



The North East Exhibition for Future Engineers *Impact Report 2017*

Compiled by Moira Shaftoe
EngineeringUK Employer Support Manager, NE Region

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Introduction

EngineeringUK's State of Engineering Report 2017 highlights the need in the UK for 186,000 people with engineering skills per year coming into the sector up to 2024 to fill demand. The demand in the north east is to fill 6,000 jobs with engineering skills each year to 2024. There are some positive signs among the data in the report:

- 9% more engineering and technology first degrees obtained in 2014/15 than the year before
- Highest number of engineering related apprenticeship starts in England for ten years
- More 11-16 year olds "would consider a career in engineering" (up from 40%-51% in four years).

But there continue to be real concerns, which highlight why efforts should be redoubled to improve STEM education, to attract young people into engineering. Currently, there are 26,911 fourteen year olds in secondary education in this region. It is vital that more of these young people – particularly girls – study STEM and take up engineering apprenticeships and degree courses.

Bring it On showcased the very best of north east engineering to young people (aged 10-14) from across the region. The exhibition exposed young people to different types of engineering and presented an opportunity to meet a wide variety of different types of engineers, improving knowledge and perceptions about the sector, helping to inspire the next generation of north east engineers.

This report provides analysis and evaluation on the inaugural Bring it On Exhibition that took place on the 3rd & 4th October 2017 at the Stadium of Light in Sunderland. The zoned event provided students and teachers with the opportunity to meet and engage with companies from the following sectors:

- Automotive/Rail/Aerospace
- Creative & Digital Technology
- Civil/Structural/Construction Engineering
- Subsea/Oil & Gas/Renewables/Energy
- Chemicals & Processing

They also had an opportunity to engage with representatives of the Professional Engineering Institutions in an 'Engineering your Career' Zone, full of information about pay, job and life opportunities, types of engineers, important school subjects and the various routes into engineering.



Evaluating Bring it On

The student experience was evaluated using EngineeringUK's Common Evaluation System the 'Engineering Brand Monitor' (EBM). Teacher feedback was gathered via questionnaires and employer feedback via an online survey.

Engineering Brand Monitor Evaluation

The Brand Monitor is an annual, nationally representative survey of perceptions of engineers, engineering and STEM among the general public, educators and pupils. It provides an understanding of the environment in which we operate and produces comparable results year-on-year. EBM sets a baseline, or benchmark, for outreach programme evaluations, allowing us to measure and demonstrate the impact that programmes are having in a robust and trusted manner.

Methodology

The student evaluation results were compiled from pre and post event EBM questionnaires, completed by a cohort of 137 students on the 4th October 2017.



The pre questionnaire featured three core knowledge and perceptions questions taken from the full EBM questionnaire:

- *How much would you say you know about what people working in these areas do? (Science, Technology, Engineering)*
- *How positive or negative is your view of the following? (Science, Technology, Engineering, Maths)*
- *How desirable do you believe a career in the following areas to be? (Science, Technology, Engineering)*

Students completed pre questionnaire at the point of registration, in advance of any activity taking place, to establish a baseline for existing knowledge and perceptions of the sector before experiencing Bring it On. The post event questionnaires were completed at the end of the day, prior to departure.

Each of the core questions requires students to respond on a scale of 1-5. Analysis of the results focuses on number of positive responses to each row of each individual question. Positive responses are numbers '4' and '5' on the scale combined (highlighted in green in the example below):

EXAMPLE Q3	How desirable do you believe a career in the following areas to be? Please choose a number 1-5. Please tick one answer for each row.					
	PLEASE TICK ONE BOX ONLY					
		Not at all desirable			Very Desirable	
		1	2	3	4	5
Science	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Technology	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Engineering	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

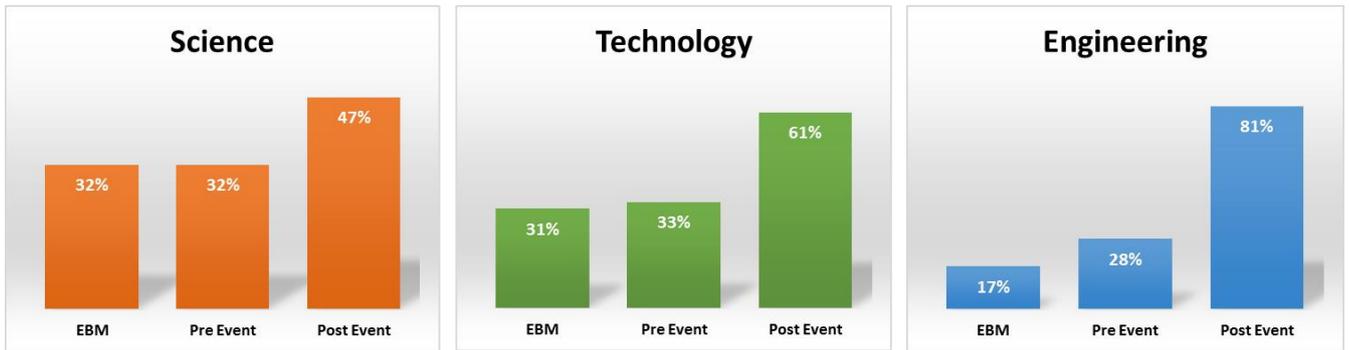
Results are calculated by counting the number of times pupils ticked options '4' and '5' in each scale/row, divided by the total number of respondents (fully completed questionnaires only) and multiplied by 100 to obtain the figure for the percentage of positive responses (rounding the first decimal place up or down to a whole number).

Findings

The following analysis of the findings illustrates the combined pre and post evaluation results of 137 students from 12 randomly selected Bring it On schools from across the region.

Each of the charts below illustrates 3 sets of data, comparing students' pre & post event core knowledge and perceptions responses, alongside the EBM 2016 data set.

Question 1 - How much would you say you know about what people working in the following areas do?



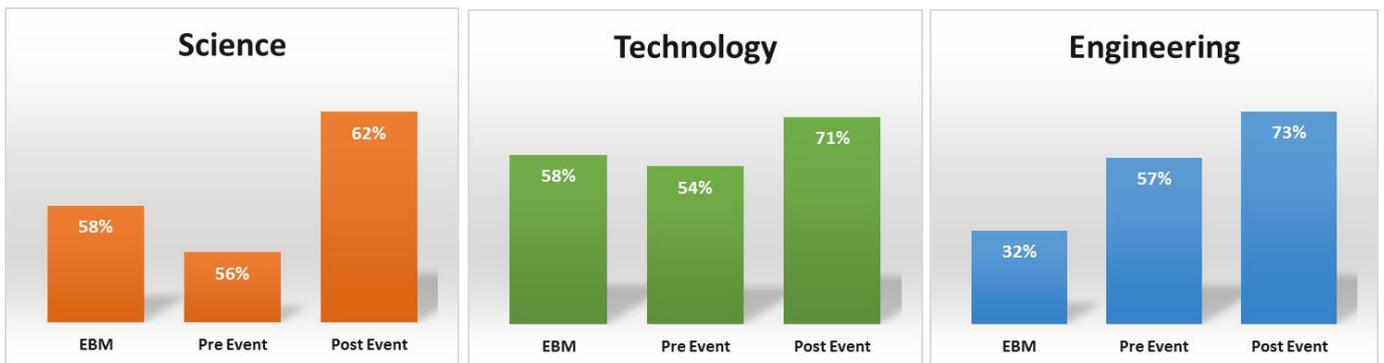
Combined results from the pre event questionnaire, assessing the students' baseline knowledge about what people working in Science, Technology & Engineering do, reflect positively against the EBM 2016 data set. Before participating in Bring it On, respondents were on a par with EBM national statistics for knowledge about what people working in science do, show a 6% increase against EBM national statistics for knowledge about what people working in technology do and a 65% increase against EBM national statistics for knowledge about what people working in engineering do, indicating respondents feel they have some awareness of what people working in Science, Technology and Engineering do.

In comparison to pre event data, the post event questionnaire results indicate that Bring it On had a very positive impact on increasing students' knowledge and perceptions about what people working in Science Technology and Engineering do. Respondents' informed post event results show:

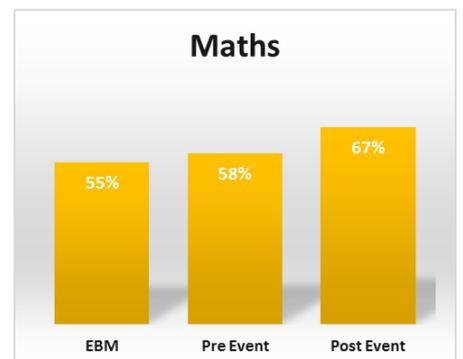
- 47%** increase in their knowledge and understanding about what people working in Science do.
- 85%** increase in their knowledge and understanding about what people working in Technology do.
- 189%** increase in their knowledge and understanding about what people working in Engineering do.

The increase in knowledge and understanding about engineering is particularly pleasing. Bring it On was designed to showcase engineering to young people and the results indicate our exhibitors hit the mark in terms of content, providing a very positive, engineering focused, learning experience for participants.

Question 2 – How positive or negative is your view of each of the following?



Combined results from the pre event questionnaire, assessing positive/negative baseline perceptions of Science & Technology, fall slightly below the EBM 2016 data set. Baseline perceptions of Engineering and Maths reflect positively against the EBM 2016 data, particularly for Engineering. An indicator that respondents, before participating in

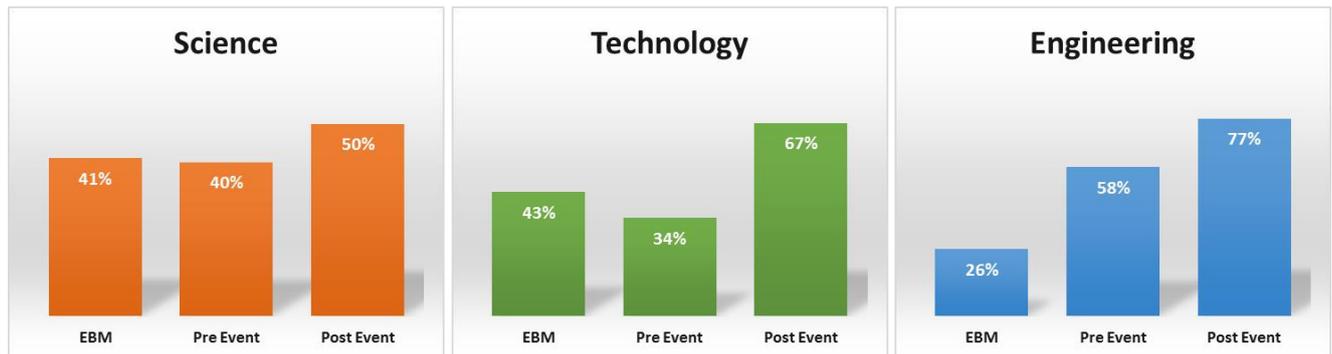


Bring it On, already have a more positive impression of Engineering than their peer group nationally. Post event questionnaire results indicate, across the board, that Bring it On had a positive impact on increasing students' positive perceptions about Science, Technology, Engineering and Maths, particularly Technology and Engineering.

Results show:

- **11%** increase in their positive perceptions about Science.
- **31%** increase in their positive perceptions about Technology.
- **28%** increase in their positive perceptions about Engineering.
- **16%** increase in their positive perceptions about Maths.

Question 3 – How desirable do you believe a career in the following areas to be?



In terms of Technology, combined results from the pre event questionnaire, fall below the results recorded by the respondents' peer group nationally, as represented in the EBM 2016 data set, indicating some lack of awareness, understanding or interest about careers in that sector. Pre questionnaire results for Science are on a par with EBM 2016 national data set. Respondents' existing pre event desirability for a career in Engineering reflect very positively against the EBM national data set for 2016, indicating a good level of understanding amongst respondents that a career in Engineering is an attractive proposition.

In comparison to the pre event EBM data, post event results indicate that Bring it On had discernible impact on increasing students' desirability for careers in Science, Technology and Engineering.

Results show:

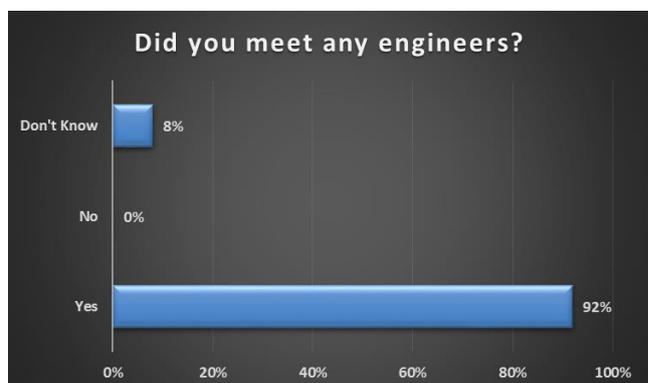
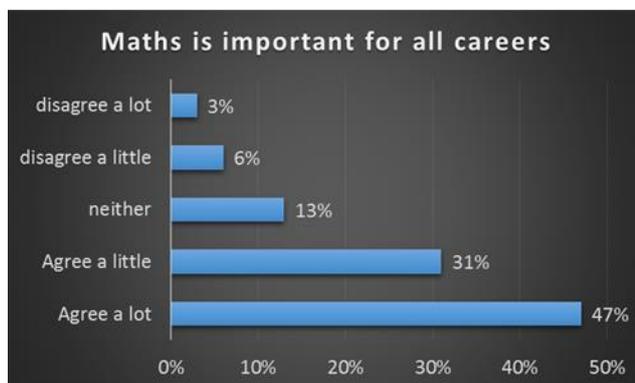
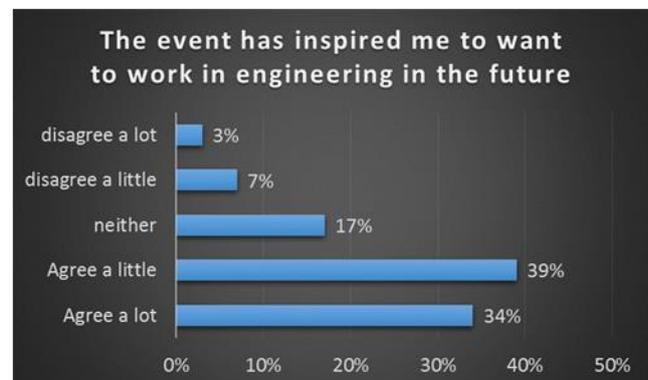
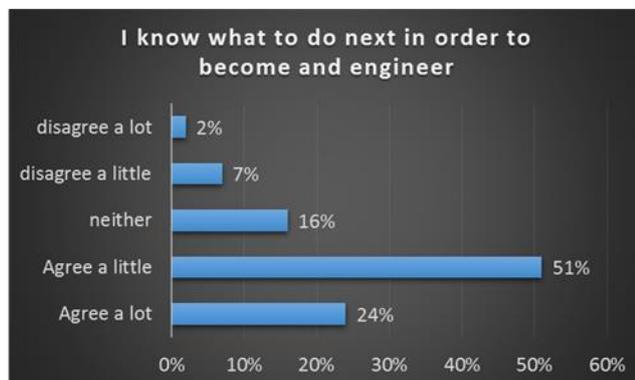
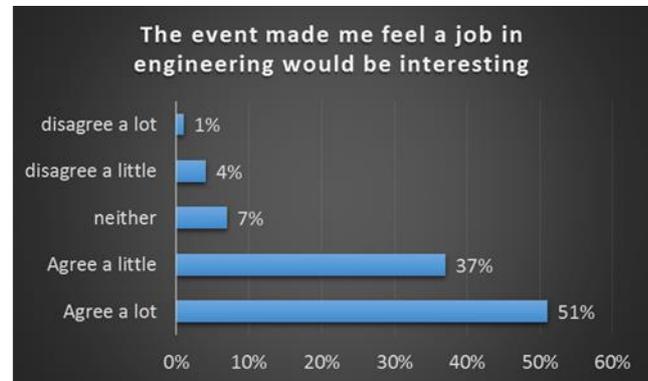
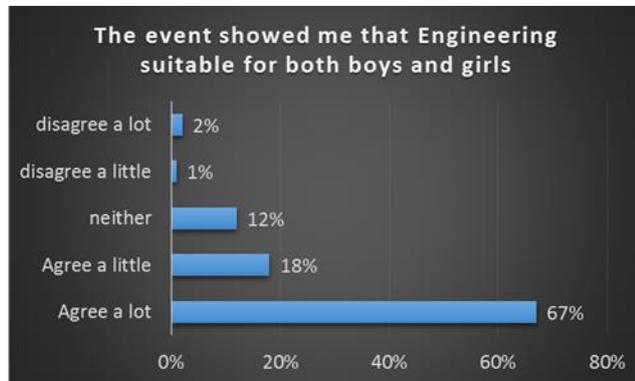
- **25%** increase in their desirability for a career in Science
- **97%** increase in their desirability for a career in Technology
- **33%** increase in their desirability for a career in Engineering.



Additional Post Event Questionnaire Results (overall experience of the event and views on STEM)

Each of the charts below illustrates combined post event questionnaire results of all 137 students who attended the Bring it On Exhibition on the 4th October 2017.

Question 4 - Students were asked to what extent they agreed with the following statements about the Bring it On Engineering Exhibition. They were also asked if they had met any engineers. Results below:



A key driver for the Bring it On Exhibition was to inspire girls, as well as boys, about careers in engineering. Results indicate a positive impact, with 67% of students agreeing 'a lot' that the programme showed them engineering is suitable for both boys and girls. 85% of the students agreed, to some extent, that the programme made them feel a job in engineering would be interesting.

The Bring it On Exhibition did impart a level of knowledge and understanding to students about what they need to do next in order to become engineers with 75% of the students agreeing, to some extent that they know what to do next in order to become an engineer - although only 24% of the students 'agree a lot' with this, highlighting an opportunity to place more emphasis on routes into the sector at future Bring it On events. In terms of increasing desirability to want to work in engineering in the future, 73% of the students agreed, to some extent, that Bring it On has inspired them to want to work in engineering in the future.



Although the emphasis at Bring it On was north east engineering, overall, the students indicate a good level of awareness about the importance of maths to careers. The exhibition facilitated a great opportunity for young people to meet face to face with engineers and 92% of students recognised that fact. The 8% of students who indicated they weren't sure whether they had met any engineers, probably did over the course of the day, just didn't realise it. This highlights an opportunity to 'badge' engineers to make them more visible to students for future events.

Students provided some additional comments about their Bring it On experience:

The event was well designed and well thought out. There was lots of information on each different aspect of engineering. However, there was a lack of information on chemical engineering, which was disappointing - *Nunthorpe Academy*

It was informative and interesting - *Park View School*

I enjoyed most of the day but mostly I enjoyed using and looking at the different technology - *Red House Academy*

I liked the Expert Station with the man who makes machines that make things. I also loved the stations where you were involved in the presentations - *Whytrig Middle School*

I enjoyed all the different zones available because they covered a variety of different aspects of engineering - *Sandhill View School*

It has inspired me to a change in idea of what I would like to do as a future job. I think technology will be a career for me - *Shotton Hall School*

I thoroughly enjoyed this event because it has made me understand engineering a lot more than previously - *St. Hild's School*

I really enjoyed the part of the event when I got to look at the science part of work and we had to design an area in which to make cake mixtures and medical substances because it really helped me to engage in friendly conversation with the staff at that station which made me even more interested - *Studio West School*

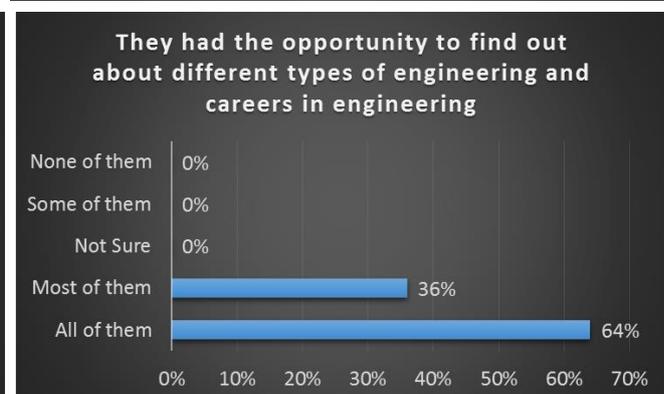
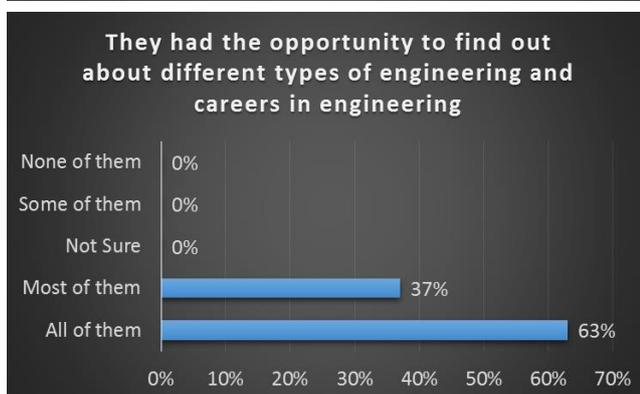
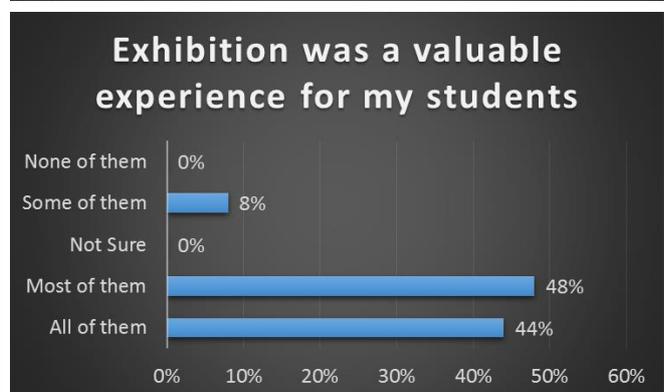
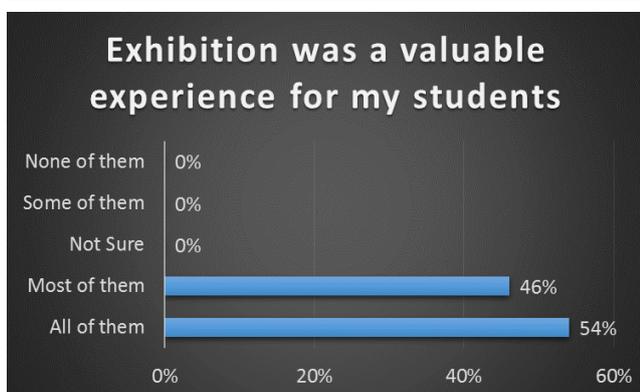
I think the event was great. The staff were enthusiastic and informative and loved to answer and questions that were asked. My favourite parts were the areas involving technology and computing and I learnt that engineering can change the world - *Venerable Bede Academy*

The people were very kind, very informative, interactive - *Whitburn Academy*

I enjoyed finding out all about the different types of engineers and all the different companies. I liked how the information was presented, and everyone knew what they were talking about. The event was very tightly packed though - *Whytrig Middle School*

Teacher Evaluation

Teacher feedback forms were handed out to all teachers who attended the final plenary session each day. Overall, we received 49 fully completed teacher questionnaires (24 primary respondents, 25 secondary respondents). Feedback from primary school teachers is illustrated in the charts on the left hand side of the page, feedback from secondary school teachers to the right.



96% of primary school teachers and 92% of secondary school teachers rated the event, overall, as good or excellent and a majority indicated that the event was a valuable experience, with 100% of primary school teachers and 100% of secondary school teachers agreeing that Bring it On provided most/all of their students with the opportunity to find out about different types of engineering and about careers in the sector.

Teachers provided some additional comments in response to the questions above. Comments included:

Children had hands on opportunities to experience different types of engineering - *Primary*

A wide range of engineers to suit all abilities and interests - *Primary*

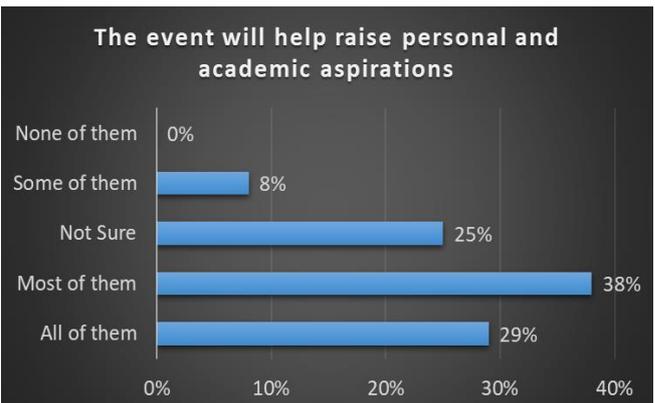
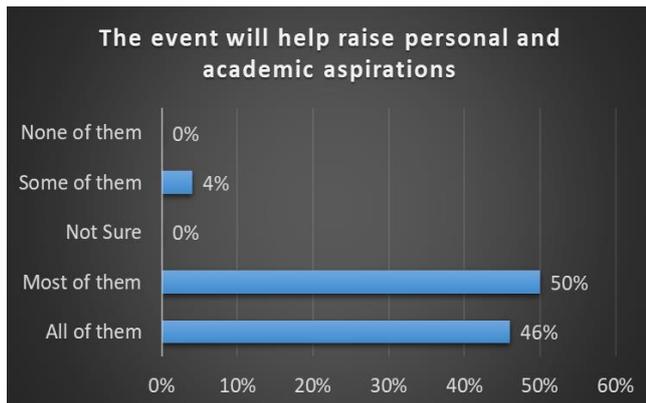
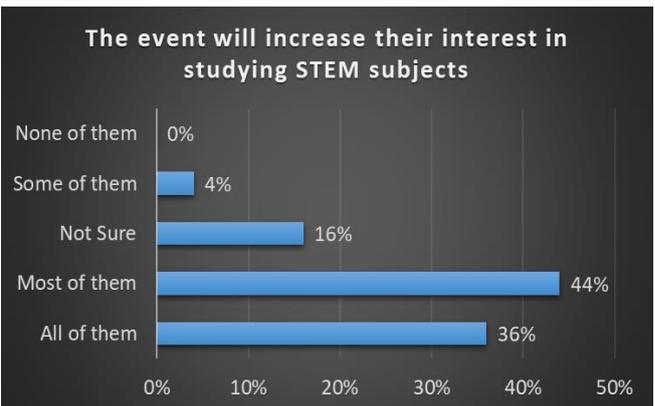
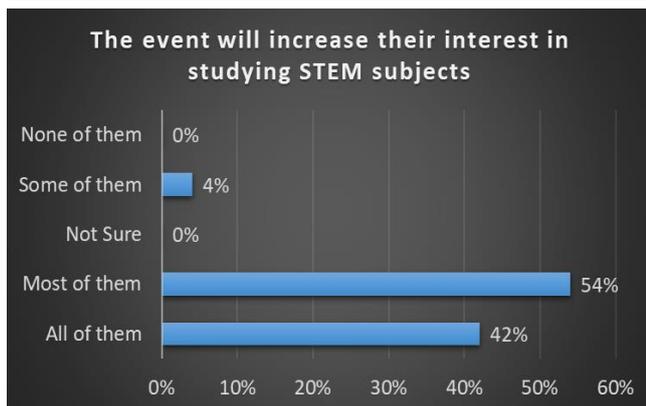
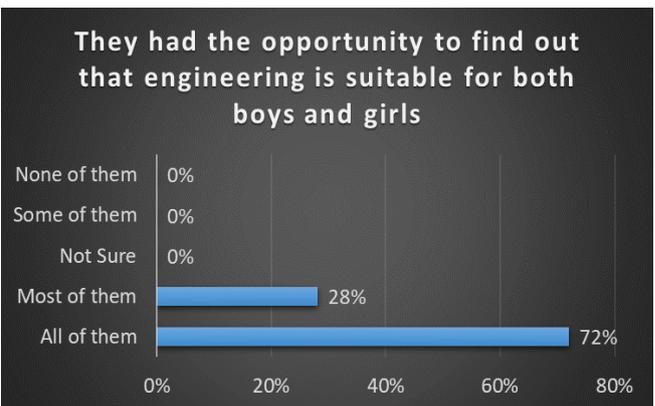
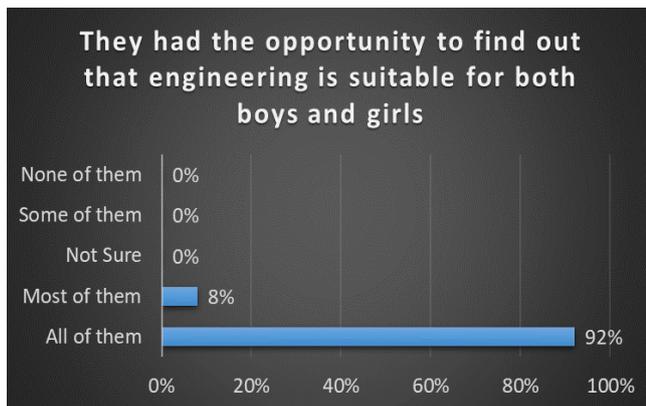
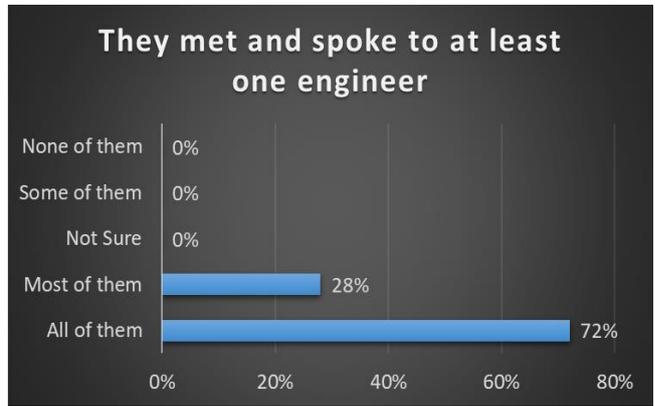
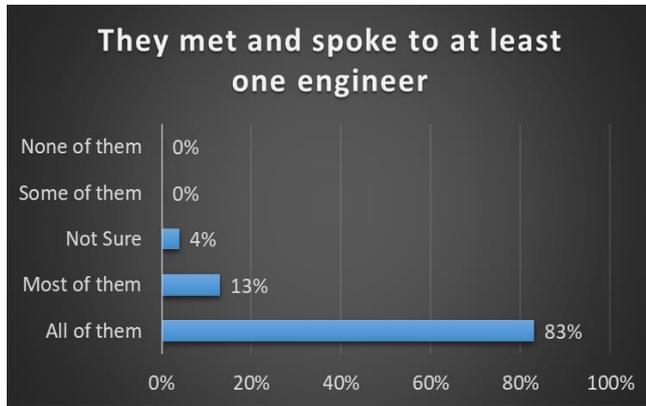
Lots of pupil engagement – *Primary*

There were lots of exhibits that the children could interact with, which was excellent for their imagination – *Primary*

All the exhibitors were excellent in their engagement with the students. Everything was well contextualised – *Secondary*

Overall, a valuable event – *Secondary*

Teacher Evaluation continued...



The most effective way to inspire young people about engineering and careers in the sector is to get them face to face with real engineers. All the primary school and secondary school teachers indicated that most/all of their students met and spoke to at least one engineer. 96% of primary and 80% of secondary teachers indicated that Bring it On will increase most/all of their students' interest in studying STEM subjects. Teachers were also positive about the event helping to raise the personal and academic aspirations of most/all of their students, with 96% of primary and 67% of secondary teachers agreeing it would do so.

Teachers provided some additional comments in response to the questions above. Comments include:

First event to show all different types of engineering – *Secondary*

Really good range of industries to talk to – *Secondary*

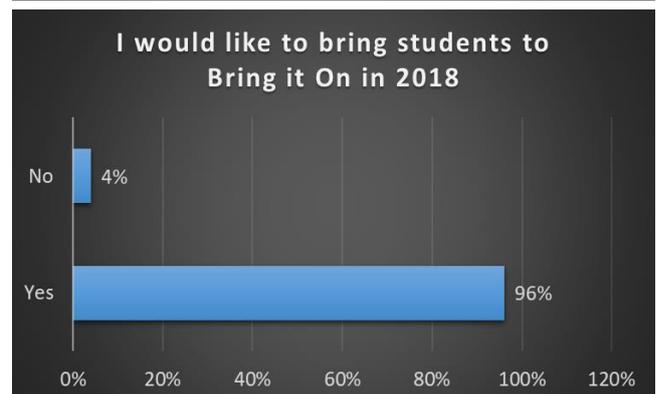
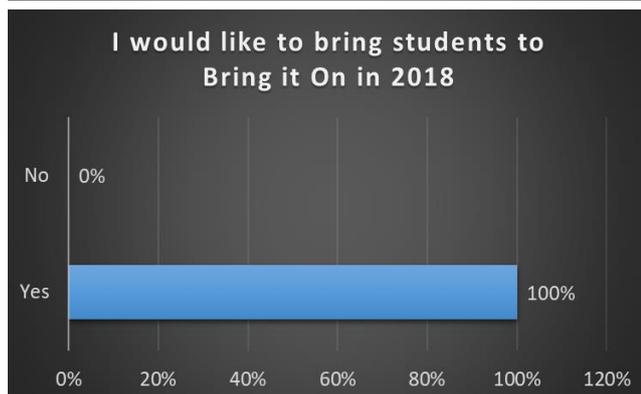
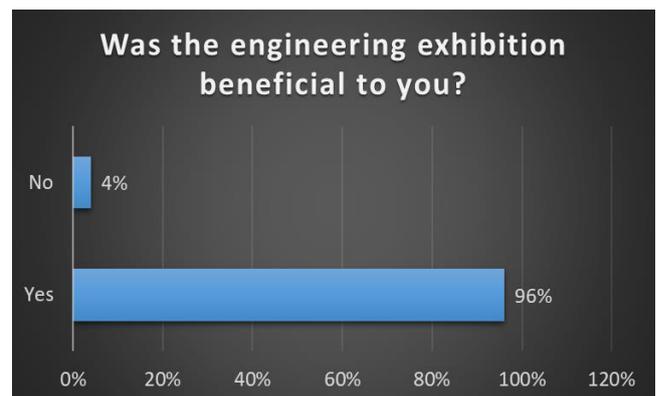
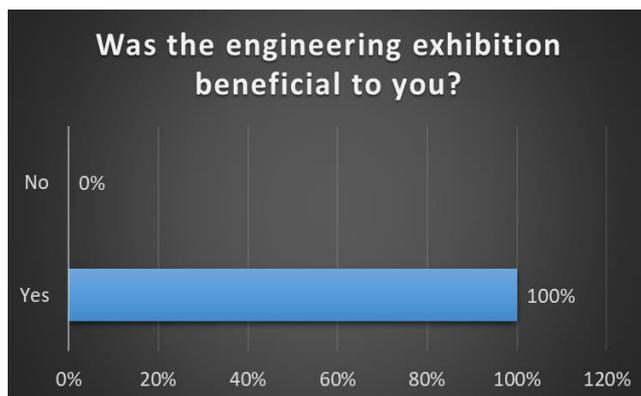
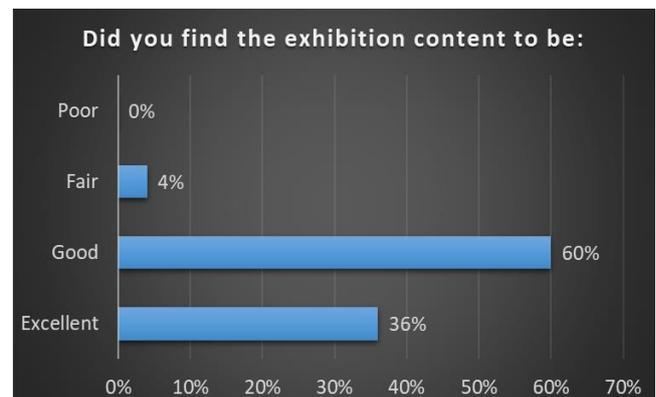
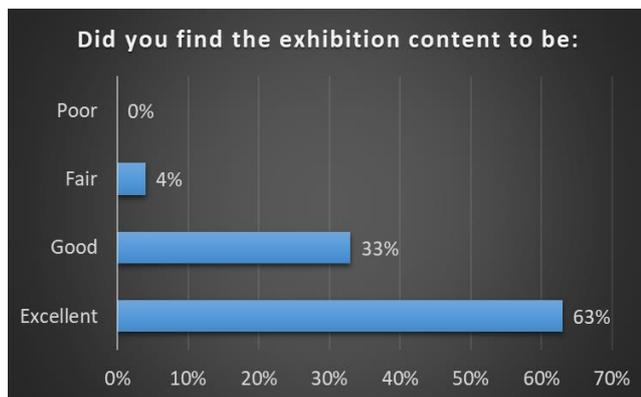
Lots of areas covered with well-staffed stalls – *Secondary*

Great interactiveness for the children – *Primary*

Most stalls really interesting and interactive. Some stalls more suitable for an older audience – *Primary*

Provided the children with more information about what they can do for careers – *Primary*

Teacher Evaluation continued...



Teachers provided some additional comments in response to the questions above. Comments include:

The students got a lot out of today. Really fun but educational too. Excellent day!! – *Secondary*

I would like to bring more than 15 students in 2018 – *Secondary*

Hope to bring Primary as well as Secondary next year - *Secondary*

The children very much enjoyed the ‘hands-on’ activities and all engaged very well with the engineers they spoke to – *Primary*

Fantastic day. Children have met with so many different engineers...the bridge building in the Construction Zone was an amazing team building experience – *Primary*

The final talk was very well done. The speakers were clear and interesting, not too much depth, bearing in mind the age group of the children. Komatsu talk was very good – *Primary*

The event was well-organised and contained many different & interesting exhibitors linked to STEM. Looking forward to another event in 2018! – *Primary*

Emphasised more engineering jobs than I knew – *Primary*

Discussion topics in STEM lessons will now have more context and real-life meaning - *Primary*

It was excellent to talk with different age groups of engineers & people who have taken different routes into their careers - *Secondary*

As a teacher it has brought me more up to speed with what is going on. I can now talk to my students in a more informed way - *Secondary*

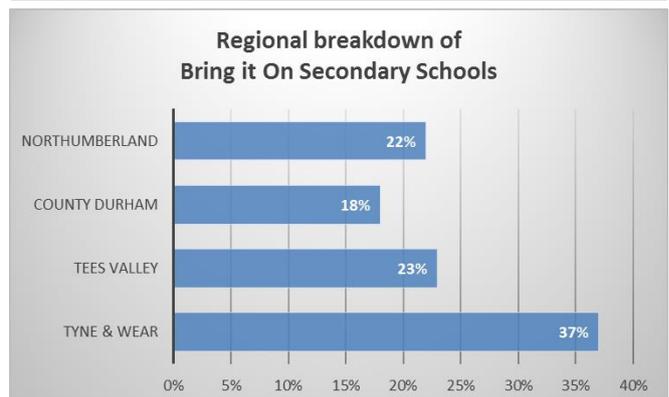
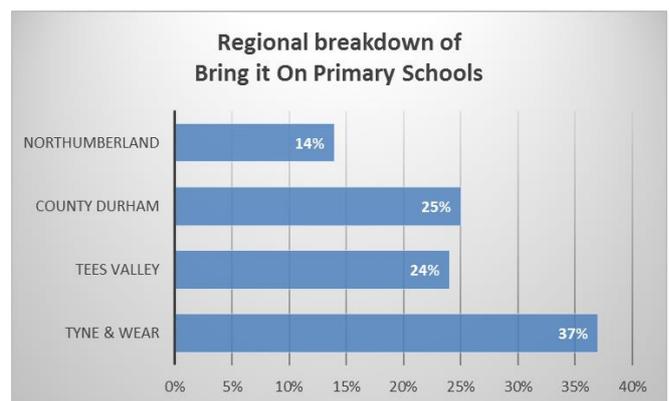
It gave me encouragement that there will be jobs & careers for my students in the future – *Secondary*

Overall, feedback from primary and secondary school teachers indicates that Bring it On was a worthwhile experience for their students and very different to what they have been exposed to before, with a pure emphasis on north east engineering as opposed to a generic STEM focused event. Teachers also provided us with some useful feedback on how to improve the event in 2018.

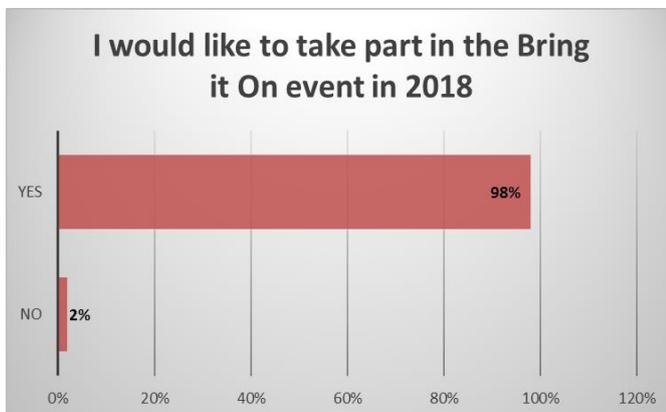
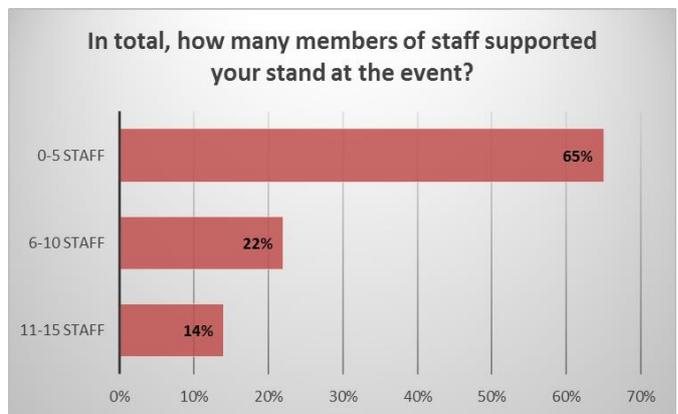
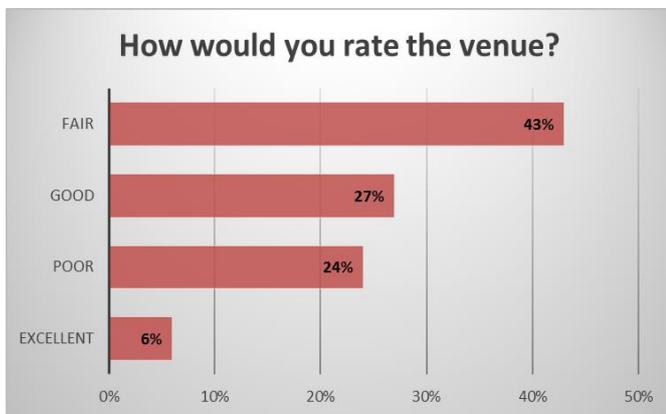
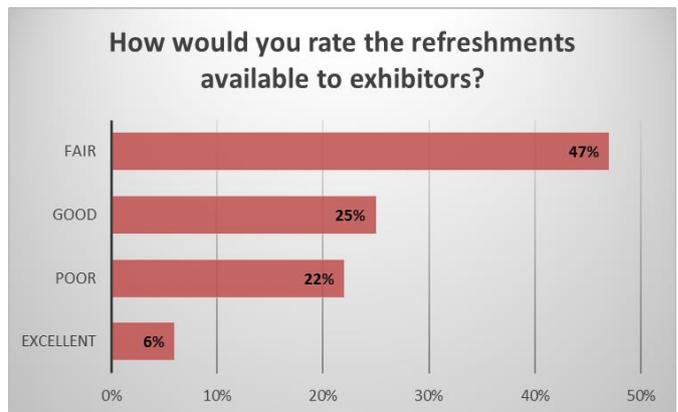
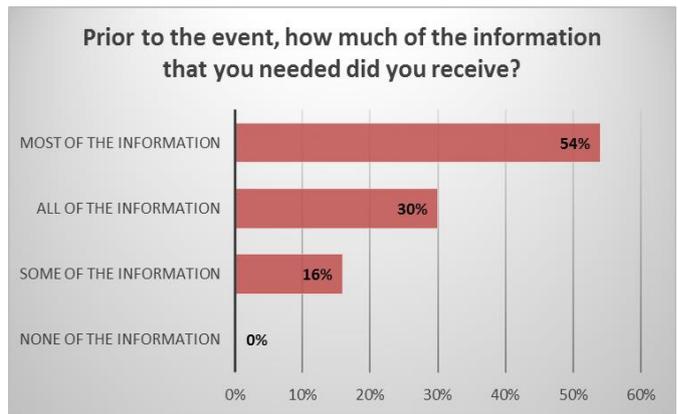
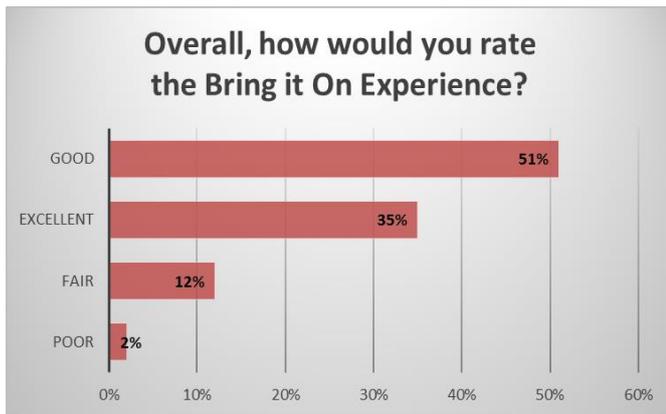
Regional Impact - The adjacent charts indicate the regional spread of schools that participated in the Bring it On Event.

The table below shows the % of schools from each cohort of Local Authority schools that attended.

LA Area	Primary	Secondary
Darlington	14%	25%
Durham	6%	33%
Gateshead	5%	60%
Hartlepool	10%	80%
Middlesbrough	24%	71%
Newcastle	15%	62%
North Tyneside	14%	37%
Northumberland	3%	34%
Redcar & Cleveland	9%	30%
South Tyneside	9%	89%
Stockton-on-Tees	17%	23%
Sunderland	7%	33%



Employer Feedback - 51 employers completed the post event online survey. Results as below.



86% of employers rated their overall experience of the event as good/excellent, with **84%** indicating they received all/most of the information needed prior to the event.

Exhibitors were set-up around the whole of the concourse area at the Stadium of Light in Sunderland for the two day event. The temperature in the concourse, across both days, was bitterly cold and lighting was poor in some areas, this is reflected in the feedback with only **33%** of exhibitors rating the venue as good/ excellent.



On the whole, employers that participated in the event provided some fantastic feedback and great suggestions on how to improve aspects of the event like catering and behind the scenes organisation for 2018.

Employers provided some additional comments in response to the questions below.

What did you enjoy most about the Bring it On event? Comments included:

That the exhibits were focused more on what we as engineers do rather than who has the best freebies.

Interaction and meeting others from outside our normal sphere of operations.

The kids were really enthusiastic and eager to learn about what we did. It was great to see them so engaged about what they were wanting to do in the future.

It was great talking to the kids and being able to engage them about how the subjects they enjoyed could be useful in their future careers.

Being able to talk about our industry and ensure that people know it's a viable career choice! And learning that many kids are already doing programming in school, which is great.

How much the pupils were enjoying themselves. Seeing incredible amounts of potential in the venue for our future generation.

The turn-out of so many companies based in the north east.

The whole event was excellent - the pupils who attended were engaged and interested.

The range of exhibitors giving a great experience for the students.

What did you dislike most about the Bring it On Event?

The venue was very cold for two days of standing.

The location was cold and the refreshments were a little basic and a long way from our stand.

At times (our pitch) was very (very) busy with some kids spending 30mins (or maybe more) at our station - hence we had double/triple booking. We (EDF Energy) can improve this with more staffing.

Venue - cold, no wifi.

Nothing to dislike other than being at the Stadium of Light when I support Newcastle United.

The venue, the location of our stand, not being able to interact with the other exhibitors more.

Little interaction or guidance from badged stewards.

The 30 second looping track in the Digital Zone was very unpleasant to listen to all day.

The place where we were put was rather cold due to being put by an access/egress point but wearing a coat solved that issue!

Is there anything else you would like to share with us about your Bring it On experience and/or any ideas you have for helping to make the event bigger and better in 2018?

We had a lot of interest shown in the Drone we had on our table. Next year it would be great to get permission to fly it over the football pitch.

Pick a more suitable venue and start now by engaging with more employers for next year's event.

I thought it was great, as did all of my colleagues and we'll be very interested in supporting the next event. I had no issues getting to the venue, there was lots of parking available. I would have liked to see the other exhibitors as from the video there was lots of cool stuff there. I think for making the event bigger then aim for more schools attending, maybe add an additional day if you get more schools to attend. The numbers attending were really impressive though.

Have come away with a much greater understanding of requirements and can provide so much more for the next one.

Pupils who attended seemed very interested and enthusiastic about engineering already. I would like to see pupils who don't really know much about engineering or not very motivated to find out about it to attend events like this because the main aim is to inspire.

Name badges for Exhibitors and also school teachers/helpers. This would make communication easier and know who you are communicating with.

I think the event, on the whole, was great and the kids seemed to really engage. The main thing for us would have been knowing how many kids would have been in our area at any time so we could plan to go for lunch etc.



Conclusion

Bring it On was the culmination of a successful collaboration between a number of different organisations from across the region working together to inspire young people about north east engineering.

Using EngineeringUK's EBM Common Evaluation Questionnaire, has enabled measurement of the impact the exhibition had on participating students against a nationally representative survey of perceptions of engineers, engineering and STEM, and, best practices from other STEM focused engagement activities. In addition to this, undertaking the pre and post questionnaires enabled a direct comparison of results to evidence actual impact the exhibitors had on positively influencing students' knowledge and perceptions of the sector through participation in the event.

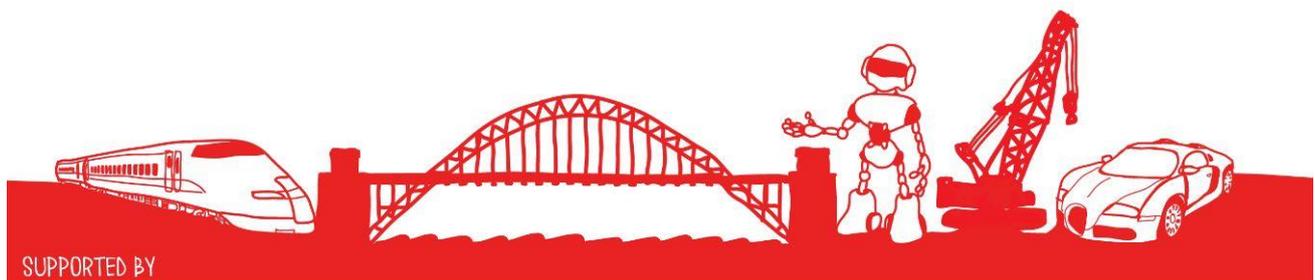
All 137 student respondents participated fully in all aspects of the Engineering Exhibition. The cumulative results are favourable in comparison to the 2016 EBM data set and pre questionnaire results, indicating a very positive impact on improving knowledge and perceptions about what people working in the sector do and generating desirability, particularly with regard to Technology and Engineering, for future careers.

The results highlight the real benefit of enabling students to meet face to face with all types of engineers, alongside the opportunity to see and experience, first-hand, examples of what we engineer and manufacture in the north east, shining a light on the breadth of engineering in this region and the associated career opportunities.

Bring it On was designed to inspire, inform and educate young people and teachers about north east engineering. Evaluation results indicate a good level of success with regard to that, but highlight the need to place more emphasis on routes into the engineering sector at future Bring it On events, helping students to better understand the steps they need to take to become engineers.

In terms of increasing desirability among the students to want to work in engineering in the future, Bring it On will afford young people ongoing opportunities to meet with engineers and experience engineering via its legacy programme, to continue to build knowledge and understanding about the sector.

The intention is for the exhibition to be an annual showcase of the amazing engineering companies we have operating in the region, across all sectors, and the career opportunities available to young people. Thanks to all of the organisations that financially supported the Bring it On Exhibition in 2017 and to all of the amazing employers that gave up 2 consecutive days of their time, in addition to all of the pre event planning and prep, to bring the exhibition to life for all the young people and teachers that attended. You are truly inspiring people, as reflected in the great feedback we received from students and teachers about the impact you have had on their knowledge and perceptions about engineering. We would not have had an event without your support, so look forward to working with you again in 2018.



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