Trust has built the world renowned National Science Learning Centre at York University with research and residential facilities plus nine other Science Learning Centres around the country built close to schools. At the Science Learning Conference a number of interesting questions were posed, ***“Do school leavers know enough science to use technology responsibly and effectively and make informed judgements on global issues?”***

Professor John Holman is the inspiring Director of the Centre who spent some time talking and discussing the challenges facing the UK in attracting students and retaining teachers in the area of Science.

GlaxoSmithKline sponsor **Researchers in Residence** where scientists, as part of their role, visit schools (mainly secondary) and talk with students about their work. There are also over 17 500 science and engineering ambassadors working in schools to raise students' aspirations, help students be better informed and to bring real life examples to the classrooms thus enriching the syllabus.

Dr Derek Bell, the Chief Executive of the Association for Science Educators raised some concerns about the impact of assessment and testing regimes, lack of professional development for primary teachers, lack of technical support in secondary schools, the actual physical environment and resources for teaching Science and teacher expertise. He raised the issue of focusing on what primary teachers do well – that they don't need to know a lot of science knowledge – they are creative teachers who shouldn't worry about being subject specialists. ***The important implication for my work is to ensure that the syllabus being revised in NSW doesn't make teachers feel that they NEED to be a specialist teacher in Science and Technology.***

In Scotland the Qualifications and Curriculum Authority advise teachers that they should aim for 35 hours professional development a year – but this is not mandated.

New York City had a unique approach to professional development. Meeting with the Science Curriculum Director in New York revealed an interesting content driven syllabus funded by the Mayor of New York city. The content is prescribed and teachers are given end dates to teach particular units. Principals need to make a choice how they want their professional funding to be spent in one of three ways – to purchase text books – to purchase teaching kits – or a combination of text books/teaching kits.

The New York state has standardised tests in Science, Mathematics and Language Arts and the city has also introduced standardised tests in Science, Mathematics and Language Arts which have no diagnostic feedback to teachers for future planning/teaching/learning and generally arrive in the school after the end of the school year. However they are available to the media to compare school results as published league tables comparing schools in each district.

Publishing houses are an integral part of the syllabus development process – with the syllabus referring to particular published resources in the mandatory units of work. Schools have Science co-ordinators who work with a Science consultant in 9 regions across the state in a train the trainer model for any professional development.

Pedagogy in teaching/learning/assessing Science and Technology

An important issue that emerged in every discussion was **HOW** Science and Technology is taught in classrooms as part of the total primary curriculum. The teachers with whom I met were passionate educators in Science and Technology recognising however that other primary teachers have a passion/expertise in other learning areas of the primary curriculum. Brenda Keogh and Stuart Naylor were integral in assisting to organise visits around the United Kingdom for this Fellowship. Both previously taught at Manchester Metropolitan University in teacher education and now have their own professional development consultancy where they are in great demand in the UK, Sweden, New Zealand and Australia where they have presented at national and international conferences. They focus strongly on pedagogy – **HOW teachers teach Science and HOW students learn effectively**. They have worked on the National Curriculum in the UK, they work closely with teachers and are actively involved in current research.

They worked with teachers and university researchers to produce STARS – Small groups working together; Thinking and Talking; Active; Relevant; Sharing results using different media. This is a GlaxoSmithKline sponsored resource that teachers use in their classrooms launched at the National Science Learning conference at York, England at the conference in 2007. Students and their teachers are encouraged to use scientific procedures to solve problems eg measurement is important and variables make a difference. Teachers and students at the launch were enthusiastic about having a quality resource that children enjoyed learning and teachers had fun teaching!

Reference to Robin Alexander's current research on ***Towards Dialogic Teaching – classroom talk (2006)*** promoted much discussion with teachers. This research emphasises the value of children talking and asking questions about their learning. They ask questions such as:

What do we want to find out?

How will we do it?

What will we use?

How will we make it fair?

What do we think will happen?

What did we find out?

The professional development provided to teachers by these two outstanding educators inspired and enthused teachers to focus on the HOW they are teaching - not just Science - in their classrooms – and provided (through the financial sponsorship of companies) quality classroom resources.

They focus on the importance of the teacher making a difference to students' learning.

The important implication for my work is: **What is being taught is not the issue – it's the HOW . . .** the pedagogical framework of children actively learning (not always hands on) – from teachers who themselves are also actively learning with planned quality professional development and a manageable curriculum that's not cluttered with learning areas that are connected - not disjointed - and sufficiently flexible to accommodate the needs of all learners.

Another inspiring educator, researcher and professional developer is Dr Anne Goldsworthy. Anne began her professional session that I attended with research from TIMMS study that showed in 1995 80% of 11 year olds said they enjoyed Science lessons but in 2003 (after 4 years of national testing) this had dropped to 68%. She then presented a day of revision activities based on national testing topics to show teachers that science learning (and revising) can be fun. **Teacher feedback focused on the interaction and discussion with other colleagues** and HOW they learnt to teach and revise their curriculum. They appreciated the opportunity to DO activities that also linked across other areas of the curriculum.

In discussions with teachers on this day, they also emphasised that they were not specialists in science and needed the confidence and professional development to be able to competently teach the syllabus.

Professor Wynne Harlen has completed research over many years in the UK and overseas on primary science. Discussions with her in Scotland began around her most recent book and research on the ***Teaching of Science in Primary Schools*** – but stretched into what skills and knowledge primary students need for the 21 century. She strongly believes that **testing stops teaching** – but she believes that sample testing is good. Professional development of teachers is critical for growth and development. She stresses the importance of teachers talking with teachers, sharing their pedagogy and successful strategies.

Professor Harlen stated that **teachers can be confident without competence** – primary teachers don't have to be the font of all knowledge in all subject areas.

It's more important to get children talking and engaged in their learning. She is currently doing research on effective testing in primary science – sponsored by the Wellcome Trust.

Finding **quality resources** that teachers can readily access and use – not just in Science and Technology – was part of the quest on this fellowship. A visit to the *Education Excellence – Virtual Learning Experience* site demonstrated practical teaching resources that assist teachers to focus on planning, teaching and assessing Science and Technology in their classrooms with simple strategies and low cost resources. This team worked closely with teachers in the UK and provided some solutions to everyday issues for teachers. Practical experiences – for teachers and their students – were their main areas with some simple strategies that are easily accessible to assist teachers in their teaching.

The issue of quality resources will promote interesting focus discussions with sectors and teachers when developing the K-6 Science and Technology syllabus in NSW.

The place of environmental/global issues in the primary curriculum

The place of environmental and global issues was the focus of a number of discussions on the Fellowship. Use and forms of energy, use of water, climate change, the environment, sustainability are current issues that students, the media and politicians are concerned about. Where these issues fit into a primary curriculum - if they fit at all – will be a source for future discussion in revising the current Science and Technology syllabus in New South Wales.

At the Science Learning Conference in York Dr Steve Tilling raised the issue – yet again – about teacher confidence, competence and commitment in using Field Study Centres for Science and Technology. The majority of teachers who use these centres teach Geography, English, Visual Arts and Drama – and 3 times more primary teachers use the centres than secondary.

Professor Erminia Pedretti (Head of Science Education at OISE, Toronto) has just published a major report in Ontario about the importance of outdoor education and environmental education in primary and secondary schools. The Ontario provincial government has accepted the recommendations to include this area as a cross curriculum requirement. The issue of environmental education needs to be considered when revising the NSW Science and Technology Syllabus. Currently this important area is in Human Society and its Environment and Science and Technology. There needs to be clear connections for primary teachers in order to eliminate duplication and confusion.

Other initiatives

An interesting local initiative launched in England in March 2007 is the Science and Engineering Clubs – as an after school activity. Two hundred and fifty schools in nine regions across England have received eight thousand pounds to sponsor and organise engineering and science activities aimed at students in their first year at high school. The co ordinator was most enthusiastic about some of the activities being organised from ponds to food technology to links with industry. AstroZeneca was also a major sponsor of these after school clubs.

Science Sisters was a spin off from the Science and Engineering Clubs – they were for mothers who were interested in finding out more about what their children were learning in Science at school – again sponsored by corporate companies.

In Canada and the UK there was a strong focus on making Science and Technology real and meaningful in students' lives and using the Field Study Centres and Environmental Centres to promote understanding of global issues.

National Curriculum

The national curriculum in the UK has overarching themes that have a significance for individuals and society and provide a relevant learning context. They are: **identity and cultural diversity – healthy lifestyle – community participation – enterprise – global dimension and sustainable development – technology and the media – creative and critical thinking.**

Statutory expectations are in 5 areas under which another 14 subjects are placed, include Science and Design and Technology. The areas are: *Communication, language and literacy; Creative development; Knowledge and understanding of the world; Mathematical development; personal, social and emotional development; physical development.*

Catering for the needs of all students

Regarding the development of syllabuses that are inclusive of all students, I discussed with curriculum developers current research into gifted and talented education, education of students with special needs, boys education and girls education.

Professor Carol McGuinness, Professor of Psychology at Queens University in Belfast presented at the Scottish Convention on the Development of Thinking in Edinburgh and raised the importance of cognitive and motivational indicators of learning – for all students.

At this Thinking conference researchers presented their work on curiosity, task mastery, independence and self efficacy. Professor McGuinness presented research on students with special education needs that demonstrated improvement in learning when **thinking skills** are explicitly taught. Stuart Naylor presented on the importance of active assessment and the use of stories to motivate students to think, talk and learn working with primary teachers who have the full range of learners in their classrooms.

Dr Jim Beggs and Professor Colette Murphy at Queens University in Belfast have completed some research on gender differences in children's attitudes to Science. In Northern Ireland, data showed that **girls were more positive than boys toward science in primary school.** Girls liked Science more when they were doing experiments and boys enjoyed science more when they could talk about what they were doing rather than writing about what they were doing. Girls seemed more positively disposed toward practical work and boys more positive about problem solving.

Conclusion

“All great empires of the future will be empires of the mind”
Winston Churchill

The opportunity to investigate best practice in Science and Technology in Primary Education has **major implications** for my role at the NSW Board of Studies. The importance of :

- **the uniqueness of primary education** includes issues such as students' attitudes towards Science and Technology, quality resources for teachers that are fun for students, how the syllabus is organised, how much time should be given to the teaching of Science and Technology, national curriculum and national testing;
- **professional development to improve teacher confidence and competence** is critical in the development and implementation of this syllabus which will have important implications in my role;
- **pedagogy in teaching/learning/assessing Science and Technology** – how Science and Technology is taught is just as important as what is being taught – supported by quality resources;
- **the place of environmental/global issues in the primary curriculum** will definitely be considered in the development of the syllabus
- **catering for the needs of all students** is an integral part of the syllabus development process at the Board of Studies – recognising recent research from the Fellowship.

Appreciation

The Churchill Fellowship (with thanks to the Northern Districts Education Centre) has been a life changing experience. The professionalism, kindness and generosity of the people involved in Science and Technology and their passion for the education of primary aged students were truly inspirational. These generous educators have a “fire in the belly” to make a difference to teachers' teaching and children's learning. Their advice, experience and friendship have inspired me as a curriculum developer at the NSW Board of Studies to ensure that the best K-6 Science and Technology syllabus in the world will be produced for the benefit of children who are the future leaders of the 21 century.

Just as Stevie's heart was singing about his Science excursion so too is mine about the Fellowship. No words can ever express the singing that is in my heart as a result of visiting two continents and talking to academics, consultants, teachers and students about Science and Technology in primary education. The people, places and experiences that this Fellowship provided will have a lasting impact on my life – and indeed the lives of 650 000 children in over 2 000 primary schools including our own newly born granddaughter – this Fellowship meant a great deal to me and is a spring board for future research – thank you for the honour and opportunity.