

Monitoring and evaluation template 2008/09

Project Title: '*Genes and human health- a case study on the role of science in society*'

Lead contact name: Dr Colwyn Thomas (BIO)

Tel: 593866

Email: colwyn.thomas@uea.ac.uk

Summary of project:

The aim of this project was to conduct engagement activities on the subject of genes and human health, and the associated ethical issues, in a significant number of UEA/*AimHigher* priority target schools. We also organised two one-day events for Yr 10 students and for science teachers/technicians, in the School of Biological Sciences (BIO). On these days teachers and students also had the opportunity to meet with fund raisers from local medical charities, such as *BIG C*. The activities in each school and the BIO-based events included the following components-

- An introduction to the theory of inheritance and human genetics in relation to human disease
- A practical activity which demonstrated particular aspects of the theory or technology that underpins genetic profiling including DNA isolation, PCR, and gel electrophoresis.
- A discussion of the ethical issues raised by genetic profiling through interactive seminars, workshops and lectures.

We fulfilled our objective to include a variety of UEA/*AimHigher* target schools, students and staff in this programme of events. The events have proved to be a successful mixture of practical science and a discussion of the ethical issues it raises that have been well received by students and teachers. The feedback has been very positive and this reflects the care, attention and design that went into this programme. There is a clear demand for similar types of activity in the future. The programme has been a very successful cross faculty collaboration (Dr CM Thomas and Dr Kay Yeoman- BIO, and Dr L Bowater- MED) that should be encouraged and supported in future bids. Schools have been successfully recruited, our '*coverage*' has been excellent, and we believe this represents very good value for money.

Dates of school-based activities

<u>School</u>	<u>Date</u>	<u>Number of Pupils Attending</u>
		Total- 159
Cliff Park (Yr 10)	23 rd February	30
Smithdon (Yr 10)	25 th February	30
The Hewett School (Yr 13)	27 th April	11
Stalham (Yr 10)	1 st May	30
Great Yarmouth (Yr 10)	23 rd April	30
	13 th May	28

BIO-based activities

Schools Day at UEA

<u>Schools Attending</u>	<u>Date</u>	<u>Number of Pupils attended</u>
	18 th June	Total of 76 pupils
Debenham High Caister High Wayland Northgate High Charles Burrell Cliff Park High School OB High School Lynn Grove High School		10 pupils Yr 10 10 pupils Yr 10 8 pupils Yr 10 10 pupils Yr 10 11 pupils Yr 10 7 pupils Yr 10 10 pupils Yr 10 10 pupils Yr 10

Teachers/technicians day at UEA

<u>Schools Attending</u>	<u>Date</u>	<u>Number of Staff attended</u>
	25 th June	Total of 36 school staff
Leiston High School		2
Flegg High School		2
Norwich High School		1
Thetford Grammar School		2
City College Norwich		3
Diss High		1
Hills Road Sixth Form College(Cambridge)		1
Hewett School		1
Hartismere High School		1
Ipswich School		2
King Edward VI		2

Grammar School		
Attleborough High		2
North Walsham High		1
ArchBishop Sancroft		1
High School		
Greshams		2
Wymondham College		1
Great Yarmouth		2
College		2
Holbrook High		2
Denes High School		
(Lowestoft)		1
Neatherd High School		1
St Bede's High School		
(Cambridge)		

Copy of programme/s

The school-based activities (2 x 50 minutes each session) included the following activities-

1. An introduction to the structure and function of DNA and human genetics.
2. Isolation of students DNA samples and preparation of DNA necklaces.
3. An introduction to the ethics of genetic profiling and a group activity to consider an ethical scenario.
4. A short presentation by pupils of their ethical analysis.

For BIO-based one day activities each day was made up of the following components-

09h15- 09h30 Arrive in BIO atrium and register

09h30 Laboratory session I (George Duncan Laboratory)

- Introduction
- Genes and Human Health
- Genetic profiling
- Set up DNA preparations and PV92 genotyping activity

11h15 Refreshment break (BIO Atrium)

11h30-12h30 Seminar/Workshop activities

- Common genetic disorders, inheritance patterns
- Ethics, including reporting in the media, and the use of genetic information, ethical exercise

12h30 Lecture on Genetics and Cancer (Prof Dylan Edwards) Queen's building
LT

13h00-13h45 Lunch and opportunity to meet with representatives of local medical charities (BIO atrium)

13h45-14h15 Genetic information and medical ethics (Dr Mark Wilkinson MED) Queen's building LT

14h15-15h30 Laboratory session II (George Duncan Laboratory)

- Complete PCR genotyping exercise
- Demonstration of battery operated electrophoresis equipment
- Microscopy of human chromosomes
- Concluding remarks

Summary of Schools/organisations engaged with and the number of participants involved:

The total number of students engaged through these activities was 235 (School visit 159 + BIO Day 76). The number of staff engaged was 36 for the Teacher/Technicians day, however 13 staff also attended the student day in BIO and 11 staff were also actively involved in the school visits programme. Overall more than 30 schools were involved in the programme.

Evaluation

Summary feedback from participants

Feedback from school-based activities

Teachers evaluated the course very highly. It was commented that the activity managed to incorporate many learning styles with a didactic lecture, an active experimental section (preparation of students DNA samples), a group based session based around an ethical dilemma, and a student presentation and wrap up session at the end. Teachers commented the subject matter fitted well with the GCSE science curriculum and recognised that the session given to Yr 10 students would prepare them appropriately for the curriculum to be covered in the future. Teachers enjoyed the mixture of ethics and science and recognised that the topics covered were contemporary and pertinent. Teachers also commented how students who were normally reticent with the science content of the course took an active and effective role in the ethical aspects, and the group work. Several teachers said they would use aspects of this programme in other lessons.

Student feedback was obtained using 'post-it' notes distributed at the end of each session. Without exception, the feedback obtained was extremely positive. Pupils were happy to supply feedback and students enjoyed different aspects of the programme, with some enjoying the ethical group discussions, and other pupils engaging more with the experimental section. Feedback comments included the following;

'I learnt a lot and it was really fun and interesting making our DNA'

'Really good, best science lesson yet'
'I enjoyed the lesson it helped to understand DNA and genetics'
'I thought the group work was good as you got to hear different people's views'
'DNA was very interesting as was learning about the ethical implications of science'
'very interesting and supported my ambition of furthering my biology education'
'enjoyed debating scenario'

Feedback on BIO-based activities

More than 70 evaluation forms were completed and interestingly, 18 pupils reported that they knew no one who had studied at an HE institution. The programme for the day was designed to supply a range of activities that would appeal to different learning styles. This was reflected in the feedback obtained. Every activity was mentioned as a *'favourite part of the day'* by at least one pupil. This included, the lectures, the DNA practical sessions within the laboratory and the ethical lecture and group work. Evaluation was very positive overall. Some negative comments were focused on a request for more time in the laboratory, on campus, or in lectures.

Also, 12 teachers completed evaluation forms for this event. All teachers felt that this event had been useful for their students. Again, teachers pointed out that every activity was mentioned as a *'favourite part of the day'* by at least one teacher. All teachers reported that the length of the event was *'just right'*. Finally, although teachers rated the venue highly, the seminar room was not big enough for the workshop session.

Feedback on Teacher/Technician Day at UEA

In total, 35 teachers/technicians completed an evaluation form and 31 reported they found the event to be useful overall, with 4 reporting that it had been averagely useful. Once again, each activity was reported as being the *'most beneficial'* by at least one participant. Overall participants commented that they were disinclined to name any part of the day as *'least beneficial'*. Comments included the following;

'I wouldn't want to loose any of it'.
'I gained something from all sessions'

The majority of participants reported they could find something that they could undertake or use back at school, which is a very positive outcome.

'I will use the ethical issue problems'
'use of DNA electrophoresis in DNA analysis'
'update cancer lessons'
'use Powerpoint presentations as a resource'

What worked well?

The format and content of these events was well conceived and executed and was greatly appreciated by all participants, as evidenced by the positive comments on feedback forms. A mixture of theoretical, practical and group

discussion exercises over a double period in schools was just the right length to maintain student's interest in this subject. It also provided a useful opportunity to discuss the role of science in society which now forms an important part of the curriculum. Activities in BIO were also well received and provided students with a greater understanding of this subject, as well as introducing them to the theory and technology that underpins genetic profiling. The one day activity for teachers and technicians also provided them with appropriate training in this subject which will support future teaching, and practical activities in schools.

Areas to improve?

Despite the overall success of the project there were several requests from teachers on the teacher/technicians day for additional material including access to extension material and Powerpoint presentations. Similar programmes were implemented on both BIO-based days and it was clear that teachers would benefit from greater in-depth coverage of this subject area in the future. This issue will be addressed for any follow-on activities in this area.

One negative aspect of this project has been the time demands on the co-applicants. If follow-on funding is obtained we will aim at appropriate training of additional faculty members to spread the work load. Also, the initial delay in receiving notification of a successful bid meant the activities had to be compressed in to two months after Christmas, which impacted on other teaching demands at UEA. Future events will be staged at the end of the autumn semester.

Budget

Please include a breakdown under the following headings:

Total Development costs	£
o Staff time (technical staff)	£ 730
o Resources	£
Total Delivery costs	£
o Staff – teaching and support (Demonstrators)	£ 1600
o Materials/resources	£ 3,364
o Travel	£ 120
o Room/equipment hire	£
o Catering	£ 270.10
o Other – with detail	£
Total sum spent	£ 6,084.10
Faculty/school support	
In kind support provided by your school/faculty that you will not be claiming for – e.g. staff time, use of facilities etc.	BIO faculty- Dr CM Thomas and Dr K Yeoman MED faculty- Dr L Bowater

Dissemination of activity

Please provide a paragraph suitable for the Outreach newsletter to promote your activity and highlight any best practise.

Members of faculty in BIO (Dr CM Thomas and Dr K Yeoman) and MED (Dr L Bowater) have conceived and delivered a schools engagement programme entitled '*Genes and human health- a case study on the role of science in society*'. The activities were conducted in five local schools and also included two one day activities in BIO, one for students and another for teachers and technicians. In total, the activities involved nearly 250 Yr 10 students and 50 teaching staff. Each school session incorporated a combination of activities including an introductory talk on DNA, human genetics and genetic profiling, a practical activity which involved students preparing their own DNA, and an introduction to the ethical issues associated with genetic profiling. Each session was concluded with a group discussion and a short presentation based around an ethical scenario. The BIO-based activities focused on the technology that underpins genetic profiling (including PCR and gel electrophoresis) but also included lectures on cancer, its causes and treatment, a lecture on medical ethics, and a discussion of ethical issues. The feedback from students and teachers alike was extremely positive demonstrating clear demand for this type of high quality engagement activity that can enhance students understanding of key elements in the science curriculum, as well as considering wider issues such as the role of science and technology in our society.

Any outstanding balance of funding will be transferred upon completion of proposed activity and receipt of this completed monitoring and evaluation form. Please return the completed evaluation to:

Trevor Smith

t.d.smith@uea.ac.uk

Tel: 591513