

The COPUS *Sharing Best Practice* series aims to provide inspiration, practical advice and food for thought for all those involved in communicating science, engineering and technology. The series draws on the experiences of evaluators, organisers of events and on public understanding of science research studies, identifying information and findings of relevance to the practitioner, and highlighting strategies and tools that might be useful.

The series began with *So did it work?* which gives guidance on how to evaluate a public event about science, engineering and technology. This was followed by *To know science is to love it?* in which public attitudes to science, engineering and technology are described. *Out and about* was the first and *Reaching out* the second in a three-part collection of case studies from the COPUS grants scheme in which the project organisers tell their story.

*Reaching out* has been produced by COPUS with funding from the Office of Science and Technology.



## Reaching out

Organising public events: a collection of case studies from the COPUS grants scheme

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# PREFACE

If you're looking for inspiration or ideas on innovative approaches to communicating science, engineering and technology then *Reaching out* can help. Organisers of some of the 1000 projects funded since 1987 through the COPUS grants scheme describe here their projects, sharing their experiences, and offering advice on the pleasures and pitfalls of planning similar activities. *Reaching out* is a treasure trove of individual approaches which can be replicated or emulated on large or small scale. The theme throughout is projects which provide **access** to science and engineering, scientists and engineers.

COPUS thanks journalist Barbara Drillsma who was commissioned to write this guide, and the project organisers featured who gave up their time to share their experiences with others. Finally, for every project described, there are many others equally informative that simply could not be included in a publication this size.

## REACHING OUT TO TEENAGERS...

We all recognise that enthusing teenagers can be a great challenge, particularly when it comes to science. But it is today's teenagers who are growing up in a world of continuous technological advances and it is crucial they are kept up to date with the latest research and innovations so they can make informed decisions in the future. COPUS has supported a number of projects aimed at enhancing teenagers' understanding of science. The following are examples of the diverse range created to capture young peoples' imaginations.

*With any kind of creative programme there is always an element of risk and failure. To try and lessen this risk make sure you have clear aims and objectives, a good team and hope you are blessed with a lot of luck. ;*

### Pig in the middle

Y Touring is a nationwide theatre company attached to the Central YMCA. Formed in 1989, it has commissioned a series of specially-written plays designed to inform teenagers about important current issues that are scientifically, socially and medically relevant to them. These include *Connected* which tackles teenage pregnancy, *Breathless* which addresses smoking in young people, *Inner circle* which covers HIV infection, *The gift* investigating genetics and *Cracked* about mental illness and mental health.

COPUS provided £10,000 for this project-based, issues-led company to commission, produce and perform a new play for young people, under the artistic direction of Nigel Townsend, looking at the scientific and ethical issues raised by transplant surgery.

Four writers competed for the job of writing a play for teenagers which was both informative and entertaining. Judy Upton was the winner for her offbeat love story about two teenagers who meet on a kidney dialysis ward. The girl is an animal rights supporter, the boy a macho sports-orientated youngster who urgently needs a transplant and is offered the chance of an animal organ due to the lack of human alternatives. The girl organises a demonstration, the boy becomes ill and the whole debate is taken to a government select committee – the audience.

"The production went down so well that some of the audience really believed it was happening and started asking lots of questions during the break. And the debate at the end of the performance, modelled on a government enquiry, is always immensely lively," says Nigel who was delighted with the reception the play received wherever it went.

"It is quite challenging in terms of science to produce a play for teenagers which is authentic, presents all the sides of an argument and yet is sexy for the age group," he says.

To ensure the play presented a balanced view, it was developed in partnership with the Nuffield Council on Bioethics and expert advice was sought from a transplant surgeon, animal rights groups and a transplant co-ordinator. A special production was staged at the House of Commons attended by MPs, members of Ignot (the interdisciplinary group on genetically modified technology) and representatives of the Home Office, Ministry of Agriculture and Department of Health.

By the end of its run the play had been seen by more than 12,000 young people. It visited schools and was performed throughout National Science Week and at the Edinburgh International Science Festival. It has also attracted wide interest from overseas through its extensive press coverage.



*When developing or building an interactive exhibit it is vital to use the most robust and practical materials available. Constant use can shorten an inferior material's life-span and cause much wasted effort and disappointment. ;*

### The K Zone

A lottery machine, a sexually explicit interactive exhibit and a model featuring a real human diseased lung are some of the exhibits built by Chris Morris for a mobile exhibition which aims to help teenagers make more informed decisions about lifestyle and risk-taking.

"Unfortunately too many teenagers see science as being a dry and dull subject. I've set out to concentrate on teenagers' lifestyle issues and to use them to demonstrate the necessity of having a basic understanding of science to cope with our technological age," says Chris.

The £20,000 COPUS grant was used to design and produce 10 prototype models and to test them out on teenagers in the Sheffield area. They were taken to the central bus station, to a doctor's surgery, to the Leadmill nightclub and to a youth centre. Although the models were amusing and entertaining there was a serious scientific concept behind each. For instance a replica lottery machine where people could choose six numbers without having to pay a pound showed the unrealistic expectations people have of winning a lot of money. "Research shows that many young adults spend considerable sums playing the lottery when they have something like a one in 14 million chance of scooping the jackpot," says Chris. "If they have a better understanding of basic statistics it could help them make an informed decision on whether or not to play."

The same criteria apply to smoking. Teenagers may feel bombarded with messages telling them not to smoke but they still do. Chris made a sculpture out of a segment of a lung from a 38 year old woman who died of emphysema caused by smoking. He then presented the facts against smoking in such a way that teenagers are not directly told to stop smoking but given the information to make a responsible decision.

A particularly novel exhibit produced by Chris Morris was a human body map inviting youngsters to use a stethoscope in the way a computer mouse works and to point it at certain parts of the body. The commonly used slang terms for these parts, particularly sexual organs, then appeared on a computer screen. Many young people are ignorant of the correct terms for parts of their body making it difficult or embarrassing for them to seek medical help when needed. However, on the body map alongside the slang terms appeared medical terms and relevant useful information.

The K Zone has been used by around 10,000 young people and is currently being developed in the format of an amusement arcade with plans to extend and tour it to major events like rock festivals and pop concerts as well as appearing at schools and colleges throughout the country.

### Rap, rave, reggae and resistance

Young people love music but how many of them, particularly young musicians, understand the technology behind the sounds they are creating and the equipment they use to produce it?

Dave Knight, a lecturer and designer in popular fashion and culture, used a £2000 COPUS grant to expand the understanding artists and performers have of their work by explaining the science behind the operation of sound systems. Through the Raven Project at the Nguzosaba Centre in Preston, Dave Knight ran a series of workshops ranging from examining the nature of sound to how PA systems work and should be set up. He also concentrated on safety aspects of both recording and performing. Various pieces of equipment and electronic components were bought and he made sure there were enough headphones, microphones and small mixing desks for all participants to use.

The Nguzosaba Centre is a community group supported mainly by members of the local African community – hence the rap and reggae connection. "The idea was to give people an insight into the science behind music, to give a basic grounding in science and to introduce the technical terminology," says Dave, a part-time lecturer at the University of

*Community groups could always think of approaching their local university for advice, assistance, support or even premises. Many further education institutions are actively trying to engage local groups in their outreach programmes so it is always worth a phone call to find out what help is available. ;*

Central Lancashire. Men and women from mid-teens to late 20s attended.

Dave now hopes the project will be featured as a regular short course at the University and will be used as a template for other similar workshops reaching both young people and community groups.

## ...AND TO PARENTS

Many parents would like to help their children with their school work but when it comes to science many feel they have too little knowledge and find it difficult to follow the terminology used in their youngsters' lessons. Three COPUS grants have helped to bridge the gap.

### Science at home

*If inviting parents to a meeting or workshop after school hours try and provide refreshments or care facilities particularly for the very young. Parents attend because they want to learn something and constantly dealing with youngsters can prevent them from doing so.*

When English is a parent's second language there is an added difficulty in understanding just what is being taught in school. A project in London's Tower Hamlets, an area with a large population of Bengali speakers, was an innovative attempt to raise the science literacy of parents and children by looking at the application of science in the home. Bilingual facilitators were on hand to help.

Meenal Gupta, then Project Manager with the area's Education Business Partnership, linked up with local scientists and engineers and devised a scheme where four primary schools staged after-school science clubs for parents. A £2000 COPUS grant was used to buy a series of science resource packs and materials and for training staff to run the clubs.

Attendance at the clubs was not huge but what was encouraging for Meenal were the added benefits the parents – all women – gained from the project. "Mothers in the Bengali community have a huge influence on their children. They want to help their families get a good start in school but because of language and educational constraints sometimes have problems helping them with homework and projects," she says. "Not very many women or those from ethnic minorities go into careers like engineering so we tried to provide positive role models by making sure our helpers were from similar backgrounds, that they were local and young."

The science clubs focused on five basic scientific aspects – air, fire, water, light and magnets - using equipment and materials that could be found at home. A glass of water and crumpled up paper showed how water levels can rise and the same equipment using burning paper demonstrated the principle of vacuum. Fun was had when racetracks were drawn on card and paper cars equipped with paper clips, moved from below with magnets to demonstrate magnetic force.

Evaluation sheets and clear instructions for repeating more than 20 experiments at home were handed out to the mothers who attended the clubs; all were completed and returned.

Meenal found resource packs produced by the Centre for Paired Learning at the University of Dundee particularly useful and she recommends them to anyone wanting to run a similar scheme.

### Smallpox - a battle fought and won?

Smallpox is unfamiliar to the majority of Britons but many a family history tells of ancestors who have died of the disease.

Fir Vale School in Sheffield takes pupils from 11 to 16 years and is multi-ethnic with more than half of its pupils speaking English as a second language. The staff had always been

*Gordon Watson devoted considerable time to advertising performances in the three community languages, using posters and radio. He recommends researching community radio stations in your catchment area - in Sheffield there is a radio station broadcasting in Urdu - and signwriters working in multi-ethnic communities will be able to help with producing high quality posters with writing in languages such as Urdu, Arabic and Somali.*

*When planning an event get as many ideas as possible down on paper and then try them out on others. Don't just concentrate on your own plans, be open to suggestions from others, even if they aren't as well qualified or experienced as you are. A fresh view point is always useful.*

aware of the problems of persuading parents to take a more active role in school but when Gordon Watson, the Head of Science, decided to run a project on vaccination, he found he had massive support.

Armed with a £2000 COPUS grant, Gordon decided to produce and perform a play based on the work of Edward Jenner who discovered vaccination and its benefits. His senior laboratory technician, Michael Andrews, started researching Jenner's life and Michael's wife, a part-time writer, wrote the script.

"The majority of our pupils and other families speak either Urdu, Arabic or Somali," says Gordon. "So as soon as we had a good script we decided to have it translated into these three languages. A teacher, a 16 year old pupil and a community outreach worker translated for us and in the case of the Urdu and Arabic versions, had to write it all out by hand because we didn't have access to typewriters or word processors that could do this for us."

The play was actually performed in English but three narrators explained at the start of each scene what was going to happen and before performances every member of the audience was given a photocopied script in their own language so they could follow the story. In addition, leaflets explaining vaccination (in all three languages) produced by the Department of Health were handed out.

More than 1000 people flocked to the School's small theatre to watch the play. They had been targeted by letters sent home with pupils and by posters and information sheets in local community centres. All were written in the three community languages.

The COPUS grant provided enough money for the School to hire period costumes, including a pantomime cow, and to fund an arts and crafts project which involved pupils making realistic masks showing the ravaging effect on the face of smallpox.

"The play was an enormous success both in getting the vaccination message across and involving the Urdu, Arabic and Somali speaking communities in our School," says Gordon. "As to actually getting the whole project going I found I had to be something of a squeaky wheel. I badgered people, phoned people back if they hadn't returned my calls and made a slight nuisance of myself but it worked and worked well."

### Science mission impossibles

Big Wood School in Nottingham is a secondary school in what is described as a socially and economically challenged area. Michael Hill, Head of Science, was anxious that the school's new intake of pupils were enthused about science from the start of their school careers and decided the best way to do this was to have support from home.

A small COPUS grant of £770 was enough to set up a science fair at a consultation evening for the year seven parents – the first year at a secondary school when pupils aged 11 join – held during the first term. He called his evening **Science mission impossibles** and set parents seemingly impossible tasks like making a radio out of scraps of tinfoil, making a cloud in a bottle and navigating the solar system with no prior knowledge.

"I felt that if we could entice parents along and give them a really fun evening they would become interested in science and hopefully pass it on to the children," says Michael. "We invited the children along and we found that when the visitors started to really enjoy themselves they were picking up the science too."

More than 100 adults spent the evening using interactive computer packages and applying science and technology, easily explained on accompanying leaflets, to help solve a range of problems.

The COPUS grant was used for materials like magnets, wood, metal, paint and electronic components and a proportion was used to buy computer programmes guiding users around

the human body and space. Big Wood School provided its own computers and staff helped publicise the event.

## HIT THE ROAD

Taking science out on to the road is a popular way of allowing people access to events and projects they may otherwise have missed because of a lack of time or travel facilities. The history of travelling shows is centuries old and it is a tried and tested formula. Schools and remote communities are amongst those who have benefited from COPUS grants.

### Mobile mini-beasts

Roma Oxford has a particularly good reason for driving carefully around North and East Yorkshire. When she is out in her estate vehicle she is likely to have a whole collection of creatures carefully packed in the back and the last thing she wants to do is have a bump and upset them. For Roma runs a unique project - the **Mobile mini beasts** service.

Roma has become a familiar visitor at primary schools in and around York. She runs an independent environmental education service and tours schools showing a selection of wildlife, aiming to arouse curiosity and stimulate interest in the biological sciences.

Roma successfully applied for a £2500 COPUS grant to take her mobile service to schools – not to show children but their parents! “There are a lot of myths and misunderstandings about creatures like bats and hedgehogs. Some people think, ‘Ugh, horrid things, they’ll give you fleas or attack you in the dark’ and I wanted to show parents this wasn’t true,” says Roma. In her van she usually has a hedgehog, bats and a collection of spiders, toads and frogs. In her spare time she operates the York Bat Infirmary and uses some of her patients as live exhibits. “You could say they are earning their keep and acting as ambassadors for their species,” she says.

Roma has found that parents, once they have been to one of her workshops, show a more active interest in their children’s studies and are more aware of environmental matters and the needs and habitats of animals. She used her grant to pay for advertising, posters, tickets, transport costs and the upkeep of her exhibits.

### Science on the move

Satrosphere in Aberdeen was Scotland’s first hands-on science centre. It has proved a huge success but its outreach project was hampered by lack of funds until a COPUS grant of £20,000 enabled a full-time person to be appointed to take a selection of mobile exhibits out on tour.

Called **Science on the move** the interactive exhibits built by Satrosphere’s own staff with grants from the Office of Science and Technology and the Gatsby Foundation, cover light, sound, electricity and magnetism. Since the COPUS grant was awarded **Science on the move** has visited venues as far north as the Outer Hebrides and as far south as Brighton. It has been set up in shopping malls, community halls and even at a railway station. **Science on the move** was based on Science circus operating in Australia where the tyranny of distance is felt even more than in Scotland.

“We have two main audiences – community groups and schools,” says Dr Alistair Flett, Satrosphere’s General Manager. “The project has been a real hit and our outreach officer never knows where he’ll be next – crossing the North Sea on a ferry or tearing down the motorways of England. We’ll take **Science on the move** wherever it is needed for a small fee to cover costs.”

“Don’t under-estimate the effectiveness of word of mouth advertising. Roma asks parents to pass on details of the service to other parents and schools and is delighted with the resulting high uptake.”

“Sometimes schools and small groups cannot afford to pay even nominal costs for a touring exhibition to visit them. It is worth approaching local companies or enterprise boards to see if they will contribute to the costs in return for a mention on advertising literature and posters.”

“When building equipment for a specific use try and think ahead to see if it could be designed to have a life after it has fulfilled its original role.”

Originally Satrosphere hoped to be able to afford its own vehicle to take the exhibits but there haven’t been enough funds to buy one. They have, however, been incredibly lucky to be supported by a local car-hire company which lends a van when necessary. “We just attach our logos and off we go,” explains Alistair.

### The Reptile Roadshow

Many people go through their lives without actually seeing, never mind touching, a live reptile. So whilst working at the Welsh Mountain Zoo in Colwyn Bay, Education Officer Kim Taylor decided to try and introduce as many people as possible to a selection of the Zoo’s reptiles – by taking them out on the road.

A successful application to COPUS for a grant of £1780 paid for a range of purpose-built travelling boxes to transport the creatures around safely. Some of the money was also used for display material – in English and Welsh – and for the cost of taking the van out.

Over a year the **Reptile Roadshow** visited more than 60 schools with a display of corn snakes, Indian pythons, geckos, lizards, an iguana and a tortoise.

“We also called in at nursing homes where, after the initial ‘ugh and yuck’, the snakes in particular were a great success,” says Kim. “It was the same when we took the mobile vivariums (reptile houses) to centres for the disabled; they went down really well.” Kim and her van soon became a familiar sight around North Wales. She took the Roadshow to science fairs, summer fetes, schools and local radio outside broadcast events. The vivariums and other display material are being seen by the Zoo’s thousands of visitors to this day.

### The Minch Project Tour

While the Government is trying to reduce classroom sizes it is incredible to think that one school in the Highlands of Scotland has only one pupil in the whole school and many have less than 10! It was to communities like this that the **Minch Project** bus toured.

The **Minch Project** (Minch is an area between Scotland’s west coast and the Outer Hebrides) is the brainchild of Tricia and David Matthews, an imaginative couple who set up Nature Workshop, a small charity specialising in taking hands-on nature and environmental workshops to rural areas. A £3000 COPUS grant helped them to convert a double-decker bus into a marine exhibition. The bottom level was “under the sea”, the upper deck “above the sea”.

The bus was packed out with marine exhibits, interactive equipment, microscopes, art materials and models depicting rock pools, sea lochs, deep sea and shore life. It even had a 30 foot jigsaw of a minke whale which was made to be dismantled and stowed away. The bus set out to the remote northern areas of Scotland. It travelled on ferries on rough seas to the Western Isles and also to Skye visiting schools, community groups, old peoples’ homes and centres for adults and children with learning difficulties. Two and a half thousand flocked to the bus and it played a prominent role in World Oceans Day when hundreds of children brought along their families after seeing the bus during their school day.

“It was an amazing time and a huge success,” says Tricia Matthews who piloted the exhibition on her own three small children and a class from a local school. “We ran through the exhibition and all the things we could do and see with it and tested it out on the kids before we set off. It was a great way of tweaking the finer points.”

One of the project’s attractions was a walk-through kelp forest which was built when the bus stopped off for a week. Visitors helped make six foot seaweed fronds which were used to show the variety of life kelp sustains.

“Baby fish have their nurseries in such forests and a wide range of creatures live and feed



Children, whether your own or “borrowed” from a local school or play group, are wonderful critics and a great help in letting you know whether you have pitched your project correctly. Schools are often willing to let a class act as guinea pigs. Why not ask? ]

from them,” says Tricia. “It was a way of showing the ecosystem supported by a seaweed forest and how important it is to keep them intact.”

The COPUS grant enabled the project to set out but there was no change for luxuries or expensive materials. Old doors were stripped and pieces of unwanted timber used to build the exhibits which featured fold down flaps for all to see. Some of these exhibits were taken from the bus into premises for the disabled and elderly people to see; specimens from the sea were taken to examine under microscopes and a tape of sea sounds.

Adds Tricia: “It was really good to go into some of the remote communities and be with old people. Many of them had spent their working lives connected to the sea and the exhibition set them off reminiscing about the old days.” In fact the success of the [Minch Project](#) with groups who find accessing this sort of exhibition difficult – the old, disabled, those with learning difficulties and handicaps – has prompted the couple to continue with their work in this area, co-producing a bat bus and with further plans for an energy bus and third world bus for the future.

## NO PROBLEMS FOR THE DISABLED

The needs of disabled people are becoming increasingly recognised and fulfilled. Public gardens, for instance, often have sections for the blind, concentrating on scent and touch, and the growth of interactive technology has led to improved access for all.

### Science in the garden

David Lefever, ex-dairy farmer and gardener, used a £2500 COPUS grant to start [Science in the garden](#), a course at Fircroft College in Birmingham showing the science behind gardening to adults with severe learning difficulties.

“I realised there were other projects for people with learning difficulties, showing them how to garden and helping them to grow and cultivate plants but there didn’t seem to be one explaining why things happen,” says David. “For instance, students may be told to water a plant but given no explanation as to why it needed water. What would happen to the plant if you didn’t? Why?”

The project initially started with a series of five week courses for students attending a Birmingham Social Services allotment project. The courses were based on the question “what do plants need to live?”. Students explored the answers through a series of simple experiments.

“There is often a preconception that people with learning difficulties cannot handle difficult concepts,” says David. “But given the right language and plenty of positive encouragement they can achieve a great deal. Students, starting with simple experiments involving one plant being denied water, light etc and one not, were able to come up with the need for replication in experimentation after one of their plants, and therefore their experiment, was “tied up” by the cleaner.”

All the students, whatever their individual learning difficulties, seemed to benefit in ways that reflected their very different needs. For the majority, it was in gaining a new understanding of events that affected their daily lives. For others, it may have been through the confidence building aspect of being part of a small, friendly and innovative learning group.”

Projects often take longer than expected and may involve more work than envisaged at the outset. If possible, write in extra time for any hiccups in the planning stages, particularly important if you are aiming for a set date. ]

When dealing with people with learning difficulties try and find a way to ask questions which cannot be answered with just a yes or no. Questions like “Did you enjoy doing that?” will provide a one word answer. A better way of getting a response would be: “Tell me why you enjoyed doing that.” ]

If you plan to offer wheel-chair access to a project, invite a wheel-chair user along to try it out. The same goes for blind or deaf or any other form of disablement. ]

### Videos for the deaf

There are around 62,000 deaf sign language users in Britain, many of whom also have poor reading skills and speech. An initiative set up by Paul Arnold, a lecturer in psychology at the University of Manchester, aims to encourage deaf people to visit science museums by providing videos with a commentary in British Sign Language (BSL).

A COPUS grant of £1300 allowed Paul and one of his students, Sharon Ridgeway who is profoundly deaf, to prepare a series of videos showing difficult to understand scientific concepts like electricity and gravity. The videos are being offered to deaf clubs in and around Manchester and will hopefully be used as a teaching aid for deaf schoolchildren.

“It was a Russian psychologist, Vygotsky, in the 1920s who first started using visual aids to teach deaf people and it got me thinking of how science could be explained visually too,” says Paul. “Many deaf people have poor reading skills so straight visual reading aids don’t always work.”

Paul prepared a series of lectures and demonstrations and Sharon provided the ‘words’ using BSL. Among the material filmed is a selection of exhibits at the Manchester Museum of Science and Industry. It is hoped the project will encourage members of deaf clubs to visit the museum and for it to be available for deaf visitors attending.

### SEEHEAR

A project in Dorset will allow blind and partially-sighted people to understand what is happening under the sea. COPUS has contributed £28,000 to help people become as familiar with the sounds of the sea as they are with bird song. Based at the Durlston Country Park, within the Dorset Marine Research Area, [SEEHEAR](#) uses a hydrophone located on the sea bed in 12 metres of water, 400 metres offshore in Durlston Bay, to listen to the noisy life below the surface.

Visitors can listen to the distinct sounds associated with dolphins, a mixture of clicks, buzzes and occasionally whistles, which coincide with sightings of bottlenose dolphins just offshore. The movement of waves and other wildlife noises from fish, shrimps or mussels can also be detected as can the occasional explosive sounds magnified from local quarries, the movement of ferry boats and naval sonars from frigates operating out at sea.

“The COPUS grant has allowed not only specific developments to be carried out but has proved to be a catalyst for other organisations and businesses to take part,” says Professor Vincent May of the School of Conservation Sciences at Bournemouth University, who is running the project jointly with Dorset County Council.

The Durlston Centre has 100,000 visitors each year. Part of the COPUS grant has provided a push button interactive centre which allows visitors to discover what causes particular sounds in the sea. To record how successful this project has been, visitor behaviour and comments were monitored using video recorders. This not only recorded the “wow, I didn’t know that” responses but also showed that many questions were not being answered. An interactive CD Rom was developed and introduced not to replace the existing display but to supplement it.

Careful monitoring also showed that the service offered to the blind and partially sighted visitor was not 100% effective. Although hand-held audio systems do help by providing aural information, it is more difficult to explain fully what the sighted person can see.

As a result the team has tried to make interpretation independent of visual images. After all that’s how undersea organisms work most of the time.

## BOOK INTO SCIENCE

Gone are the days when libraries were dark gloomy places where a frosty librarian would peer over her glasses and glare if you made a noise. These days libraries are bright, exciting centres crammed with activities and exhibitions as well as with books. Libraries are a useful resource for anyone planning a science event and can often be the focus of such events as the following examples show.

### The Amazing Human Body Experience

The human body is a topic which fascinates children, a fact reflected in the enormous number of books published on the subject. And it is what prompted Maggie Corr, Librarian in Charge of Youth Services at Edinburgh City Libraries, to create an exhibition which toured the city's network of 29 community and mobile libraries.

A £3000 COPUS grant enabled her to commission a brochure from children's illustrator Keith Brumpton crammed with cartoon characters, quizzes, amazing facts and a list of related books to read. She also set up an exhibition based on *Funny Bones* by Alan Ahlberg featuring skeleton figures on a giant backdrop. An anatomical skeleton – a model not the real thing – was bought to show the body's structure and a range of hands-on activities and craft devised.

The project was launched at the Edinburgh International Science Festival and went on to play a major part in the Libraries Big Book tent at the Scottish International Children's Festival. Since then it has demonstrated long-term benefits by being in constant demand from libraries, schools and community groups. Publishers of children's books on the body proved remarkably generous in providing books for both display and prizes.

"The project has been very successful and has resulted in thousands of children and their parents boning up on the subject," says Maggie Corr. "One of the advantages of the way in which we planned the project is that it is extremely flexible. We can show it on a grand scale or just use parts of it if the venue is too small to house the whole display."

Maggie wishes she could have laid her hands on an indestructible skeleton as visitors love to touch and move the various body parts which ultimately damages the skeleton. "The skeleton certainly captured the imagination of visitors," she adds. "Without firing the imagination and enthralling youngsters, you've lost them."

### Libraries as science shops

Anything that raises the profile of science goes down well with Professor Jack Meadows who, as Professor of Library and Information Studies at Loughborough University, became familiar with science "shops" (really a type of information centre) as a way of answering people's scientific questions. However, he questioned whether they were an adequate answer, being concentrated as they often are in large city centres.

With a COPUS grant of £2500 and staff from Leicestershire Libraries Service, he ran a three month experimental service in selected libraries based in small towns and rural areas answering people's queries on environmental matters. The grant provided training for librarians, the wages of a part-time researcher, publicity material and the purchase of specialist books and reports.

"One of the first problems we faced was defining our terms," says Professor Meadows. "We chose the environment as our subject because research shows us that's what people are interested in. However, we found ourselves faced with queries about local development projects and planning permission which could loosely be called environmental questions but could easily fit into another category."

*Timing is important. If running a project where the response of a cross-section of the public is needed be careful of choosing summertime when children are away from school and many people off on holiday.*

By the end of the trial we found there were very few questions the librarians couldn't answer. They were able to give enquirers instant access to source material as well as answering questions themselves. More than 200 questions were used for analysis and this didn't include the mass of enquiries from schoolchildren working on projects. The service was used across the age range and was enthusiastically received, particularly in small areas where this level of service had not been previously provided.

"We were pleased with the trial but if we repeated it, would run it for a longer period," reflects Professor Meadows. "We saw a jump in figures just when children were about to start back at school, working on their homework!"

The final report of the project was sent to the Library Association who are studying it carefully, looking at the feasibility of introducing such a service as part of a library's role to inform the public. In the meantime, Leicestershire County Council has produced an environmental plan for the county which specifically includes this role for libraries.

### Book into space

There were two things uppermost in her mind when Sylvia Chaplin, Manager of the Jodrell Bank Science Centre, planned an event for National Science Week. She wanted to let people know what was happening at the Centre beside the giant telescope and, as a joint activity with Cheshire's Libraries Service, wanted to help publicise the vast range of science books on the shelves of the county's libraries.

And what a success it was. Librarians reported their shelves had been almost emptied of books – from science fiction to factual science books – and hundreds of people reported back that they used star maps to study the heavens from their own back gardens. Many of them also asked for information about local amateur astronomy groups, an added bonus.

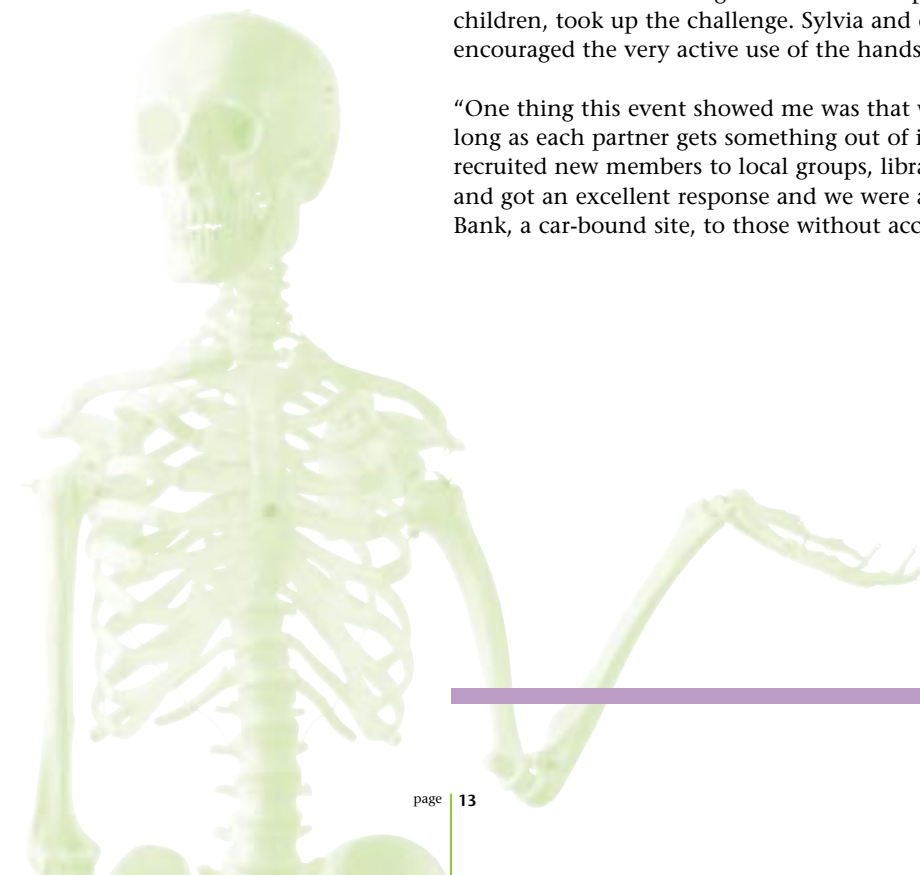
Sylvia's project, funded by a £1000 COPUS grant involved hiring a van, filling it with display material, telescopes, astronomical equipment including a gravity hollow - a sort of black hole - and a computer. She and her team then toured seven towns, setting up on the pavements outside public libraries. Voluntary help came from members of the Macclesfield Astronomical Society who lured passers-by using telescopes to project sun spot activity and giving out maps of that night's sky showing where stars and planets could be found.

Inside the nearby library, staff mounted displays under the heading "Read a science book this week" and were delighted to find that people of all ages, from pensioners to small children, took up the challenge. Sylvia and other volunteers manned displays and encouraged the very active use of the hands-on exhibits!

"One thing this event showed me was that working in partnership can be a great success as long as each partner gets something out of it," says Sylvia. "In our case the astronomers recruited new members to local groups, libraries for the first time focused solely on science and got an excellent response and we were able to take some of the attractions of Jodrell Bank, a car-bound site, to those without access to cars."

*When planning an event for children remember they love the hands-on approach, touching and feeling things. Bear this in mind though when buying exhibits. It is worth paying a little more for the sturdiest and most robust materials.*

*If holding any sort of event out on the street or public highway remember to let the police know it is happening well in advance.*



# LEAVE IT TO THE WOMEN'S INSTITUTE

The Women's Institute has been very busy explaining science to its members. Topics covered include the science behind cake-making to more complex subjects like global environmental changes and the role society plays in this. We illustrate here just a few of the many COPUS funded initiatives.

## Science in a picnic basket

*Give people the impetus to go off and discover things for themselves by demonstrating and showing stimulating activities.*

One of COPUS' flagship activities was to fund a hugely successful course at the WI's lifelong learning centre Denman College in Marcham, Oxfordshire. Here members attended lectures, talks and demonstrations showing how science underpinned and interacted with their lives. As a result many enthused WI members wanted to go back to their groups and pass on their knowledge but they lacked one thing - confidence.

With a COPUS grant of £3000, John Nicholson and Imelda Race from the University of East Anglia, embarked on an initiative to promote science activities throughout WIs in England and Wales, building on the enthusiasm generated by that original course at Denman.

"We devised an idea of packing picnic baskets with materials, equipment and laminated activity sheets and showing science representatives how to use the baskets with their members. The choice of the picnic basket was to convey portability, conviviality and a sense of fun and exploration. The intention was for members to enjoy doing science for themselves."

Most of the material and equipment packed into the baskets could be found in any kitchen although more specialist equipment like specimen tubes, teat pipettes, pH paper and indicator solution was also included. In all seven fully stocked baskets were assembled and distributed to science representatives throughout England and Wales who then coordinated their use within their areas.

As well as offering some follow up support for the first science picnics, John and Imelda organised a training session where members extracted coloured dyes from vegetables and used them to test the pH of a range of household products. This prompted lots of discussion, for example about the alkaline content of toothpaste and how it counteracted acids in saliva. There was also an artistic element, making a rainbow of colours by adjusting pH (purple cabbage came in useful here!) or doing pH painting.

And using the same model and hands-on approach, John and Imelda went on to produce Science in a paintbox about the science behind the art of Stone Age, Egyptian and mediaeval painting.

## Why and how – the science behind cooking

Women's Institute members are famed for their cookery but successful soufflés, pastry and sponges were not enough for Val Swarbrick, science co-ordinator for the South East. She and her members wanted to know and understand why recipes worked.

Mrs Swarbrick has no formal scientific background, her interest was sparked off when she attended the COPUS funded *Science, you and everyday life* course at Denman College.

"I have a lively and enquiring mind which is all you need to have fun with science," says Val. "I had learned a lot and enjoyed immensely the course at Denman College where Dr Peter Barham from Bristol University taught us a little about scientific processes in cookery."

*Some people wear self-imposed blinkers when faced with the prospect of learning science. Try giving information in a novel way and build on what they know rather than highlighting what they don't know.*

The home economics tutors and I thought it would be good to pass on this knowledge to members by producing a leaflet."

The leaflet became three and showed how various factors influence successful baking. Tests were performed on raising agents; on pastry to see if it worked best by leaving it to rest or not; on icing sugar finding out whether it can be used in the baking of a Victoria sandwich cake instead of caster sugar (yes, it produces a denser but sweeter cake) and on eggs, seeing what happens to egg whites when they are beaten.

Five thousand leaflets were produced, distributed locally and put on sale in the WI shop where they have a potential audience of almost 250,000 WI members. When the first print run ran out, more copies were photocopied and have continued to be so.

## If it washes whiter, how can it still be green?

Paul Kneller has had a wonderful time since he embarked on a COPUS funded project to encourage WI members to study the claims made by manufacturers of washing powders and shampoos. He has discovered villages he did not know existed, has toured unfamiliar parts of the British countryside and made many new friends.

A lecturer at Bournemouth University, Paul Kneller was awarded a grant of £650 with which he built up a collection of slides, videos, posters and samples of popular shampoos, conditioners and washing powders. He tours WI meetings with his display and shows the audience what exactly is in the products they buy.

"Originally I had the word science in the title of my talk," says Paul. "I called it 'Is science misused in adverts?' but I've realised if you use the word science it puts people off, so now I call it 'If it washes whiter, how can it still be green?' and that works."

Amongst the many facts he has revealed is that some hair conditioners contain silk proteins which could be made from pig ears, trotters or stringy tendons – which doesn't go down too well with the vegetarian members. And he has explained why he believes environmentally-friendly products should be labelled greener, not green.

"Women buy soap powders without phosphates, believing them to be more environmentally friendly. However many powders contain zeolites and depending on which part of the country you live in, the zeolites may cause as much harm to river ecosystems as those powders containing phosphates."

Paul believes an important result of his talk is that it empowers women. "I have produced a four page dictionary of terms used by manufacturers so people can take it with them when they go around the supermarkets. Everybody who uses it thinks it is a great idea, the only problem is it takes people twice as long to do their shopping!"

Colleagues at Bournemouth University have been happy to help Paul's projects by producing slides and photographing materials for him to use in his display. In addition to the WI the talk has been given to church groups and colleges.

"The WI, however, is a wonderful organisation because the women are really concerned and eager to learn," says Paul. "Many of them start off believing they do not understand any science at all and are surprised at the end of the talk to realise just what they do know."

## It'll all come out in the wash

The second part of the title of this project is 'The WI gets technical about textiles' and that's what the North Yorkshire West Federation aimed to do with a small COPUS grant of £600.



Whenever possible prepare information sheets or informative leaflets for people to take home with them. Contact numbers and addresses where they can obtain further information are useful too.

The group called upon the University of York and the Bradford Colour Museum to help with a project looking at textiles and how lights and dyes affect them. The Dales have long been home of the textile industry and there are many local people with a specialist knowledge and interest in textiles.

Co-organiser Margaret Stockdale contacted firms like Procter and Gamble and collected together material to mount an exhibition. Two venues were selected, one a rural setting in a village hall in Bolton Abbey, the other in a hall in Ripon town centre. The event was staged to coincide with National Science Week. Posters and flyers were distributed to local schools, wool shops, the Embroiders' Guild and advertised in the WI newsletter.

In addition to looking at the science of textiles the WI also exhibited a display of appliqué and patchwork, made by members and had people on hand to emphasise the relationship between science and more familiar craft skills. Tables were set up to give people a chance to try a range of activities such as using various dyes on litmus paper to demonstrate colour chromatography. The exhibitions were judged a success and prompted the WI to continue applying for COPUS grants to further promote science.

## ARE YOU RECEIVING ME?

Science lends itself to the medium of radio surprisingly well. There is no need to have to see how experiments work and projects operate – vivid verbal explanations, entertaining speakers and imaginative sound effects can help explain a whole range of scientific topics and help listeners connect to science within a non-scientific context. Four COPUS grant projects set out to do just that.

### Science for Southern Radio

A past COPUS media fellow and lecturer in electronics and computer science, Adrian Pickering, is the ideal choice for running a series of science radio programmes. He was concerned that too often local radio steers clear of presenting science programmes, believing them to be too difficult. He was also aware that it is cheaper and easier for producers to simply get a scientist in to the station, sit him or her in a studio and have listeners ring in to ask general science questions.

Adrian wanted to pilot a scheme showing that science could be presented differently and in a way which would be interesting and relevant to local listeners. With a £3000 COPUS grant he set out to prepare short science stories to be slotted into general interest and news programmes such as on BBC Radio Solent, based in Southampton.

The topics he covered included why there is a red tide in the Solent, something that all locals spot – it's down to a seasonal emergence of a particular algae - and the closeness of the Southampton Oceanography Centre helped in an item on tracking rubbish in the North Sea. Adrian used local businesses and institutions as a source of subjects. Very often local people know there is a factory nearby but cannot be quite sure what goes on inside it.

"Local radio stations love projects like this because for them it's free and they are often strapped for cash," says Adrian. "It's also a good way of interesting young people in science – using subjects they are interested in and slotting them into the sort of programmes the younger market listen to."

How did Adrian measure the success of the project? "Well the radio station kept on using the items - I did about 70 altogether, and I questionaired the contributors. The main result was that they felt more confident about doing this in the future, which was one of the reasons for the exercise in the first place," explains Adrian.

If you want to either broadcast an item on radio or have a project aiming to get more science on the airwaves make sure you actually sit down and listen to the station's output. You have to be able to speak with some authority when you phone or meet with a radio producer, particularly if you are trying to influence what is broadcast.

If working on an event or project which has not been tried out before double the amount of time you think it will take. Even the best time planners have been surprised at how long it can take to pin people down, use them for whatever purpose you have in mind and then get on with the job.

It is important to monitor the success of any project and producing a database of a target group is one way of ensuring feedback. All callers to the phone-in competition were logged and can be used for mailshots and questionnaires.

### Science for hospital patients

It could be said that scientist and broadcaster Lynton McLain had a captive audience for his COPUS funded project. He was awarded £1500 to prepare a series of programmes on scientific subjects to broadcast on London's Charing Cross Hospital Radio.

Lynton was a volunteer presenter and producer at the London-based radio station when he decided to use his scientific knowledge and interest to make science accessible to bed-bound patients. The theme of the programmes was "our world" – broad and varied but not intimidating to a general audience. The topics covered light, energy, sound, weather, plants, muscles and the chemistry of a cup of tea. Children introduced each programme with their ideas about, for example, how plants grow. Songs and music linked each section with scientists from Imperial College illustrating the latest research in the subject. Imperial College scientists were used because that's where Lynton was working at the time and this allowed him immediate access. For instance, Professor David Phillips of the College's chemistry department spoke about light, explaining an innovative treatment which uses light to reach cancer cells. Not all talks were medicine-based; Lynton felt the patients might just have had enough of that.

The 10 minute programmes were initially broadcast each day of National Science Week and since then have been broadcast over 200 times. BBC Radio Scotland took on the project and used the original programmes, substituting a Scottish voice, for inclusion in its weekly national science programme.

The whole amount of Lynton's grant went to hire a BBC studio and to commission evocative electronic sounds for inclusion in each programme. These were written and produced in the BBC's radiophonic workshop and the synthesised music and sounds greatly added to the programmes' appeal. The whole project ran smoothly, thanks to months of planning and hard work by Lynton.

"When I started out I knew I was going to be busy but really had no idea of just how much of my time the programmes would take," he says. "Sometimes I would spend days and late into the night in the studios."

### EGIN – Welsh for "budding shoots"

One of the biggest problems facing the rural areas of West Wales is the growing number of young people who leave home in search of jobs. The ramifications for the sustainability of the whole area are wide and community groups are trying desperately to stop the people drain from Welsh country areas.

The Theatr Felin-Fach based in Ceredigion, a predominately Welsh speaking area, works closely with Radio Ceredigion, the most listened to station in rural West Wales. It has successfully attracted funding, including a £3000 COPUS grant to establish a bilingual science, engineering and technology distance-learning project. This aims to show listeners just how much science happens in their area.

"We did our own research and ran a series of broadcasts showing our listeners just what was happening in their own locality," says Euros Lewis, Lecturer in Charge at Ceredigion's Community Education Centre. "For instance, in Ffostrasol, a tiny village of no more than 200 people, there is a company running a world-wide service producing antibodies for snake venom. This is a company with a niche market on a global scale and hardly anybody knows it is happening. There are also well-established dairies which are now making an impact producing value-added products like Welsh butter and cheeses."

Euros and his team set out to visit such establishments, conducting interviews and producing 12 ten-minute programmes, in both English and Welsh, which were broadcast at breakfast time and during peak listening slots. Using their theatrical skills, the producers made entertaining and lively broadcasts and later made them available on tape cassettes for local schools to use.

The project also ran a phone-in competition and this again showed the organisers just how high the listening response was. The Egin project is on-going, as long as funds hold out and there are hopes to develop more ambitious distance learning projects.

### Talking science and science questions

One of the first projects the newly formed Leicestershire and Rutland branch of the British Association organised was a series of **Science questions ...** broadcasts for Radio Leicester.

A COPUS grant of £1200 funded the first three events in the series. Panels of experts were invited along to answer questions on a variety of subjects including space science and aliens; "we are what we eat" which covered the controversial subject of genetically modified food; and climate change looking at hurricanes and global warming. The programmes were recorded by Radio Leicester at specially staged events held at Leicester University, the Snibston Discovery Park in Coalville and Loughborough University. A small invited audience was present at each.

"One of our first happy discoveries was that although our budget included a fee for each of the invited speakers, most of them only claimed expenses," says branch secretary Jean Collins. "So we were able to use our original money to hold a series of question and answer sessions called **Talking questions**. This involved schoolchildren quizzing experts live on air about their subject and listeners being invited to email or phone in their questions as well."

So successful were the programmes that Radio Leicester has said it is more than happy to continue with the format. There are plans for the **Talking questions** programmes to be broadcast every month for the next year with sessions being held over lunch so that the schoolchildren and the scientists can nip in during their breaks.

*Do not be bashful about asking people if they are prepared to give their services free. Very often travelling expenses and refreshments are all that many require. Scientists are often only too pleased to be able to talk about their work and research.*

*"In a nutshell, research the strategy first, take technical advice from those who are more experienced and aim to actively involve people: don't just present information."*

## IF THE MOUNTAIN WILL NOT COME TO MAHOMET ...

One of the problems faced by most event organisers is trying to entice people to a particular venue at a certain time. One way around this is to take your project to the people – organising it in such a spot that the public cannot help but see it. The following demonstrate just some of the possibilities.

### Underground science

Probably the COPUS grant project to reach the most people, **Science on the Underground** saw all 4000 of London's underground trains whizzing around the capital carrying posters posing science questions in cartoon form and inviting people to find out the answers from a web-site.

It was the brainchild of husband and wife team Brenda Keogh and Stuart Naylor, both lecturers in science education at Manchester Metropolitan University. Brenda and Stuart decided to run the project when they realised that most of the material on the Underground was not very challenging and that there was a very large (bored!) and captive audience on the trains.

From the start this was going to be both an ambitious and expensive project. COPUS provided a £40,000 grant which was matched by Glaxo Wellcome and the Institute of Physics. Numerous meetings followed with London Underground and artist Ged Mitchell who was commissioned to draw the cartoons featuring images such as a snowman putting on a coat and asking what would happen as a result. The idea here was to encourage people to think about insulation. It made a lot of people think including TV personality



Alan Davies who mentioned the cartoons on the Clive James show! Other subjects included the question of why plants do not grow under pine trees (lack of shade and acidic soil) and how far car headlights shine.

Brenda and Stuart worked with the London Transport Museum whose help was invaluable in negotiations with the advertising company TDI (London Transport do not own the advertising space) and in giving advice and support in preparing the posters. "They said the posters made them want to talk about science which is why they wanted to be involved in the project," explains Brenda.

The whole idea seems deceptively simple but people engage with the posters at their own level of understanding so that a poster which is accessible to a seven year old can also present a challenge to someone with a physics degree. "In working with all the groups involved we were willing to take their advice on the technical issues but we stood our ground on the overall strategy," says Brenda. "We were confident in the approach because we had researched it thoroughly before we made it publicly available."

The posters appeared on the tube during two National Science Weeks and then again in August when the trains were packed with tourists and visitors to London.

"We had more than 11,500 responses on the web site over three months which was fantastic," says Brenda. "People also left us messages including one commuter who told us she was so interested in the poster she went right past her stop!"

And as a measure of how successful the idea was both Russia and Sweden had the cartoons translated and ran them on their own public transport systems.

### Science travel shop

To be precise it was not an actual shop but a bandstand at the Marlands shopping mall in the heart of Southampton where the University of Southampton used a £1500 COPUS grant to set up a travel shop. Here visitors were able to travel from the bottom of the oceans to the furthest reaches of the cosmos through a series of activities and displays. The travel theme also included areas of medical science (travel around the body), engineering and the superhighway (optical fibres).

It was an exhilarating, successful and exhausting six day exhibition set up by Sarah Watts of the University's Public Affairs Office and helped by teams of students, researchers and lecturers. Thousands of people stopped and took part in a host of activities including making star maps which they took home; interacting with computers and watching videos of life on the ocean bed.

"At times it was like being on a Blue Peter set," says Sarah Watts. "The only difference being we had visitors of all ages not just youngsters." One distinguished visitor was the then Science Minister, Ian Taylor. He was particularly intrigued by a display of house dust mites which could be studied under a microscope as part of a project explaining asthma and allergies. However, he declined an invitation to have a simple skin test to see if he was allergic to anything, choosing to volunteer his assistant instead. And the assistant's test showed up positive!

The Isle of Wight with its reputation for dinosaurs and fossils is just a short hop over the Solent from Southampton and a geology exhibition featuring a wide range of fossils proved popular with shoppers as did the chance to study a giant satellite model.

With so much happening at the site the exhibits had many models and pieces of equipment. They were too cumbersome to move each night so the University's insurance policies were checked and it was safe to leave everything on display in the mall at night as long as the security staff were on patrol.

*"It may seem obvious but people often make the mistake of planning to use students as helpers at events and then discover they are on holiday. University terms vary from school terms so always check dates."*

"It's a very useful point to make," says Sarah. "Always check insurance policies and personal liability insurance too when organising a public event." Sarah also advises paying for at least one advertisement before an event takes place as very often all publicity generated by the event itself appears too late to attract visitors.

### Surgery, senses and statistics

Hundreds of people daily pass through the foyer of the Ninewells Hospital in Dundee making it an ideal venue to display some of the exciting work the Hospital is renowned for – work at the forefront of pioneering science.

There is a thriving section of the British Association in the Dundee area and Graeme Adamson, its treasurer, was anxious to apply to COPUS for a grant in order to stage an exhibition for National Science Week. He particularly wanted to feature Ninewells Hospital because that is where he returned to in his 30s to embark on a medical training – as a mature student.

"We have the world expert in key-hole surgery here, Professor Sir Alfred Cushieri," says Graeme. "It only seemed right to demonstrate his work and show people the science behind the innovations they hear about in the media."

A grant of almost £3000 was sufficient to mount a week-long display which showed not only key-hole surgery but looked at problems associated with eyes, ears, nose and skin and demonstrated the importance of mathematics and statistics in modern-day medicine. Such disciplines are particularly useful in making projections of the relationships between, for example, outbreaks of common illnesses like colds and influenza, linked with external influences like the weather or environmental changes.

The organisers wanted to make it a fun event as well as informative so had on display a series of basic training aids where people could have a go at trying some of the techniques doctors use on their patients. Reminiscent of the children's game, *Operation* where an organ had to be slotted into the right place in the body, the Dundee exhibition had members of the public testing their steady hands by manoeuvring shapes into receptacles and hoping they were reaching the right slot!

### Scientific power to the people

"Here at the University of Bristol we believe we have a duty to the people of the city to show what is going on at their university," says Raymond Hales of the Faculty of Aerospace Engineering. "It is always difficult getting people to attend events within the University so we decided to take exhibitions and demonstrations of our work to the people."

A £3000 COPUS grant enabled the University to set up a huge display in the popular Galleries shopping centre to coincide with National Science Week. Twenty four exhibits, most of them interactive, were set up including an earthquake machine with models of different houses and shops which demonstrated the damage that can be done to buildings of varying sizes and structures. Other displays covered the valuable research the University carries out into arthritis, dementia and fertility.

Another popular exhibit was a plastic model of the human body which is used in the University's Medical School to help teach medical students the intricate techniques of key-hole surgery. Members of the public were invited to try fishing around for particular plastic organs of the body which showed them where the body's organs are situated and how they all link together.

Display boards, models and literature covering all aspects of medicine, science and technology taught at the University were placed in the shopping area's central mall. Students were only too pleased to help out and to leaflet shoppers, alerting them to what they could discover amongst the supermarkets and clothes stores.

So successful has this sort of exhibition been that the University has staged it five times now. "It is not an ideal time for us as National Science Week coincides with the end of a busy spring term but the response and interest from people has been so great that we have been encouraged to continue," says Raymond. "We reckon it costs us about £8000 to stage the week-long exhibition but once we have secured COPUS funding it is easier for us to interest other organisations in helping us make up the shortfall."

## SCIENCE FOR ALL

One of the fun things to do with a science project is to try to involve as many people as possible and have them report back with their results and observations. This is true research and the more people involved the better.

### Garden birdwatch

Garden birdwatch is now the world's largest citizen science project with more than 10,000 volunteers throughout Britain involved in spotting and recording the birds that come into their gardens.

A COPUS grant of £19,550 was awarded to the British Trust for Ornithology to allow them to prepare a full-colour handbook which is sent to all volunteers enrolling in the Garden birdwatch project. It is crammed with information about 41 bird species, hints and tips about identifying them, a glossary of scientific terms and a comprehensive section on why monitoring bird populations is so vital in gathering information about what is happening to our environment.

"Deterioration of the traditional British countryside probably linked to more intensive farming, the destruction of hedgerows and the increasing use of chemicals in agricultural production are effecting the lives of birds. More and more are taking refuge in our gardens and it is important that we plan and manage our gardens to replace as many of the missing links in the birds' seasonal cycles as possible," says Andrew Cannon, organiser of Garden birdwatch.

Volunteers are issued with an information pack containing the book and a series of forms divided into categories which they are asked to fill in when they spot a bird listed. These have to be completed several times a week and four times a year these records are collected and scanned into the BTO's database. The information is then analysed to track the changing pattern of birds' movements and the ecological implications.

In addition to the pleasure gained from bird watching and encouraging wild birds to nest and feed in their gardens, volunteers become familiar with a whole host of scientific principles and concepts. This often encourages them to take a wider interest in environmental and ecological matters. An added bonus is that this sort of project can be easily accessed by elderly and housebound people. All they need is a window!

"This project has been a great success and it is the largest of its kind in the world. Thousands of enthusiasts are collecting data which will enable campaigners and decision-makers to establish and hopefully agree conservation priorities" says Andrew.

“A first port of call when trying to find premises is to approach a place or venue where you may once have worked or studied.”

“Asking post-graduate students to assist in displays and exhibitions not only helps people understand but is a valuable training aid to the students themselves. It gives them an opportunity to think of how the public see and understand their research and helps them explain their results clearly. This is a good point to remember when trying to entice students to help.”

*“Involving local people in any project based in an educational establishment increases the likelihood of obtaining further funding, particularly from the industries and businesses attracting its workforce from the area.”*



## From small acorns huge oaks grow

When pupils from Yardleys School in Birmingham decided to do something about a derelict wildlife conservation area near their school, little did they realise that it would grow into a massive project involving the local community forming themselves into a charity and gaining funds to create a Millennium Green.

Westley Brook was an area disfigured by old mattresses, derelict cars and broken television sets. Yardleys pupils, aged between 11 and 16, used a COPUS grant of £1000 to study the effects and causes of pollution by both the dumping of rubbish and the effect of effluent and industrial waste products on the Brook which runs through the site. They also took samples of air, often polluted by car exhaust fumes.

Residents of 40 homes adjoining the site were invited to use the School's science facilities and to become involved in logging the findings. "This became a project involving the students in addressing issues that concern them and their future and joining with others in their community to take positive action to create change. And very successful they were too," says Yardleys' Head Teacher Heather Jones.

Local industry and bodies like the National Rivers Authority soon became involved in the project – offering funding and staff to assist. Displays were mounted and clean-up days held. The School used COPUS' grant to buy survey materials, chemicals for testing samples and for hiring the school after hours.

Such was the interest in the project that local residents formed an action committee and have received further funding to build a reed bed in the Brook to filter water into a pond and to develop a wetland reserve within the conservation area. The School will naturally be involved in this ambitious project spurred on by the fact that last year they were the winning school in Severn Trent's *Environmentalist of the Year* award scheme.

"The project has done a lot of good," says Heather. "It has raised public awareness of environmental issues and created a cohesiveness amongst the community that certainly wasn't there before."

## Astronomers assemble

It's true but it's often the simple ideas that work best as a project organised by Mark Toner, President of the Dumfries Astronomical Society demonstrates. Remember the interest in the comet Hale-Bopp? The streets were filled with people with cricks in their necks from gazing up searching for the comet.

Mark Toner had the good idea of taking out an advertisement in his local newspaper, the *Dumfries Courier* with a circulation of almost 40,000, giving readers a simple map of the night sky and telling them where to look to see the comet and also the planet Mars. He used a COPUS grant of just under £500 to pay for the advertisement and that was it. People were able to stand in their back gardens, look at the map and gaze up. No expensive equipment was necessary and there were no barriers preventing participation.

"I also gave details of our astronomy society and we have had people coming in to ask questions, many of whom had the advert with them," says Mark, a lecturer in astronomy and maths. "One of the problems we had was that we had no real way of evaluating how successful the project was. We did ask readers to let us know by returning a small form but not many bothered."

The Dumfries Astronomical Society, pleased with the comet-watching night has gone on to organising starwatch evenings. It uses the Wildfowl and Wetlands Trust Centre in Caerlaverock where people can use members' telescopes to search the skies, accompanied by the sound of geese and other wildfowl. Detectors are on hand for those who want to listen out for bats and a close co-operation and mutual interest has grown between the astronomers and amateur ornithologists.

*“Dennis Ashton believes people can be critical in a constructive way and advises listening to your audience. He actively canvassed the public's views, listened to what they wanted and acted upon their comments. The successful “drive-ins” and “take-aways” were suggestions from members of the public.”*

## Star Centre

**Star Centre** is a national centre giving public access to information and activities in astronomy. It was set up with the help of a £20,000 COPUS grant and is enabling people to access information directly by telephone, fax, email or post.

The project is run by staff at the Centre for Science Education at Sheffield Hallam University who have also used some of the grant money to organise a host of astronomy public observing sessions through regional star parties, drive-ins and take-aways.

"The public are fascinated by astronomy and space travel," says Bill Harrison, Head of the Centre. "We don't have an astronomy department here at Sheffield Hallam but we do run a major public understanding programme. One of our visiting lecturers, Dennis Ashton, has a mobile planetarium, a star dome, which he has had great success with. We decided to cash in on the public's fascination and Dennis' expert knowledge to set up this project."

When the **Star Centre** was launched a capacity audience of 400 packed in for an event hosted by astronaut Helen Sharman. Letters of support for the project were received from far and wide including a fax from cosmonaut Valentina Tereskova.

"Since then we have gone from strength to strength," says Dennis Ashton. "At the start we had an astronomer staffing the Centre one day a week and in 50 days received more than 700 enquiries. We've organised "take-aways" where members of the public or groups of schools telephone us and we descend on them with telescopes and "drive-ins" where we set up a site and ask people to drive up and visit us."

Another popular event focused on the partial solar eclipse when a "solar tower" – a specially constructed frame housing a series of telescopes – was erected in Sheffield's city centre allowing shoppers to use telescopes, many of them for the first time. More than 500 took up the challenge. There have been astronomy sleep-overs and the establishment of a meteorwatch project which links up with schools and supplies teacher information packs.

## Project cloudwatch

Seventy schools and thousands of children took part in a mass observation project looking at and recording cloud movements during what turned out to be the coldest May week for 75 years. A COPUS grant of just under £1000 made to the Royal Meteorological Society provided a 20 page booklet on clouds and a cloud recognition chart.

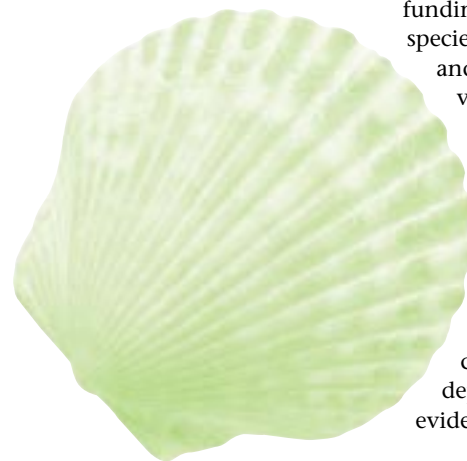
The pupils learned how to look out for and record 10 different cloud types, note wind direction and study convection, condensation and radiation processes which effect cloud formation. Results were sent by teachers to the RMS where a cloud map of the country was produced. This was then compared to satellite images for the same period to compare how accurate the children's observations were. And they were almost spot on!

"Cloudwatch was the first simultaneous cloud and precipitation observation ever taken throughout the whole of the British Isles," says Education Officer Malcolm Walker. "It really helped improve pupils' observation skills as well as helping them in geographic-based field studies. They enjoyed themselves too, despite having to go out and record the clouds three times a day during the very cold weather."

## Recording and mapping marine biodiversity in Northeast England

One of the exciting aspects of mass observation projects is seeing the results from a project pour in. The Dove Marine Laboratory in Tyne and Wear received a COPUS grant of £2860 towards their project involving the public in data gathering exercises. And staff were delighted when one volunteer discovered a Craterolophus – a stalked jellyfish – on the Northumberland coastline. The last recorded sighting of such a creature was back in 1856!

“The Laboratory has used some of its funding to develop a project technique involving computer packages, literature and publicity material which offers a model which can be easily transferred to any part of Britain’s coastline. It is a good idea to “think big” when embarking on a project like this.”



The recording and mapping exercise is part of an initiative called *The North Sea: our joint responsibility*. Local wildlife groups were invited to a series of workshops where they learnt about identifying various species. The coastline was divided into sections and each group of volunteers sent off to a particular section with recording sheets to see what they could find.

Community groups, students, young children and retired people were also amongst the volunteers. One of the organisers, Dr Stewart Evans, believes a project like this really draws people together.

“Local people find their interest in the environment is raised and they are then encouraged to develop action plans which lead them to actually having a say in their own community on their own environment.”

Judy Foster-Smith who heads the mapping project has also been delighted at the response from the public and equally delighted at the results.

“We held a few summer report-back sessions but this is an on-going project, as long as the funding holds out and we expect much more important data to come in. Many common species on the coastline are under-recorded because people assume they are in abundance and don’t bother to record them. These species include, for our region, whelks, starfish, various seaweeds and fish. There are 2400 species already documented, we could probably double that number.”

In a project like this, results are often newsworthy, generating press coverage and more interest. For instance there was great concern in the 1980s that anti-fouling paint being used on small craft was having an adverse effect on sea snails resulting in them changing sex. Legislation was passed banning such toxins on certain craft and scientists at the Dove Marine Laboratory have actually shown a startling reversal and have evidence that the sea snail population is recovering. Likewise, concerns were being raised that the commercial fishing of common whelks was depleting whelk stocks. Again the Laboratory’s volunteers have collected sufficient evidence to show that whelks are still around in reasonable numbers.

## COMMUNICATING SCIENCE

Science is a subject about which many people would like to be better informed. But few scientists have all the answers. They can be experts in their own field and have a smattering of knowledge in other disciplines but no one person can be expected to know all things scientific. What is important is that scientists know how to communicate and how people want to receive information. Two COPUS grant projects contribute on a practical level to easing the dialogue.

### Helping the scientific community do its public duty

The Oxford Trust has been communicating science for more than 10 years. Whilst there has never been a shortage of organisations willing to host lectures and to supply interested parties to attend events, it has not been so easy to find scientists and engineers willing to talk about their work.

A £20,000 COPUS grant enabled Gillian Pearson, the Trust’s Director of Education, to encourage more of the local scientific community to get involved in science communication activities. At the outset she and her team contacted seven Oxfordshire organisations, visited them and discussed with individual scientists the exact nature of their work and how it could be used to enthuse teenagers in science. Four responded positively and further visits were made when staff were shown how they could use their

“Gillian Pearson found she had to have huge reserves of tact and diplomacy as well as a great deal of patience to encourage the scientists to believe they could make their demonstrations genuinely accessible to young people. It’s no good giving in at the first hurdle. Perseverance usually pays off.”

skills to encourage young people to take part in innovative projects.

“Many scientists feel that only someone with a knowledge around PhD level could understand their work and its relevance and schools were keen to make sure any activities could be tied in with National Curriculum restraints,” says Gillian.

“We showed the scientists how to present and demonstrate their work and helped them make a success of their demonstration. We found, naturally enough, that when scientists were given a few ideas and enjoyed the demonstration, the students responded well.”

Gillian and her team worked with Kraft Jacob Suchard to develop workshops on smell and taste which involved testing a diverse range of foods including coffee and Angel Delight. She helped Exxon Chemical to produce an interactive demonstration lecture on viscosity in which pupils make liquid timers from a range of household products. And she worked with the MRC Magnetic Resonance Imaging Group to develop a workshop and class investigation into muscle fatigue, allowing real MRI analysis.

To make sure their project was working all scientists were asked to complete evaluation forms with very positive feedback. One added bonus was that many of them found how beneficial the demonstrations were to them and how their presentation skills improved as their confidence grew. When asked if they would do it again the response was “if we find time” and “if you (ie the Oxford Trust) can help with the organisation and schools contact”.

“We don’t want to hold their hands all the time but I take a very positive attitude along the lines of ‘trust me, I’m a doctor, you’ll enjoy it, go ahead and try,’ “ says Gillian. Two companies have even been inspired to go it alone. Exxon Chemical has gone solo and regularly delivers the viscosity workshop in local schools using staff trained by the Oxford Trust and using equipment the Trust put together. Oxford Asymmetry, not one of the first organisations to join the scheme, has proved to be one of the most successful. It runs an isomerism master-class for schools and its scientists now confidently deliver this without any assistance.

### Communicating science with smart technology

Hands-on science exhibitions are extremely popular and the Exploratory in Bristol was one of the first in the country offering learning fun via interactive exhibits. But understanding requires more than experience and the Exploratory knew that many visitors disliked reading lengthy captions and information sheets attached to exhibits. As a result they were not gaining as much information as they could.

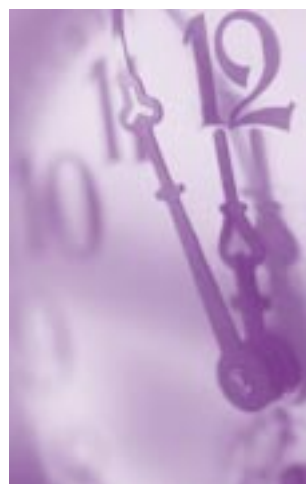
Dr Priscilla Heard, a senior lecturer at the University of the West of England’s Psychology Department, wanted to find out how information could be made available and appropriate to people’s needs. Aided by a £36,000 COPUS grant she devised a computer-controlled system which allows each individual visitor to control how much information she or he receives and enables them to make links to other sources.

With the help of John Taylor, then at University College London, researchers from her own department and Hewlett Packard Laboratories in Bristol, she created auditory headsets, linked to computers and a mobile telephone unit. They offered the usual facilities of a tape recorder but were programmed so the wearer could re-start the tape, jump to a section which offered more information or choose a different style of presentation. Commentaries were automatically adapted depending on what had already been listened to.

Targeted groups were invited into the Exploratory to test out the equipment. More than 200 people from a five year old upwards took part. The project focused on pendulums and at each stage video cameras filmed their progress looking for any possible problems they may have using the equipment.

“We chose pendulums because they don’t leap out at you as having an amazing fascination

Priscilla Heard firmly believes that people learn in their own style and the most important thing is to provide information in a variety of ways - using the latest technology and experts used to communicating science.



across the age range," says Priscilla. "To engage the young visitor's attention we developed a story based on a character called Harry who wanted to open his birthday presents but was told by his mother he couldn't until his conker pendulum clock said it was the correct time. Harry then tried to move the pendulum clock by pushing it and adding weight to it. It didn't change the time but when he shortened the pendulum the clock moved forward and he was able to open his presents.

"The children loved this angle, they thought it terrific fun and their knowledge of pendulums certainly improved."

Priscilla's team was careful to monitor the success or otherwise of their experiments. Visitors were asked to complete a questionnaire before they used the equipment to tour the pendulum display and were then tested on their way out. Some people were given both questionnaires but didn't use the experimental equipment. Results showed an improvement in knowledge for those using the new equipment and demonstrated that each visitor actually spent longer on each exhibit and used it more effectively.

Each set of equipment was programmed to keep a record of the way it was being used and these logs were used to evaluate the usefulness of the headsets.

Priscilla believes that the commentaries each headset offered were important.

"We used a local science teacher, Sir Michael Berry, Royal Society Research Professor of Physics at Bristol University, and Professor Richard Gregory, founder of the Exploratory, to write and record commentaries. Both professors are at the top of their fields and used to explaining well and to all levels what their branch of science entails."

Priscilla is continuing her work on the smart technology and believes she has a prototype which is flexible enough to be adapted for other science centres and museums.

## HOW TO ORGANISE YOUR OWN PUBLIC EVENT ...

Several of the organisers featured in this collection offered similar advice for others planning public events which has been summarised below.

1. Think through your idea and if you're sure it will work, do not be put off.
2. Gather together a team who will support your idea. Allocate tasks and make sure that everyone is clear about the project's goals, direction and who is responsible for what. Communicate - little and often, and keep it simple. In all the enthusiasm, don't let the project expand unrecognisably without thinking through the extra work and the cost implications.
3. Look around for sources of funding. COPUS can offer suggestions if it is unable to help. Prepare a comprehensive breakdown of costings and write in a contingency figure in case anything goes wrong.
4. Secure premises, checking your event will not be clashing with anything similar.
5. Notify the media - remembering that national newspapers have weekend supplements with suggestions for family days-out; local press; give-away advertising newspapers; local radio; specialist publications (which often require a few months' notice); and information services on the web.
6. Notify the local authority (which may also help with publicity), police and fire services.

7. Print leaflets and distribute them around schools, youth groups, societies and organisations. Ask supermarkets if you can put up a poster or hand out leaflets on their premises. Don't forget public libraries and tourist information points.
8. Determine whether or not your event could link in with topics currently being covered by the National Curriculum. If so, make contact with the local authority's education department and use their facilities to notify schools.
9. Bear in mind disabled visitors. Check access points, wheelchair ramps and toilet facilities.
10. Don't forget the three Ps — publicise, publicise, publicise!

One further point worth remembering is that if you enjoy what you are doing, your enthusiasm will rub off on others.

## ... AND GET HELP FUNDING IT

COPUS grants in support of public understanding of science, engineering and technology

The Royal Society, through COPUS, is committed to funding projects which enable public access to contemporary issues and ideas in science, engineering and technology, whether it be through debate or demonstration, interaction or exhibition, the arts or other pursuits. Since 1987, some 1000 diverse projects have been funded throughout the UK.

For up to date information about deadlines and application forms, please email [copus@royalsoc.ac.uk](mailto:copus@royalsoc.ac.uk) or look up our web site at [www.royalsoc.ac.uk](http://www.royalsoc.ac.uk) under "Science for all".

## IN THE SAME SERIES

*So did it work?* Evaluating public understanding of science events

*To know science is to love it?* Observations from public understanding of science research

*Out and about* Organising public events: a collection of case studies from the COPUS grants scheme

Available from COPUS or look them up on our web site at [www.royalsoc.ac.uk](http://www.royalsoc.ac.uk)