



# Bloodhound SSC on the road

## Final report



## Summary

'Bloodhound SSC on the road' is an interactive science show developed by *science made simple* for the Bloodhound education team. The show lasts 45 minutes and is targeted at years 5-8. The Show was launched at the Cheltenham Science Festival in June 2009 and has since been delivered at schools and festivals across England. Evaluation has shown high levels of student enjoyment and increase in positive attitude to science and engineering. There is demand for more shows from staff and pupils.

## Development

Development of the show began with a focus group held with 20 year 6 students. The Background to the car was introduced and the students asked for their first thoughts and questions. Most questions were in one of two areas: Statistics of the car, (how big, how fast, how heavy etc) and safety (what are hazards, how is driver protected?)

Collaboration with the Bloodhound Education Team (BET) and research into links to the National Curriculum led the development of the show structure. Demonstrations, video clips, images and opportunities for audience participation were all included to increase effective audience engagement.

The show was piloted in a school, and following a review was offered to festivals during summer 2009.

During December 2009 the show underwent a further review based on presenter experience and feedback from teachers and students. The visuals were also updated at this time to reflect changes in the car design and to allow the inclusion of new information. The show continues to undergo periodic review as new audiences receive the show and iterative evaluation is carried out. As the Bloodhound project develops further it will be useful for the *science made simple* team to meet with the engineering team to update the show content and highlight the current challenges.

## Content

The show begins with an introduction to the Bloodhound project and the key challenges facing the design and engineering team. A brief historical review is used to place the project in context, comparing Bloodhound SSC with the first world land speed record holder and the Bugatti Veyron.

The show then moves on to explore the forces acting on the car, in particular those exerted by the air and how the shape of the car is determined by the need to control those forces.

The speed of sound is then discussed and the propulsion of the car is introduced, with an examination of the jet engine and hybrid rocket which power the car.

The content is adapted to suit the audience with more or less emphasis placed on each section according to the age and ability of the students. The flexible, unscripted approach employed by *science made simple* allows each show to be different and responsive to each audience.

The show includes a number of props and visual aids, these have been replicated so that the show is now available from each of *science made simple's* three offices: Norwich, Bolton and Cardiff.

## Marketing

The show has been offered to schools across England. Marketing has been through the BET, *science made simple's* contacts and through existing networks such as STEMNET.

Thanks to funding from BET the show was offered at a low rate to schools to encourage participation by a wide range of schools and festivals. Host schools were charged £75 plus VAT.

Secondary schools have been invited to host 3 performances of the show in a day and to invite their feeder primaries to at least one presentation. This approach has enabled the project to reach pupils from a large number of schools, and has also been welcomed by teachers as a way of strengthening links between schools.



fig 1 Bloodhound roadshow venues

Tours were arranged in the Government Office Regions across England with a total of 65 days available to schools and 6 for major science and engineering festivals. 62 of the available dates were booked by schools during the 2009/10 school year. The final number of days available was not known until April 2010 which made it harder to market to schools. The remaining 3 unbooked dates could be offered in the next academic year.

There is currently a waiting list of 22 schools, in areas already visited by the roadshow, who would like the opportunity to participate in future. There is demand for further regional tours, and gaps in coverage can be seen from the venues map (*fig 1*)

## Delivery

The shows were delivered by a single presenter, who brought all the equipment to the venue.

Once a booking was confirmed, the presenter discusses the show content and requirements with the contact teacher. Most of the shows were presented in a school hall, during summer term, clashes with examinations meant that smaller rooms were used in some schools. This reduced the overall audience size.

The schools' shows have been delivered in 60 venues and drawn pupils from over 150 schools. This includes a small number of shows, outside the BET contract, delivered at full cost to schools.

The shows were presented to students in yrs 4-9 (ages 8-13). The average audience number for school shows was 250. The full list of schools can be found in appendix ii

The show was also presented at:

Cheltenham Science Festival  
The Learning grid Rockingham festival  
Newcastle Science Festival  
Oxfordshire Science Festival  
The Big Bang, Manchester

The festival audiences saw a mix of invited schools and family audiences.

The total audience numbers were as follows:

Schools	20392
Festivals	940
Full cost shows	1490
Total audience	22822

The full list of schools can be found in appendix ii

## Evaluation

Evaluation of the show has been carried out by a questionnaire given to pupils. The students form is produced in line with the Generic Learning Outcomes framework developed by the Museum, Libraries and Archives Council to measure informal learning. The strategy looks for attitudinal and behavioural change in audiences as well as judging their level of satisfaction with an intervention.

A copy of the questionnaire can be found in appendix i

586 responses were received 2.57% of the schools show audience. It has proved difficult to get feedback from large numbers of pupils. Students often have to leave the room immediately after a show to move onto their next lesson. There is a very low return rate for forms left with schools for completion at a later date.

Of these 53.9% were male 46.1% were female.

The overall results show high levels of satisfaction with the show, and that the students feel they have learnt something new by watching the performance.

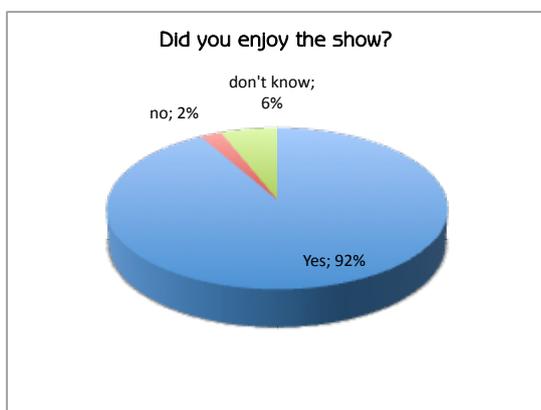


fig 2 Audience enjoyment

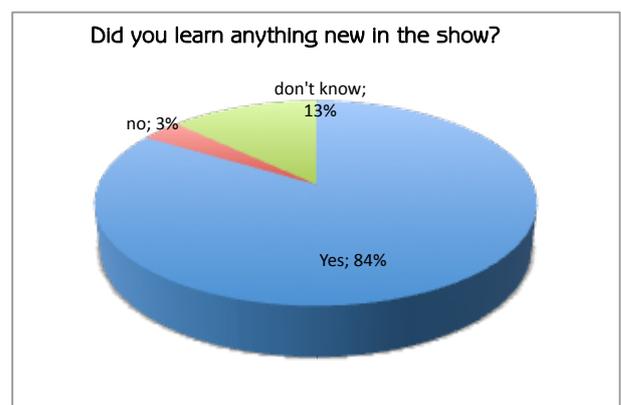


fig 3 Audience learning

Students were also given the opportunity to tell us *what* they had learnt during the show. Their answers covered a range of topics from the very basic:

"I learnt that there was a Bloodhound project"  
(year 8 girl)

"cars can go quite fast"  
(year 9 boy)

"How technology and science is heading in the future and how the features of Bloodhound work" (year 8 girl)

### to the detailed

"..How the jet and rocket work, and a new compound  $H_2O_2$ "  
(year 8 boy)

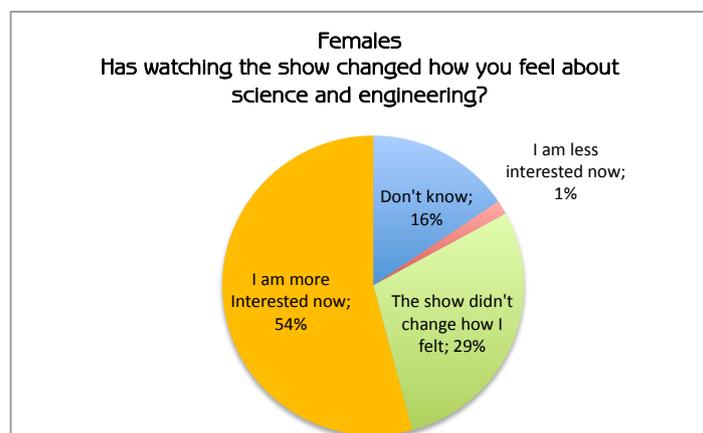
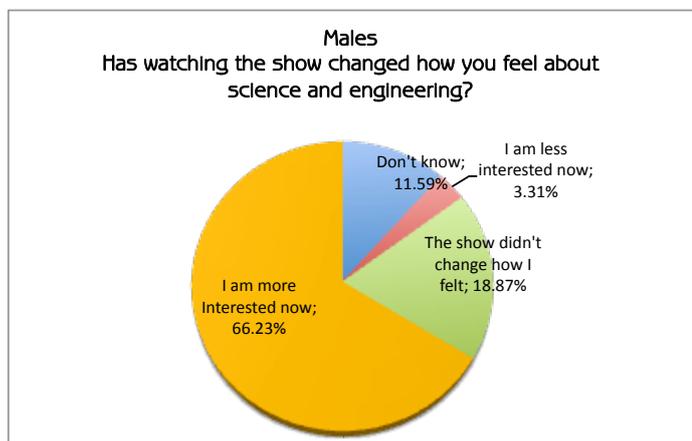
" I learnt how rockets work, how difficult it is to make sure that bloodhound stays on the ground and how much science goes into it"  
(year 8 girl)

"How aerodynamics affects movement"  
(year 7 boy)



Word cloud based on students responses to the question "what have you learnt?"

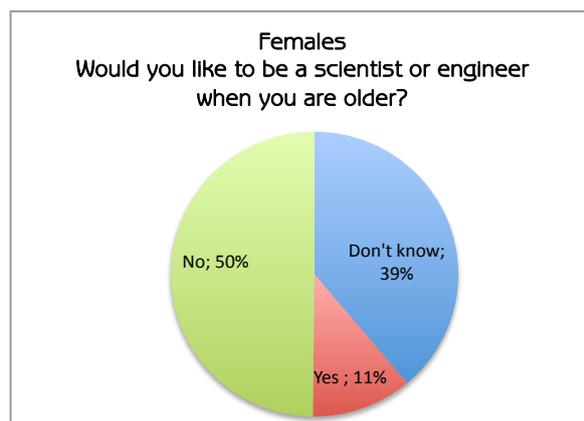
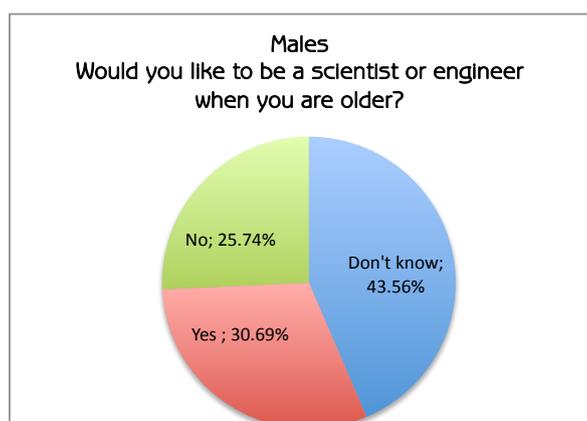
One aim of the project was to promote positive attitudes towards science and engineering and to encourage students to consider careers in STEM. They were asked questions to reflect this. The responses were split by gender to identify any imbalance in the impact of the show.



figs 3&4 Attitudes to science and engineering

More than half of respondents say that they have more positive attitudes towards STEM subjects following the performance. However, it was found that boys are more likely to show increased engagement than girls. 62.5 % vs 51%. (figs 3&4) Without a previsit baseline assessment it is impossible to know what the girls previous attitude was.

The pupils were also asked if they would consider future careers in STEM areas. (figs 5 &6)



figs 5 &6 Attitudes to future careers

With similar numbers in each group being uncertain about their future career, the boys once again show a more positive attitude to STEM subjects. This is reflected in other surveys of students

Asked if they would like to see another similar show in the future, the response was very positive. (fig 7) This figure is in line with the results of surveys across the whole of *science made simple's* show range. These results are available at [www.sciencemadesimple.co.uk/page203g.html](http://www.sciencemadesimple.co.uk/page203g.html)

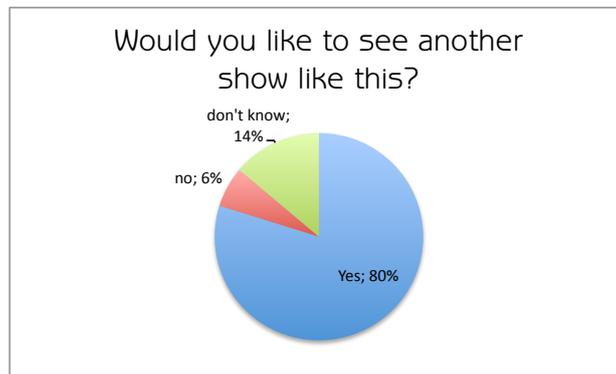


fig 7 Demand for further shows

Teachers were also given the opportunity to rate the show and to comment on its suitability for their students. All the teachers surveyed rated the show, “very good” or “excellent” Comments received included:

“Pitched perfectly”

“engaging and friendly”

“Enthusiastic and knowledgeable”

“very enthusiastic and well organised”

## Conclusion

The results of the evaluation demonstrate that the show has had a positive effect on the students attitudes to science and engineering. There was a difference in the responses of boys and girls. This is most likely a reflection of the wider social perception of STEM subjects being more typically male pursuits. It is encouraging that despite this view the show was enjoyed by an overwhelming majority of both boys and girls.

The attitudes question highlighted that girls are more likely to be undecided about their response which is in line with other research

“Girls are more likely to select ‘undecided’ answers than boys in general.”  
(DCSF 2008)

The number of students considering careers in science or engineering also show a bias towards males. However it is encouraging that 11% of girls say they would like to follow careers in the field. Given that over half the girls said they were more interested in science following the show, clearly there is scope to influence the opinions of young women and break down the stereotypical view of STEM careers as a male only option.

Evaluation of other engineering projects has produced similar findings.

“While many school-age girls are indifferent to science and engineering, a substantial minority, about one-third, are not.

This is the group that needs to be encouraged if we are to have more women taking up careers in these fields” Brosnan, Mark (2007)

"Boys are still much more likely than girls to consider a career in science or engineering, with 22 per cent of boys saying this was an option, compared to 12 per cent of girls" (NOISE 2006)

Further development of the show content and delivery could broaden the appeal of the show to female students. Following the interim evaluation steps were taken to try to improve the impact of the show on female students.

- Highlight the role of female members of the Bloodhound engineering team
- Use female presenters to deliver the show

The show is popular with students and uses the iconic nature of the Bloodhound SSC project to introduce a broad range of science topics. There is a demand for further performances from teachers and pupils.

The subsidy provided by the BET has enabled large numbers of students from across England to participate in the project. Future funding could enable yet more pupils to find out about the project, it would be particularly valuable to visit schools in Scotland, Wales and Northern Ireland.

## References

Brosnan, Mark (2007) Factors Predicating Attitudes and Success upon a Science/Engineering Project, <http://tinyurl.com/yasx9uf>

DCSF (2008) After School science and Engineering Clubs Evaluation Interim Report <http://tinyurl.com/ye3ymz2>

NOISE (2006) You and Work, [www.noisemakers.org.uk/modules/articles/show\\_press.cfm?id=23](http://www.noisemakers.org.uk/modules/articles/show_press.cfm?id=23)



Appendix i

Students' evaluation form

Thanks for helping us out by filling in this quick form.

Please circle your answers below

What year are you in?  
Are you..... Male                      Female

1. Did you enjoy the show

Yes              No                      Don't know

2. Did you learn anything new in the show?

If yes, tell us what it was here:                      Yes              No                      Don't know

3. Has watching the show changed how you feel about science and engineering?

Don't know                      I am **less**                      The show didn't                      I am **more**  
Intersted now                      change how i felt                      Interested now

4. Would you like to be a scientist or engineer when you are older?

Yes              No                      Don't know

5. Would you like to see another show like this about science or engineering

Yes              No                      Don't know

Appendix ii  
Participating schools

school name	Town	County
Laxton Junior	Oundle	Northamptonshire
Oundle school	Oundle	Northamptonshire
Oundle and kings cliffe middle	Oundle	Northamptonshire
Soham village college	Soham	Cambridgeshire
St Andrews Primary	Soham	Cambridgeshire
Acle high school	Acle	Norfolk
Wooton Upper school	Bedford	Bedfordshire
Wooton lower school	Bedford	Bedfordshire
Ennerdale & Kinniside	Cleator	Cumbria
St. Joseph's Catholic Primary School	Frizington	Cumbria
Netherhall	Maryport	Cumbria
Solway	Wigton	Cumbria
Stainburn	Workington	Cumbria
Victoria Junior School	Barrow in Furness	Cumbria
Walney School	Barrow in Furness	Cumbria
Cambridge Primary School	Barrow in Furness	Cumbria
St. Bernard's Catholic High School	Barrow in Furness	Cumbria
St. George's CE School	Barrow in Furness	Cumbria
St. Thomas's CE School	Kendal	Cumbria
Stramongate	Kendal	Cumbria
Queen Katherine School	Kendal	Cumbria
Central Academy	Carlisle	Cumbria
Richard Rose Morton Academy	Carlisle	Cumbria
St Bede's	Carlise	Cumbria
Newman Catholic School	Carlise	Cumbria
The Hemel Hempstead school	Hemel hempstead	Hertfordshire
Boxmoor primary	Hemel hempstead	Hertfordshire
Pixies hill school	Hemel hempstead	Hertfordshire
South hill school	Hemel hempstead	Hertfordshire
Backwell Secondary school	Bristol	Southwest
Cardinal Allen Secondary	Fleetwood	Northwest
Bluecoats	Liverpool	Liverpool
St Edmund Arrowsmith	Manchester	Manchester
Frederick bremer school	Walthamstow	London
Bishop ramsey school	Ruislip	London
Holy trinity primary	Ruislip	London
Warrender primary	ruislip	London
Bishop Ingram	Ruislip	London
Blaengwawr Comprehensive,	Aberdare	Mid Glamorgan, Wales

Rhydywaun Comprehensive,	Aberdare	Mid Glamorgan, Wales
West Jesmond Primary	Jesmond	Tyne and Wear
St Cuthbert's High School	Newcastle	Tyne and Wear
Westgate Hill Primary	Newcastle	Tyne and Wear
Walbottle Campus	Newcastle	Tyne and Wear
Atkinson Road Primary	Newcastle	Tyne and Wear
Hobart high school	Loddon	Norfolk
Loddon junior school	Loddon	Norfolk
St Mary's RC School	Hereford	Worcs
Chase Technology	Burntwood	Worcs
Great barr School	Great Barr,	West Midlands
Great barr primary	Great Barr,	West Midlands
Glenmead primary	Birmingham	West Midlands
Ridgewood School	Stourbridge, Dudley	West Midlands
Mount Pleasant School	Dudley	West Midlands
The Ridge Primary School	Dudley	West Midlands
Old Swiford CE School	Dudley	West Midlands
Ham Dingle	Dudley	West Midlands
Anthony Gell School (extra)	Matlock	Derbyshire
Newdale Primary School	Newdale, Telford	West Midlands
Wednesfield High School	Wolverhampton	West Midlands
Sir Alexander Fleming Primary	Sutton Hill, Telford	West Midlands
Harlescott Education Centre	Shrewsbury	West Midlands
Brosely Primary School	Brosely, Shropshire	West Midlands
High Arcal	Sedgeley, Dudley	West Midlands
Dudley College	Dudley	West Midlands
Royal hospital school	Ipswich	Suffolk
Town close prep	Norwich	Norfolk
Frinton primary	Frinton	Essex
Bentley primary	Great Bentley	Essex
Holbrook primary	Holbrook	Suffolk
Riddlesworth hall prep	Riddlesworth	suffolk
Archbishop sancroft	Harlseton	Norfolk
Harleston primary	Harelston	Norfolk
Pakefield middle	Lowestoft	Suffolk
Wimbledon College	Wimbledon	London
St John Fisher Primary	Raynes Park	London
St Thomas of Canterbury	Mitcham	London
St Matthews Primary	Raynes Park	London
Sacred Heart Primary	Raynes Park	London
Sanders Draper School	Hornchurch	London
Hactons Primary School	Hornchurch	London

Scotts Primary School	Hornchurch	London
St Albans Primary	Hornchurch	London
Suttons Primary	Hornchurch	London
Burntwood School	Wandsworth	London
Beatrix Potter School	Wandsworth	London
Earlsfield Primary School	Wandsworth	London
Fircroft School	Wandsworth	London
Cleeve Park School	Beckenham	London
Orchard Primary	Beckenham	London
Royal Park Primary	Beckenham	London
Yarborough School	Lincoln	East Midlands
St Martins Catholic School.	Stoke	West Midlands
Liskeard Community college	Liskeard	Cornwall
Holsworthy Community college	Holsworthy	Devon
Ridgeway	Plymouth	Devon
Exmouth community College	Exmouth	Devon
Woodbury Salterton C of E Primary	Exeter	Devon
Brixington Primary School,	Exmouth	Devon
Drake's C of E Primary School	Budleigh Salterton	Devon
Littleham C of E Primary Schoo	Exmouth	Devon
St. Peter's C of E Primary School	Budleigh Salterton	Devon
Marpool Primary School,	Exmouth	Devon
St Josephs Primary	Exmouth	Devon
Sidmouth College	Sidmouth	Devon
Newton Poppleford Primary	Sidmouth	Devon
West Moors Middle School	Ferndown	Dorset
St Nicholas' School	Fleet	Hampshire
Salesian College	Farnborough	Hampshire
St Osmunds School	Dorchester	Dorset
Danway primary	Effingham	Surrey
St Lawrence school	Effingham	Surrey
Royal kent school	Effingham	Surrey
Howard of effingham	Effingham	Surrey
Crayford academy	Crayford	Kent
Slade green	Crayford	Kent
Knights academy	Crayford	Kent
Wilimington boys grammar	Wilmington	Kent
Anthony roper primary	wilmington	Kent
Emmbrook school	Emmbrook	Berkshire
The hazeley school	Milton keynes	Buckinghamshire
Christ the sower	Milton keynes	Buckinghamshire
Bradfield school	Sheffield	Yorks

Nook lane juniors	Sheffield	Yorks
Wharncliff side	Sheffield	Yorks
Oughtibridhe primary	Sheffield	Yorks
bradfield dungworth primary	Sheffield	Yorks
Almondbury high	Huddersfield	Yorks
Lower houses	Huddersfield	Yorks
Almondbury junior	Huddersfield	Yorks
Dalton primary	Huddersfield	Yorks
Swallow hill secondary	Leeds	Yorks
Filey high school	Filey	Yorks
Filey juniors	Filey	Yorks
Hertford vale	Filey	Yorks
Hummanby	Filey	Yorks
Seamer primary	Filey	Yorks
Friaridge	Filey	Yorks
Flamborough	Filey	Yorks
Wadd Newton	Filey	Yorks
Cayton	Filey	Yorks
Overdale	Filey	Yorks
Beverley high	Beverley	Yorks
St Nicholas primary	Beverley	Yorks
a/n other	Beverley	Yorks
Framwellgate school	Durham	County Durham
Jarrow School	Jarrow	Tyne and Wear
Whitley bay high school	Whitley bay	Tyne and Wear
Seaham technology college	Seaham	County Durham