

PUBLIC ENGAGEMENT AND SCIENCE COMMUNICATION SURVEY 2014

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SUMMARY

This report describes the findings of a study of the public engagement and science communication activities of BBSRC funded researchers. Following an earlier assessment from BBSRC in 2005 a more detailed survey was issued in 2014 to principle investigators (PIs) and doctoral students (PhDs). A total of 42% of PIs and 22% of PhD students asked to participate went on to complete the survey. While only a proportion of BBSRC funded researchers were surveyed, this substantial percentage of respondents would indicate that there is a strong base of individuals interested in public engagement and science communication among BBSRC-funded researchers.

Of those PIs who responded 95% had included some plans for engagement in their initial grant application 'Pathways to Impact' section. Further, 83% reported actually going on to undertake public engagement or science communication activities, an increase of 7% when compared with the previous 2005 BBSRC survey. Of the total number of PhDs who responded 74% had performed some public engagement and science communication activities. The report identifies some of the successes, pitfalls, and barriers grant holders experience when undertaking public engagement activities. Some key findings are:

- A large proportion of respondents were aware of BBSRC's definitions of public engagement and science communication but researchers commented that they find it difficult to differentiate the two in practice
- There are notable differences in PI and PhD activities and opinions in several areas, including the value placed on public engagement and science communication in terms of its importance in career development, and the kinds of activities that the two groups find easy/difficult and worthwhile.
- Of the 95% of PIs who said that they had included public engagement and science communication in their Pathways to Impact, 35% said they had asked for funding. 60% were unaware that it was possible to ask for funding in this way or had funding from other sources.
- Reasons for not taking part in public engagement and science communication included lack of training and information, perception of the research being complex or uninteresting to the public, and in some cases a lack of time. Comments related to this question mainly cited that it was too early in a grant or PhD for doing public engagement or science communication but that there were plans in place.
- Evaluation is usually done informally, often using self-reflection
- Most respondents reported that public engagement and science communication activities they took part in included only 1-20% of their own research.

In addition, it appears that the survey was appreciated as a learning exercise with many respondents reporting that they would increase or change plans for engagement in the future. Several respondents were also interested in learning more about the opportunities, resources, and organisations associated with engagement.

INTRODUCTION

In 2005 BBSRC issued a paper-based questionnaire to several grant holders to help identify barriers to public engagement. Of those contacted 74 responded, and of these 76% reported taking part in public engagement activities.

In 2006 the Royal Society published a report on Science Communication designed to establish factors affecting science communication and public engagement for scientists and engineers. While 40% of respondents to a survey for the report said that they were content with the amount of time they spent engaging, 40% said that they would like to spend more time involved with science communication and public engagement. In addition, 69% said that they believed funders of scientific research should help scientists to communicate with the non-specialist public.

BBSRC recognises that thinking and practise around public engagement and science communication has moved on significantly since 2005/6. RCUK Pathways to Impact statements as part of grant applications and the inclusion of impact in the REF are two innovations that have occurred in the last few years and the public engagement and science communication community has grown and matured. BBSRC decided that it would be valuable to explore how BBSRC funded researchers are approaching public engagement and science communication activities, where their successes are and what obstacles they are facing. This will help BBSRC to celebrate and share good practice in public engagement and science communication and to consider our role in alleviating the challenges that might be holding some researchers back.

METHODOLOGY

To help identify opinions, facilitators, and obstacles to public engagement and science communication for BBSRC funded researchers, a questionnaire was designed and circulated in June and July 2014 to 390 principle investigators (PIs) at 84 institutions (42% responded) and 473 doctoral students (PhDs) at 42 institutions (22% responded). The survey was distributed to those PIs funded between 01/04/2012 and 31/03/2013 and cited one successful grant from this period per PI. This ensured that;

- 1) PI responders would have completed an 'impact summary' and 'Pathways to impact' as part of their grant application that may have included some proposed public engagement and science communication plans.
- 2) there had been enough time elapsed since a grant had been awarded to a PI to allow some participation in engagement activities.

Each PI was provided with just one grant name and number issued during the above time frame to consider while responding to the survey so that we would be capturing a true representation of their activities over the course of a specific grant, and not a summary of their best activities to date.

PhD students whose period of funding began between 01/04/2012 and 31/03/2013 were contacted to take part in the survey. This timeframe had been chosen so that there had been enough time elapsed since their PhD had been awarded to allow some participation in engagement activities.

Post-doctoral researchers were not contacted due to difficulties in being able to communicate directly with a large number of them. This is owing to the nature of post-doctoral employment under PI grants meaning BBSRC does not hold a full central database of their contact details.

Public Engagement and Science Communication Survey 2014

Using a standardised electronic survey 390 PIs and 473 PhD students were contacted with a survey of 11 questions regarding their awareness and opinions of, and activities related to, public engagement and science communication (please see Appendix 1 for the full survey in its issued form). Respondents were also invited to freely comment on their own experiences and opinions following each question.

RESULTS

The results below report each survey question with relevant statistics and key themes of comments reported by PI and PhDs. Several questions show the rank of responses as well as percentages; the top ranked responses for each question have been highlighted in bold and red.

The comment themes are ranked by the number of comments within each theme from greatest to smallest. Themes regarding PI comments appear on the *left*, and themes regarding PhD comments appear on the *right* (with the exception of questions 8B and 9 which have comments only from PIs).

While general themes of comments are provided in the Results section a report of all comments is provided in Annex 2, these comments are grouped by global themes under each question number for PIs and PhDs. Each question lists themes containing the highest proportion of comments first, the next theme containing the second highest proportion of comments second, and so on.

A total of 390 PIs and 473 PhD students were contacted in June and July 2014 to participate in an online survey (no paper-based versions were issued) – the total number of responses are listed below.

	PI		PhD	
Base (all contacted individuals)	390		473	
Responded	163	42%	104	22%
Did not respond	227	58%	369	78%

Q1. The table below shows the percentages of respondents who were aware of the definitions of public engagement and science communication from BBSRC cited below.

“BBSRC considers public engagement to involve dialogue, interaction and participation, drawing in researchers and non-academics while science communication is primarily a one way communication process although there may be some, limited, opportunities for discussion.”

	PI	PhD
% said yes	63%	49%
% said no	29%	41%
% said unsure	9%	13%

PI comment themes

- 1) *In general agreement with terms outlined (33%)*
- 2) *Would not differentiate terms (27%)*
- 3) *Would use different terminology/definitions (21%)*
- 4) *Disagreed with terms outlined (18%)*

PhD comment themes

- 1) *In general agreement with terms outlined (49%)*
- 2) *Would use different terminology/definitions (23%)*
- 3) *Would not differentiate terms (11%)*
- 4) *Disagreed with terms outlined (11%)*
- 5) *Unaware of BBSRC definitions (6%)*

Public Engagement and Science Communication Survey 2014

Q2. The table below shows the ranked importance (and percentages) of reasons for participating in public engagement and science communication. Percentages sum to 100% per group per each reason listed.

	Very important		Important		Neither important or unimportant		Unimportant		Very unimportant		Unsure	
	PI	PhD	PI	PhD	PI	PhD	PI	PhD	PI	PhD	PI	PhD
To increase the impact of my research	4 35%	6 19%	5 41%	1 56%	5 18%	5 17%	4 6%	4 6%	4 0%	5 0%	5 0%	2 2%
To raise awareness of my own research	5 31%	3 31%	4 44%	2 50%	3 20%	6 15%	5 4%	6 3%	4 0%	5 0%	5 0%	5 1%
To raise awareness of bioscience generally	2 42%	2 53%	1 54%	6 36%	7 4%	7 10%	7 1%	7 1%	4 0%	5 0%	5 0%	6 1%
To ensure the public is better informed about bioscience and technology	1 60%	1 59%	6 38%	5 38%	8 2%	8 3%	8 0%	7 1%	4 0%	5 0%	5 0%	8 0%
It benefits my career	8 6%	5 25%	8 32%	3 49%	1 47%	3 19%	2 9%	5 5%	1 5%	4 1%	3 1%	6 1%
It benefits my research	7 10%	7 15%	6 38%	7 33%	2 35%	2 31%	1 11%	1 14%	2 4%	2 6%	1 2%	2 2%
To be accountable for use of public funds	3 37%	4 25%	3 51%	4 46%	6 7%	4 18%	5 4%	3 7%	4 0%	3 2%	3 1%	2 2%
To meet BBSRC grant minimum requirement for public engagement and science communication activities	6 14%	8 10%	2 53%	8 29%	3 20%	1 34%	3 7%	2 13%	3 3%	1 7%	1 2%	1 8%

PI comment themes

- 1) *Personal enjoyment (28%)*
- 2) *To encourage interest in science/next generation of scientists (22%)*
- 3) *Other (22%)*
- 4) *Advantageous to career/research (11%)*
- 5) *Sense of personal responsibility (11%)*
- 6) *Consider engagement a requirement as a researcher (6%)*

PhD comment themes

- 1) *To encourage interest in science/next generation of scientists (29%)*
- 2) *Other (29%)*
- 3) *Personal enjoyment (21%)*
- 4) *Advantageous to career/research (14%)*
- 5) *Sense of personal responsibility (7%)*

Public Engagement and Science Communication Survey 2014

Q3. The table below shows the ranked perceived difficulty (and percentage of those that responded to the question) of public engagement and science communication activities or opportunities.

	Very easy		Easy		Neither easy or difficult		Difficult		Very difficult		Don't know	
	PI	PhD	PI	PhD	PI	PhD	PI	PhD	PI	PhD	PI	PhD
Working with journalists (e.g. press, popular science, own press office)	3 7%	8 4%	4 34%	8 14%	1 31%	8 13%	5 17%	1 38%	3 5%	3 5%	8 6%	2 28%
Using social media (e.g. Twitter, Facebook)	1 12%	1 31%	7 22%	3 41%	5 26%	9 10%	9 7%	8 9%	4 4%	5 2%	2 29%	8 8%
Attending public dialogues/debates	4 6%	3 15%	5 33%	2 42%	3 29%	2 21%	3 20%	6 12%	8 1%	8 1%	7 11%	7 9%
Judging awards/exhibitions	7 4%	6 6%	6 23%	6 23%	1 31%	1 22%	8 11%	5 15%	9 0%	4 3%	3 26%	2 28%
Activities for Secondary/Primary schools	4 6%	5 12%	2 36%	4 38%	8 20%	5 17%	2 23%	4 17%	5 2%	5 2%	6 12%	6 14%
Developing educational resources	8 1%	6 6%	8 20%	7 20%	6 23%	3 19%	1 32%	3 28%	2 7%	2 6%	4 17%	4 19%
Citizen science/crowdsourcing	9 0%	9 0%	9 6%	8 14%	9 15%	6 15%	4 18%	2 30%	1 9%	1 8%	1 50%	1 33%
Participating in exhibitions/science festivals	1 12%	2 18%	1 50%	1 52%	7 21%	4 18%	7 12%	9 7%	6 1%	9 0%	9 3%	8 8%
Presenting at science centres/museums	6 6%	3 15%	3 35%	5 37%	4 27%	6 15%	6 16%	6 12%	6 1%	5 2%	5 14%	4 19%

PI comment themes

- 1) Time constraints (35%)
- 2) Press specific comments (33%)
- 3) Long/hard work investment (15%)
- 4) Have found one or more things listed easy (15%)
- 5) Unable to comment (15%)
- 6) Barriers associated with difficult activities (10%)
- 7) Have found difficult challenges valuable (3%)

PhD comment themes

- 1) Long/hard work investment (29%)
- 2) Have found one or more things listed easy (21%)
- 3) Time constraints (21%)
- 4) Unable to comment (14%)
- 5) Press specific comments (14%)

Q4. The table below shows the ranked sense of worth (and percentage of those that responded to the question) of public engagement and science communication activities or opportunities for the respondent and for an audience.

	Worthwhile for me		Worthwhile for my audience		Worthwhile for neither		Don't know	
	PI	PhD	PI	PhD	PI	PhD	PI	PhD
Working with journalists (e.g. press, popular science, own press office)	1 63%	7 54%	3 83%	5 70%	6 2%	3 6%	9 4%	4 9%
Using social media (e.g. Twitter, Facebook)	7 25%	4 58%	8 37%	5 70%	1 18%	2 8%	2 34%	6 7%
Attending public dialogues/debates	3 58%	1 81%	6 67%	7 55%	4 5%	5 2%	4 12%	6 7%
Judging awards/exhibitions	7 25%	9 32%	7 53%	8 47%	2 9%	1 10%	3 31%	2 25%
Activities for Secondary/Primary schools	5 50%	5 57%	2 87%	1 91%	7 1%	8 0%	7 7%	8 4%
Developing educational resources	6 35%	6 56%	4 80%	4 82%	7 1%	8 0%	4 12%	3 11%
Citizen science/crowdsourcing	9 18%	8 38%	9 20%	9 41%	3 7%	4 5%	1 64%	1 35%
Participating in exhibitions/science festivals	2 61%	2 76%	1 88%	2 84%	9 0%	6 1%	8 6%	9 2%
Presenting at science centres/museums	4 53%	3 67%	4 80%	3 83%	5 2%	6 1%	4 12%	5 8%

PI comment themes

- 1) Found activities to be worthwhile or helpful (58%)
- 2) Unable to comment (26%)
- 3) Have found one or more thing listed enjoyable (5%)
- 4) Found activities to be not worthwhile or unhelpful (2%)

PhD comment themes

- 1) Found activities to be worthwhile or helpful (100%)

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Q5. The table below shows the ranked awareness (and percentage of those that responded to the question) of public engagement and science communication organisations, activities, and opportunities.

	PI		PhD	
BBSRC's media training	4	63%	3	35%
BBSRC's public engagement training	5	44%	1	44%
BBSRC School Regional Champions (SRC)	7	10%	10	2%
Research Councils UK School-University Partnerships Initiative	9	9%	6	8%
That a BBSRC grant application requires an Impact Statement and a Pathways to Impact proposal	1	96%	2	36%
That BBSRC grant holders (or anyone within their team) must spend at least two days per year, per grant on public engagement or science communication	3	67%	4	29%
That the 2014 Research Excellence Framework (REF) has a 20% weighting for 'impact' which can include public engagement and science communication	2	80%	5	14%
The National Co-ordinating Centre for Public Engagement (NCCPE)	11	7%	10	2%
The Manifesto for Public Engagement	10	8%	7	5%
The Concordat for Engaging the Public with Research	6	13%	8	4%
The Beacons project	12	6%	8	4%
The Catalysts project	8	10%	10	2%

PI comment themes

- 1) *Would like more information/opportunities (29%)*
- 2) *Aware of one or more points (29%)*
- 3) *Disagrees with one or more points (21%)*
- 4) *Other opportunities mentioned (14%)*
- 5) *Unaware of one or more points (7%)*

PhD comment themes

- 1) *Found activities to be worthwhile or helpful (75%)*
- 2) *Would like more information/opportunities (25%)*

Q6. When asked what, if anything, can BBSRC do to foster more public engagement and science communication there were 105 comments from PIs and 63 comments from PhDs.

**Please note that at this point the surveys diverged for each group. PIs continued onto questions 7, 8 A or 8 B, and question 9, while PhDs skipped straight to question 10.*

PI comment themes

- 1) Increase work with own training and general PE opportunities (17%)
- 2) Current BBSRC support works well (14%)
- 3) Increase work/contact/support with existing or new institutions (14%)
- 4) Encourage media presence within institutions and combat problem of 'sellable' science (11%)
- 5) Provide (or encourage) greater incentives (e.g. time, value-based measures) (10%)
- 6) BBSRC to increase work with schools to foster better connections to institutions (8%)
- 7) Provide funding/salary for time spent on activities (7%)
- 8) Set more stringent rules for grant holders (7%)
- 9) Raise public profile of BBSRC itself (5%)
- 10) Request/require less public engagement and science communication work/justification (4%)
- 11) Create a central database of information (2%)
- 12) Individual unaware of current opportunities/support in place (1%)

PhD comment themes

- 1) Increase advertisement/communication of opportunities (e.g. events, training, etc.) (57%)
- 2) Increase work with own training and general PE opportunities (18%)
- 3) Set more stringent rules for funded students (10%)
- 4) Raise public profile of BBSRC itself (9%)
- 5) Cultivate a positive appreciation for public engagement and science communication in funded staff (7%)
- 6) Provide advice/training on activities regarding 'difficult to understand' or controversial topics (7%)
- 7) Increase work/contact/support with existing or new institutions (4%)
- 8) More BBSRC presence regionally (4%)
- 9) Current BBSRC support works well (3%)
- 10) BBSRC to increase work with schools to foster better connections to institutions (3%)
- 11) Unsure (3%)
- 12) Provide (or encourage) greater incentives (e.g. time, value-based measures) (3%)
- 13) Encourage BBSRC influence of policy outside of institutions (1%)

Q7. When PIs were asked whether they had included any public engagement or science communication plans in either the Impact Statement or Pathways to Impact sections of their specified grant, 95% said yes while 5% said no.

**Please note that at this point the survey diverged for the PI group where a 'yes' answer here skips onto question 8A while those responding 'no' skip ahead to question 8B.*

Q8 A. PIs who had mentioned plans for activities were asked if they applied for funding from BBSRC as part of their grant application 35% said yes while 60% said no and 5% declined to answer.

**Please note that at this point the survey diverged for the PI group where a 'no' answer here skips onto question 9 while those responding 'yes' skip ahead to question 10.*

Q8 B. The table below shows the ranked reasons (and percentage of those that responded to the question) why respondents had not mentioned any public engagement or science communication activity plans in their grant application. Respondents were invited to tick all that apply and as such each statement reflects a percentage of the total number of people who said that they had not planned any activities, and will not sum to 100%.

	PI	
I did not anticipate having enough time for activities	5	0%
I did not have any plans related to the grant at the time of application	2	56%
I did not believe it contributed something worthwhile to the grant application	3	22%
I anticipated joining pre-arranged activities rather than planning my own	3	22%
I did not realise that this could be included in a grant application	5	0%
Other	1	67%

PI comment themes

- 1) *Feel research is not appealing to public (33%)*
- 2) *Feel research is too complex for public appreciation (33%)*
- 3) *Feel research is too sensitive for public consumption (17%)*
- 4) *Have since included plans (17%)*

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Q9. The table below shows the ranked reasons (and percentage of those that responded to the question) why respondents had not applied for funding for their public engagement or science communication activity plans as part of their grant application. Respondents were invited to tick all that apply and as such each statement reflects a percentage of the total number of people who said that they had not applied for funding, and will not sum to 100%.

	PI	
I was concerned that it would affect the decision to grant the award	5	6%
I did not consider applying for public engagement or science communication funding to be a worthwhile part of the grant	4	8%
I believed I could get necessary funds for public engagement or science engagement plans elsewhere	2	32%
I did not know that I was eligible/did not realise I could apply for funding as part of my application	1	43%
Other	3	26%

PI comment themes

- 1) *Planned activities did not require funds (36%)*
- 2) *Felt applying for funds would mean more time spent writing/justifying on application (15%)*
- 3) *Plan to request funds in future applications (8%)*
- 4) *Was not responsible for this part of the application (8%)*
- 5) *Costs for activities were actually budgeted in the overall grant request amount (8%)*
- 6) *Funding not deemed an important part of the grant purpose (15%)*
- 7) *Desired to keep overall grants costs down (4%)*
- 8) *Had not realised that activity costing could be included in the grant budget (4%)*

Q10. The table below shows the percentage of individuals who reported whether they or someone in their immediate research team had taken part in any public engagement or science communication activities (it was made clear that these activities could not include conference attendance or articles published in refereed journals).

**Please note that again at this point the survey diverged for all groups where a 'no' answer here skips onto question 11 A while those responding 'yes' skip ahead to question 11 B.*

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	PI	PhD
% said yes	83%	74%
% said no	17%	26%
% not responded	0%	0%

Q11 A. The table below shows the ranked reasons (and percentage of those that responded to the question) for respondents not participating in any activities reported as percentages of the total number that reported they had not participated in any activities.

	PI		PhD	
Lack of time	2	33%	2	46%
Lack of opportunity	1	35%	3	43%
Lack of resources (e.g. funding, equipment)	4	11%	6	14%
Lack of relevant training or information on how to undertake activities	3	15%	1	50%
Lack of support from your institution/department	8	2%	6	14%
Concerns regarding health and safety	11	0%	11	0%
Concerns over contentious nature of research (e.g. use of animals, etc.)	7	4%	10	7%
Concerns regarding competence or confidence of self	6	7%	4	32%
Concerned other scientists think negatively of your time spent engaging	8	2%	9	11%
Had not planned any activities	5	9%	4	32%
Planned activities were cancelled	8	2%	11	0%
No reason/Don't know	11	0%	6	14%

PI comment themes

- 1) *Too early in grant (88%)*
- 2) *Research material too difficult to communicate (13%)*

PhD comment themes

- 1) *Plans for activities (55%)*
- 2) *Too early in PhD (18%)*
- 3) *Other (18%)*
- 4) *Does not wish to participate in activities (9%)*

Q11 B. The table below shows the percentage of individuals who reported whether they had evaluated any public engagement and science communication activities they had participated in.

	PI	PhD
% said yes	43%	58%
% said no	56%	39%
% not responded	1%	3%

PI comment themes

- 1) Find feedback helpful (23%)
- 2) Too early in grant/activity plans to have evaluated (20%)
- 3) Too difficult to evaluate (17%)
- 4) Informal evaluation used e.g. self-reflection (12%)
- 5) No evaluation attempted (11%)
- 6) Evaluation processed by another source (9%)
- 7) Dislike evaluation (6%)
- 8) Purpose of evaluation not clear (3%)

PhD comment themes

- 1) Find feedback helpful (37%)
- 2) Informal evaluation used e.g. self-reflection (27%)
- 3) No evaluation attempted (20%)
- 4) Evaluation processed by another source (7%)
- 5) Purpose of evaluation not clear (7%)
- 6) Too difficult to evaluate (3%)

Further, respondents were also invited to detail how they had used any evaluation information collected.

PI comment themes

- 1) Feedback used to improve future activities (86%)
- 2) Positive evaluation received (5%)
- 3) Too early in grant/activity plans to have evaluated (2%)
- 4) Informal evaluation used e.g. self-reflection (5%)
- 5) Purpose of evaluation not clear (2%)

PhD comment themes

- 1) Feedback used to improve future activities (81%)
- 2) Positive evaluation received (7%)
- 3) Too early in grant/activity plans to have evaluated (4%)
- 4) Informal evaluation used e.g. self-reflection (4%)
- 5) Evaluation not used (4%)

The table below shows the percentage of content directly related to their own research during activities respondents had participated in.

	PI	PhD
0%	5%	22%
1-20%	47%	29%
21-40%	19%	21%
41-60%	15%	13%
61-80%	7%	9%
81-100%	8%	6%

Finally, the table below shows the percentage of respondents that felt supported during any public engagement and science communication activities they had performed.

	PI	PhD
% said yes	56%	66%
% said no	20%	8%
% not responded	24%	26%

PI comment themes

- 1) *Did/do feel supported (either monetary, time, or personal) (33%)*
- 2) *Did not/do not require support (17%)*
- 3) *Would like more support (8%)*

PhD comment themes

- 1) *Did/do feel supported (either monetary, time, or personal) (75%)*
- 2) *Felt unsupported with negative consequences (7%)*
- 3) *Did not/do not require support (7%)*

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- 4) *Response answering further to last question (23%)*
- 5) *Unsure of support question (10%)*
- 6) *Would like more support directly from BBSRC (6%)*
- 7) *Felt unsupported with negative consequences (2%)*

- 4) *Would like more support (4%)*
- 5) *Unaware of any support available (4%)*
- 6) *Unsure of support question (4%)*

DISCUSSION

A total of 42% of PIs and 22% of PhD students asked to participate went on to complete the survey. While only a proportion of BBSRC funded researchers were surveyed, this substantial percentage of respondents would indicate that there is a strong base of individuals interested in public engagement and science communication across all BBSRC researchers. This discussion will highlight points of interest in the survey results and any notable contrasts in responses between PIs and PhD students. A full list of all comments from PIs and PhD students can be found in Appendix 2. Additionally, it is important to note that the research assessment switched from the Research Assessment Exercise (RAE) to the Research Excellence Framework (REF). The 2014 REF included a 20% weighting for impact which can include public engagement and science communication as evidence of impact (while the previous RAE had not explicitly included this). As such, significant shifts in responses between the previous 2005 BBSRC public engagement questionnaire and the current survey will also be noted.

Respondents were shown a statement from BBSRC regarding the definitions of public engagement and science communication (please see Results Q1 for the full statement) and indicated whether they were aware of these definitions or not. Of PIs surveyed 63% said they were aware of the definitions, and 49% of PhD students said the same. Comments following the question (some are reported sic below) brought out similar themes in both groups indicating that while the majority was in agreement with the terms outlined some felt that they would use alternative definitions, or would not differentiate the terms 'public engagement' and 'science communication' at all. The general consensus was that while the terms and definitions outlined seemed correct in theory, in practice most people would not know the difference or distinguish between the terms.

PI comments

Communication may reach a wider audience than engagement.

Science communication is like a report...usually given as a paper but also as a seminar.

Science communication is the first step to public engagement.

PhD comments

'Public engagement' suggests an active involvement of the public, so I agree with both parties being included in the definition. 'Science communication' makes sense to be primarily one way, as it is the communication of scientific work by specialists to a the lay public.

I do not disagree with the definition I just was not previously aware the the BBSRC had personally defined it

Agree with both definitions. For increased clarity the definition of "science communication" could explicitly include the target of the process, similarly to the definition of "public engagement".

When asked to rate the importance of several reasons why they participate in public engagement and science communication activities there were several differences between PIs and PhD students. Most notably significantly more PhD students than PIs considered that it benefited their career; 25% of PhDs versus 6% of PIs rated it as a 'very important' reason, whereas 47% of PIs rated it as 'neither important or

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unimportant'. It is interesting to question whether these differences reflect a change in attitude at more senior level in academia, or because engagement is more accepted across the board than it was in 2012, i.e. more people think it's acceptable to dedicate time to it now. Considerably more PIs (53%) than PhDs (29%) considered meeting BBSRC minimum requirements for public engagement and science communication as important. This is not surprising since PIs are required to read grant paperwork stating these minimum requirements, whereas PhD students are not.

When asked to rate the difficulty of several public engagement and science communication activities (such as working with journalists, using social media, attending public debates, developing educational resources - please see Results for full details) there were some marked differences mainly regarding media communication. While 31% of PhD students said that they found social media use (e.g. Twitter) 'very easy', only 12% of PIs said the same thing (in fact 29% of PIs said that they 'don't know' presumably because they had not used it). Conversely 28% of PhD students said they 'don't know' about working with journalists in the press or with their own press office, while just 6% of PIs said the same thing. This demonstrates a clear distinction between the way senior academic staff communicate their research relative to more junior researchers. Further, 50% of PIs said that they 'don't know' about citizen science or crowdsourcing, while only 33% of PhD said they weren't aware of this. Again, it is interesting to reflect on whether these differences in opinion stem from the seniority of one's role (i.e. PIs are contacted more often for press releases rather than PhDs) or whether the PhD students' appreciation of these activities is a reflection of the zeitgeist of their generation of researchers. Both groups commented on media and press interactions, with PIs communicating several personal issues with how science is communicated in the media. Mainly PIs were unhappy about media interest in only high profile or 'catchy' research outcomes, and were concerned about story 'spin' or misinterpretation either from researchers, institution press offices, or the press.

When asked to rate the same activities as above as worthwhile for themselves, worthwhile for their audience, or worthwhile for neither. Just 7% of PhD students said that they 'don't know' if using social media is worthwhile, whereas 34% of PIs said the same. There is a trend revealed here that suggests that PIs are unaware of social media and its possibilities, whereas PhDs are more aware and further find it worthwhile for themselves (58%) and even more worthwhile for their audience (70%). A similar trend was seen again for citizen science with an increased percentage of PhDs over PIs finding it worthwhile for themselves and their audience, with 64% of PIs saying they 'don't know' if it is worthwhile.

Respondents were next asked to view several statements and state whether they were aware of them (e.g. BBSRC's media and public engagement training, the National Co-ordinating Centre for Public Engagement, The Manifesto for Public Engagement, etc. - please see Results for full details). PIs were generally more aware than PhD students of statements across the board. When asked if they were aware that a BBSRC grant application requires an Impact summary and Pathways to Impact proposal 96% of PIs said they were aware, while just 36% of PhD students said they were aware. Further, 80% of PIs said that they were aware that the 2014 REF had a 20% weighting for 'impact', while just 14% of PhD students were aware of this. This reveals a considerable difference in how much both groups understand about grant applications and research funding, namely that PhD students are largely unaware of the concept of 'Impact' and the requirement for Impact statements.

Question six (how can BBSRC foster more public engagement) yielded the greatest amount of qualitative information. A full list of global comment themes can be found in Results, below are some comments capturing the essence of these themes (all quotes are reported sic). Interestingly a major

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difference between the groups reflected that PIs were more likely to ask something of BBSRC directly (in the form of support, presence, or funds) whereas PhD students for the most part asked only for more communication from BBSRC regarding training and opportunities. In fact, several comments from PhD students cited that they were unaware of what BBSRC could offer or what BBSRC should do for them. Some comments from both groups centred around event organisation and the difficulty of independently organising activities. Some respondents felt that larger scale activities were better for engaging with audiences, and allowed a central administrator to co-ordinate most of the work so that they could join only when necessary. Additionally, several comments requested an increase in regionally-based events and aid since most opportunities seem to occur in London requiring more time and monetary investment than if something was happening closer by.

PI comments

Support a small number of well-qualified popular communicators to raise the profile and make clear the significance of BBSRC's remit within bioscience with the ability to convey complex (non-medical) bioscience in an accessible way across a range of media.

Be pro-active in suggesting ideas and opportunities to current grant holders, particularly after an important piece of work is published.

Awards of BBSRC-funded studentships to groups that were highly prominent in public engagement would be an incentive.

Make it as respected as publications as far as outputs from grant proposals are concerned. So that we feel justified spending the time on it.

I think the BBSRC does a commendable amount in this area, but some of the aspects in this questionnaire I was not aware of, so it would be good if a similar questionnaire could be sent to new grant holders as they start a grant to check they know the latest information.

Provide specific schools training The Public engagement, Science communication training was very useful

Mandatory training in how to become involved in PE and SciComms for all PIs. Build cross-institution networks of PIs and provide support for working group meetings to plan dissemination of science.

PhD comments

Sending out a monthly/quarterly newsletter to researchers advertising upcoming festivals/events/etc may be useful. It may also encourage people to attend events outside their local region if something catches their interest.

I think researchers need to be shown the benefits to THEM. And how their careers will profit.

Offer an email newsletter of the research being conducted under BBSRC grants

More local training programmes (Scotland)

Provide easy access to short public engagement guides (e.g. "Do's and Don'ts of Public Engagement" etc.)

Promote the opportunity and funding it has more thoroughly & reward involvement

As a phd student, I think it would be emphasised as the start of every students project. After a few months they tend to get engrossed in the own research and many do not consider doing much public engagement/science communication. But if they are 'targeted' in the first few months with plenty of info on what options are available to them for public

Organise more events at which many scientists can engage with a large audience as opposed to individual scientists trying to organise their own engagement events

The next several questions were directed at PIs alone since they were relevant only to the cited grant application that the respondent had submitted to BBSRC. When PIs were asked if they had included any public engagement or science communication plans in their grant application 95% said yes, while 5%

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said no. Of those who said they had not planned any activities 56% said that they had not had any plans related to the grant at the time of application, while 67% provided their own comments under 'Other reasons'. These reasons were generally related to personal feelings about their research being too complex or dull for public interest, with a small number being concerned about the sensitivity of their research.

Of those 95% that *had* mentioned plans for activities 35% said they had applied for funding for these activities from BBSRC as part of their grant application, while 60% said no, and 5% declined an answer. Of the 60% who had not applied for funding support for their activities 43% said that they did not know they were eligible for funding or did not realise it was a part of the application. Further, 32% believed they could get the funds elsewhere, while just 6% were concerned that asking for funds would affect the decision to grant the award. Comments following this question revealed that on the whole planned activities did not require funds but if respondents had not realised they could apply for funds they would do so in the future. In addition a strong message from these comments suggested that PIs felt applying for funds would mean more time spent writing and justifying their application, which they felt was already too complicated. None of those that had not planned activities said that they had not anticipated having time for activities, which had been a significant point of concern in the 2005 BBSRC survey as well as the 2006 Royal Society report. This may suggest a shift in beliefs surrounding public engagement and science communication towards including such activities as part of a research profile or job, rather than an 'extra' requirement that might consume time outside of research.

The final series of questions from this point (Results Q10) were addressed to both PIs and PhD students again. Respondents were asked if they (or someone in their immediate research team, in the case of PIs) had gone on to actually take part in any public engagement or science communication activities. In contrast to the 95% of PIs who said they planned for activities in their grant 83% had in fact gone on to participate in either their planned activities or activities organised by others. PhD students fell a little behind this number with 74% stating that they had participated in activities. Of those PIs who had not participated in activities the main reason cited was lack of opportunity, then lack of time, then lack of relevant training or information on how to undertake activities. For PhD students who had not participated in activities the main reason (for 50% of them) was lack of relevant training or information, then lack of time, then lack of opportunity.

It would seem that both PIs and PhD students hold similar concerns regarding their lack of participation in activities; however, some striking differences also appeared in other cited reasons. For example, 32% of PhD students indicated that they had concerns regarding competence or self-confidence versus 7% of PIs, and 11% of PhDs cited concerns that other scientists think negatively of their time spent engaging versus 2% of PIs. While the small number of PIs who consider this an issue is commensurate with the Royal Society 2006 report finding (1-3% felt that engaging with the non-specialist public made them look bad in front of their peers), there is a clear difference in how PhD students feel about their participation in such activities. Further comments following this question indicated that the main reason they had not participated in activities *yet* is because not enough time had yet passed since the start of the grant funding period or PhD funding period. This suggests that researchers may be waiting to have results to share as part of the engagement – which is not necessary. BBSRC requires grant holders (or those working on their grant) to complete two days public engagement and science communication per year from the start date of the grant and this finding suggests that this requirement may not be being fulfilled.

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Those respondents who reported that they had participated in public engagement or science communication activities were asked several questions regarding their activities. First, both groups were asked if they had evaluated their activities with 43% of PIs and 58% of PhD students indicating that they had evaluated their activities. The free comment section below this question revealed several themes common to both groups in varying levels of importance. Those who had used evaluation cited the use of informal evaluation such as self-reflection, or indicated that evaluation had been used for the activity but had not been administered by themselves. For those who had not used evaluation the main reasons were that it was either too early in the grant for activities to have been performed let alone evaluated, but for those who had completed an activity evaluation was outright not attempted with no reason or considered too difficult. The comments also revealed that several PIs dislike evaluation, and both PIs and PhDs student find the purpose of evaluation unclear.

When asked how they had used the evaluation information (if they had evaluated at all) comment themes centred mainly around using the information to improve future activities. There were further comments surrounding the use of informal self-reflection to deliberate what had worked best during engaging. There were also several comments citing that there had not yet been enough time since the funding start date to allow for activities with evaluation, although there were several individuals who now planned to use evaluation in the future. Many respondents cited self-reflection as an evaluative tool and indicated that they were not aware of meaningful ways of evaluating activities. Interestingly, the idea of using evaluation to monitor observable quantitative factors about the success of the activity in reference to its objectives, as a measure of impact, was rarely mentioned if at all.

PI comments

School presentations, difficult to find meaningful ways to evaluate

I was unsuccessful in a recent STFC SciComms Fellowship application and one of the main criticisms of my application was that I had failed to adequately describe how my activities would be evaluated. PIs need to be instructed in how to design activities that have clearly measurable outcomes.

PhD comments

We wanted to ensure the activities provided adequate information for school curricular outlines.

Hearing back about positive feedback made me content to have put the time and effort in, and more willing to participate in future public engagement activities

Respondents were asked what proportion of the content or material in their public engagement and science communication activities had included information from their own research. The majority of both PIs and PhD students indicated that only between 1 and 20% of activities they had participated in included their own research, while only 8% and 6% of PIs and PhD students respectively reported between 81% and 100% of the material had been related to their own research (please see Results Q11 B for full list). This is likely a reflection of earlier comments from both groups citing that activities they have participated in have sometimes not been of their own design. A lot of the opportunities for researchers in public engagement and science communication arise as they join events that have already been organised as 'specialists' or helpers. This often means that event content has been decided before their arrival making it difficult to include details of their own research. This may happen because researchers appear to find the prospect of arranging their own events challenging for many reasons including time investment and lack of training or preparation, as revealed by the outcome of the following question.

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When asked if they had felt supported in any activities they had participated in the main response from both PIs and PhDs was positive with the majority of respondents (56% PIs and 66% PhDs) indicating that they had felt supported (either monetarily or personally). The rest of the comments provided indicated that a large proportion of both groups felt unsupported and would like more support. Notably, a small number of PIs felt unsupported and that there had direct been negative consequences for themselves to this, whereas for PhDs this was a more significant theme.

PI comments

My head of college instructed me not to take part in my impact activities and put in place serious consequences

PhD comments

I found it hard within my institute to get people to help. We had a very small budget and my supervisors were concerned with the time I was taking away from research work.