Evaluation of “Science is for Parents Too” Course 2014-2015

Centre for Lifelong Learning, University of York
Funded by the Wellcome Trust

Evaluation Report by Dr Sarah West, Stockholm Environment Institute

Since 2012, the University of York’s Centre for Lifelong Learning has been running a series of courses for parents to teach them the science that their primary school-aged children are learning. This has been funded by the Wellcome Trust and run at the National Science Learning Centre (NSLC) in York. After the success of the first two years of courses, another series of courses were run in 2014-15. This document reports on the evaluation of the latest provision. It summarises the key findings, describes the methods used for the evaluation, gives detailed findings and makes suggestions for improving the courses if further funding is available.

Key Findings

- 95% of parents felt that course had changed their views or attitude towards science in a positive way. The only exception was someone who said “No, I loved science anyway”.
- All parents said they had benefitted from attending the course, with gaining knowledge about science, being able to help with homework and increasing their confidence being the most commonly mentioned benefits.
- The majority of parents reported feeling more confident helping their children with science homework, the exceptions were two who felt ‘about the same’ level of confidence, and they had attended the course in previous years, so may already have had high confidence levels.
- All but one parent said they had spoken to their children about what they had learnt on the course, the exception being someone who said their children were “too young”.
- All parents would recommend the course to a friend, and the majority wanted to attend further courses.
- After the course, no parents disagreed with the statement “I understand the science taught in schools”.
- Children whose parents attended the courses showed an increase in scientific knowledge throughout the course, with a control group showing smaller increases in knowledge or no improvement in knowledge over the same period.
- A greater proportion of children whose parents attended the courses would like to be a scientist after the course compared to the control group.
- There were some unexpected positive outcomes from the course reported by parents, namely that two parents felt the course had helped them with their work teaching others about science, and one parent had set up an after school science club for their daughter and her friends.
Introduction
Following the success of the Key Stage 2 (KS2) courses in 2013 and 2014 and the KS3 course in 2014, in 2014-15, one KS2, one KS3 and a community course were run. As in previous years, the KS2 and KS3 courses were held at the National Science Learning Centre (NSLC) (see Figure 1) at the University of York, whilst the community course was held at Haxby Road Primary Academy. There were 19 people on the KS2 course, 26 on the KS3 course and 9 on the community course.

All courses aimed to teach parents the science that their children learn at school, and were particularly aimed at parents who had limited scientific education. The courses used a variety of different methods for teaching in order to ensure the course was appropriate for different learning styles. These included watching experiments, YouTube videos, and presentations. The face-to-face courses also involved parents conducting experiments themselves, field trips, talks from scientists, and a course handbook with extensive notes.

The objectives of the course were to:

1. Increase the scientific knowledge of parents and encourage them to share this learning with their family
2. Create a range of learning materials suitable for a range of abilities, which could be used in other locations
3. Raise the aspirations of parents by bringing them onto the university campus.

Building on lessons learned from the previous courses, advertising was undertaken through ‘taster sessions’ in schools, through leaflets sent via school ‘book-bags’, posters in schools and libraries, and through word of mouth from City of York Council Adult learning staff. The course was also advertised on the Centre for Lifelong Learning’s website. This year, the area of advertising was extended to include schools not in York, and in recognition of the fact that grandparents often play a role in supporting homework, the course was advertised to them too.

![Figure 1 Parents and their children at the course celebration event in 2014 at the National Science Learning Centre](image)

Methods
We decided to evaluate the course based on our previous methods of evaluation. We did not conduct any formal formative evaluation but Alex, the course tutor, gave parents ample time to raise questions throughout the course, which, as in previous years, was valued by parents in their responses to the questionnaire at the end of the course.

Summative evaluation, which usually takes place at the end of the project, was used to assess the impact of the project on participants and pupils from the classes. A control group of children whose parents were not participating in the project was also used. Two methods were used in this evaluation: pre- and post- knowledge and attitude questionnaire with children of attending parents and a control group and two questionnaires to parents. The first parent questionnaire was conducted using a pre-post-design and involved 7 questions about parents’ self-reported understanding of science and their confidence, with responses on a 5 point Likert scale (Strongly agree to Strongly disagree). The second questionnaire was just used at the end of the course and asked fourteen questions to which parents could respond in an open format. This allowed us to capture in more detail any changes they felt had taken place as a result of the course, as well as any suggestions for improvement. Participants were encouraged to be as honest as possible in their responses. Contrary to previous years, we did not
conduct any focus groups, because we felt that the questionnaires gave sufficient insight into parent knowledge and attitudes towards science.

**Pupil questionnaire**
The questionnaire for pupils consisted of five multiple-choice questions designed to assess scientific knowledge, and 14 five-point Likert scale questions designed to assess attitudes towards science. These attitudinal questions were a sub-set of those used by Pell and Jarvis (2001) which had been developed for use by primary school aged children. There were 18 KS3 and 14 KS2 pupils whose parents were on the course who completed the attitude questionnaire before and after the course. The knowledge questionnaire was just done with KS2 children whose parents had done the course, and 11 completed it before and afterwards. There was also a group of children whose parents did not attend the course who acted as a control group from St Wilfrid’s School RC Primary School with 56 completing both the pre and post questionnaire.

The following questions were asked, with five responses (Strongly Agree, Agree, Neither Agree nor Disagree, Disagree and Strongly Disagree). Questions with an asterisk were not asked of the KS3 group.
1. I should like to be a scientist
2. Science is good for everybody
3. You have to be clever to do science
4. I like science more than any other school work
5. I often do science experiments at home
6. Science is just too difficult
7. We have to do too much work in science
8. I like to watch science programmes on TV*
9. Science makes me think
10. I am always reading science stories*
11. I should like to be given a science kit as a present
12. We do too much science at school
13. One day, I should like to go to the moon*
14. I think science is fun

**Parent questionnaires**
The two questionnaires were designed in conjunction with the Centre for Lifelong Learning to ensure they were relevant for their needs and were suitable for their participants.

**Pre- post- questionnaire**
A seven item questionnaire was designed to be administered before and after the courses held at the NSLC, with 5-point Likert scale response options (Strongly Agree, Agree, Neither Agree nor Disagree, Disagree and Strongly Disagree). This had the following questions:
1. I understand the science that is taught in primary schools
2. I like to watch science programmes on TV
3. I can understand basic scientific ideas
4. I can talk about science with confidence
5. I read science news stories
6. I am confident helping my children with science homework
7. I have a good general level of self-confidence

**Community questionnaire**
Due to the shorter duration of the community course, there was no pre-test questionnaire. An eight item questionnaire was designed to be completed after the course. The questions aimed to be quick to complete whilst giving useful information. It had the following questions:
1. I understand more of the science that is taught in primary schools
2. I understand more science than before the course started
3. I’m more confident helping my children with science homework
4. I talk to my children about what I’ve studied on the course
5. I will (or have) showed my children the experiments from the course
6. The course has been useful
7. The course has changed my attitude towards science
8. I have enjoyed the course

This was completed by 9 parents.

Qualitative questionnaire
This longer questionnaire for parents attending the courses at the NSLC had 14 open questions which focused on whether the course met parents’ expectations, whether it had changed their views or habits in any way, and also gave them an opportunity to make any further comments. It was handed out at the end of the course with 15 minutes time given for completion. The questionnaire had the following questions:

1. Where did you first hear about the course?
2. What made you want to come on the course?
3. Overall, was the course what you expected? Please explain why / why not.
4. Do you think you have benefited from taking part in the course? If so, please list as many benefits as can think of.
5. Has the course changed your views or attitude towards science in any way? If so, how?
6. Have you spoken to your children about what you’ve learnt on the course? Please give details.
7. Are your children interested in what you’ve studied on the course? Please give details.
8. Since the course started, do you feel more or less confident helping your children with science homework?
9. Since the course started, do you feel more or less confident talking about science with others?
10. Would you recommend the course to a friend?
11. What do you think we should change for future courses?
12. Is there anything else you’d like to say about the course?
13. Would you like to do a more advanced science course at the Centre?
14. Would you be interested in attending similar courses on other topics? Please give details.

This was completed by 22 parents.

Findings

Children

Knowledge and attitudes

Five questions designed to test KS2 children’s scientific knowledge were asked before and after the course. Eleven children responded to both questionnaires. A control group of 52 children also completed this questionnaire before and after the course.

Figure 2 shows that the percentage of children getting the correct answer varied depending on the question asked. Questions 1, 2 and 3 were based on experiments carried out in the class. Questions 4 and 5 were based on knowledge covered during the course. For the children whose parents had been on the course (blue bars), four out of five questions showed an increase in the percentage of children getting the correct answer after the course, with a particularly large increase for question 2. Question 5 saw no change in percentage of children getting the right answer, with nine children answered correctly both before and after the course and two answering incorrectly. For the control group (green bars), the difference in responses before and after the course was smaller, with two of the five questions showing a decrease in the percentage of children getting the correct answer.
Fourteen KS2 children completed the attitude questionnaire before and after the course, and 18 completed the KS3 attitude questionnaire. The responses for all questions can be seen in Appendix 1, here we focus on some of the key findings. The control group, who were aged between 9 and 11 returned 56 questionnaires before and after the course.

Both courses increased the percentage of children responding that they would like to be a scientist (Figure 3) compared to the control group which saw no change in the percentage of children responding positively to this question. Interestingly, both KS2 and KS3 saw an increase in the percentage of children disagreeing with this statement after the course, but the numbers should be treated with caution as it is a small sample size (only one additional child disagreed with this statement before and after for KS2 and KS3 respondents).

Figure 2 The percentage of KS2 children choosing the correct multiple choice answer in the knowledge questions. Note that there were 11 respondents for the test group (SiFPI) and 52 for the control group.
Both courses showed an increase in positive responses to the question “I think science is fun” (Figure 4), with the control group showing a slight drop in percentage agreement to this statement.
decrease in agreement to this question over time (Figure 5), which indicates that at least some parents are doing the experiments they are taught on the course at home with their children.

Figure 5 Responses to “I often do science experiments at home” before and after the course, for the test groups and the control group.

Similarly, responses to “I like science more than any other school work” were more positive after the course for the children whose parents had been on the course than the control group, which saw no change in response over time to this question (Figure 6).

Figure 6 Responses to “I like science more than any other school work” before and after the course, for the test groups and the control group.

Parents
Responses to the quantitative questionnaires give an overview of the outcomes of the courses, whilst the open-ended more qualitative questionnaire gives a richer picture of the outcomes.

**Knowledge and attitudes – quantitative questionnaires**

This questionnaire was completed by 14 parents before and after the KS2 course. As can be seen in Figure 7, a greater proportion of parents agreed with each statement after the course than before the course, indicating an increase in confidence and knowledge. Interestingly, there seemed to be an increase in general self-confidence as well as confidence talking about science and helping children with homework, suggesting that the course may have wider impacts on participants than just teaching them about science. None of the 14 parents disagreed with any of the statements after the course, although several were neutral.

![Figure 7 Questionnaire responses of parents attending the KS2 course before and after the course. Note that there were only 14 respondents before and after, so the sample size is small.](image)

Seventeen KS3 parents completed the questionnaire before and after the course, and similarly to the primary school course, a greater percentage of respondents agreed with all the statements after the course than before (Figure 8), with fewer parents giving neutral responses to the questions after the course. One respondent did disagree after the course that they understood the science taught in schools, basic scientific ideas, and read science news stories, but they also disagreed that they had a good general level of self-confidence. Therefore this response may reflect their overall level of self-confidence.
Community course
Nine parents completed the community course questionnaire, which was a shorter version of the one issued for the longer courses. All enjoyed the course, felt it was useful and that they understood more science. The results are shown in Figure 9, which indicates that all responses to the questions were positive. All parents had spoken to their children about what they had studied on the course, felt more confident helping with science homework and at least planned to show their children the experiments from the course (Figure 9).
Figure 9 Responses from the parents who attended the community courses. No respondents ticked 'Disagree' or 'Strongly disagree' and therefore these options are not shown.

Knowledge and attitudes – qualitative questionnaire

Twenty-two parents completed the qualitative questionnaire. One ‘parent’ was actually a grandparent who wanted to help her grandchildren with their homework. The responses to the questionnaire give some insight into their motivations for attending and any changes in knowledge or attitude as a result of the course. Without exception, all said they would recommend the course to a friend, and the majority wanted to attend further courses (both science and other topics). The exceptions were two who said they couldn’t attend any more courses at the moment and one who said “Maybe – depends on the time commitment”.

The most common means of hearing about the course was through school (13 people), either by email or newsletter. Other recruitment methods were less commonly mentioned but included word of mouth, the library, directly from the National Science Learning Centre and the University, or that they had attended a previous course (3 people).

There were a wide range of motivations for wanting to attend the course. The most commonly mentioned was wanting to learn more about science (mentioned by 8 parents), followed by wanting to help children with their homework (6) and to gain a greater understanding of the level at which their child should be working (4). All motivations mentioned are summarised below, with larger phrases those mentioned most often, and the smallest phrases only mentioned by one parent. The diversity of motivations mentioned by parents could be used to help target advertising of future courses, by including mention of them in flyers, emails etc.
All parents felt that they had benefitted from attending the course, with gaining knowledge, being able to help with homework and increasing in confidence being the most commonly mentioned benefits. The responses to this question have been categorised and are summarised in the figure below. Some of these may be unexpected benefits, for example, three people mentioned that the course had helped them in their work e.g. “Renewed excitement in teaching STEM. Many great ideas for interesting kids in STEM subjects. Knowledge of the National Science Teaching Centre [sic] and contacts there”. Another perhaps less obvious benefit was that one person felt that the course had “Made me think about science policies when voting / environmental issues”.

Figure 10 Coded responses to “Do you think you have benefitted from taking part in the course?” The largest word, knowledge, was mentioned by 10 different people, the smallest words (e.g. fun, ideas for holidays) were mentioned by one person.

One parent commented that “I benefited by having some 'me' time, although it was originally for the kids - I benefited greatly.”, and another enjoyed “seeing campus, feeling 'student’ again”.

Twenty-one respondents felt that the course had changed their views or attitude towards science, for example, “I hated science in school, it was lectured to us with no ability to ask 'how' or 'why'. I know now that science is and can be fun”. Several other parents also commented that science now felt accessible, for example, one wrote “When I was at school the geeks were scientists. Being able to connect science to everyday items make it feel like anyone can do science and it feels more inclusive rather than just for the boffins who can do algebra!” The only parent who said it had not changed their attitude towards science wrote “No, I loved science anyway”.

The Wordle at the top of the report shows the uncoded responses to this question, which clearly shows that the course piqued people’s interest in science.
All but one parent said they had spoken to their children about what they had learnt on the course: the one who had not said “they are too young”. Four parents said that they talk to their children after each session about what they have learnt, and another wrote “We have done some of the excellent practical fun experiments I was taught on the course. They loved them!”. One parent was pleased that her children had shown an interest in “food facts which is great that they have a better knowledge and understanding of what fats/sugars/proteins etc they are consuming and also need”. One parent had gone beyond talking to her children about what they had learnt and had “begun a Young Creators Club for my daughter and her friends”, demonstrating that the course can have impacts wider than that expected.

Most parents (18/22) reported that their children were interested in what they had studied on the course. One said “No - but my children aren't interested in me!” and three said not applicable, one because “they don't get homework yet”. Parents mentioned the children liking the experiments and several said it helped spark off conversations: “Yes, each topic we have done we have talked (and argued!) about around the table, most weeks”

Confidence
The majority (19/22) parents said they felt more confident helping their children with science homework, with one not responding and two saying they felt about the same, with one commenting “To be honest, don't get round to doing the experiments. Tend to talk about it. Also I'm very good at forgetting non-obvious answers e.g. whether high / low pressure goes with more / less rain” and the other “I still have to refer to notes to check my understanding”. Both these parents had attended previous courses, so it may be that the prior courses increased their confidence and perhaps their level of confidence has plateaued.

The majority (18/22) also felt more confident talking about science to others, with the remaining four answering ‘About the same’. Those who did not feel their confidence had increased gave a variety of reasons, including that “Most of my friends have degrees in maths / science related topics so I don't feel any more confident about the principles, but I do feel more confident about talking about relevant current topics we have studied”. One parent felt “more confident about science, but as yet would not be able to talk about science” and another said they “don't tend to discuss much science with others”. However, the majority felt it had increased their confidence in talking about science to others, with one noting that they “Have been known to drop the odd science fact into conversations!” and another wrote that their confidence had increased to the point where they felt “Happy going to hear speakers and attend conferences and events that are science based”.

Format and resources
Many of the respondents mentioned the helpful workbook, for example “Notes have been very helpful as a resource to refer to. Makes me feel more confident and looks better to my child!”, and “Great handouts to keep, which have already been used to help my son with homework”. The experiments, as in previous years, were very popular with parents and their children, as were the science days where parents brought their children to the NSLC.

Parents particularly praised Alex’s teaching style, saying he created a relaxed atmosphere where they had “no worries about asking silly questions and getting laughed at.” A typical comment at the end of the questionnaire was “a very enjoyable experience that will be useful for years to come. Alex was a very knowledgeable and enthusiastic instructor”. Alex’s ability to make science fun and interesting is reflected in the Wordle below, which is made up of all the words parents used in response to ‘Is there anything else you’d like to say about the course’.
Future courses

The questionnaire asked parents to suggest areas for improvement for future courses, although most did not make any suggestions. In response to this question, several mentioned that they felt that a suggested shift to online courses would not be a positive move: “it would be a shame if the courses went online. It is a more fun environment to learn in a class of people.”, and “Not change as such, keep the same, but definitely no online course”. Two parents wanted the course to be longer, and two wanted materials to be available online, including an optional quiz to help test their knowledge.

Summary

As in previous years, these courses have been very well-received by parents. A comment from one of the parents on their questionnaire sums up the feelings of many: “Great fun, really interesting, very educational, can’t believe it was a non fee paying course for me!” The evidence from the child and parent questionnaires suggests that not only are the courses improving parents’ knowledge of science and their confidence, particularly in helping their children with homework, but that this is cascading down and having positive impacts on their children’s knowledge of science and attitudes towards science.

References


Appendix 1

The figures below show the attitude questionnaire responses for each of the groups.
Figure 11 KS2 children responses to the attitude questionnaire. Note that there were 14 respondents.

Figure 12 KS3 children’s responses to the attitude questionnaire. Note that there were 18 respondents.
Figure 13 KS2 and KS3 control group responses to the attitude questionnaire. Note that there were 56 respondents.