



## **Norwich Science Olympiad 2009**

### **Evaluation of Final Day Events**

#### **Introduction**

Two Final Day Events were held at the University of East Anglia, one for Secondary schools on 1<sup>st</sup> July and one for Primary Schools on 2<sup>nd</sup> July. Both comprised practical activities, some of which were competitive, and a lecture. Nine year-groups are invited to take part each year, ie, Year 3 up to Year 12, excluding Year 11 who complete GCSE exams shortly before the event. Over the course of the three years for which the Norwich Science Olympiad is currently funded (2009-11), activities for each of three year groups are being evaluated in particular. This year the focus was on the activities provided for students in Years 3, 7 and 12. Because 2009 is the International Year of Space, this year's Olympiad adopted a general Space theme.

The evaluation was designed to discover to what extent the Final Day events had succeeded in the stated aim of the Olympiad of increasing interest in science and technology. It was carried out in two ways:

i) In order to generate feedback on the overall impact of the Final Days, questionnaires were distributed for all participating students and accompanying teachers and parents to complete after the event, together with stamped addressed envelopes for their return. Slightly different questionnaires were designed for each group: primary school children, primary school teachers and accompanying adults, students in Year 7 – 10, teachers of these students, Year 12 students and Year 12 teachers. The questionnaire responses can be found in full as appendices at the end of this report.

ii) Focus groups were held with two groups each of Year 3 children and Year 7 and Year 12 students who took part in the Final Day event. The six schools selected for this purpose represent a range of urban and rural schools, High Schools with and without sixth forms, and a sixth form college. The focus groups were held within a week of the events, lasted between ten and thirty minutes, and were conducted by six postgraduate science students under the guidance of Dr Teresa Belton, an educational evaluator in the School of Education and Lifelong Learning at the University of East Anglia. The focus group facilitators also observed the activities of the year-groups they later talked to. Signed consent to participation in a focus group was obtained from pupils' parents and from Year 12 students themselves. The discussions were audio-recorded, and transcribed without the use of participants' names. Criminal Records Bureau checks were not sought for the facilitators, so the focus groups were conducted in the presence of a teacher.

## Evaluation of Final Day Event for Primary Schools

Thirty primary schools took part in the Final Day event, bringing a total of 398 pupils, in pairs or groups of mostly four children per year group per school. Pupil numbers broke down into year groups as follows:

Year 3 100

Year 4 104

Year 5 102

Year 6 92

Nineteen of the participating schools are located within Norwich and the others are within a two to fifteen mile radius of the city.

The activities provided for primary school pupils were:

### Competitive tasks

- Year 3 - Rocket launch tower: Pupils to build as tall a tower as possible using unusual materials (pasta and sweets).
- Year 4 - Space buggies: Pupils to use a range of materials to build a buggy that travels as far as possible after being launched down a ramp.
- Year 5 - Rocket launching: Pupils to experiment with different proportions of vitamin C tablets and water in order to create a rocket that launches as close as possible to a 10 second countdown.
- Year 6 - Land an egg on Mars: Pupils to design parachutes to land an egg safely (thrown over a badminton net and aimed towards a target).

### Enrichment tasks for all years

- Interactive lecture 'Weird space' with Aton Vamplew
- Dome and rockets : Build and launch compressed air rockets. Visit inflatable planetarium.
- Computer quiz similar to Top Class quiz but using interactive voting technology (handsets similar to 'Who wants to be a millionaire?').
- Astronomy events:
  - ~ Make constellations by making pinpricks in black card that is then projected onto a screen using a torch.
  - ~ Make a spectrometer/spectroscope. Use old CDs/DVDs and card templates to build an instrument for analysing different light sources (pupils were presented with a range of lamps etc to compare).

## Questionnaire responses

Questionnaires were received back from 157 children and 24 teachers and other accompanying adults from seventeen of the thirty participating primary schools. These showed that teachers selected pupils to take part in the Final Day for three main reasons: they were considered to be particularly able scientists or problems solvers (or, in some cases, designers); they were good team-workers; or they were on the Gifted and Talented register. From teachers' and other accompanying adults' responses it was evident that the day inspired much interest and enthusiasm in the children who took part, as evidenced by their talk and questions both during the event and afterwards. This was then communicated in participants' schools. The adults were in agreement that the day was both most enjoyable and very well organised, with two reservations expressed by a few that longer or more breaks, and more time for some activities, would have been beneficial; (this was also a point made on some of the pupils' questionnaires). There was also some concern that the Top Class quiz was less useful to pupils than the more practical activities.

The pupils' questionnaire set out to find out whether the day was enjoyable to them, increased their interest in science and technology, and if and why particular activities were or were not enjoyed. The responses gave a clear indication that the Final Day stimulated a very high level of engagement and enjoyment, noted also by the observers, and an increased interest in science and technology for the great majority.

*Table 1 Summary of impact of Primary Final Day event*

	Yes	No	Y and N
Did you enjoy the Olympiad Final Day?	156	1	0
Before the Olympiad were you interested in Science?	143	13	1
Has taking part in the event made you more interested in science?	145	10	2
Are you looking forward to learning more about science at school?	155	1	1

### Commentary

One child out of a total of 157 said they did not enjoy the day. Thirteen said they were not interested in science before the Olympiad, and ten said that taking part in the event did not make them more interested in science. However, only one of the children who said they were not interested in science before the event was among those who said it had not made them more interested, which suggests that the other twelve who began the day without interest in science became more interested as a result of taking part. The lack of an increase of interest in some children can perhaps be explained by their pre-existing interest being maintained rather than increased. All the children except one or two Year 6s said they were looking forward to learning more about science at school. Overall, 145 children (92%) said that taking part in the Final Day had made them more interested in science.

In each year group, the competition activity was the one that the children enjoyed the most, by a very large majority. In the case of Year 3s, this was so for

thirty out of thirty-eight respondents. A large part of the appeal of constructing a tower was the inclusion of sweets as building materials, some of which were eaten at the end. But all the year-groups said they enjoyed their activities for similar reasons: they were fun, a challenge, involved teamwork, provided opportunities to see other children's ideas, were exciting, and were sometimes messy. It is also possible that the children were freshest and had the most energy for these activities which happened at the beginning of the day. However, ten children in all the year-groups enjoyed the lecture most and smaller numbers liked the quiz, the star dome, and the making of constellations or paper rockets best.

Twenty-four out of all the participants said there was an activity they didn't enjoy: a number did not like the lecture, saying that it was too long; some found that the star dome made them dizzy; and some were bored by making constellations. However, asked what changes they would make to the day, the majority were quite happy with the day as it was. The improvements that were suggested were mostly clustered around the ideas of having more time and more activities – which in themselves suggest that the day was greatly enjoyed - and a longer break.

### **Focus Groups**

Focus groups were held with the Year 3 participants from Brundall School and West Earlham Junior School. One of the facilitators began her transcription of the discussion with the observation that, *"The children were very excited when I first got there [about a week after the event] and were very keen to tell me how much they'd enjoyed the day. The teacher who was the point of contact at the school said they'd been talking of nothing else in class ever since."* The teacher also said that she had been pushing the school to introduce practical sessions into science classes because science lessons had consisted of reading from textbooks; she thought that the introduction of practical sessions had made the children more enthusiastic, and that the Olympiad had definitely contributed to this. All the children spoken to enjoyed the day greatly, and the first activity they had undertaken, the challenge to build the tallest tower out of spaghetti, lasagne, marshmallows, jelly babies and strawberry shoelaces, was very popular. They enjoyed rebuilding those towers that fell down. In fact, the children in both these groups remembered a great deal of the day and seemed to be enthusiastic about everything. Two extracts from the discussions illustrate this:

One school –

Q – What do you think was the best thing about the day?

“Building the towers”

“The marshmallow thing because at the end you get to eat them”

“I liked the rocket exercise because mine went really far, even though the nose came off. Everyone else's noses got smashed but mine didn't because it didn't have a nose!”

“Mine was so good it went all the way into the bushes and we couldn’t find it so we had to build a new one.”

“I liked the dome thing with all the stars and wiggly things and a little door but when you went inside it was all big, and it turned inside and made you go really dizzy”

“At first everyone thought it was going to be really boring but then it turned and there were stars and we were all like – Wow – and went really dizzy”

“It was like a surfing volcano”

“I really liked the dome too”

Q - What was the most memorable part of the day?

“The stars” (all agreed this was good)

“I remember them giving out the trophies”

“I remember everything”

Q - What was the most interesting part of the day?

“The stars!” (all agree again this was interesting)

“I thought that man [the lecturer] was funny. I liked the talk and the movie ‘Weird Space’”

.....

Q – before going to the Olympiad were you interested in science

“Yes”

“Yes”

“Yes 100%”

Q - And has going to the Olympiad made you more interested in science?

“Yes”

“Yes”

“Yes, well kind of, I’m still going to be a scientist”

“I don’t know what I’m going be when I’m older”

“I’m going to be a vet”

“I like mechanical things”

.....  
Q - What did you learn at the Olympiad that you didn't know before?

“That the moon is very very very far away from the earth. And the moon is small. And the earth is bigger than the moon”

(some debate between the children between which is bigger between the earth, sun and moon)

“I learnt that the star Betelguise is way bigger than the sun”

“I learnt that sometimes when you look at something you might see different things, optical illusions, you can see faces and when you get close it might change”

[this was from the lecture where he showed patterns on planets that people had thought resembled faces]

“Like on Mars where it looked like there were canals that Martians had built but it was just an illusion”

.....  
“Will we get to go back next year?”

Facilitator: I don't know

“(Will we) if we stay interested in science?”

(All the children tell me how interested they are in science)

Q – Would you like to go back next year?

“Yes” (very enthusiastic!)

Q – Did the Olympiad change your opinion of science?

“Yes”

“I liked it a little bit, now I like it a bit more”

.....  
Q - Did the Olympiad change your opinion of scientists?

“[Scientists are] people who look at little things like molecules”

“I want to find a cure for every disease in the world.”

The other school –

Q - Did you enjoy the Olympiad day?

“Yeah”

“I definitely did, it was really fun”

.....

Q - Can you remember what you did in the afternoon?

“Um, that was Weird Space and the spectrometer thing”

“And we saw that there was faces on The Moon and Mars”

“Yeah, that was Weird Space”

Q - Did you enjoy that, and being in the lecture theatre?

“Yeah, we enjoyed that”

Q - And did you enjoy the talk?

“Yeah, yeah”

Q - And what do you remember most from that talk?

“That they had all of the faces shaped on the Moon and stuff”

“I remember that star thing - it was something like beetle juice, and it meant the armpit of the giant”

Q - Were you interested in science before you went to the Olympiad?

“Yeah, yeah”

.....

Q - Would you say that being at the Olympiad has made you more interested or less interested?

“More, more”

“A lot more”

Q - Was there anything that you didn't like?

“No”

Q - So you liked everything?

“Yeah”

.....

Q - What would you say that you learnt that you didn't know before?

“That there are faces on Mars”

“And that there was rust on planets”

“I learnt that there are numbers like ‘a quadrillion’ and ‘a quinzillion’

Q - Would you like to go again another year?

“Yeah, yeah”

“Definitely”

Q - Are there any ways that you can think of that it could have been made even better?

“No”

## Evaluation of Final Day Event for Secondary Schools

Fourteen secondary schools took part in the Final Day event, bringing a total of 232 students. Students numbers broke down into year groups as follows:

Year 7 46

Year 8 52

Year 9 56

Year 10 48

Year 12 30

The activities provided for secondary school students included step-by-step instructions, and in some case a little relevant information.

- **Year 7**

### 1. Food Dyes

Using 1% salt solution, red blue and green food dyes and chromatography paper, finding out which two of the dyes is contained in the mixture given, using chromatography.

### 2. Hot Stuff

Heating copper sulphate, and adding two samples of the product of different weights to water discovering how much of the product would be needed to raise the temperature of 10cm<sup>3</sup> of water by 8<sup>o</sup>C, and completing the equation:

Blue copper sulphate + heat = white copper sulphate + .....

white copper sulphate + ..... = blue copper sulphate + .....

### 3. Meteoroids and the Craters They Make

*This activity investigates the formation of craters. [Using flour, drinking chocolate and plasticine] you'll see how the mass of a meteorite affects the size of the crater it makes. You will collect data for meteorites with masses of 15g, 30g and 60g. From this you will need to work out what size crater would be produced by a meteorite of mass 40g*

- **Year 8**

### 1. Food Dyes

Similar to Year 7 task but requiring the working out of the Rf values for the components in a mixture of dyes

### 2. Hot Stuff

Similar to Year 7 but set up so as to be able to answer the question:

What temperature rise would be achieved if 2g of your product was added to 10cm<sup>3</sup> of water?

### 3. Meteoroids and the Craters They Make

Similar to Year 7 but working out what size meteorite would produce a crater 80mm in diameter.

- **Year 9**

- 1. How far is that star?**

*The distance of a star from the Earth is often calculated by comparing the amount of detected starlight with the total quantity of light which that type of star is thought to give out or emit. You are going to find out how this is done.*

***The Challenge:** A lit lamp will be placed at an unknown distance from you. Use the light meter to find out how far away the lamp is. Make a table a table of results and draw a graph of your data.*

- **Year 10**

- Build a power boat that goes the furthest in 90 seconds**

Using a test tube, a length of jumbo plastic straw, a blob of Blu-Tack, an elastic band, a cup of citric acid, a cup of sodium hydrogen carbonate, an empty cup, paper towel and lollipop sticks.

- **Year 12**

- 1. Build a spectroscope using a template**

- 2. Use the spectroscope to analyse light from two different sources**

- 3. Is there life on Uranus**

The aim of this task is to establish whether there are signs of primitive life in the samples collected by these intrepid, interplanetary explorers, using a sugar solution containing a redox dye.

- 4. Measuring the speed of light using a microwave oven and a popcorn**

### **Questionnaire responses**

Questionnaire were received back from fifty-five students in Years 7-10, six of their teachers, nine Year 12 students and no Year 12 teachers, from eight out of the fourteen participating secondary schools.

The teachers' responses showed that secondary students were selected for participation in the event on a similar basis to primary pupils, namely that they were able students (though science was not specified), good at team working, or among those identified as Gifted and Talented. All had noticed their students talking about the day afterwards, to classmates, teachers and/or parents. They felt that their students' interest in science and technology had been increased by the day, and that the day was enjoyable and well organised, although a little concern was expressed that the lecture was rather complex, some instructions for experiments could have been clearer, and that the imprecise timing of activities left too little time for lunch.

Table 2: Summary of impact of the Secondary Final Day event on students in Years 7, 8, 9 and 10

	Yes	No	Yes & No
Did you enjoy the Final Day event?	53	2	0
Before the event were you interested in science?	55	1	1
Has your <i>general interest</i> in science and/or technology increased as a result of taking part in the event?	37	17	1
Has your interest in any particular aspect of science or technology increased as a result of taking part in the event?	29	25	1
Are you now more interested than you were before in studying a particular science or technology subject?	24	31	0
If you were already interested in studying a science or technology subject after GCSEs are you more interested in studying a science or technology subject at university as a result of taking part in the event?	35	21	0

#### Commentary

The responses suggest that the impact on students' interest in science and technology, both in general and from an academic point of view, was positive to a substantial degree.

67% said their general interest had been increased as a result of taking part; 53% said their interest in a particular aspect of science had increased. Of these, 20 cited astronomy, 2 chemistry, 1 physics and 1 biology

44% were more interested in studying a particular science or technology subject: astronomy 9, chemistry 3, physics 6 and biology 1.

64% of students who were already interested in studying a science or technology subject post-16 were now more interested in studying a science or technology subject at university.

These figures are significant in view of the fact that 55% said they were already interested in science before the event; thus the Final Day achieved more than merely maintaining the level of interest of a large proportion of participants.

As with primary pupils, the numbers of students answering "No" to the questions about the event having increased their interest in science needs to be interpreted with caution: one student took the trouble to explain that he was already very interested; the negative responses here can therefore probably safely be understood as indicating a maintenance of interest rather than a decrease or a negative impact.

Regarding the activities, the practical activities were all found interesting by most students, though some participants found some activities uninteresting. Opinion on the lecture divided sharply; for instance, five Year 8 students found the lecture was the most interesting activity and two did not find it interesting. Among the Year 7s specifically, four students did not find the lecture interesting, two adding these comments, "I think the lecture was too adult for the audience", and, "I think the lecture was a bit too complicated for our age and me and my friends felt a bit lost with it all".

The father of one of the enthusiasts was actually moved to write the following email to the lecturer, Dr Robin Catchpole:

Dear Dr Catchpole  
 My son heard your lecture at the science olympiad at UEA today. He was clearly inspired and I'd like to ask if you have any suggestions for nurturing his interest, including any forthcoming events you may be involved in. He's 13 and has been home educated until quite recently. Frankly we have not seen him so animated about any subject since he has started going to school.

Almost all enjoyed the practical activities best, either in general, or specifying one of the experiments, evidently enjoying the experimental process and finding out the results. Most of their suggestions for improvements to the day focussed on a shorter, simpler lecture.

All the Year 12 participants were studying science subjects for at AS Level: 9 Chemistry, 6 Physics, 3 Biology, 3 Maths, and therefore demonstrated a relatively high pre-existing level of interest in science. Nevertheless, two-thirds found that the Final Day increased their general interest, and the day stimulated new interest in a specific aspect of it in nearly half: two in astronomy/astrophysics, two in spectroscopy and one in chemical analysis.

*Table 3 Summary of impact of Final Day event on Year 12 students*

	Yes	No	Yes & No
Did you enjoy the Final Day event?	9	0	0
Before the final Day were you planning to continue the subject/s to A2 Level?	8	0	1 subject Y, 1 subject N
If yes, are you interested in studying a science or technology subject at university?	9	0	0
Do you feel your <i>general interest</i> in science and/or technology has increased as a result of taking part in the Final Day?	6	3	0
Have you developed a new interest in any specific aspect of science or technology as a result of taking part in the Final Day?	5	4	0

Opinion was fairly evenly divided regarding what the most interesting activity was, with three specifying the exercise with the poppads and the microwave, and three spectroscopy. Five of the nine students found one of their activities uninteresting, four each naming different activities. The only suggested improvement to the day that was mentioned more than once was that the lecture should be shorter, suggested twice.

## Focus Groups with Year 7 students

Focus groups were held the week after the event with the Year 7 participants at North Walsham High School and Framingham Earl High School. The students in both schools described the day as “brilliant”.

At one school the students explained to the facilitator that they had worked in pairs, doing one of two experiments, one to do with a crater and a meteorite and the other involving chromatography. They would have liked to be able to do both experiments, however they enjoyed what they did and found the instructions easy to follow. They liked working in pairs and appreciated the presence of their teachers and the attitude of the demonstrators.

“They [the demonstrators] treated us like we were actual proper scientists, not little kids. They asked us our opinions and treated us like adults”.

By contrast, they agreed that they found the lecture on space to be long, boring, and confusing because of the long words used. They did, though, enjoy the slide show of photographs taken by the Hubble telescope, and the use of a laser pointer by the speaker, and said that the lecture added to their knowledge of space and changed their perspective on it. The practical activities were clearly the most popular part of the day, and they students would have liked more:

“I would have liked more experiments. I felt that I didn’t get to do a lot. There could be three practical sessions, one on physics, one on chemistry and one on biology.”

“I would have liked a shorter lecture, maybe say a half an hour lecture. You could have the lecture in between the two practicals just to divide the day into blocks.”

The students said that they were glad that the Science Olympiad gave them a chance to see what it is like at university. They said that they were happy to see how actual scientists at the UEA work in the lab.

“I actually prefer the labs at the UEA to ones here (in school).”

“It’s good to see what a real lab is like. When you enter a lab you can imagine people working there.”

“I was intrigued when we were walking towards the lab. I saw through the windows, there were these people with big microscopes and they had proper scientific stuff. Wow!”

All the students talked about going to university for higher education. They inquired about courses offered by the UEA. Two out of the four said that they would like to take up science at GCSE level and for further studies.

Q - Has your opinion about science changed from the final day event?

“I realised that science is a lot more complicated than it is at school. At first, I thought that science is test tubes, Bunsen burners, exam papers and books and then you go there and see these proper big labs and see people researching. I was like wow!”

“The final day opened my eyes to science.”

All the students felt that the day was a nice trailer of studying science at university. They all said that they enjoyed coming to the UEA. For most of them, this was their first visit to university.

“It was great just walking around the UEA campus. It is a proper village in itself. It was great to be let loose in it so that you can go and explore.”

Thus the Final Day event provided these students not only an experience of science activities different from those available at school, but also a glimpse of a university campus and the professional practice of science.

The students at the other school were less forthcoming but they responded in a similar way in that they particularly enjoyed the practical activities and would have liked to do more of them.

“We could have had more experiments, we only did two”.

They were ambivalent about the lecture:

Q - Do you think that taking part in the day has raised your interest in science in general?

“Yes, especially astronomy, space. But it was very complicated”

“ More in science than technology”.

Q – Was there anything about the day that put you off being a scientist?

“The really long lecture at the end – it was interesting but it was quite long. The information was a bit over our heads. It was a bit confusing”

These students also had comments to make about other aspects of the day:

“I didn’t get how the copper sulphate bit was linked to space.”

“The competition didn’t seem like a competition.”

[Teacher]: “they weren’t happy with the grading and the marking criteria – it was more obvious to staff. It would be better with more specific questions or a clear number of points for each question.”

## Focus Groups with Year 12 students

Focus group discussions were held with four Year 12 students at Paston College and four at Wymondham High School. All were enthusiastic, although they also had some constructive criticisms to make.

In one group, some sense was expressed that the activities they had been given were a little different from what they did at school.:

“... much more freedom, we were allowed to work out things on our own without the teachers talking us through everything, we were just given our samples of space dust...”

“I think it was quite good because there was quite different ways of doing stuff which is a bit different to perhaps what we might do at school.”

“It was a bit bigger, that was pretty much the only difference.”

“Well I think it was completely different, with all the completely different equipment and the spreading out.”

“But there was lots more equipment.”

“There was a hell of a lot of equipment, but we didn’t use it”.

“I think it would be really good to see things that we can’t do at school – everything we did there we probably could have done at school.”

“But then surely the whole idea of the day is sort of do stuff yourself instead of just watching all the time.”

“We used stuff we have in school - but it did give us experience.”

Different aspects of the day particularly interested different students:

“I found the more chemically bits more interesting, as I’m quite good at chemistry.”  
“Yeah, I’d agree with that, but I think it depends on your subject choices as to which areas are relevant to you.”

“I liked the rates of reaction one and you had to like really think it through, like which one had more active life in, or no active life in it. There was more to it; I like the thought process that went into it. I like Biology, so that would probably be why.”

“ I like to think above it – with the light spec thing, you weren’t really thinking about it you were it was like just ticking and colouring boxes and stuff, whereas with this one, you sort of had to think higher, like how would you find/know if it was a chemical change or whether it was actually life.”

“Yeah I like thinking higher instead of just being taken through it”

“I nearly fell asleep in the lecture, I remember that.”

“I thought that parts of it were interesting but I don’t think that perhaps it suited everyone, like what subjects you were taking”

“And age”

“Yeah cos we were there with Year 7’s and I can’t see them understanding a word of it.”

“Some of them did actually fall asleep in it.”

“Apart from that, it was really good.”

Q - Was the day relevant in some way to you’re A Level studies?

“I think for me, I liked making the Spectroscope, but since I like doing biology and chemistry it perhaps wasn’t as relevant. I think it was quite physics based, but would have been more useful if it encompassed other subjects as well.”

“It helped with bringing up from GCSE physics – if you don’t do physics it helps to bring a new area of science as they do all link together, so I do think it brought everything together a bit.”

“I think it definitely reinforced more than taught.”

“It definitely reinforced the practical side of things, like doing it on your own really helped you through thinking about the process of doing it on your own, what you are going to do and check that there’s no flaws.”

“We have to get used to doing practical investigations as we have assessed ones anyway, so it’s more experience.”

Q - Has the Olympiad increased your interest in Science and Technology?

“I was already interested in Science and Technology.”

“I think that’s the thing – most people that went already had this interest in Science and Technology, so to further it is probably quite difficult.”

Q – Have you any other thoughts?

“Shorten the lecture.”

“Or make the lecture sort of more hands-on, maybe demonstrations and stuff”

“I think it was really specific to physics. I think it should perhaps be broader as unless you’re not doing physics it wasn’t going to make much sense to you.”

“Maybe they should have put the younger students together and maybe give them a sort of toned down version of that because it would have made more sense and they would have understood it more and with us you could have given us the full blown science – but mix it.”

But these criticisms were minor, for the students really appreciated the experience:

“I’d do it again, I’d say go.”

“It’s definitely an experience, to say the least, and it’s pretty good for your CV.”

“And for your UCAS application as well.”

Among the other group responses were similar.

Q - What do you remember most about the final Olympiad day at the UEA?

“I think mostly the astronomy lecture. It was more appealing than the actual activities we did” [two others then agree with this statement].

“He [the lecturer] went a bit too in-depth and I got more and more lost as he went on...he almost expected us to know too much, and to say there were Year 8 upwards, and we only just got it, I can imagine Year 8’s really struggling with that.”

“I learnt from the experiments, but I understood nearly everything in the lecture. I study a lot of astrophysics at home, it interests me”.

“I didn’t have a clue about astrology before until then, so that helped a lot. I know we’re doing cosmology this year, so it was a good start to get us into the set of mind that we need”.

“I did quite a bit at high school so I understood most of it. It was about the right level”.

Q – Did the Olympiad differ from what you do in Science lessons at school?

“[At school] we do set experiments which kind of don’t relate to real life. With the Olympiad it was like almost as if there was a storyline behind it, which is a lot different to what we do here”.

“It wasn’t as strict either. Here the chemicals you have to make sure you are handling chemicals properly, but at the Olympiad you could kind of do what you want..... it was more relaxed. I felt really into it. Our conversation was about the work. It was fun and enjoyable”

“There wasn’t strict instructions of how to do certain things, and so you had to use your own knowledge behind it. And if we were at college doing the same experiments there’d be a list of methods going through exactly step-by-step and you haven’t got any independent way of getting to the answer”.

**This group were impressed to discover what could be done with simple equipment:**

Q – What did you particularly enjoy or find most interesting?

“I think for the experiments, the physics part which was the microwave and the poppadom. I quite enjoyed that. I’ve never done something like that before with such simple equipment.”

“I liked the idea behind the spectroscope. I had no idea that that set up could be used to read the wavelength of light, so that quite surprised me.”

“The practical aspects, like the CD are like everyday aspects as well, not just high-tech equipment.”

“I liked that idea, that it’s not high-tech that only certain places can afford.”

“It’s just knowing how to put low-tech things together!”

The students felt that some details of the day could have been improved:

“The samples one took a little bit too much time [space dust practical]”.

“We did it all and realised our results were rubbish so then we had to do it all again with longer times. We weren’t sure of the time span that we were meant to be looking for. There was no hint of it being 10 minutes or two minutes”

“They didn’t tell you how long to do it for or how much [of the samples] to put in”

Q - Was this a fault of the practical instructions not containing enough detail?

“I’m not sure actually, it’s somewhere in between. Maybe it should have given us the amount of how much we should be using, maybe not the time limit, but the amount. We weren’t sure if we were meant to tip it all in or a spatulaful”

Q - Was the day relevant in some way to your ‘A’ Level studies?

“Physics it was, it was based on mostly astronomy so that was relevant to the physics we’ve got coming up and it’s relevant to what I want to do at university, so I found it very helpful”.

“I do three sciences but other people only do biology or just chemistry, so when it came to the physics one they had no idea what to do. I don’t know whether it would be best to say this is just a physics day or a chemistry day or...”

“I think it was good to use biology, physics and chemistry”.

“Maybe, it sounds a bit expensive, but individual lectures depending upon what you wanted to see; a biology one, physics or a chemistry one, not just the astronomy one.”

“I think so, yeah, I don’t do biology but I helped out with the biology experiment when we were doing it, and I think that really helped recap everything that we did in GCSE about biology. I want to go on to do Natural Sciences so it quite helped me with that and the astronomy lecture [helped] with future A’ levels.”

The students were keen to go again next year:

“It was a fun day, it wasn’t too serious or too competitive. It was competitive but it wasn’t too competitive.”

“It was enjoyable at the same time.”

But they had some suggestions for improvements:

“I think it would be better if you had more team-based things [experiments], cos when we did it we just split up and you were on your own with the biology box for half an hour, then you go to the other person and they’d sit there with there thing and you think if we just sat there together as a team [they could get the experiment completed together]”.

All agreed that they would prefer experiments in which they were encouraged to work as a team. They also liked the idea of a topical theme with application to real life, such as climate change.

The Olympiad changed these students’ views of scientists and science somewhat, and caused some of them to review their plans for future study:

“In the contest, when we were doing all the experiments, the guy [the lecturer] was much happier than I imagined. He was enthusiastic and didn’t seem too obsessed with solving working out life kinda thing or fit the stereotype [long grey beard and whacky hair!]”.

“It was fun, it’s not like you are learning things for exams or coursework or anything so it’s quite good”.

“I think it’s changed my ideas a little bit. I did want to do natural science before I went to the Olympiad but now, after the astronomy lecture I found really interesting, I’m thinking something more physics and astronomy based, so now its just confused me really! I’ll have to have another think about what I want to do”.

“I was looking at astrophysics beforehand, and then seeing all of the pictures [from the Hubble space telescope] has reignited my passion for it. When I was in first school I was really interested in astronomy and everything, and I got back into it last year. It’s sort of pushed me into it [to study astronomy/astrophysics at university]”.

“I knew that I was going to study physics at university, so it’s just confirmed that I want to study physics rather than biology or chemistry”.

### **Barriers to participation**

None of the participating secondary schools were Norwich schools, and some came from a considerable distance. The absence of local schools was a noted difference from the attendance pattern of previous years, so schools in the city, and some others which had previously taken part, were contacted to enquire as to the reason for their non-participation. The explanations received can be summarised as:

- Difficulty in providing cover for teachers accompanying participating students
- Fully stretched teachers unable to take time to organise participation
- A variety of other activities arranged by schools for that week
- Cost or availability of transport
- Timing of school buses to and from a rural school
- Short notice of the event
- [It is probably worth noting also, that the Final Days this year fell on the same two days as the Royal Norfolk Show, on which some schools choose to hold INSET days, although this was not cited as a reason by those teachers who responded to the email query].

Schools that did participate were also invited to say why they had done so. The two reasons received were:

- Involvement of teachers in the organising committee for the event
- Attendance by a teacher new to the area at a Subject Leaders meeting at the Norwich Professional Development Centre, at which the event was publicised

#### Future considerations

In their responses to the query as to why their school had or had not taken part in the 2009 Norwich Science Olympiad, some teachers pointed out barriers to future participation that they anticipate:

*The government's 'hardly any cover' scheme to be implemented next year should mean less staff have to cover absent colleagues' lessons but it also probably means there will be less educational trips - unless they are planned well in advance. This may affect your uptake next year.*

*Next year departments not only have to pay for travel they also have to cover supply costs or cover the lessons of any staff on the trip from within the department. I fear this may have repercussions for the future.*

#### **Conclusion**

The evidence of the questionnaire responses and the focus group discussions strongly indicates that the Final Day events of the 2009 Norwich Science Olympiad succeeded in its aim of increasing children's and young people's interest in science and technology. It extended the experience of science that is possible within school, and, in addition, offered participants a glimpse of the world of professional science. It is to be hoped that the coming constraints on schools' participation in external activities will not reduce the possibility for students' to take part in the Final Day events of the Olympiad in future.

Primary Schools' Questionnaire Responses

**YEAR 3**

Did you enjoy the Olympiad Final Day?	Yes 40	No 0
Before the Olympiad were you interested in Science?	Yes 37	No 3
Has taking part in the event made you more interested in Science?	Yes 39	No 0 [Yes and No 1]

Which activity did you enjoy the most?

1. Making the air rockets
2. Making the rocket towers
3. Building a tower out of sweets
4. Making the rocket
5. Making the towers out of sweets
6. Making a tower
- 7 The activity where we made towers out of sweets
- 8 Making the tower out of egg
- 9 Weird Space
- 10 The sweet towers
- 11 Building the tower for the rocket
- 12 Rocket one
- 13 Making towers out of sweets
- 14 I enjoyed making the tower for the rocket because we won and it kept falling and we make it different each time
- 15 Making the tower for rockets
- 16 Building a tower out of ingredients
- 17 Anton's presentation
- 18 Anton's 'Weird Space' presentation
- 20 The rockets
- 21 The rockets
- 22 I liked the star dome although it made me dizzy
- 23 Star dome
- 24 Building a tower made of sweets and pasta
- 25 building a tower made from sweets and pasta
- 26 The sweet tower
- 27 Macking the sweet tower and gowing in the half surcel
- 28 the one when you had to make a tower out of marshmallows, strawberry laces, spaghetti and lasanya

- 29 Making sweet structures
- 30 The sweets that we built the towers
- 31 The competition
- 32 Building the tower out of sweets
- 33 It was making a tower out of sweets and stuff
- 34 Launch pad for a rocket out of sweets
- 35 Sweet tower
- 36 Making a tallest tower with sweets
- 37 Competition
- 38 Activity
- 39 Competition
- 40 Yr3 competition

What did you like about it?

- 1. It was artistic
- 2. Using my imagination to think up ideas for the tower
- 3 Eating the sweets
- 4. Eating the sweets
- 5. Eating it
- 6. Eating it
- 7 I liked it because your hands get all sticky and you can lick them. And I like the idea that all the tower is is a pile of sheets
- 8 Eating the sweets and just making it
- 9 The numbers because it started from 26 - 26,000,000,000,000
- 11 It was hard and we worked well together
- 12 That we got to fly our rockets
- 13 Everything
- 14 That we were in partners and the challenge was make out of foods it was great fun
- 15 I liked trying to build it all and eating it afterwards!
- 16 We eated some at the end
- 17 The display I loved how everything moved around
- 18 The way that he explained about people and space
- 20 Star dome
- 21 The star dome
- 22 That it was about natural objects, not cars etc
- 23 It was very clever
- 25 Everything!
- 26 Eating the sweets after
- 27 We got to eat it after becoss I now pichers with stars
- 28 I think I liked about it was that you didn't have to sit around like in class
- 29 Cos you could eat them!
- 30 It was extremely fun
- 31 The tower of sweets
- 32 It was fun
- 33 At the end we got to eat it
- 34 You learn a lot more about science

- 35 It was tasty
- 36 Tastey
- 37 Making the model
- 38 It was fun
- 39 Because it was something different
- 40 Because I learnt lots

Was there any activity that you did not enjoy?                      Yes 7                      No 33

If yes, what was it?

- 5. Space dome
- 7 The star constellations
- 8 Making the star constellations
- [12 Where we made something out of sweets]
- 30 When we were watching the space thing
- 32 The one in the lab
- 39 The light activity

What didn't you like about it?

- 5. It was spinning and I was dizzy
- 7 It was fun at first but it was a bit boring just punching holes in a piece of black paper
- 8 Because it was just poking holes into black pieces of paper
- [12 The pasta kept snapping]
- 30 It was way too long
- 39 I didn't understand how it went with the space theme

If you could make any changes to the day what would they be?

- 1. A bit of a longer break
- 2. More break
- 3. having something that didn't make me feel space sick [?]
- 4. I would not make any changes
- 5. Making other things
- 7 A bit longer time on making the sheet tower
- 8 More changels [sic: challenges?]
- 9 Everyone did everything
- 10 More challenges
- 11 Nothing
- 12 Nothing
- 13 Nothing
- 14 For the challenge to have more of the food so we could made it taller
- 15 Nothing
- 18 More time on activities/more activities
- 19 More activities
- 20 Make the star dome light

- 21 Nothing
- 22 Nothing
- 23 Nothing
- 24 More marshmallows and jelly babies
- 25 To be doing real science experiments
- 26 None of them
- 27 No
- 28 That you could eat the sweets from your model after you've finished
- 29 [written by teacher: they enjoyed everything, but said that making the spectrometer hurt their eyes (!) and there wasn't anything to do after they had made it]
- 30 Make more activities
- 31 To have more activities
- 32 More activities
- 33 Nothing
- 34 Nothing
- 35 Nothing
- 36 Nothing
- 37 Having more time for lunch
- 38 Nothing
- 39 Nothing
- 40 Because I learnt lots

Are you looking forward to learning more about Science at school?

Yes 39

No 0



- 34 Making the cars to hold the eggs
- 35 Year 4 competition
- 36 Making stars
- 37 Making the buggy's
- 38 Lecture
- 39 Competition
- 40 The competition

What did you like about it?

- 1 I liked all of it!
- 3 Everything
- 4 That it was completed
- 5 I like building cars
- 6 It was nice and I love creating
- 7 I like it because I love making things
- 8 I liked making them and making them faster
- 9 It was fun to make and fun to race
- 10 The science person
- 11 I like making things and I thought it was fun
- 12 The way you press the buttons very quickly
- 13 I like answering the questions
- 14 I liked it because we got to use remote controls to answer the questions
- 15 I liked the bit where we made the cart
- 16 Racing the buggys with eggs in
- 17 I liked it because of the space theme. I am really interested in space
- 18 I thought is good because we all took part and it was fun pressing the button on the handset
- 19 Putting it down the ramp to see how far it went
- 20 Making it
- 21 I like it because it was very interesting and educational
- 22 Covering the egg in tin foil
- 23 I liked cutting the straw
- 24 I like planets and stars and so for me it was fun
- 25 It was interesting
- 26 The thought and co-operation we had to put into it was a nice challenge
- 27 I like building cars
- 28 Being in lecture room was wow and speaker was funny. Remembered beetlejuice in the armpit!
- 29 I liked it when we tried it out for the first time and the car went a few centimetres
- 30 It was quite arty and a fun challenge
- 31 Don't know, the whole thing was fun, fun, fun
- 32 Making a car
- 33 Creating the thing/lunar lander
- 34 It was challenging because me and Franny couldn't do it at the start
- 35 Make stuff
- 36 It was really fun and creative

- 37 We got to try to make stuff and do a experiment
- 38 I like spais and all about the planie
- 39 I enjoy doing DT
- 40 Working together to make the model

Was there any activity that you did not enjoy?                      Yes 4                      No 36

If yes, what was it?

- 7 The constellations
- 27 Making constellations
- 37 Doing the star constellation making

What didn't you like about it?

- 2 I didn't like losing the buggie contest
- 7 It was fun at first but then it got a bit boring
- 27 It wasn't very fun
- 37 It was boring. The people could not even no which one I did

If you could make any changes to the day what would they be?

- 2. Nothing
- 4 Make more activities
- 5 I loved the day but I wish we could of won!
- 6 More challenge like the buggie races; air conditioning!
- 7 Having more challenges and competitions
- 8 More challenges like the buggie race
- 9 I would make more activities like the buggie race
- 10 More activities
- 11 Being more organised for the activities
- 12 To have done more activities
- 13 More time to do more activity
- 14 I wish we could have parked the coach in a cooler place, it was hot!
- 15 I don't have any changes. It was soooooo fun!
- 16 More activities
- 17 I wouldn't change anything
- 18 I think I would race everyone in the buggie race not just different groups
- 19 I want it to be longer
- 20 Finishes at 4:00
- 21 Winning the wooden egg
- 22 More activities
- 23 Nothing
- 24 Nothing because the Olympiad final day was great
- 25 More making for year 4
- 26 The timing of activities
- 27 I wouldn't make any
- 28 [written by teacher: Enjoyed it all but liked the constellations least because activity didn't take long - although invented own constellations. Make room darker for constellations. Have a visual presentation on stars first]

- 29 If we could do electric cars instead
- 30 That we could do something like and outside activity
- 31 More activities!!
- 32 Nothing. I loved it
- 33 More activities
- 34 Nothing
- 35 I would try be a bit more exact
- 37 Get rid of constellation make and do about the planets like Pluto what is to smart to be a planet
- 38 None
- 39 I don't know because I liked it all
- 40 None

Are you looking forward to learning more about Science at school?

Yes 39      No 0



- 32 Film canisters
- 33 Exploding film canister
- 34 Film canisters
- 35 Exploding film canister
- 36 Launching the film canister
- 38 When we had to make the exploding rocket
- 39 I enjoyed making the rocket with the water and tablet
- 40 The competition
- 41 Where you had to put the vitamin C tablet and water in the film canister
- 42 The competition
- 43 Going in the tent to see the star patterns
- 44 I enjoyed the popping canisters

What did you like about it?

- 1 It was interesting and fun to take part in
- 2 I liked how to answer using the remote
- 3 I liked it because it really tested my scientific knowledge
- 4 I like it because we had to experiment with different quantities
- 5 The big booms
- 6 Just answering the questions
- 7 Pressing the buttons on remotes
- 8 It was fun and interesting
- 9 It was messy and fun
- 10 Messy fun and exciting
- 11 The interesting facts and fun activities
- 12 I liked because it was a challenge and everyone was excited
- 13 I liked it as it was something different I really had to think about it
- 14 The dome was cool looking at the consilations
- 15 All the explosions
- 16 The bang
- 17 I liked exploding them
- 18 It was very exsiting
- 19 You had to work in teams and we won we flew it the furthest
- 20 It was fun
- 21 Them flying up
- 22 I liked the explosions
- 23 It was cool
- 24 It was hard and we worked well together
- 25 Star dome was amazing. It cost thousands of pounds!
- 26 It went everywhere
- 27 I liked all of it!
- 28 The best thing I liked was winning and overall winning the egg
- 29 It was something new
- 30 That we won
- 31 How high they went
- 32 Seeying it go pop



- 14 Add a science quiz
- 15 Have a question session
- 16 Winning the egg (wooden)
- 17 None
- 18 More activities
- 19 Longer lunch
- 20 None
- 22 I would make more activities and an all-about science lecture
- 23 More challenge
- 24 Explosions
- 25 Star dome didn't inflate
- 26 We won everything
- 27 More explosions
- 28 If I was to make any changes there would just be more activities, but other than that, I would not change anything
- 29 There isn't anything I didn't enjoy {see above}
- 30 More activities
- 31 More activities
- 32 Nothing
- 33 It was all great; more challenging activities
- 34 To have more doing activities
- 35 Make it longer!
- [36 Less heat]
- 37 Us winning the medal
- 39 I wouldn't
- 40 Putting less water in the film canister for the competition
- 41 The lecture because I knew nearly all the answers
- 42 None
- 43 A more informative lecture

Are you looking forward to learning more about Science at school?

Yes 43

No 0

## YEAR 6

Did you enjoy the Olympiad Final Day? Yes 33 No 1

Before the Olympiad were you interested in Science? Yes 33 No 1

Has taking part in the event made you more interested in Science? Yes 31 No 2

*[1 pupil who answered Yes to the previous question, I answered who answered No]*

[+ 1 yes/no]

Which activity did you enjoy the most?

1. The Mars landing
2. The competition throwing egg onto "Mars"
- 3 Trying to land eggs on Mars in our buggy
- 4 Taking part in the competition
- 5 Throwing egg at someone
- 6 Making the egg holder and trying to get it to Mars
- 7 The bit where we had to make the parachute for the egg
- 8 I enjoyed when we had the competition
- 9 Making the space shuttle and throwing them over the robe without the egg breaking
- 10 Doing the eggs to Mars
- 11 The challenge
- 12 Probably the challenge!
- 13 The 'probe-on-Mars' challenge
- 14 Egg throwing
- 15 Weird Space, the lecture
- 16 I enjoyed doing the egg challenge (it was smashing)
- 17 The egg part when you have to get the egg to the target. It can't crack and you have to use materials to slow the egg down
- 18 The competition
- 19 Landing on mars
- 20 I liked the Weird Space lecture
- 21 Liked it all
- 22 The challenge
- 23 Making the constellations
- 24 When we made a safe landing for an egg to drop on to Mars. Also to make sure the egg didn't break
- 25 The weird space presentation with Anton
- 26 The egg activity/competition
- 27 Throwing the egg
- 28 The competition
- 29 Compertision
- 30 Frowing the egg
- 31 The lecture

- 32 Making the shuttle to land on Mars!
- 33 The end activity
- 34 Doing the competition

What did you like about it?

- 1 It had a lot of DT involved as well as science
- 2 Eggs splattering everywhere
- 3 It was educational and fun
- 4 It was fun and very hard. I also like a challenge
- 5 It was funny
- 6 It was fun and very hard. I like a challenge
- 7 That it was interesting to see everyone's ideas
- 8 That I got to see everyone's ideas
- 9 I liked the bit when our egg broke and the balloons fell off
- 10 Funny
- 11 All of it
- 12 I like the fact that although it was educational it was also extremely fun
- 13 the D & T
- 14 The mess!
- 15 I found it enjoyable and it was really interesting. I loved the way Anton involved the rest of the hall
- 16 I liked finding out if our egg was broken or not
- 17 When you have to chuck the egg to the target because most of the eggs crack
- 18 Eggs flying at people
- 19 Lobbing eggs
- 20 Well Anton Vamplew made it exciting and interesting and it made me want to be an astronomer
- 22 The activities and the challenges
- 23 It was fun putting the experiment together and making the little holes in the card
- 24 the fun in making the spaceship with my partner and seeing if it broke or not
- 25 I thought it was very interesting and funny especially the illusions part. Overall it was the best
- 26 I loved seeing other people's models and the way they protected the egg!
- 27 Splattering the egg
- 28 The competitiveness
- 29 Most things
- 30 Frowning the egg
- 31 The fascinating facts
- 32 It was really fun and it was fun trying not to smash the egg!
- 33 That the challenges were interactive
- 34 It was interesting and funny

Was there any activity that you did not enjoy?                      Yes 7                      No 25

If yes, what was it?

- 3 The lecture
- 13 Lecture
- 14 Lecture
- 16 The light testing
- 17 The quiz
- 18 The spectrometer
- 19 Philososcope
- 27 Constellation

What didn't you like about it?

- 3 It was too long
- 13 Too long; not very helpful
- 14 Too long
- 16 The lights were out of reach
- 17 The Bluebell girls didn't let us join in
- 18 It was hard
- 19 I thought it was quite boring
- 27 Boring
- 29 Lecture time

If you could make any changes to the day what would they be?

- 1 Have more hands on experiments
- 2 MORE SCIENCE!
- 3 Less lecture more activities
- 4 Make the lecture more involved
- 5 We should have been able to use sponges
- 6 Make the lecture more involved
- 7 We should have had a few more activities
- 8 we should have more activities
- 9 That you could pick your own partners
- 10 Not boring talks at beginning
- 11 Nothing
- 12 None as I thought the day was brilliant!
- 13 [none]
- 14 Shorter lectures; more activities
- 15 I would probably find some better method to help people find their way around
- 16 Have a shorter lecture
- 17 Some harder questions
- 18 More fun!
- 19 Longer lunch break
- 20 I would want a second chance at the 'landing an egg on mars' challenge, so I could learn from my mistakes - have a retry
- 21 None
- 22 Nothing
- 23 Nothing really, it was fantastic!

- 24 It was brilliant
- 25 Nothing it was all brilliant
- 26 I wouldn't change anything!
- 28 Longer time!
- 29 Less lecture time
- 30 More activities
- 31 Should give 4<sup>th</sup> place
- 32 have more time to have lunch
- 33 Make the start a bit shorter
- 34 Maybe make the talk at the beginning a bit shorter

Are you looking forward to learning more about Science at school?

Yes 32 No

1

[Yes and No 1]

## Primary teachers' and accompanying adults' questionnaire responses

*(Teachers only)* **What criteria did you use to select children for participation?**

- 1 (Y6) Independence, self-motivation, ability to work with others
- 2 (Y3, 4) Ability in science including practical skills; ability to work with others
- 3 (Y5,6) Ability to work well in group and with others; capable to produce a high standard of work in science
- 4 (Y3,4) Interested in science; creative/inventive; could work in group; worked well all year; well behaved
- 5 (Y3 - 6) Gifted and talented register, class teacher's choice of most able scientists
- 7 (Y5, 6) Most able at problem solving/science and DT skills. Good at working as part of a team
- 9 (Y3, 4) Gifted and talented
- 11 (Y 3,4,5,6) Good scientists; well behaved and deserved a treat!
- 13 Selected those most able and enthusiastic in science
- 14 (Y 3, 4, 5, 6) Good at science
- 16 (Y 3, 4) Gifted and talented
- 17 (Y6) More able scientists
- 18 (Y3 – 6) Gifted and talented
- 19 (Y3-6) Gifted and talented scientists or identified as MAPs during the academic year
- 20 Pupils who had not had the opportunity previous years who enjoy Science and adopt a problem-solving approach
- 22 (Y3-6) Gifted and talented in science or design
- 23 (Y3-6) Gifted and able

**Did your pupils talk much about the Final Day event afterwards?**

**Yes 22**

**No 1**

If yes, please describe: (did they talk to you, to each other, to classmates, to parents? What sorts of things did they say or talk about?)

- 2 They talked to me and to each other and to their parents. Several parents commented the following day how much they had enjoyed it. They mainly talked about what they had done in the competition and activities. They did not say much about the Weird Space lecture although they had enjoyed it.
- 3 They spoke to me about the tasks they had to do, what they built and how they got on
- 4 Great enthusiasm for it. Parents fed back positive comments. They particularly enjoyed the challenge/making/practical part in the morning. They spoke to the rest of the class about it, and seemed to have remembered/learnt a lot.
- 5 They enjoyed telling me about the competitions on the way back to school and other teachers have said that the children in their class were enthusiastic and talking about the event the following day.

- 6 (non-teacher Y5) Enjoyed very much; Some didn't like dome; Found it interesting; Awesome/fun day
- 7 All the pupils said they had really enjoyed the day and were pleased to have taken part in the Olympiad.
- 8 (non-teacher Y3, 4) Everyone about how they won their sections, and winning an egg
- 9 Talked about the 'wow' events: rocket making, cr making, and Anton's lecture
- 10 (non-teacher Y4, 6) The children were very eager to tell us what they had been doing and especially how they got on in the competitions. With respect to the competitions some discussed with each other where they had made mistakes and where they could have made improvements
- 11 All. Enjoyed activities from lecture to challenge
- 17 That they enjoyed it – some children had been last year and were very excited to be chosen to go again
- 12 (non-teacher Y 3,4,5,6) They were excited and eager to describe what they had been doing in their individual activities to me and to their class teachers. They also compared what they did as year groups – they were interested to find out about what their friends had been doing, what they had made and found out about.
- 13 They spoke to parents and classmates. They were very excited and enthusiastic about the day. They reported back about what they did.
- 14 They talked to rest of class about what they did
- 15 (Y 3-6 non-teacher) To all – very positive
- 16 Y3 Said it was the best day ever
- 18 Children explained in assembly – science activity, competition activity
- 19 In playground, in assembly to whole school. all very positive
- 20 The told me (their teacher), classmates, and parents what a great time they had. They really enjoyed the talk about space.
- 21 Spoke to parents and other pupils about the 'competitions' each had taken part in
- 22 Me – what they enjoyed/disliked. Y3 event "Yummy!" Each other; assembly of whole school – events, highlights
- 23 All of the above! Spoke mainly about the competition, sharing their experiences with the other year group teams and their class mates back at school
- 24 (Non-teacher Y5)One child mentioned a lot about rocket firing and explained in great detail about how they had to get the timing correct

**Did their experience of the event stimulate questions?                      Yes 19                      No 8**

**If yes, what sorts of things were they asking?**

2 I think it may provoke questions in due course but at the moment they are still busy telling me about it rather than asking questions!

4 They want to do more investigative science!

7 They're all pretty enthusiastic about science already!

6 Why do things work this way? I didn't know that answer; Lots of various questions re space lecture

8 Only as to why they were left on their own to do the task

9 Lots of questions especially in rocket making, car making and Anton's lecture

10 Why are the stars such different sizes? Do you have to use CDs in the spectroscope? Several relating to the quiz

11 Can we come again next year

12 Can they go again next year!

17 Mainly discussion during event – deciding best plans for devising design

18 How could ..... School have won when they broke the egg!

19 During events lots of "what if.....?"

21 Questioning and thinking about different designs they could have used in their competition

22 Why did it work? What made the other teams win?

23 Mainly about the university and what facilities it had to offer in science

24 When will rockets go back to the moon?

**Are there any ways in which the event could have been improved for your pupils?**

1 They (Y6) were slightly disappointed with the lack of science in the practical tasks – they said it felt like a DT lesson, which was an unusual thing for them to say!

3 I know that timings are tight, but some are a little too tight for the very young children (Ys 3 and 4)

4 The lecture could have included more involvement of the children – they seemed to be sitting just listening for a long time

- 5 Some of the pupils I was with were disappointed with the top class quiz as an activity as all the other groups seemed to have a practical activity. Also the timetabling meant that this group went straight from the introduction to the lecture and then the quiz. Two hours is a long time for 9/10 year-olds to sit and listen!
- 6 Maybe more time on some allocated tasks – especially in the afternoon
- 7 It was rather rushed in the morning – need time for a break at some point. Longer needed for lunch! It was a shame the teachers couldn't see what happened during the competition part ...
- 8 An adult per age group; some activities didn't 'sound' as exciting as others when announced, which caused some groups initial disappointment
- 9 I felt that the "who wants to be a millionaire" style activity gave little extra knowledge to children (no teaching as to why an answer was correct/incorrect) and this type of activity could be done in-school. Being a university, I'm sure there are lots of other 'wow' activities that could have been done in different labs.
- 10 They seemed to favour the practical activities, so perhaps more of them may be a consideration.
- 11 No
- 12 Maybe an earlier start time so that they are not quite so rushed to complete the activities
- 13 We do not have enough staff to bring one per year group. I felt uncomfortable leaving some children unattended
- 14 I was a bit concerned that some children had no adults with them from our school, when walking around the campus. Make sure all the hand-held scorers work in the quiz.
- 16 Some sort of award for best attitude at the end
- 17 Allowing teachers into competition for taking photos – last year we made a lovely display but could not do so this year
- 18 Star dome needed time to inflate! The science behind the activities, eg, why the constellation upside down / compressing air to make a rocket. Was there scientific explanation for winning designs during/after the competitions? It became more technology than science at times [cont/see below]
- 19 I didn't attend the lecture or workshops as I was taking photos of comp events but the Y3/4 parents said it was too long/high level and the workshop practical 'spectrometer' didn't work.
- 20 No, they had a great time. They did feel (Y5&6) that pupils near the front were rather vocal and dominated the talk about space in the theatre
- 21 Bit longer for break/lunch

22 Lots of children wanted water as it was hot. A source of drinking water would have been helpful

23 I was able to accompany the Y6 during their science activity (constellations) which they thoroughly enjoyed. It allowed them to work in a 'real' lab doing something new. By contrast the Y4 group were involved with the computer quiz. This didn't provide them with a new experience (many of them play computer games at home) or teach them anything new. The novelty of the game quickly wore off

24 Lecture was interesting and seemed to keep the children's interest but he spent a lot of time asking the children for questions which for me made the presentation disjointed, especially as you could not always hear the children's actual questions. He did, however, have some very imaginative ways of explaining things. He promised he would do some experiments at the end of the lecture, which he new got to do as he ran out of time.

### **Have you any other comments?**

1 The staff and helpers at UEA were very good. Great lecture and speakers

2. It was a very busy day and I think a slightly longer break for lunch would have been beneficial (or an additional break at some point). It did feel as if we were rushing from one place to the next – partly due to the speed at which Y3 children move compared to the student guides. Thank you for an excellent day all involving science.

6 Very interesting day for adults and children

7 Our Y3 and Y6 pupils were absolutely thrilled to win the eggs – thank you very much for organising the event and we were delighted to be able to take part this year.

8 A bit more information for adults

9 A very enjoyable day, very well organised. Thank you.

10 A well organised and very enjoyable day for children and staff. A good opportunity for the children to see what the inside of a university is like.

12 The Y3/4 lecture was pitched at the right level for that age-group and it was more "child-friendly" than previous years. A great day enjoyed by all.

13 Thank you – lovely day!

17 Excellent organisation – children felt safe walking around the campus even when not accompanied by staff from school. Talk much better than last year and more suited to age group and attention span

18 Having said that, it was FANTASTICALLY organised and the children clearly engaged/wowed by the whole event. They behaved brilliantly, stayed on task, busy busy all day. Just what G & T need. Thank you!

19 Thank you so much once again – we had a fantastic time and so many of our pupils are now working extra hard to be selected next year!

20 Pupils benefit from participating every year

22 A well organised day which was enjoyable for adults and children alike

23 Overall a fantastic day with great organisation

## Appendix 2

### Year 7, 8, 9, 10 Questionnaire responses

#### Year 7

**Did you enjoy the Final Day event of the Science Olympiad?** Yes 16  
No 2

**Before the event were you interested in Science?** Yes 17  
No 1  
(1 kinda)

**Has your *general interest* in Science and/or Technology increased as a result of taking part in the event?** Yes 13  
No 5

**Has your interest in any particular aspect of Science or Technology increased as a result of taking part in the event?** Yes 7  
No 11

**If yes, what aspect is it?**

- 9 Astronomy
- 10 Experiments
- 12 Astronomy
- 13 Astronomy
- 14 Astronomy
- 15 Astronomy
- 16 Astronomy
- 18 Biology

**Are you now more interested than you were before the Final Day in studying a particular Science or Technology subject?** Yes 8 No 10

**If yes, which subject/s?**

- 4 Chemistry
- 10 Science
- 13 Physics
- 14 Physics
- 15 Physics and Chemistry
- 17 Physics
- 18 Astronomy

**If you were already interested in studying a Science or Technology subject after GCSEs are you now more interested in studying a Science or Technology subject at university, as a result of taking part in the event?**

Yes 11 No 8

**Which activities did you find most interesting?**

- 1 Crater measuring
- 2 Doing the experiments
- 3 The practical activities
- 4 Burning the copper sulphate
- 5 Burning hydrochloric acid
- 6 Practical competitions
- 7 Flour meteorite
- 8 Meteorites
- 9 Meteoroid
- 10 The burning
- 11 Practicals
- 12 None
- 13 Moon crater experiment
- 14 The moon crater experiment
- 15 The meteor drop and the lecture
- 16 The chemistry one
- 17 The copper sulphate experiments
- 18 Chromotology [sic]

**What did you find interesting about them?**

- 1 It was interesting finding out how the size or mass of the meteorite
- 2 They were fun and I hadn't done the experiments before
- 3 We hadn't done the experiments before and it was nice working with my friends to complete them and to record the results
- 4 How it changed colour
- 5 How the mass changed
- 6 They were a challenge and I got to have a bit of fun
- 7 It was fun
- 8 Very interesting
- 9 Dropping stuff
- 10 I found them exciting
- 11 Dunno
- 12 Nothin
- 13 Finding out the end result was interesting
- 14 I found finding out the end results was interesting
- 15 They were very amazing facts and I would like to learn more
- 16 There was burning
- 17 Using chemicals
- 18 How the results were found

**Were there any activities that you did not find interesting?      Yes 7    No 11**

[No 12 answered Yes to this question and No to every question above]

**If Yes, which was it/were they**

- 1 I think the lecture was too adult for the audience
- 2 The chromatography
- 3 I think the lecture was a bit too complicated for our age and me and my friends felt a bit lost with it all
- 4 The lecture at the end
- 5 The moon crater one with flour

- 6 The lecture on astronomy
- 12 All of them

**Can you suggest any ways in which you think the event could have been improved?**

- 1 More experiments, as it was very short
- 2 I think the lecture was boring and it was too confusing for our age
- 3 I think the lecture could have been made a bit simpler and that they shouldn't pack the facts in so were not above our heads in information
- 4 don't have an hour and a half lecture
- 5 More interesting, cool experiments
- 6 Make it a bit more understandable for younger people/audiences
- 7 Instructions clearer
- 8 Instructions clearer
- 12 Free food
- 13 The lecture was a bit too long
- 14 The lecture was a bit too long to be sat in the dark without doing anything
- 15 The fire drill. And we could have had a more interesting experiment, eg hydrogen exploding
- 16 No fire drills
- 17 Longer breaks
- 18 It could have improved by adding more colours to the chromatology

**Any other comments?**

- 5 The space lecture was very good but too complicated, with all the rays and lights split into different colours
- 6 The pictures that were taken in space which were in the lecture were amazing. Thank you to everyone who organised the event
- 9 Free food; no fire alarm

## Year 8

**Did you enjoy the Final Day event of the Science Olympiad?** Yes 11 No 0

**Before the event were you interested in Science?** Yes 11 No 0

**Has your *general interest* in Science and/or Technology increased as a result of taking part in the event?** Yes 9 No 2\*

**Has your interest in any particular aspect of Science or Technology increased as a result of taking part in the event?** Yes 6 No 5\*\*

**If yes, what aspect is it?**

- 2 Astrology
- 4 The study of astronomy
- 5 Astronomy
- 6 Astronomy
- 7 Space outside our universe
- 8 Chemistry

**Are you now more interested than you were before the Final Day in studying a particular Science or Technology subject?** Yes 6 No 5

- 1 Cosmology

**If yes, which subject/s?**

- 3 Astrophysics
- 6 Astronomy
- 7 Space

**If you were already interested in studying a Science or Technology subject after GCSEs are you now more interested in studying a Science or Technology subject at university, as a result of taking part in the event?** Yes 9 No 2 1\*\*\*

**Which activities did you find most interesting?**

- 1 Cosmology lecture
- 2 Lecture
- 3 Meteoroid
- 4 The lecture of astronomy
- 5 All of them
- 6 The meteorite activity
- 7 Meteor crater diameter
- 8 The copper sulphate
- 9 The space lecture
- 10 The space lecture
- 11 The meteorite experiment

**What did you find interesting about them?**

- 1 Pictures v. good, now interested in the VLT (very large telescope)
- 2 Stuff I didn't know
- 3 (?) thinking
- 4 Finding out life in the study of astronomy beyond of what we knew about space
- 5 They were fun and I found out stuff I didn't know
- 6 It was just fun to do
- 7 The force of gravity having a large impact on how big a crater is
- 8 The chemistry and how it worked
- 9 To see about stars how they were born and the problems they cause
- 10 To see how university life is like
- 11 It was fun and messy

**Were there any activities that you did not find interesting?**

**Yes 4 No 8**

No, I enjoyed them all

**If Yes, which was it/were they**

- 1 Practicals – plasticine balls into flour
- 6 The lecture went on a bit too long
- 10 The meteor experiment
- 12 The universe trip, it went on for too long and it was really complicated

**Can you suggest any ways in which you think the event could have been improved?**

- 1 More interesting practicals – magnesium, iron; magnetism/electro-magnetism
- 2 Keep on schedule
- 3 No
- 4 More practical activities – two isn't enough!
- 5 No
- 6 Shorten the lecture
- 7 Not really
- 8 Do more activities
- 9 No
- 10 We could have done more interesting practicals
- 12 Use Bunsen burners more, it makes it more fun

**Any other comments?**

- \*1 already very interested
- \*\*1 Possibly cosmology – but not much new in the lecture
- \*\*\*1 already had the desire
- 1 Thank you for this great opportunity!

## Year 9

**Did you enjoy the Final Day event of the Science Olympiad?**      Yes 17      No 0

**Before the event were you interested in Science?**      Yes 17      No 0

**Has your *general interest* in Science and/or Technology increased as a result of taking part in the event?**      Yes 13 (one:ish)      No 4

**Has your interest in any particular aspect of Science or Technology increased as a result of taking part in the event?**      Yes 7      No 10

### **If yes, what aspect is it?**

- 3 Astrology, but I liked it before (a bit)
- 5 Astronomy
- 6 Astronomy
- 7 Astronomy
- 10 Astronomy
- 11 Chemistry/Astronomy
- 13 Space

**Are you now more interested than you were before the Final Day in studying a particular Science or Technology subject?**      Yes 8      No 9

### **If yes, which subject/s?**

- 2 Astronomy
- 5 Physics
- 7 Astronomy
- 8 Astronomy
- 10 Astronomy
- 11 Eager to learn more biology
- 16 Chemistry

**If you were already interested in studying a Science or Technology subject after GCSEs are you now more interested in studying a Science or Technology subject at university, as a result of taking part in the event?**      Yes 9      No 8

### **Which activities did you find most interesting?**

- 1 The light experiment
- 2 Making a boat
- 3 Slideshow
- 4 Raft making with straws
- 5 Lecture
- 6 Lecture
- 7 the raft making
- 8 The crater one
- 9 Boat one
- 10 The boat one
- 11 The boat floating one
- 12 The one where you had to measure light

- 13 The star and graph making
- 14 The boat practical
- 16 Boat test
- 17 Boat test

**What did you find interesting about them?**

- 1 Finding out about Lux
- 2 It was fun
- 3 all of it
- 5 Learning more about the universe
- 6 Learning about how stars are made
- 8 Seeing how there made
- 9 It was fun and you had to use the initiative to make the boat work
- 10 It was more practical
- 11 The tiny changes would make big differences
- 12 I just thought it was easier
- 13 We did well and it was challenging
- 14 It was fun!
- 16 Because it was fun
- 17 You could try anything you want

**Were there any activities that you did not find interesting?    Yes 6    No 11**

**If Yes, which was it/were they**

- 2 The lux experiment
- 4 Testing lights
- 7 Testing the amount of light
- 9 The light measuring one
- 16 Science lecture
- 17 Science lecture

**Can you suggest any ways in which you think the event could have been improved?**

- 1 More interesting
- 2 Make it more interesting
- 3 Go on schedule
- 5 More practicals, let us roam freely
- 6 More practicals; break
- 7 In a pitch black room
- 8 Free food and longer time
- 9 No
- 10 Longer lecture
- 12 I think there should have been a more fun lecture instead of one about stars
- 13 Give a free lunch
- 14 Bigger teams
- 15 More organised
- 16 Breaks be longer
- 17 Breaks could be longer, be with other students

**Any other comments?**

- 2 I think we need more [sic]
- 14 It was really good!

## Year 10

**Did you enjoy the Final Day event of the Science Olympiad?**      Yes 9      No 0

**Before the event were you interested in Science?**      Yes 9      No 0

**Has your *general interest* in Science and/or Technology increased as a result of taking part in the event?**      Yes 3      No 6

**Has your interest in any particular aspect of Science or Technology increased as a result of taking part in the event?**      Yes 4      No 5

**If yes, what aspect is it?**

- 1 Solar system
- 2 Physics
- 3 Astrophysics

**Are you now more interested than you were before the Final Day in studying a particular Science or Technology subject?**      Yes 2      No 7

**If yes, which subject/s?**

- 2 Physics
- 4 Astronomy practicals

**If you were already interested in studying a Science or Technology subject after GCSEs are you now more interested in studying a Science or Technology subject at university, as a result of taking part in the event?**      Yes 6      No 3

**Which activities did you find most interesting?**

- 1 The lecture and speedboat experiment
- 2 The universe talk was the best
- 3 Light
- 4 Practicals
- 5 The test tube boat race
- 6 The second experiment
- 7 The boat race
- 8 The boat race, with the mixing of different chemicals
- 9 The boat making one

**What did you find interesting about them?**

- 1 Unusual and interesting. V. informative
- 2 Light sensor
- 3 The visual media and the wonders they depicted of our universe and how spectrometry enables us along with pictures to find out about the makeup of our cosmic universe
- 4 Challenge
- 5 It was fun to work together and learn how to use trial and error
- 6 The competitiveness
- 7 It was fun as well as a competition. Working together helped as well

8 I enjoyed the whole trial and error element to it, being able to develop one idea further

9 The fact that we had a very strict [sic]

**Were there any activities that you did not find interesting?**

**Yes 3 No 6**

**If Yes, which was it/were they**

2 The experiments could have been more interesting

3 Boats

4 The boat practical

**Can you suggest any ways in which you think the event could have been improved?**

1 Could have run a bit more on time

2 It would be better if the experiments were more interesting. In addition groups of 2 to 3 are too small. Groups of 4-6 would be better for more interesting experiments. Timing needs to be watched more carefully for adequate breaks

3 More science, less design

4 Not the boat practical

5 The lecture was a bit too long

6 The judge needs to explain how to use the equipment they provide, for example the light meter

7 Equipment needs to be explained when you need to use it, ie the light meter in the first experiment

**Any other comments?**

6 Thank you

7 Thanks for a good day!

## Secondary Teachers, Years 7, 8, 9, 10

### What criteria did you use to select students for participation in the event?

- 1 General interest; G&T considered but not solely choice [sic]; Those in Y10 considering careers in science
- 2 G&T
- 3 Ability – top end
- 4 Students in top set classes
- 5 Good at problem solving/practical work; work well together as a pair/team
- 6 Able and enthusiastic students

### Are you aware of your students talking about the Final Day event afterwards?

Yes 6 No 0

### If yes, to whom did they talk (each other, you, their classmates, parents, others) and what sorts of things did they say?

- 1 Comparing events;  
Discussion of *how* things were graded
- 2 Each other
- 3 Other students, teachers: fun day out, what they had done challenge-wise
- 4 Each other and other classmates. Acknowledging and describing what they did
- 5 Each other, other classmates, some staff (helped that some won medals and trophy which was shown in assembly)
- 6 Parents: outlining the day, especially medal winners explaining how they achieved their medals. Head teacher and other teachers: medal winners explaining how they won their medals. Each other: discussing Space lecture on the coach

### Did your students' experience of the Final Day event stimulate any questions?

Yes 3 No 3

### If yes, what sorts of questions were your students asking?

1. Theme of the day  
Could we do the practicals in school
- 5 Some were more interested in the universe and asked about some points from the lecture; some asked about how they could have done better in the tasks
- 6 Questions mainly surrounded the Space lecture, eg, what is dark matter?

### Do you feel that your students' interest in Science or Technology has been increased by participating in the Final Day event?

Yes 5 No 0  
(Yes/No 1)

### If yes, is this general interest or interest in a specific area? (which?)

- 1 Astronomy, science skills
- 2 Mainly general although many were talking about astronomy after the lecture (some talked about astrology too!)

- 3 General
- 4 General interest
- 5 Some were, others not, varies amongst students
- 6 General interest

**Is there any way in which this event could have been improved for your students?**

1. The lecture was very complex for the students; marking criteria given
- 2 Timings should have been strictly adhered to. There was hardly any break/lunchtime available for many as a result
- 4 More of and interactive lecture
- 5 Provision of refreshments? It was very hot
- 6 More categories for winners, ie, more students' achievements recognised

**Have you any other comments?**

- 1 Well organised event; enthusiastic staff/volunteers at UEA
- 2 Unfortunately it clashes with our school achievement evening and all most all pupils are involved with this;  
Many mentioned that instructions were sometimes unclear. Perhaps a little more guidance on the actual outcome we were looking for would help in some cases (eg the light meter practical) **IT WAS A GREAT DAY THOUGH!**
- 3 Norfolk Show day made traffic difficult; a lot of kit was needed
- 4 It was a good day, my students really enjoyed it.
- 5 Thank you very much to all organisers. We had a very enjoyable day

## Appendix 3

### Year 12

#### Y12 Students

**Did you enjoy the Final Day event of the Science Olympiad?** Yes 9 No 0

**Are you studying any Science subjects for AS Level?** Yes 9 No 0

**If yes, which one/s?**

- 1 Biology, Chemistry , Maths
- 2 Physics and Chemistry
- 3 Biology, Chemistry, Physics
- 4 Chemistry, Physics, Maths
- 5 Chemistry and Physics
- 6 Chemistry and Physics
- 7 Chemistry, Biology and Maths
- 8 Chemistry, Physics
- 9 Chemistry

**Before the Final Day were you planning to continue with it/them to A2 Level?**

Yes 8 No 0  
(Yes/No 1)

8 Yes for Physics No for Chemistry

**If yes, are you interested in studying a Science or Technology subject at university?** Yes 9 No 0

8 Physics

**Do you feel that your *general interest* in science and/or technology has increased as a result of taking part in the Final Day?** Yes 6 No 3

**Have you developed a new interest in any specific aspect of Science or Technology as a result of taking part in the Final Day?** Yes 5 No 4

**If yes, which?**

- 2 Practical astrophysics
- 4 Astronomy
- 5 Spectroscope [sic]
- 6 Spectroscope [sic]
- 9 Chemistry analysis

**Which activities did you find most interesting?**

- 1 Using spectroscope for flame tests
- 2 Poppadom in the microwave
- 3 Microwave and poppadom

- 4 Microwave and poppadom
- 5 Spectroscope
- 6 Spectroscope
- 7 Biology
- 9 The chemical parts

**Why?**

- 1 Pretty colours
- 2 Rather easy based on the results
- 3 Short, interesting, and many smaller questions
- 5 Interesting and fun
- 6 Interesting, different, and fun
- 7 Interested
- 9 Because I like chemistry

**Were there any activities that you did not find interesting?      Yes 5      No 4**

**If Yes, which was it/were they?**

- 1 Finding speed of light
- 3 Biology life experiment
- 7 Lecture
- 9 Spectroscopy

**Why?**

- 1 I don't take Physics so didn't understand it
- 3 Too long, too complicated
- 4 The life in the sand experiment (biology)
- 9 Because it takes ages and takes good judgment

**Are you now more interested than you were before the Final Day event in studying a Science or Technology subject?      Yes 5      No 4**

**Can you make any suggestions as to how this event could be improved?**

- 1 Better, more interesting lecture
- 3 More interesting experiments
- 5 Shorter lecture at the end
- 6 make lecture at end shorter
- 7 The helpers should be more informed
- 8 Less Blue Peter
- 9 Advice beforehand

[No questionnaires received back from Year 12 teachers]