GATSBY TEACHER FELLOWSHIPS (GTF) PROGRAMME NEWSLETTER

NOTE FROM THE EDITOR

"The person who understands is capable of 'going beyond the information given'." *Bruner*

David Spendlove
University of Manchester
GTF Newsletter Editor, 1999-2000 Fellow

CREATIVE AUTONOMOUS PROBLEM SOLVERS

The term creativity is used by many people to describe different things. Cropley (2001) suggests most individuals connect creativity with artistic or aesthetic phenomena. However, over the last 50 years leading educationalists such as Roe and Guilford have begun to explicitly express the important link between creativity and areas such as science and engineering.

A good example of the widening accepted definition of creativity is the scientist, whose lucid thinking allows him to make the link between mould growing in a lab and the anti-biotic penicillin.

Yet with all this research, creative problem solving is still not always finding its way into our teaching as often as it could. The evidence is that too often our education activities are focused on closed questions with their reliance on linear process and logical reasoning. (DfEE 99 pg 95)

For further information on the Gatsby Teacher Fellowships Programme please contact:

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Industry too is beginning to feel the pinch of past educational policies and many technological based companies such as Marconi, Jaguar and Dyson are all struggling to recruit people with the required creative thought processes to keep them at the leading edge (Breckon 2001).

With Gatsby funding I am now researching different and exciting ways to deliver a modern and technologically advanced Design Technology curriculum that allows, indeed nurtures, creative autonomous problem solvers.

Aim of my fellowship project
To investigate potential means to help nurture creative autonomous problem solvers within the Product Design arena and to develop an eight week scheme of work based around PIC chip technology.

I am now well into my fellowship project, looking at ways to help nurture creative autonomous problem solvers within Design and Technology, and develop a scheme of work based around PIC chip technology.

Gatsby funding has allowed me to travel around the country to look at several different establishments to see how they deliver Systems and Control based projects and see first hand the ways in which they have tackled creative problem solving. I am at that middle point in any research-based project where I now have far more questions than answers. However, I have tried to distill my thoughts into four main focus areas:

- Greater project transparency for students (project timescales and breakdown of learning objectives)
- Team learning
- Photographic story board handouts showing the manufacturing process
- Set final objective but no set way of reaching it

These ideas are not new in themselves, but hopefully if they can be brought together and packaged effectively they will provide the basis of a project that will resolve many of the problems laid out in my project proposal.

One of the most interesting avenues of research is the design of photographic story board handouts showing the manufacturing process broken down into step-by-step commands. Initial results seem to show that managing a project this way means students can determine their own order of manufacture and testing - albeit within a carefully controlled and formatively assessed framework.

Another pleasant outcome is the significant reduction in teacher-based troubleshooting required. As students all build the project independently, following simple photographic steps, they appear to really take ownership of their project and are able to fix them more easily if, and when, they go wrong.

If there is anybody reading this who is currently researching or teaching in this field please drop me a line. I am always pleased to get different viewpoints or to speak to people about similar PIC based work. My email address is elliottwillson@fsmail.net

Elliott Willson
The Wavell School, Farnborough
2003-2004 Fellow

CALLINGTON SPACE CENTRE LANDS!

I was awarded a fellowship in 2001 for the development of materials for non-specialists in physics at KS3. However this was just the start and my Gatsby fellowship allowed me develop a vision which was supported by my headteacher because he saw that Gatsby had identified in me potential to make a difference to the motivation and inspiration of many students.

22 January 2004 will see the formal opening of the Callington Space Centre, by Cosmonaut Colonel Alexander Volkov. The space centre has been my vision for the last two years and January marks the completion of the first two stages.

Stage 1 was the building of a facility that was separate from the main part of the college allowing us to use it how we pleased and not be tied by the constraints of the timetable. The classroom was to allow us to deliver a varied program of events of a science nature to inspire and motivate students. The courses would have a main theme of a workbook, a make activity and an opportunity for students to work with other students from around the counties of Devon and Cornwall. This has been the basis of our 'Accelerated Learning' modules in which we offer primary schools the opportunity to send their gifted and talented pupils to us to work with like-minded students. The pupils cover work that would not be out of place in KS4 physics lessons. Having returned to their own schools the students are supported in giving presentations, allowing them to show their developing key skills and scientific knowledge.

Stage 2 was the delivery of a 14-inch Meade telescope, which will allow courses to be developed with KS3 and KS4 students in mind, to show them the importance of observational astronomy, and how scientists use data for analysis. The aim is that identified able maths and physics students start to work practically on large-scale projects. The telescope will be enhanced with a CCD camera to allow us to offer live observational sessions to schools and colleges via the internet.

Stage 3 will be the building of a large permanent structure, which will house a classroom, a robotics area and a CAD/CAM facility which will be open for the public to view lessons and take part in workshops. This, however, will be in the future - although not too far in the future!

The project keeps developing and we now offer residential weekend workshops based on three missions, 'Mars', 'Jupiter' and 'New Worlds to search for in space and inhabit'. We have six 'Accelerated Learning' modules, each lasting one day, and the intention is to have two robotics modules written for the New Year based on Lego. We have just been appointed the robotics centre for Cornwall and Devon.

Our community work has grown alongside our curriculum work and I am happy to report that many parents will watch the progress of Beagle 2 with their children thanks to the work we have done.

I would like to offer fellows the opportunity to use the venue to spread the word about their projects; the greatest thing about Gatsby is the ability to make things happen through the support of like-minded people, so if you want to make contact or bring students down please just email.

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Mike Grocott
Callington Community College
2001-2002 Fellow

DATA LOGGERS

It is important for students to be taught up-to-date science, including methods of scientific investigation, as well as current applications and theory. The use of data logging and computer analysis of results is standard in industry but little used in school. Having acquired a small range of data-logging equipment, I feel it is important to allow students to use it with a purpose. My aim is to develop a series of investigations (SC1), which use the technology of data logging as a tool for recording tedious results and analysing them quickly to help the students understand the concepts illustrated. These will then need to be trialled with students of varying abilities and modified accordingly. From my work with York University, I have a series of practical Chemistry investigations adapted for use with the data-logging equipment. The main thrust of the project is to write instruction sheets and work with students of varying abilities to produce a series of viable SC1 investigations for KS4, and collect suggestions for course work at KS5.

I have tried the original experimental ideas with one of my Year 11 groups, just using eyes and test tubes. I produced an initial sheet on the reaction between potassium manganate VII and oxalic acid. This was as a rate of reaction with dilution exercise. They thoroughly enjoyed the exercise and found the colours made it more interesting. Their feedback and evaluation was very encouraging.

I then wrote an experimental set of sheets to instruct in the use of the colorimeters and the data-logging equipment. I designed the double lesson, with my other Year 11 group, to try to follow the instructions to carry out the experiment as a catalyst reaction.

Owing to the lack of data-logging apparatus, I had three activities running, each investigating a different aspect of the experiment. I had one group looking at a chemical industry website on catalysis (www.uyseg.org/catalysis/pages/cat_fames.htm) to enhance their understanding of the concept, one was using the data loggers and colorimeters, and the third was following the same experiment using just colorimeters and recording the results. Each group was asked to give feedback on their experiment and to evaluate the worksheet. I am now in the process of interpreting this information with a view to improving the worksheets and experimental technique.

One of my original thoughts was to extend my work into our cluster schools with students of different ability levels. Unfortunately, there is a lack of data-logging equipment and software, even within our school. However, I intend to change direction slightly, to enable all students to look on data logging as a tool to use as and when appropriate, and also for them to learn how to use them with an easy guide. We have bought into a new KS3 course, which has plenty of opportunity for data logging, and I intend to ensure that all pupils have this experience, once we have sufficient equipment. This will involve working thorough the experiments, producing instructions for the students on how to use the apparatus and training the teachers in the department to boost their confidence in its use.

One problem that has arisen to date is the lack of equipment, as already mentioned. I have overcome this by organising the work as a circus, and including the Internet for research. However, there is a possibility of my department buying enough data loggers to

allow for their use in pairs within most teaching groups, as well as being able to lend some to our Cluster Schools. Having gained confidence in the use of data loggers I am beginning to see far more uses for them, but mostly to demonstrate the speedy recording of results and for illustrating a concept. These ideas are being written into our schemes of work.

Outline next steps – the evaluation of outcomes
Try the instruction sheets with a different group and get their feedback and evaluation.

- Look through the new Year 7 texts and highlight where data loggers can be usefully used and write these into the scheme of work.

- Prepare student and teacher instruction sheets for the use of the data loggers.

- Organise workshops for our department to give them confidence in their use.

- The instruction sheets will be thoroughly tested and evaluated as these will give teachers confidence to encourage students to look upon data loggers as another tool for recording results, just like a thermometer.

The opportunities for using data loggers are there, if a little lateral thinking is applied, and the students' learning is enhanced in the process.

Sue Kendall
Plymouth High School for Girls
2003-2004 Fellow

IMPLEMENTING DNA BASED PRACTICES INTO KS5 SCHEME OF WORK

I started my project in April 2003 so that I could go on two teacher placements. I visited a research laboratory at Kent University where I learnt how to carry out restriction digests, ligation and bacterial transformation techniques. I had been teaching the theory of these protocols to my 'A' Level students for three years without ever having the opportunity to carry them out.

I was extremely grateful to Kent University but I began to realise that to use the skills to design a practical that my students could carry out was going to be very expensive and almost impossible under current licensing policies.

I then attended two fantastic nationwide INSET courses that answered my prayers. A company called Bio-Rad (www.bio-rad.com) produce practical kits at a reasonable cost that cover restriction digests, transformation, DNA fingerprinting and a whole lot more. These kits are suitable for a class of 32 students and come with a comprehensive guide on how to prepare and teach the material. A word of warning though, Bio-Rad is an American company, so there are some unusual spellings and strange protocols. This aside, however, I was saved.

There is another company called NCBE (National Centre For Biotechnology Education, www.ncbe.reading.ac.uk) that provides a similar service. Their kits are also inexpensive and comprehensive but do not present as glossy an image. I have therefore purchased several kits from Bio-Rad to use with my 'A' Level group in February 2004.

My second placement, at the Pfizer pharmaceutical company, allowed me to carry out PCR on bacterial DNA, and again gave me a valuable insight into the theory that I teach at 'A' Level.

To date, I have been very busy in organising a DNA-based INSET day of my very own. I have invited teachers and their technicians to come to my school and carry out four DNA practicals from Bio-Rad.

However, my project is about enhancing the learning of my 'A' Level students by incorporating more hands-on practicals based on DNA technologies. The effectiveness in achieving this aim will be ascertained in February, when my students will evaluate their experiences.

Gaynor Duffy
Ursuline College
2003-2004 Fellow

THE BRAUN PRIZE

15-16 SEPTEMBER 2003

'Promoting Design' the logo runs, and Braun certainly do, in an impressive way. The Braun Prize was established in 1968. It was Germany's first international design competition to promote the work of young designers. The Braun Prize places great emphasis on people as the focus of product development and on product concepts which represent real innovations in design and technology intended to help people in their everyday lives – whether it's in the home, at work or school, during sports and leisure activities, or in the context of health and healthcare. In the words of Braun: "The Braun Prize should send a signal that rejects the trivialisation of values, products and design. Design should be seen as having inherent value rather than serving as decoration".

To assist in obtaining funding to visit and take part in the Braun Prize forum several opportunities for continuing professional development were identified:

(1) Visiting the Braun Prize international design exhibition to understand the interpretation of the Braun Prize design ethos into products

(2) Visiting the Braun plant to look at product design in a setting not previously studied

(3) Visiting the Oral B manufacturing plant in Marktheidenfeld to look at a fully automated manufacturing system, including high stock warehouse and robot forklift trucks

(4) To further my understanding of the whole issue of design in order to inform and enrich my classroom work and provide resources to stimulate my students and colleagues. Keynote speeches were delivered by Andej Kupetz (Managing Director, German Design Council) and Luigi Ferrara (Director, School of Design, George Brown College)

(5) Meet with designers in other countries to maintain contacts

(6) Justification (to me) of what I am teaching by studying these industrial practices

The competition is open to all industrial designers worldwide who are still studying or who completed their studies within the two years prior to the competition. A record 558 entries (from 52 countries) were received and initial short-listing was carried out by a panel of four judges. The criteria used were:

- Design – covering aesthetics, form and degree of innovation
- Technical aspects – plausibility
- Fitness for use
- Environmental impact
- The degree to which the design is focused on enhancing the welfare of people

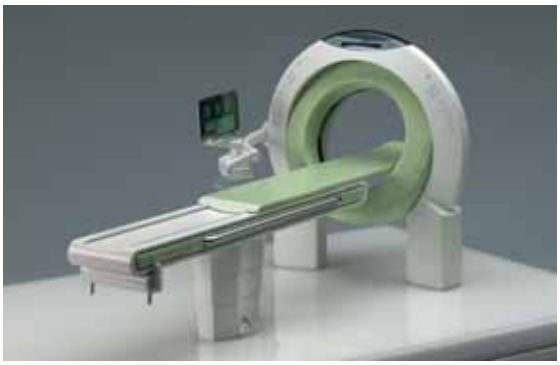
Following a thorough design process lies at the heart of the competition. First round submissions required design folders and optional video/CD evidence. Those through to the second round submitted high quality models to further communicate their ideas. Posters, booklets and the Braun website supports product design work – particularly AS/A2 level, reinforcing the need to develop skills in producing high quality models.

The feedback given by judges to the 22 second round contestants commented on the thoroughness and validity of research. From the second round four submissions were selected for the Braun Prize forum guest jurors to vote on. The final prizewinner could take either 11,000 Euros or a six-month internship in the design department at Braun. The three runners-up shared a fund of 14,000 Euros. All experienced the kudos of having their designs exhibited in the Braun Prize exhibition and scrutinised by the 400 guests at the ceremony.

Runner-up: avalanche rescue rucksack

Runner-up: Modio – a portable internet device

Runner-up: wireless electricity metering system



Winner: "C.T.Loop" – a computer tomograph by the Canadian designer Michelle DesGroseilliers

Sessions to the design and manufacturing plants were included in the overall exhibition programme. The design department at Kronberg focused on personal care accessories – shavers, hairdryers and so forth – while the nearby manufacturing installation despatched over 850,000 units of hygiene care products per day, including 750,000 replacement toothbrush heads.

All of the Braun product range is developed through sketching, hand modelling, CNC modelling and rendering, either by spraying models or using Cinema4. Autocad is used for 2D profiling and ProEngineer (ProE, the industrial version of ProDesktop) is used for all 3D development.

ProE is used as a company policy; file transfer between design and manufacturing stages (both in Germany and abroad) is straightforward and they are confident that ProE allows them all the necessary flexibility to develop and modify products. Some designs are conceived through physical modelling; they are then converted to ProE drawings for refinement and manufacturing; other designs are built up solely through using ProE. Braun designers accept and work down both routes. There is considerable debate between designers over the best software for 3D work.

The manufacturing site at Marktheidenfeld gave the opportunity to look closely at a fully automated manufacturing system. In my view this opportunity is always worth taking and this plant is no exception, being a fine example of high speed, efficient manufacturing. The manufacture of electric toothbrushes from raw materials to the finished and packaged article included over 80 injection-moulding machines and 15 tufting machines, each one applying the 1000 tufts to an electric toothbrush at one toothbrush every half a second.

Designs are under continuous review. One recently incorporated design improvement concerned the positioning of a one-way gore membrane. The membrane allows the escape of gasses created during battery recharging without compromising the 100% water seal that is required by the product. This development resulted in a complete redesign of the toothbrush handle and required retooling before production could proceed.

There is no replacement for seeing processes and techniques first hand, talking to product designers and hearing what leading members of the design community have to say to convince oneself of the validity of what is being taught in the classroom. The continued promotion of industrial visits by staff and students is high on my agenda and this visit has reinforced its value in my eyes.
I was proud to talk about the implementation of ProDesktop and associated machining capacity across the UK with colleagues from Canada, Australia, South Africa and Germany. I believe this has to remain a priority for all teachers in the subject.

Mike Cargill
Cowes High School
2001-2002 Fellow

DATA LOGGING AT KS3

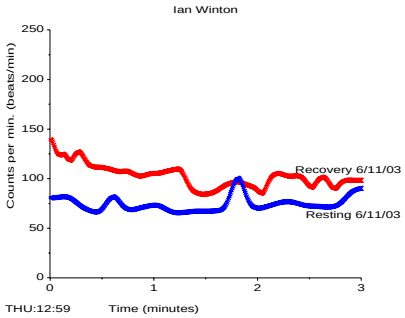
My project falls into two parts. The first part involves writing a complete set of lesson plans for data logging related to the QCA Scheme of work for KS3, the Science Strategy and the Literacy and Numeracy Strategies (not forgetting Citizenship!).

The second part of the project is to carry out some longer-term investigations related to work in Science at KS3. Three projects are planned, related to 'Pulse Rate, Exercise & Fitness', 'Seed Germination & Temperature' (using the School Greenhouse as a resource) and 'Changes in fauna in the school pond over time, related to temperature changes'.

This roughly equates to one project a term, with the curriculum development work being ongoing throughout the year.

This term we have been working on the 'Pulse Rate' and 'Fitness' investigation. Due to timetabling restrictions, I have enlisted a group of volunteers, all boys (the girls didn't volunteer) from Year 9, who willingly gave up Friday lunchtimes to come and exercise to the 'Tai Bo' video. This is good fun, and is designed to improve cardio-vascular fitness. The session lasts for half an hour so can be fitted into the lunch break, with just about enough time to eat!

Before starting the exercise programme we used the pulse monitor to measure everyone's resting pulse rate and their recovery rate after 3 minutes of exercise. This gave us individual graphs like this:



The students enjoyed this part of the process, which we did using an appointment system, making sure there were always several students present at any time.

This data was placed onto Excel, including averages taken using the 'Insight' software. A worksheet was produced for students, also in Year 9, who were following the 'Fit & Healthy' topic; this was set as homework and was well received by the students.

For the next six weeks we carried out our exercise programme every Friday lunchtime, and we will collect a second set of readings for comparison in the last week of this term (probably on the last day!). Several students volunteered and recorded their pulse rates without doing the exercise programme. This will be a useful comparison to those students who have regularly turned up.

So, still to be done is the final collection and analysis of data, and I need to write the investigation up to reflect the various strategies as listed earlier. Overall, we have all had fun doing this and the students taking part have become clearer about the relationships between 'Pulse Rate, Exercise & Fitness', but in a way which is significantly different from our usual classroom-based approach.

In the future I would like to look at linking the work to the PE curriculum, the PE department have enthusiastically taken to the pulse monitor, and the idea of linking the two curriculum areas is one that should help students to gain better understanding of how the two areas interconnect.

In January I will be enlisting the help of the 'Greenhouse Club' to carry out seed germination experiments, using the 'i-buttons' to monitor temperature over four-week blocks, while looking at the germination and growth of French Marigold seeds. The students are an enthusiastic bunch, so I am sure all will have a good time!

Bev Ashe
Ivanhoe College, Ashby-de-la-Zouch
2003-2004 Fellow

A-Z

The A-Z of design terms has now reached its 2003 manifestation and been passed to TEP for further dissemination.

At the moment TEP are preparing a complete revision/expansion of their website, ready for a relaunch next year. The D&T Dictionary that was prepared with Gatsby funding will form a distinct section of the website, and TEP hopes to expand it slowly with more images.

TEP hopes to distribute a copy via CD-ROM to all secondary schools with an issue of *News & Views* at some stage next year.

Mark Hudson, Thomas Telford School
1998-1999 Fellow

CREATING A MEANINGFUL FEEDBACK SYSTEM IN PRIMARY MATHEMATICS

I have been maths co-ordinator of a Beacon first school for three and a half years. During that time, I have endeavoured to find ways to improve further maths achievement across our school.

I began by changing the school maths books from squared to plain, in order to encourage the use of informal jottings in the children's working out; this has proven successful. However, when completing a book audit with feedback as my focus, I noticed that the use of teacher comments referring to coverage, 'Is this all you did this lesson?', secretarial skills, 'Is this your neatest work?' and the cover-all, 'Well done you have worked well today,' appeared across the school, but served no real purpose and did not provide the children with a way forward in their maths.

The aim of my fellowship project, therefore, is to improve the children's maths achievement through creating a meaningful feedback system, a culture of questioning and by raising their self-confidence – their belief that there is no area of maths in which they can't be successful. In order to achieve this, I had to find a way of giving children back ownership of their work; they were not completing the work for me, they were completing it because they wanted to learn.

My starting point was the work that had been carried out by Shirley Clarke into formative assessment.

Meaningful Feedback
I began by encouraging the children to become aware of their work in terms of what they had actually achieved. Learning intentions were made more explicit and the use of success criteria, the pointers I would use to aid my marking of the work, were visible in each lesson so the children knew exactly what they were expected to complete during the lesson.

I developed the use of a traffic light system for self-awareness of work. There were three traffic lights in the class and at the end of each maths lesson the children had to place their work on the light they thought most accurately reflected how they felt about the work they had completed during the lesson.

Red meant, 'I found this work really hard and would like some extra help.'

Amber meant, 'I think I managed this work okay but I would like you to have a look at it.'

Green meant, 'I found this work easy and would like something harder next time.'

At first the children were a little unsure. Was it admitting 'failure' if they put their book on the red light? If they put the book on the green light and got something wrong what would happen? Could they put their work on the green light if they were in the support group? Could a child in the extended group put their book on the red light?

Needless to say, for the first week or so, most children used the 'get-out-clause' and put their book on the amber light.

About two weeks into the traffic light trial the children were confident enough in their work and my 'child/maths friendly' feedback that they were able to place their books, quite effectively, on the light that best matched their understanding of the work.

I felt my next step should be to look at the feedback the children were being given.
I believe that we should be providing the children with feedback that enables them to demonstrate what they have learned during the lesson. I looked at how I could do this in the way I mark the work. I have begun trialling three ways of marking work.

Supporting Learning
For a child who is struggling in a mathematical concept, I tried to provide them with a way out. Shirley Clarke states that, 'One of the reasons for children's fear of mathematics is that it is very easy to get something wrong, and be told it is wrong, without a chance to do anything about it', (S.Clarke - Unlocking Formative Assessment, p.89).

There is a 'catch-up' programme available, but I feel that removing children from the main body of the class is not always the best way to improve their learning or indeed their self-esteem.

When I 'mark' the books of children struggling in an area of maths, I have begun to provide them with a choice of answers, the correct one and an incorrect one, they have to choose the answer they believe to be correct and explain to me or to the teaching assistant, either verbally or in writing, why they think that is the correct answer. This enables me to see exactly where their understanding lies and what I need to do in order to move them forward; putting a cross there and telling them to do it again will only serve to reinforce bad practice and instill in the child the belief that they are 'no good' at maths.

Extending Learning
For the child finding maths easy, I have chosen to trial some extension methods either through the application of developing skills – in this case I use the same method as the child has been using during the lesson but choose larger numbers, or more 'steps' if it is a word problem activity – or by providing the children with an opportunity to apply simple facts they know to solve a more difficult problem.

Understanding the Errors
There can be nothing worse for a child who believes they have understood the work than to be handed their book the next day and find that it is full of red crosses. For a child who does not require the supportive feedback as they have made the same simple error in each of their answers, I draw a moon by one of the incorrect answers, and write a comment such as, 'You have made an error here, can you tell me what it is?' It is then up to the child to apply their understanding of the concept to work out where they went wrong. The emphasis here is never on the child repeating the working out, but looking in detail at what they have done and understanding where they made the mistake, in order that when they next come to that type of question, they will know what they must do in order to complete the work correctly.

Planning and Effective Questioning
Our maths planning has become very activity based; I wanted to move the emphasis from what the children are '***doing***' to what the children are '***learning***'. The children needed to be encouraged to ask questions in a bid to develop their skills across the maths curriculum, finding links between one strand and another. Questions have, therefore, become the central part of my planning format now, they are actually written onto the plan along with the learning intention; I ask questions of the children, they ask questions of each other and, as importantly, they ask questions of me. Children are given thinking time - in order to answer their question as well as they are able, they must be allowed time to process the question and time to work out the answer. There is no stigma attached to incorrect answers, they are simply used as learning tools.

Jo Lundy
St Edmund's Catholic Primary School, Bury St Edmunds

2003-2004 Fellow

A NEW APPROACH TO PNEUMATICS

'Pneumatics in schools has long become a distant memory with teaching staff continually rushed off their feet to fulfill national curriculum requirements.' Well, this is what I had thought until I saw the work of Salford University's robotic department at the Tomorrow's World exhibition in the summer of 2000. They had been developing a range of actuators that work in a similar way to human muscles and had an immense power-to-weight ratio.

After the exhibition I was inspired to research and develop a robotic arm that could be created at low cost and in the confines of a poorly equipped workshop.

Air muscles were first developed in the 1950s by Mckibben in the USA for use in artificial limbs as they have the ability to provide slow smooth controlled movements as well as highly dynamic movements with immediate response. In the 1980s the air muscle was picked up by the Bridgestone Rubber Company and commercialised and from this point various organisations have developed uses for them. One of the most widely known is the Shadow Robot Company which has developed a complete robotic arm with all twenty-four functions; it will even do the ironing for you.

The basic manufacturing principle behind an air muscle is an expandable internal bladder surrounded by a braided shell. When the inner bladder expands in a balloon-like manner the braiding constrains the expansion creating a cylindrical shape. As the volume of air increases due to increases in pressure the actuator shortens producing tension if coupled to a mechanical load. These days you can buy air muscles from a variety of companies at a range of prices. It is, however, possible to manufacture your own using a bicycle inner tube, an electrical braiding and two aluminium end caps secured with two jubilee clips. If sourced properly air muscles can be made for as little as three to four pounds.

Having overcome the problems manufacturing the air muscles it was a straightforward matter of consulting books on human anatomy. Bones can be replicated by steel tubing, moving joints could be either roller bearings or in the case of the shoulder socket polymorph and a polyurethane ball. Ligaments are wire loops and tendons are short sections of elastic. A week and a half later I had replicated my own human arm with a robotic unit, but getting it to actually move was going to be a completely different ball game.

More information on how 'my single arm' became a fully working exhibit at the D&T show will soon be available via the Technology Enhancement Programme (TEP).

Mark Harmsworth
Rhyl High School
2003-2004 Fellow

PHYSICS ON STAGE

This festival of physics teaching was held at the European Space Agency (ESA) in Noordwijk, Holland from 8-15 November 2003. There were delegations from 22 European countries and the whole event fell into three main categories. There were large-scale demonstrations on stage from most delegations, there were workshop sessions on all matters of physics teaching and there was the fair, where each country had stands displaying teaching methods and new developments in science.

I was fortunate enough to be invited as a delegate and took with me the fast plants on which I worked during my Gatsby fellowship in 1998-1999. I was sponsored by Glaxo Smith Klein and the Institute of Electrical Engineers (IEE) and therefore gave a talk about the professional networks established by the IEE.

The UK delegation of 32 was led by Dr Kerry Parker of the Institute of Physics and was made up of secondary school physics teachers and lecturers in physics education. I felt, as a primary teacher with plant science as my main subject, somewhat overwhelmed by the whole occasion but rapidly became accustomed to the surroundings and fascinating discussions and demonstrations given during the week-long event.

My participation in a workshop involved making recommendations to the EU regarding dissemination in science knowledge throughout the expanding EU and was most fulfilling. The 20 strong group was made up of Swedes, Slovaks, French, Belgians, Dutch, myself and a large contingent from Poland. The recommendations we devised were shared with the whole conference of 350 delegates on the last afternoon and have now been forwarded to the EU for further discussion and, hopefully, development.

On the last evening there was an award ceremony where the UK stand was awarded 3000 Euros for second place in Best Fair Stand, as well as one of our delegation gaining first prize for the most interesting and exciting demonstration. As far as my fast plants were concerned, there was plenty of interest from many countries, especially Portugal and Spain. I have since been in communication with several schools in these countries and I am planning a visit to both to lead workshops regarding the plants. A most exciting, if somewhat challenging, prospect.

I have also developed communications between myself and two Polish universities with a view to setting up some plant science work. Many of the European countries do not include plant science in their curricula, especially at primary school level.

As a follow up to this superb event, I have been writing up accounts of demonstrations witnessed from the week, which are now available on www.physicsonstage.co.uk and have given feedback to local secondary school teachers.

Also, as part of the deal struck with GSK regarding sponsorship, I am to lead two workshop sessions for primary teachers at their study centres in Harlow and Stevenage. There is also to be a session at the Association of Science Education conference to be held at Reading University in early January. It is also planned that myself and Dave Richardson (another UK delegate and Gatsby Teacher Fellow) will provide a brief resumé of the week at our annual get together at Warwick in June.

Finally, I would like to extend a big thank you to Gatsby for providing my school with funds to cover the cost of a supply teacher for my absence. Without this I suspect I would not have been able to attend and so, through this generosity, I have hopefully widened the knowledge of fast plants, as well as my knowledge of science and particularly physics teaching. A most worthwhile and fascinating seven days.

Jonathan Forgham
Summercroft JM School,
Bishop's Stortford
1998-1999 Fellow

MOVING ON

I shall be moving to the University of Manchester from the end of January where I am hoping to further my research into 'educating boys', 'creativity', etc.

I am also in the process of negotiating the publication of 12 curriculum books on creativity (one for each subject) and I would be particularly interested if any colleagues in maths or science know of anyone, or who may themselves be interested in writing for these publications. If so, please contact me at david.spendlove@ntlworld.com

David Spendlove
University of Manchester
1999-2000 Fellow

MATHEMATICS ALGEBRA TRANSITION (KS2-KS3)

The aim of my fellowship project is to develop a philosophy towards the teaching and learning of algebra based on the approach that the Numeracy Strategy takes to the teaching and learning of number. The Strategy attempts to encourage KS2 teachers to make opportunities to build the learning of algebra on the number but it expects students at Y7 to work on formal algebra when the Framework itself has only just ensured that they can carry out the four written algorithms of addition, subtraction, multiplication and division.

I want to advocate a much more informal approach to learning algebra which mirrors the learning of number more closely and in a more structured way. One of the main difficulties that students have is because number calculations give them a single number answer and the process of the calculation is complete. But in algebra the process remains and the answer is another algebraic expression. If we can get students to think intuitively about harder algebraic ideas then they will come more easily to the more abstract notions of 'changing the subject' and we can move away from the idea of algebra being about making sure that the equals signs line up when solving equations.

In late summer 2003 I arranged an algebra INSET for our 11 partner primary schools. This was to take place over two mornings and each school would send two teachers. As you can imagine this took some organisation and was due to be led by the Cheshire Maths Advisory team. However, in early October tragedy struck and the Advisor/Inspector's house burned down. The INSET was cancelled and as an interim measure we agreed to set up a half-termly maths challenge led by the high school, The Heber Maths Challenge. By agreement there were to be no prizes (we had no money for them anyway!) and all participants would receive a Certificate of Participation.

We are now in the process of setting up a new date for the INSET and I have been working on identifying the parts of learning number that can be mirrored by algebraic thinking.

Sian Jones
Bishop Heber High School, Cheshire
2003-2004 Fellow

DEVELOPING PRIMARY-SECONDARY LINKS WITH THE SCIENCE YEAR PASSPORT

There has been much discussion about reasons for the 'dip' many pupils experience between KS2 and KS3 and how to tackle it, and I feel that strong links between primary and secondary schools has to be part of the strategy to address this issue. My Gatsby project is based on this issue and I am currently implementing the 'Science Year passport' with primary pupils at a local feeder school. The objectives are to help pupils to be more involved in their present and future science education, which I hope will encourage them to develop a continued interest in the subject.

The passport (which can be downloaded from www.planetscience.com) is a booklet which is issued to pupils in year 6 and then completed during years 6 and 7. The idea is to ease transition between primary and secondary education, and make science education more fun. The passport includes sections for recording science achievements and investigation work and collecting visas. The pupils have responded well to the project, are keen to be involved and have shown enthusiasm for using the passport.

I have adapted the original passport by making it a loose leaf document so that pupils or teachers can add or remove sections as necessary. I feel it important for pupils to see where their science knowledge will lead and so I have developed a section which shows pupils how their primary science work is closely linked to their secondary science work, highlighting the progression through different topics.

I am making regular visits to the primary school to build up links and to encourage use of the passport. It is my intention to follow through with the passport scheme as the pupils from the feeder primary arrive in year 7, and to assess how the use of the passport has helped the transition.

Anthea Heaton
Deanery High school, Wigan
2003-2004 Fellow