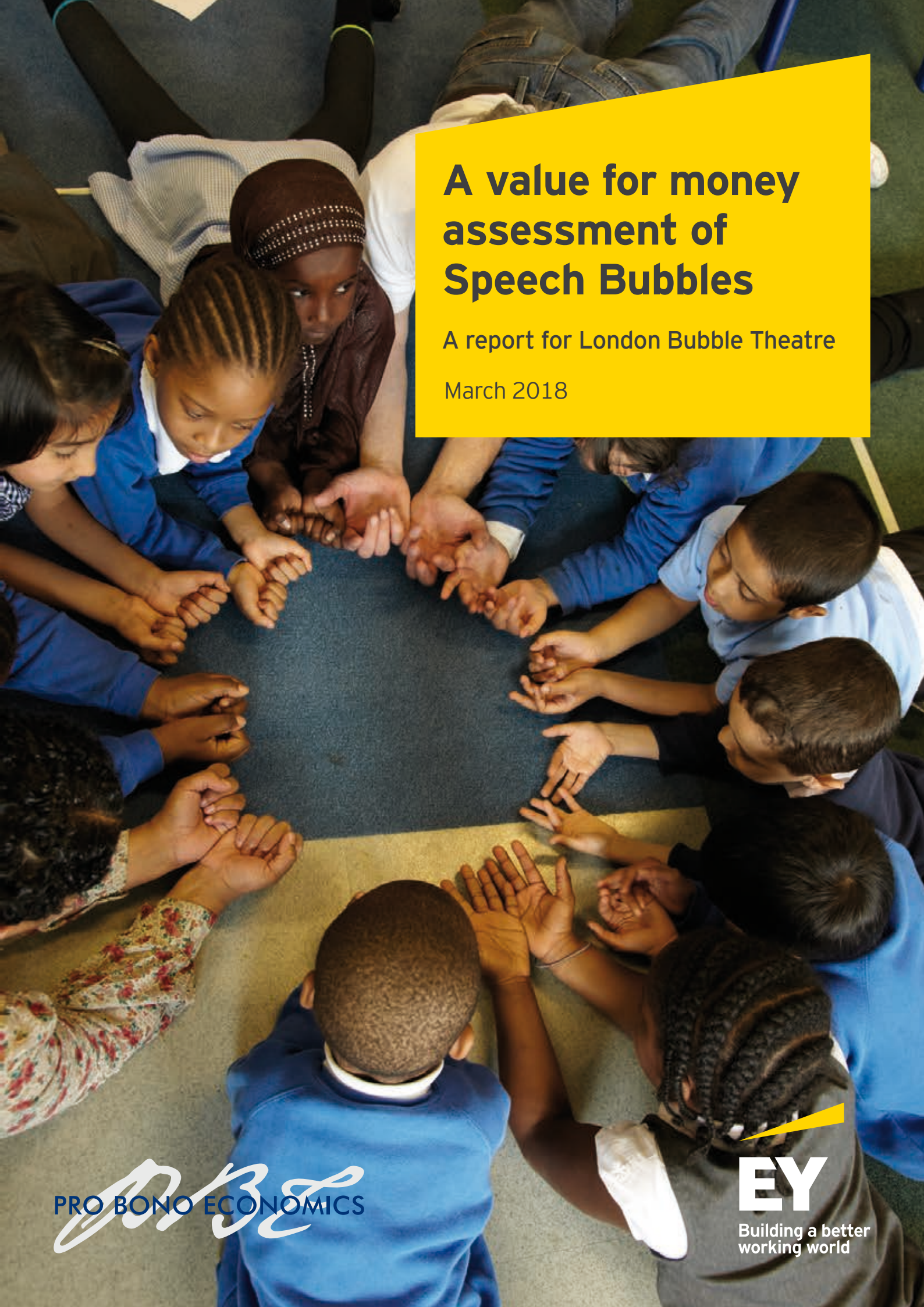


A value for money assessment of Speech Bubbles

A report for London Bubble Theatre

March 2018

PRO BONO ECONOMICS

EY
Building a better working world

Foreword

On behalf of Pro Bono Economics, I am delighted to introduce this report by the Economic Advisory team at EY.

The report provides an economic evaluation of the costs and benefits of London Bubble Theatre's Speech Bubbles programme. Speech Bubbles is a drama intervention delivered by trained drama practitioners in primary schools in disadvantaged areas in London and Greater Manchester. London Bubble Theatre has been running the programme since 2009, and it provides an innovative way of improving children's communication skills, confidence and wellbeing.

The economic benefits of the programme are quantified as increased lifetime earnings of children who participate in the programme. As is common in this type of evaluation, earnings are used to proxy improvements in individual's productivity. The study links evidence of the positive impact of the programme on participants' speech, language and communication skills to expected improvements in GCSE attainment at Key Stage 4. This is combined with existing evidence on the relationship between academic attainment at Key Stage 4 and lifetime earnings to estimate the programme's economic benefit.

The approach taken in the study is a good example of the insights that careful economic analysis can provide. Evaluating programmes such as Speech Bubbles is not easy, and requires a judicious blending of evidence and professional judgement. The authors have carefully set out the key assumptions they rely on, and provide a balanced assessment which takes account of the limitations that are inherent to this type of work.

Overall the analysis suggests that Speech Bubbles delivers good value for money, with a benefit to cost ratio that is relatively high compared to values reported in studies of other primary age interventions in education. This is an encouraging finding, given the vital importance of good communication skills in a child's development. Children who are slow to develop these skills may go on to struggle with academic and literacy skills throughout their learning.

I hope you find the report engaging, useful and informative.

Neil Pratt
Chief Economist, Pro Bono Economics

Disclaimer

This report (Report) was prepared by Ernst & Young LLP for London Bubble Theatre using information provided by London Bubble Theatre and the University of East London, and other publically available data.

Ernst & Young LLP does not accept or assume any responsibility in respect of the Report to any readers of the Report (Third Parties), other than London Bubble Theatre. To the fullest extent permitted by law, Ernst & Young LLP will accept no liability in respect of the Report to any Third Parties. Should any Third Parties choose to rely on the Report, then they do so at their own risk.

Ernst & Young LLP has not been instructed by its client, London Bubble Theatre, to respond to queries or requests for information from any Third Party and Ernst & Young LLP shall not respond to such queries or requests for information. Further Ernst & Young LLP is not instructed by London Bubble Theatre to update the Report for subsequent events or additional work (if any) performed by Ernst & Young LLP. Accordingly, without prejudice to the generality of the foregoing, Ernst & Young LLP accepts no responsibility to any Third Party to update the Report for such matters.

Contents

1. Executive summary

Project scope

Speech Bubbles delivers drama lessons in primary schools aimed at improving children's communication skills, confidence and wellbeing. In Speech Bubbles sessions drama practitioners and school staff create a safe and playful space for children in Key Stage 1 (normally aged between five and seven years) to develop their communication skills. A story drama approach places the child at the centre of the activity, and they become at different times, author, performer and audience.

A child's ability to communicate plays a pivotal role in their development, socially, emotionally and intellectually. By supporting children in developing these essential skills, the Speech Bubbles programme is ultimately aiming to transform children's life chances.

This report aims to estimate the value for money of the Speech Bubbles programme, using Cost-Benefit Appraisal (CBA) methods widely adopted by government and other funding bodies.

The report's scope is limited to developing quantifiable measures of impact and translating these into monetised estimates of the net benefits of the programme; a full literature review of other studies incorporating the potential wider impacts of the programme, (e.g., on health, crime, wellbeing and happiness) is beyond the scope of this work.

Impact:

- The base data for this CBA was a treatment group (38 pupils) and control group (51 pupils) study, set-up and conducted by the University of East London (UEL) in the 2015-16 academic year.
- For the purposes of this study, Speech, Language and Communication Needs (SLCN) are measured by scores across six attributes covered by The Communication Trust's Speech, Language and Communication Progression Tools. The Speech Bubbles programme is found to significantly raise children's scores in three of these attributes – understanding Spoken Language, Storytelling and Narrative, and Social Interaction.
- Considering individual pupil scores, 46 out of the 51 Speech Bubble participants (i.e., 90%) show some improvement in their average score across all six attributes. By comparison, 22 out of the 38 (i.e., 57%) of pupils in the control group (that did not participate in the Speech Bubble programme) showed improvements in their average score over the same period.
- The programme is found to have a statistically significant positive impact on the proportion of participants achieving a level of Speech, Language and Communication (SLC). Depending on the assumptions used, the programme results in between 8% and 18% of participants improving their scores to a level that is comparable to the relevant peer group children with no identified SLCN.

Value for money:

- These measures of impact have been combined with data on the GCSE grades that children with SLCN attain, with estimates of the causal impact of SLCN on educational attainment, and with estimates of the causal impact of GCSE grades on incremental lifetime earnings. Using all these together, a monetary value can be put on the benefit of Speech Bubbles. On the central estimate this is around £174,000 (in 2016 prices, for 291 pupils on the 2016-17 programme).
- Benefits can be compared to costs, which are estimated to be just over £98,000 (for the 291 pupils on the 2016-17 programme). The net benefit in Net Present Value (NPV) terms is therefore over £75,000. The central estimate implies a benefit of £259 per Speech Bubbles participant (i.e., divided by all participants), or £9,800 for each participant who, as a result of the programme, reaches the SLC abilities expected of their peer group.
- Expressed as a Benefit-Cost Ratio (BCR), this gives a central estimate of almost 1.8-to-1. This indicates that the Speech Bubbles programme represents good value for money and is comparable to other interventions in education.
- There is a degree of uncertainty around the programme's benefits, in particularly in terms of how long the impacts will endure and how much a child's educational attainment is causally linked to their SLC ability. To reflect this uncertainty, variant assumptions have been used to provide indicative upper and lower scenarios of impact, which estimate a lower BCR of just over 1-to-1, rising to 2.7-to-1.
- These NPV and BCR estimates are all positive even when applying the most conservative estimates of the programme's impact. Overall the analysis suggests that Speech Bubbles is a low cost intervention that delivers good value for money.

Limitations:

- The BCR measure above focuses on lifetime earnings. Other benefits (wellbeing, happiness, health, social inclusion) are likely to be correlated with earnings but are not directly measured within this study. In particular, the primary aim of Speech Bubbles is to improve the wellbeing of children, and this is not directly measured in the cost-benefit appraisal.
- The measure used to capture and monetise the benefits of the programme is binary in nature – either a participant reaches the SLC ability expected of their peer group or they do not. This therefore excludes the benefits to pupils who do not achieve this level of SLC, but who nevertheless improve as a result of the programme. The impacts estimated can therefore be considered a conservative estimate of the benefits of Speech Bubbles.
- The analysis necessarily uses a forecast of the impact on educational attainment and subsequent lifetime earnings, based on evidence taken from the wider population. In time these projections may be compared with the actual outcomes achieved by the Speech Bubbles children (and their comparator group) to test the accuracy of the projections.
- The sustainability of the improvements of Speech Bubbles participants has yet to be comprehensively tested. Pupils may slip back and/or those who still have speech, language and communication needs may improve with more time. Thus the benefits associated with the programme may fade-out over time. In this case, the benefits of the programme may prove to be closer to the lower end of those presented within this report. That said, UEL's follow-up study on the 2016-17 academic year shows no sign of Speech Bubbles children slipping back in the following year.

Recommendations:

- The programme would benefit from a longitudinal study of Speech Bubbles participants and a control group that tracks children's performance through to their GCSE results. This would support a more comprehensive understanding of the longevity of the impact of the programme and may also provide further insight into the breadth of the benefits that are realised by participants.
- Furthermore, any future work may benefit from expanding sample sizes. This would allow statistical analysis to drill-down to into analysis of sub-groups of the population (e.g., BME and English as an Additional Language status, or indicators of need such as Pupil Premium or a Statement of Special Education Needs), which may provide valuable insights into which groups of participants may be achieving greater or lesser benefits from participation in the programme.
- As part of its commitment to measuring its effectiveness, London Bubble Theatre maintains a record of the performance of children participating within the Speech Bubbles programme (and control group). These anonymised records may be enhanced by inclusion in a non-identifiable database of characteristics and scores against the various SLCN attributes, which would facilitate further analysis and allow for this CBA can be repeated and extended.
- The creation of such a database could usefully form part of Bubble Theatre's collaboration with the Royal Society for Arts (RSA) Education Endowment Foundation (EEF), which is funding a Randomised Control Trial (RCT) to assess the effectiveness of the Speech Bubbles programme. This is expected to involve 500 pupils across 25 schools, from September 2018. This is part of a programme of five new trials to find out if different cultural learning approaches can help boost primary pupils' achievement. All five projects will be evaluated by a team of independent evaluators led by the University of London – Institute of Education and the Behavioural Insights Team, looking at the impact on children's learning and development, as well as how different approaches to delivery maximise the benefit to children and schools.

Acknowledgements

EY would like to thank Adam Annand from London Bubble Theatre for his time, support and patience in conducting this study.

We would also like to thank The Communication Trust and the University of East London (UEL) for their cooperation in this work. Theresa Redmond at The Communication Trust has given her time to explain the Progression Tool used to measure speech, language and communication capabilities. Dr. Heather Price and Eric Ansong from UEL School of Social Sciences have also met with EY to explain their work in setting up a control group, measuring impact compared to that control group, and undertaking econometric work. In particular EY are grateful to Heather and Eric for anonymising, labelling and handing over the dataset for EY to undertake further econometric analysis.

We are grateful also to Dr. Jo Blanden of Surrey University for her critical review and guidance, and likewise to Dr. Mark Graham, Gemma Bruton and Neil Pratt of Pro Bono Economics for their professional input and support.

This report's authors are Nick Catton and Colin Edwards, with quality review from Matt Corkery, and supported by Steve Hook, Luke Miller and Andrew Jones.

2. Introduction

2.1 Context

Since 2009–10 the London Bubble Theatre have been running a programme called Speech Bubbles, which aims to support young children to develop their communication, confidence and wellbeing. The Speech Bubbles programme uses a story drama approach to help Key Stage 1 children (age 5–7 years) to develop their communication skills. The programme was developed in partnership with Southwark Council in 2009, and is now available to primary schools in Southwark, Lewisham, Greenwich and Lambeth with London Bubble Theatre, and in Hackney, Tower Hamlets, Enfield, Rochdale, Oldham and Manchester with partner organisations.

Although there has already been some evaluation of the impact of the Speech Bubbles programme, London Bubble Theatre wished to develop this into a Cost-Benefit Appraisal (CBA), in line with government standards for measuring the value for money of such projects.

London Bubble Theatre approached Pro Bono Economics (PBE) for support in undertaking this Cost-Benefit Appraisal. PBE is a charity that matches volunteer economists to other charities that need the services of economists. Through PBE, a team of volunteer economists from EY's Economic Advisory team was matched to the Speech Bubbles project; the matching recognising EY's long association with supporting the arts, EY and Bubble Theatre's geographical proximity in South East London, and the similar educational work of the EY Foundation.

EY has worked directly with Bubble Theatre to understand the Speech Bubbles programme and to obtain the data necessary to undertake a Cost-Benefit Analysis. The EY team has also met and worked with the Communications Trust and with a team of researchers from the University of East London (UEL), who are assisting Bubble Theatre in measuring the impact of the Speech Bubbles programme.

In finalising the report EY and PBE have worked together to ensure that the analysis is robust, with PBE providing independent peer review and quality assurance.

2.2 Scope of work

The overall aim of the work is to provide Bubble Theatre with a Cost-Benefit Appraisal of the Speech Bubbles programme that they can use as evidence when seeking funding. Within this, the work has four objectives, namely to:

- Briefly summarise the existing evidence of impact of the Speech Bubbles programme.
- Conduct a quantitative ex-post evaluation of the benefits of the Speech Bubbles programme thus far.
- Produce a formal assessment of the potential Value For Money of the current programme, in terms of the commonly used metrics of Net Present Value and Benefit-Cost Ratios, which can be benchmarked against other programmes and policies.
- Make recommendations for future evidence gathering that will enable the continued and improved monitoring and evaluation of the Speech Bubbles programme.

In line with similar projects that measure the benefits of educational programmes, this report uses changes to lifetime earnings as an approximation of economic benefits. This has the advantage of direct comparability with other such projects, is relatively easy to measure, and is likely to be a good proxy; at least in the sense that other long term outcomes (e.g., health) are strongly and positively correlated with lifetime earnings. The challenge in the analysis is to establish the link between the Speech Bubbles programme and educational outcomes (the link between educational attainment and lifetime earnings already being well established).

This approach does mean that the direct impacts on communication skills, confidence and wellbeing that may result from the programme are not valued explicitly within this analysis. Whilst this is a limitation, it reflects the lack of a robust approach to valuing the individual and social benefits of communication skills. In focusing on the economic benefits the report produces a prudent estimate of the overall benefits, and one that is directly comparable with studies of other educational programmes[1].

[1] For example, *Evaluating the Impact of education on earnings in the UK: models, methods and results from the NCDS*, IFS 2003 (DfE funded research paper).

2.3 Structure of this report

In the remainder of this report:

- Section 3 describes the Speech Bubbles programme, including the characteristics of the children, the raw data on children's speech, language and communication skills before and after the programme, results from Speech Bubbles' own national evaluation programme and an introduction to the existing evidence and literature.
- Section 4 evaluates the impact of the Speech Bubbles programme, including the Progression Tool used to measure speech, language and communication skills, reporting the control group and the econometric analysis undertaken by the UEL research team and EY's further analysis.
- Section 5 translates the measured impact into monetised benefits and compares that to the costs (including the opportunity costs) of running the programme. A range of benefit-cost ratios (BCRs) are produced to provide an indication of the value for money of the programme.
- Section 6 briefly summarises the analysis, noting limitations and making recommendations for further work.

3. The Speech Bubbles programme

This section describes the Speech Bubbles programme and summarises the existing evidence regarding its impact, including the evidence of impact of similar programmes. This provides context for understanding the impact and value for money estimates outlined later in this report.

3.1 Overview of the programme

London Bubble Theatre Company's 'Speech Bubbles' programme is a school-based intervention for children in the early years of their primary school education with identified speech, language and communication needs. Developed in 2009 by the London Bubble, in partnership with Southwark Pupil Development Centres, the Programme puts children's own stories at the centre of workshops in order to build children's confidence without immediate pressure to speak. This aims to improve children's confidence in expressing themselves through physical and verbal communication and to ultimately deliver positive and lasting change in each child's general wellbeing.

The programme is delivered using trained drama practitioners and school support staff on a weekly basis for 20 weeks for schools in disadvantaged areas in London and elsewhere. The workshops themselves take place in school time with children taking part in games and activities that encourage them to listen to each other and to express themselves. For example each week one of the children takes a turn to make up a story for the other children to act out.

In 2016-17 academic year a total of 42 schools were actively engaged in the programme, across 10 Local Authority areas; Greenwich, Hackney, Lewisham, Manchester, Oldham, Rochdale, Tower Hamlets, Enfield, Newham and Southwark.

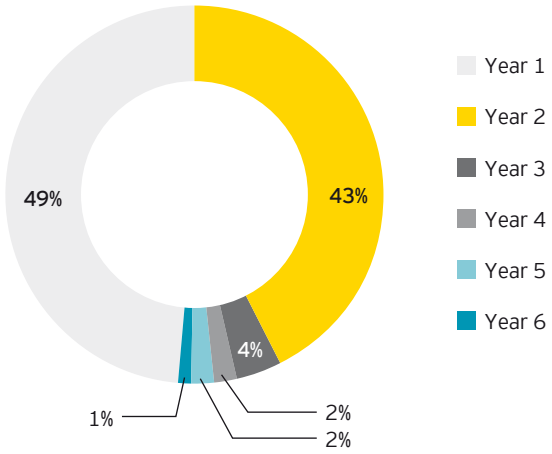
In the 2016-17 academic year, 291 children participated in the London Bubble Theatre's Speech Bubbles programme and over 800 pupils participated nationwide including the programmes run by London Bubble Theatre's eight partner social franchise theatres – Immediate, Half Moon, Face Front, M6 Theatre Company, Peoplescape Theatre, Oldham Theatre Workshop, and UEL.

3.2 Participants

The make-up of the Speech bubbles programme participants varies from year to year. Data in this section relates to the 2015-16 academic year.

Speech Bubbles tends to work with younger age groups with 90% of the participants aged seven and under. Figure 1 illustrates the age mix of Speech Bubbles pupils in terms of their school year.

Figure 1: Age mix of 2015-16 Speech Bubbles pupils



Source: Bubble Theatre

Speech Bubbles has a slight skew towards male participants (59% in 2014-15, and 64% in 2015-16).

The vast majority of children completed the whole project; of those that did not, two children were removed because the school felt referral was wrong and seven children changed school during the school year.

Speech Bubbles children have various characteristics, indicative of high levels of SLCN, disadvantaged backgrounds and/or particular educational needs:

- 61% were classified as having English as an Additional Language (EAL).[2] This compares to approximately 20% of primary school pupils on average across England.[3]
- 49% were eligible for a Pupil Premium, which is additional funding for publicly funded schools in England to raise the attainment of disadvantaged pupils (defined by receipt of free school meals or subject to adoption/guardianship/local authority care arrangements). This compares to approximately 15% of pupils in primary schools in England who are eligible for free school meals.[4]
- 31% have either an Education, Health or Care Plan (EHCP) or a Statement of Special Educational Needs (SEN). An ECHP is for children who need more support than is available through special educational needs support. Within the general primary and secondary school population in England, around 14% of pupils have either a statement of SEN or EHC plan (2.8% of all pupils) or have SEN Support (11.6% of all pupils).[5]

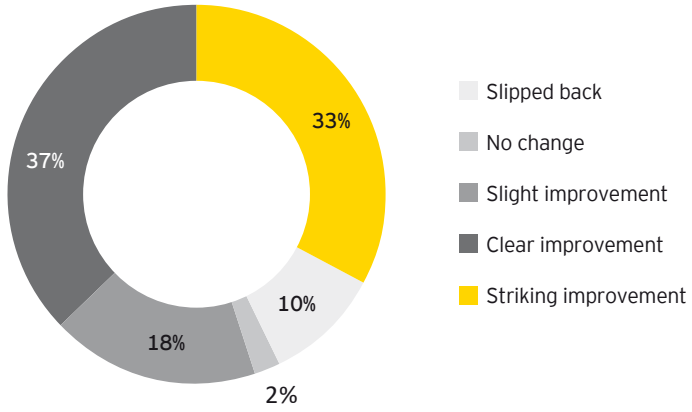
3.3 Indicators of impact

Speech Bubbles has undertaken its own monitoring of impacts, with class teachers assessing pupils' progress after completing the programme.[6] Data reported here is from the 2015-16 Speech Bubbles national evaluation, which evaluated over 400 participants (over half the total in the national programme) on 10 questions assessed by the schools. On the face of it the study suggests significant positive impacts. However, it does not consider a comparison group of pupils not undertaking Speech Bubbles, which is why alternative data is used in the evaluation conducted in sections 4 and 5 of this report.

Figure 2 illustrates the results for progression in learning, speaking and listening. The key findings were:

- 88% of students in the programme recorded a higher overall score in learning, speaking and listening.
- 37% of children participating in the programme showed 'clear Improvements in learning, speaking and listening'.
- 33% showed 'striking improvement' in learning, speaking and listening.

Figure 2: 2015-16 national evaluation – learning, speaking and listening, percentage of total

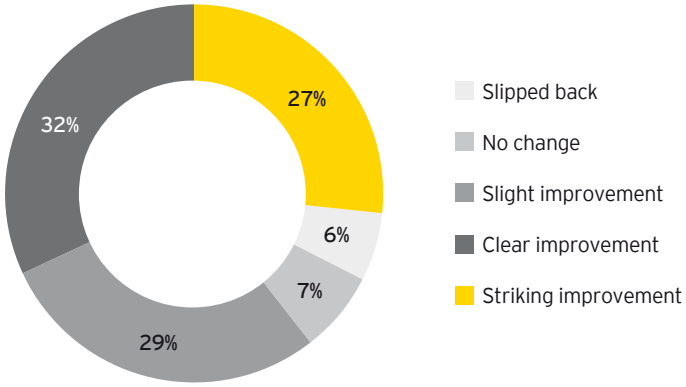


Source: London Bubble

[2] The data quoted covers 50% of Speech Bubbles participants. This should therefore be representative of the cohort, but it is possible that those who haven't returned data may be more likely to be EAL pupils.
[3] Schools, pupils and their characteristics: January 2016, Department for Education, January 2016.
[4] Ibid
[5] Ibid
[6] Speech Bubbles Year 7 Report, Adam Annand, London Bubble, September 2016.

Figure 3 below illustrates the results for emotional conduct and behaviour. The key findings were 87% of students recorded some improvement, with 27% showing striking improvement.

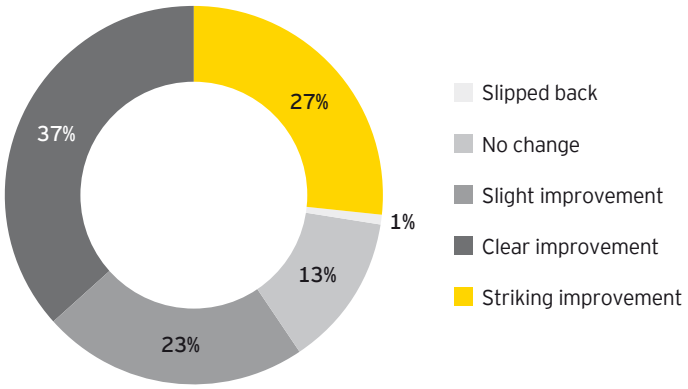
Figure 3: 2015-16 national evaluation – emotional and conduct behaviour, percentage of total



Source: London Bubble

Figure 4 below reports an analysis of teachers' comments on pupils. Again almost 90% show some degree of improvement, with 27% judged to have made striking improvement.

Figure 4: 2015-16 national evaluation – teacher comments, percentage of total



Source: London Bubble

Several previous studies have been undertaken to better understand the Speech Bubbles programme, the impact it has and the lessons that the programme can take from other initiatives. Furthermore, a substantial body of evidence (see Appendix A) has been developed on the importance of speech, language and communication development, particularly in early years, on the future educational attainment and wellbeing of individuals.

In a recent study, the Early Intervention Foundation explored much of the existing evidence for the prevalence and impact of SLCN across the UK and the links between language, literacy and comprehension and broader behavioural, mental and emotional outcomes.[7] The far reaching impacts of speech, language and communication skills, which determine how an individual interacts with their peers and absorbs information, play a critical role in childhood development and are therefore a pivotal driver of future outcomes.

In the context of Speech Bubbles, a review by Dr. Jonathan Barnes provides a detailed review of feedback from key stakeholders on the impact of the programme, including, theatre practitioners themselves, parents of participating children and teachers.[8] The review concludes that: "Speech Bubbles offers what appears to be a highly effective and sustainable means of helping children suffering the resultant poor social, emotional and educational well-being". The improvements were noted not just in measured more formalised speaking, reading and writing measures, but also extended to improvements in: "confidence, motivation, attitude, behaviour, and relationships, after they had left Speech Bubbles and for the next four years".

The purpose of this study is not to replicate this, or the broader existing research into the approach and effectiveness of the Speech Bubbles programme, but to build on this evidence to evaluate and quantify the impact of the Speech Bubbles programme from a value for money perspective.

As a result there are many aspects of the Speech Bubbles programme that are not covered in this report, in particular the impact of the programme on children's wellbeing. This is not to discount the importance of these benefits but simply reflects the focus in our work of establishing a value for money case. Further studies related to the Speech Bubbles programme and other early years interventions are referenced in Appendix A.

[7] Law, Charlton and Asmussen (2017), *Language as a child wellbeing indicator*. Early Intervention Foundation.
[8] Barnes (2015), *Speech Bubbles An evaluation of the 2013-14 extended programme funded by the Shine Trust*.

4. Understanding the impact of Speech Bubbles

4.1 Assessing the impact of the programme

As discussed in Section 3 of this report, much research has been undertaken into the impact of the Speech Bubbles programme on improving children's speech, language and communication abilities. To build on this existing evidence, this work draws in particular on a recent independent evaluation of the programme undertaken by the University of East London (UEL).[9] This study is the first evaluation which has benefitted from the use of a control group, which allows for a robust assessment of the impacts that can be attributed to the programme. As a result, this study is a crucial input in to the value for money assessment of Speech Bubbles (detailed in the next section of this report). The key features of UEL's analysis are summarised below.

4.1.1 University of East London's approach

UEL's study uses The Communication Trust's Primary Speech, Language and Communication Progression Tool (ages 5–6 years) to measure children's performance both before and after the intervention.

Results for Speech Bubbles participants were compared to those achieved by a 'control' group of children. This control group comprised children selected from the same school classes as the participants, and had been identified as also having similar speech, language and communication needs as Speech Bubbles programme participants (the treatment group).

Children were assigned to take part in either the control group or the programme by the schools themselves, with the schools encouraged to do so randomly. Importantly, the assignment to the control group was done so on the understanding that the children within this group would have the opportunity to participate in the programme in future. This ethical consideration also serves to highlights that the children within the control group share similar needs to those within the treatment group. Nevertheless, the potential for subjective bias to enter the assignment process means that the study can be considered only to be approaching a randomised control trial approach, and this limitation is borne out by observed differences in the pre-programme average test scores between the treatment and control group.

UEL uses a 'blind' assessment approach, which ensured that assessors were not aware of which children had taken part in the Speech Bubbles programme, thus minimising the potential for unconscious bias as assessors noted children's performance using the progression tool. During the course of the 2015–16 academic year, 89 pupils were assessed in total, 51 in the Speech Bubbles programme and 38 in the control group. These relatively small sample sizes limit the inferences that can be drawn, particularly when examining how the programme's impacts may vary by participant characteristics. However, the presence of the control group and the design of appropriate regression analysis does still generate statistically valid results regarding the aggregate impact of the programme.

This methodology is commonly called a treatment and control group comparison – the treatment group being the children undertaking the Speech Bubbles training. In economics it is often called difference-in-difference – i.e., it considers the difference in scores between the treatment group and the control group both before and after undertaking the Speech Bubbles training.

Table 1 illustrates how the difference-in-difference approach works, using illustrative numbers. The control group start from a slightly higher level of ability before the intervention, which may reflect some degree of bias within assignment between the treatment and control groups, with children with greater need of speech, language and communication support assigned to the treatment group. This is shown in the table, which shows that the treatment group starts off with lower scores than the control group before the intervention. Both the treatment and control group improve over time and after participating in the Speech Bubbles programme the treatment group also has a lower score compared to the control group. However, the treatment group gains relatively more after participating in the programme compared to the improvement in the control group over the same time period. The gap between the treatment and control group narrows; this narrowing of the gap is the 'difference-in-difference'. This is a valid inference so long as the 'common trends' assumption holds – i.e., that the treatment and control group would both have improved at the same rate absent the Speech bubbles programme.

[9] *An Evaluation of the Effectiveness of the 'Speech Bubbles' Drama Intervention Programme 2015–17*, Dr. Heather Price and Eric Ansong, UEL, Jan 2018: londonbubble.org.uk/uploads/Speech%20Bubbles/UEL%20Speech%20Bubbles%20Final%20Evaluation%20Report.pdf

4. Understanding the impact of Speech Bubbles

Table 1: Illustration of difference-in-difference methodology

Progression Tool scores	Before	After	Difference (Treatment-Control)
Treatment group (Speech Bubbles participants)	6.6	9.4	2.8
Control group	8.0	8.3	0.3
Difference (Treatment-Control)	-1.4	1.1	+2.5

Source: EY analysis

Table 2 illustrates the Progression Tool used by UEL for measuring the progress of Speech Bubbles and control group children. Children receive scores based on their responses to set interview questions, which focus on gauging children's abilities under each of the following categories listed below alongside examples of the abilities tested under each category:[10]

- Understanding spoken language – ability to understand 'how' or 'why' questions.
- Understanding and using vocabulary – ability to name objects, animals and characters from a description.
- Sentences – ability to answer 'what could we do next?'
- Storytelling and narrative – ability to make up simple stories.
- Speech – ability to work out what sound comes at the beginning of a word.
- Social interaction – ability to give opinions and discuss ideas and feelings.

For example, under Storytelling and Narrative, children may be asked to continue a story initiated by the Progression Tool interviewer. Importantly, as outlined earlier, the interviewer does not know whether children have participated in the Speech bubbles programme. The interviewer then records the children's anonymised responses, which are then assessed by a single assessor, who again does not know either the identity of the child or whether they are participating, or have participated, in the programme.

The Progression Tool scores children from 1 to 15 in each category, with scores progressing in jumps of two, i.e., from 1 to 3 to 5 to 7 etc. Scores above 12 (i.e., 13-15 on the Progression Tool) are marked green because they are considered to be comparable to the relevant peer group children with no identified SLCN. Scores below 4 (i.e., 1 and 3 on the Progression Tool) are marked red because they are considered to represent significant SLCN. In between these boundaries the scores represent an amber range of partial SLCN.

Table 2: The Communication Trust's Progression Tool

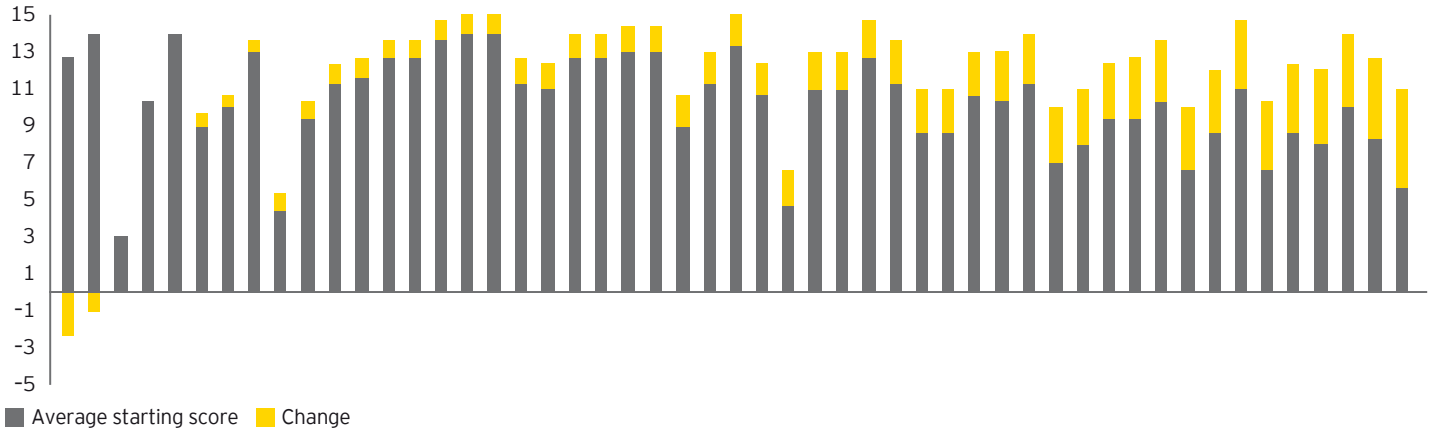
Score	Understanding spoken language	Understanding and using vocabulary	Sentences	Storytelling and narrative	Speech	Social interaction
15						
13						
11						
9						
7						
5						
3						

[10] Examples of each category represent the Progression Tool targeted at children aged 5-6 years. Those for different age groups will differ in the sophistication of abilities required under each category.

4.1.2 Raw data from the test scores

Figure 5 shows the average score across the 6 categories tested before and after for each of the 51 pupils participating in the Speech Bubbles programme. 46 out of the 51 participants (i.e., 90%) show some improvement in their average score. For comparison, 22 out of the 38 pupils in the control group showed improvements in their average score over this period (i.e., 57%).

Figure 5: Before and after scores of individual Speech Bubbles participants

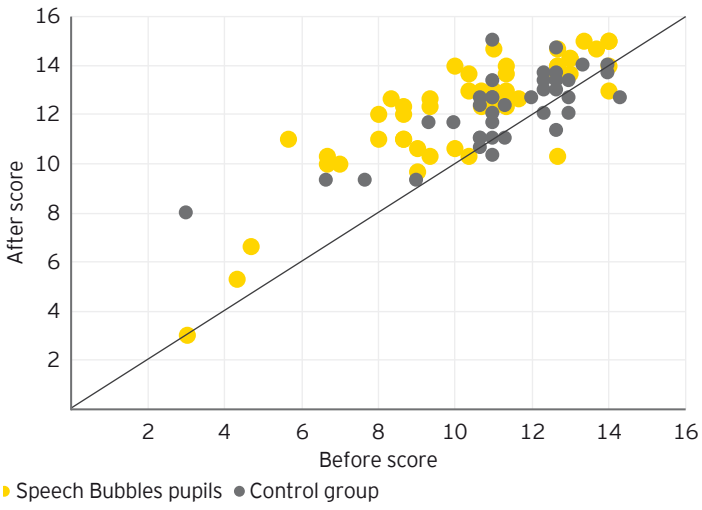


Source: University of East London, EY analysis

Figure 6 includes both Speech Bubbles (treatment group) and control group pupils' before and after average scores: 'before' on the horizontal axis and 'after' on the vertical axis. Pupils who appear above the diagonal line are demonstrating an improvement between their before and after scores. On the basis of this preliminary analysis the Speech Bubbles participants show a greater progression above the line than the control group.

There are four significant outliers within these data, towards the lower left side of the data points. The findings of this report are presented for the use of all the data shown in Figure 6, to avoid any bias in data selection. However, all analysis has been repeated for the data excluding these four outliers. In all cases, the exclusion of these outliers is found to increase both the magnitude and statistical significance of the positive impact of the Speech Bubbles programme. Thus the results based on the full dataset could be considered to be conservative.

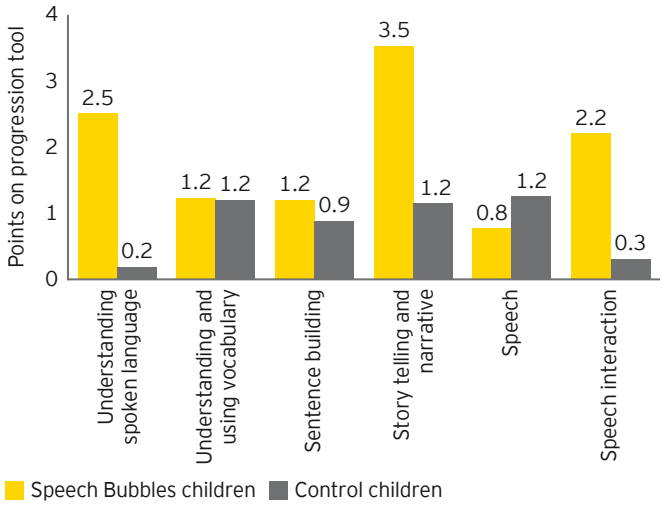
Figure 6: Before and after scores, treatment and control group, progression tool averages across six SLC attributes



Source: University of East London, EY analysis

Figure 7 shows the average change in the scores for each category, separating out the treatment group and the control group. Speech Bubbles children improve their scores by more than the control group in three categories in particular – Understanding Spoken Language, Storytelling and Narrative, and Social Interaction. The remaining three attributes show much smaller differences, which as discussed in the next section are found to be statistically insignificant.

Figure 7: Average change in scores progression tool scores, by attribute



Source: University of East London

4.1.3 Evidence of impact based on UEL's findings

The aim of the analysis is to quantify the impact of Speech Bubbles on the development of pupil's test scores as measured by the Progression Tool. The causal impact that can be attributed to Speech Bubbles is the change in student test scores that are a direct result of participation in the programme. This is measured as the difference in outcomes for the treatment group, after controlling for two other factors: the progress that participants could be expected to make over the time period between the before and after tests; and the inherent differences between the control and treatment groups, as evidenced by their different starting abilities. UEL use a difference-in-differences regression to assess the effectiveness on each of the six scores on the Progression Tool, assuming that the 'common trends' assumption holds (i.e., that the treatment and control group would otherwise have improved at a consistent rate)

UEL ran six different regressions, one for each of the test score categories. The dependent variable is the progression tool score for each child, and the explanatory variables isolate the impact of children's natural development over time, of being in the treatment or control group, and the treatment effect. EY have replicated UEL's regression analysis and produced identical results.[11]

Table 3 shows the estimated increase in scores due to the Speech Bubbles programme (the treatment effect) and their statistical significance (p-values) for each of the six categories measures on the Progression Tool. The treatment effects show the estimated impacts of the Speech Bubbles programme on each of the six attributes measured by the progression tool. This is measured in 'points' that represent the average change in a children's scores along the 1–15 range of the progression tool. The statistical significance column identifies whether the estimated impacts can be attributed to the Speech Bubbles programme, based on different boundaries of statistical significance. Where the p-value is less than 0.1, we can infer that the probability that the estimated impacts are down to chance is less than 10%; or put another way, that there is a 90% probability that the estimated impacts are due to the Speech Bubbles programme. The same logic is true for values of 0.05 (5%) and 0.01 (1%).

[11] This approach is consistent with the difference in difference methodology, utilising the equation as below:
$Yist = \alpha + \gamma NJs + \lambda dt + \delta(NJs\ dt) + \varepsilon ist$

The regression results show that the programme has resulted in a statistically significant improvement in student's test scores in three categories (Understanding Spoken Language, Storytelling and Narrative, and Social Interaction). Neither Understanding and Using Vocabulary, Sentences, nor Speech are significant at any conventional level of significance. We can therefore conclude from this that, for these attributes, although the children's scores may have improved, the improvement is no greater than may be expected without children participating in the Speech Bubbles programme, given the children's characteristics and the improvement they may naturally be expected to make over time.

Where there is a statistically significant improvement, the increase in student test scores after controlling for time and ability is approximately a 2 point increase. This is slightly lower for social interaction (1.85 point increase). The interpretation of this improvement will depend on the starting point for each child on the progression tool. For example, a child starting at a score of 3 and moving up to 5 remains at a level that indicates a need for significant support, whereas an improvement from 11 to 13 may indicate that a child is now performing at a level much closer to the expectations of their peer group. This challenge of interpretation is considered later in this section using a threshold-based approach to identify where children realise sufficient improvements to no longer be classified as having SLCN.

Table 3: Treatment effect and statistical significance of scores

Programme Stream	Treatment Effect	Statistical significance (p-value)
Understanding Spoken Language	2.036	0.010***
Understanding and Using Vocabulary	0.005	0.995
Sentences	0.281	0.742
Storytelling and Narrative	2.371	0.020**
Speech	-0.267	0.778
Social Interaction	1.852	0.024**

*** Statistically significant at 99%

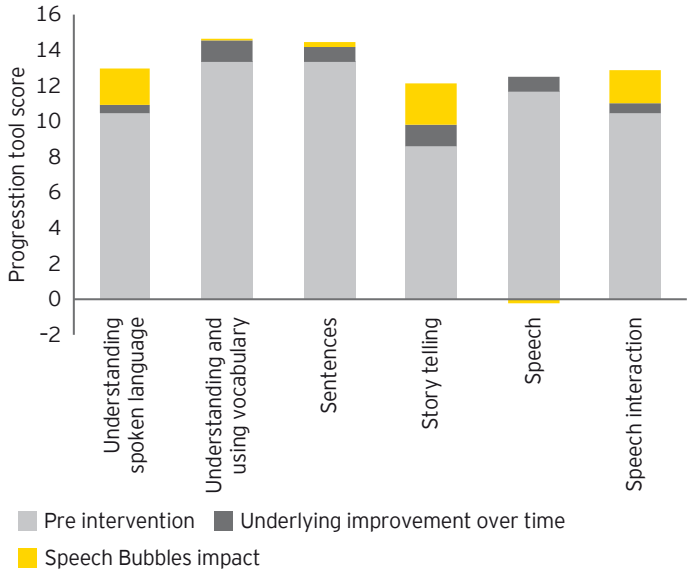
** Statistically significant at 95%

Source: EY analysis

Figure 8 below breaks down the average score after undertaking the Speech Bubbles programme into its building blocks – i.e., the initial score, underlying progression during the time between the pre-intervention and post-intervention tests, and the causal impact (i.e., the impact of Speech Bubbles) for each attribute measured by the progression tool. The causal impact is largest for the three attributes that are statistically significant. The causal impact of the Speech Bubbles programme is close to zero for the other three categories.

It is possible that the categories that start with already high scores – Understanding and Using Vocabulary, and Sentences – are affected by being close to the upper bound of the Progression Tool scores. This limits the opportunity for children to progress in these categories and may therefore limit the effectiveness of the Speech Bubbles programme, as well as bias the test against improvement in these categories. This may warrant further investigation in future, and may be made possible through analysis of larger samples of Speech Bubbles participants with control group comparisons.

Figure 8: Breakdown of impacts for each Progression Tool attribute



Source: EY analysis

4.1.4 Aggregate measures of speech, language and communication needs (SLCN)

Understanding the overall impact of Speech Bubbles requires us to understand the relationship between different scores. There may be dependencies from scores in one category that impact on test scores in another. For example, improvement in Understanding Spoken Language may have a positive impact on performance on Storytelling and Narrative. Therefore aggregate test scores are estimated as a system to allow for a better estimate of overall impact. Moreover, an aggregate measure of the impact across all the categories provides a more simplified measure of SLCN that is useful for understanding the extent to which a child's overall SLCN abilities may have changed – this simplified measure is used later in this report in the value for money analysis.

For each child two different aggregated measures of Speech, Language and Communication (SLC) ability, based on the progression tool scores, are used within this study:[12]

- **Average SLC ability:** the average of scores across all six progression tool attributes — this is the most complete measure of the improvement in test scores.
- **Minimum SLC ability:** the minimum score across all six progression tool attributes — focusing on the minimum score measures more definitively whether children reached the SLC ability expected of their peer group (whereas the average score could mask weaknesses in some categories).

Again regression analysis is used to isolate the impact of the Speech Bubbles programme and to test for statistical significance. Two different regressions were run to determine overall programme effectiveness, using the average test score and the minimum test score for all of the six categories.

Estimating the impacts with two different measures of effectiveness allows us to produce a range of results that provide a better picture of the overall effectiveness of the programme in holistically addressing SCL needs. The results in Table 4 are produced using the two aggregated dependant variables. The treatment effect is positive in both cases and is highly significant in raising children's minimum scores.

Table 4: Impact of overall effectiveness (p-values in brackets)

Programme measure	Treatment Effect	Underlying improvement over time	Treatment Group characteristics
Average impact	1.046 (0.130)	0.868 (0.098)*	-0.982 (0.045)**
Minimum impact	2.468 (0.002)***	0.316 (0.606)	-1.392 (0.016)**

*** Statistically significant at 99%

** Statistically significant at 95%

* Statistically significant at 90%

Source: EY analysis

The minimum impact measure indicates that the Speech Bubbles programme typically increases children's minimum score across all six attributes by 2.5 points, and statistically significant at conventional levels.

The average impact also indicates that the Speech Bubbles has a positive impact, raising children's average scores across all six attributes by 1.0 points. In this case, however, the treatment effect becomes statistically insignificant at the 90% threshold, a conventional level of tolerance for statistical significance. Nevertheless, this is marginal and could therefore warrant further research – indeed removing the four outliers highlighted previously raised both the magnitude and the statistical significance of this measure of impact. Furthermore, as discussed previously, higher starting scores on some attributes of the progression tools does limit the scope for the Speech Bubbles programme, which therefore limits the scope for improved average scores given the maximum score of 15 on the progression tools. The lower statistical significance of the average relative to the minimum score measure is therefore not unexpected.

For both impact measures, the table also shows the estimated underlying improvements over time and the variation in the scores that is attributable to differences in the characteristics of the treatment group compared to the control group. Under both measures the treatment group starts from a significantly lower score relative to the control group, at -1.39 points on the minimum measure and -0.98 points on the average measure. This highlights the relatively lower level of SLC ability within the treatment group at the outset of the study. This may lead to larger gains for the treatment group, because it is easier to move up from lower down the scale. However, the effects of time alone are estimated to be marginal (and not statistically significant) for the treatment group, suggesting that it is the impact of undertaking Speech bubbles that is driving the improvement from the lower starting position.

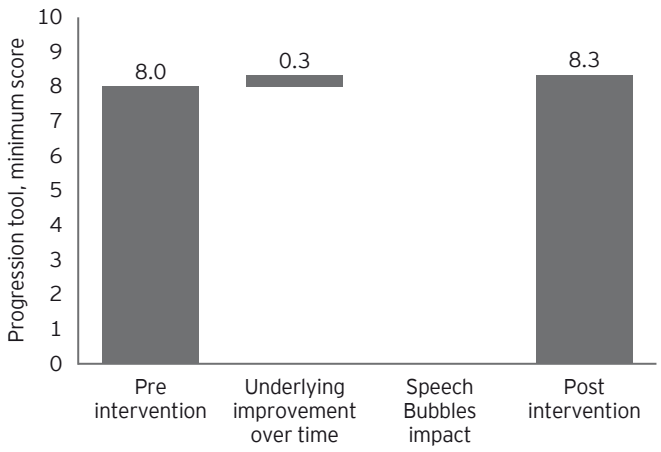
[12] As can be seen later, these are used to determine whether children progress from having SLCN to not having SLCN, which can be readily matched to the difference this makes to GCSE results.

A small underlying improvement over time is evident on the average impact measure, but not on the minimum impact. This suggests that in the absence of the Speech Bubbles programme, children may not be improving in areas of SLC in which they struggle the most. This is despite the likelihood that these are the areas in which children have the greatest potential for improvement.

Figure 9 illustrates how the children's minimum score on the progression tools builds up. On average the control group scored 8.0 at the beginning of the study. Underlying improvements over time then contribute to an increase the average minimum score within the control group of 0.3, leading to a post-intervention score of 8.3.

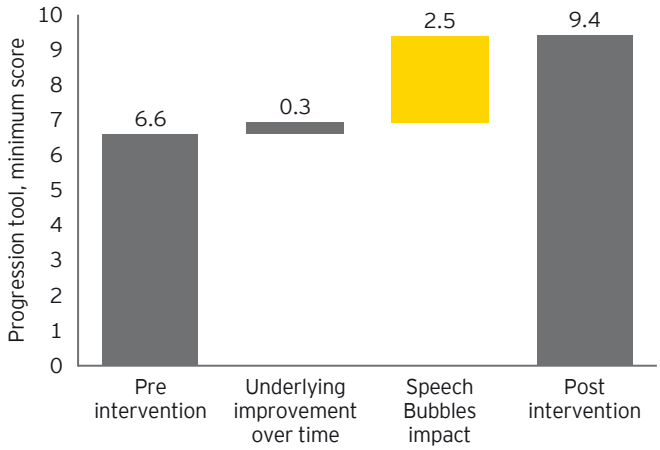
Figure 10 shows the corresponding development of children participating in the Speech Bubbles programme. On average, these children's minimum score at the start of the study was 6.6, somewhat lower than the control group, and highlighting the lower starting level of SLC ability within the treatment group. The treatment group then gain the same underlying improvement over time, of 0.3. A further improvement of 2.5 was then attributed to the Speech Bubbles programme, leading to an average minimum post-intervention score of 9.4.

Figure 9: Control group: improvements based on minimum score across all progression tool attributes



Source: EY analysis

Figure 10: Treatment group: improvements based on minimum scores across all progression tool attributes



Source: EY analysis

4.1.5 The influence of gender and home language

Within the treatment group, there may be differences in the impact of the Speech Bubbles programme depending upon the characteristics of the children taking part. For example, parts of the programme may be more beneficial to boys or girls, or depending upon children's understanding of the English language. To understand the extent to which such differences in impact may exist, further econometric analysis was undertaken which attempts to isolate difference in the treatment effect depending on whether the children are male or female and whether or not children's home language is English.

The results of this analysis are shown in Table 5. The gender effect shows the difference in the treatment effect for males versus females, whilst the home language effect shows the difference in the treatment effect for children with English as a home language versus children without English as a home language.

Overall, little evidence is found for either gender or home language having a significant impact on the impact of the Speech Bubbles programme. (The one exception is scores for Storytelling and Narrative, which do have a highly significant result when using a gender dummy.) This may be due to the small sample sizes, which make drawing statistically significant conclusions from this additional layer of analysis problematic.

Nevertheless, further analysis on a larger treatment and control group would be welcome in order to understand whether there are groups who are gaining less from the programme and could be better supported – and equally whether lessons could be learned from any groups achieving higher levels of improvement.

Table 5: Treatment effects for gender and home languages, based upon average SLC ability (p-values in brackets)

Programme measure	Gender Treatment Effect	Home Language Treatment Effect
Understanding Spoken Language	-0.263 (0.866)	-0.227 (0.898)
Understanding and Using Vocabulary	0.955 (0.568)	0.613 (0.749)
Sentences	-0.953 (0.581)	-1.055 (0.585)
Storytelling and Narrative	4.693 (0.019)**	0.482 (0.835)
Speech	1.552 (0.404)	-2.332 (0.265)
Social Interaction	1.566 (0.335)	0.206 (0.911)

** Statistically significant at 95%

Source: EY analysis

4.1.6 Number of students moving out of SLCN

The regression analysis presented above provides measures of the impact of the Speech Bubbles programme on the individual attributes measured by the Progression Tools. This provides an understanding of which specific aspects of speech and language the programme is most effective in supporting. However, in order to understand the programme's effectiveness in raising children's overall speech and language abilities, it is useful to compare a more aggregated measure of children's performance relative to the expectations of their peer group.

To do so, the Progression Tool's score banding provides useful performance benchmark. Where children's scores fall within the Green category (a score of 12 or more), children are considered as having speech and language abilities in line with the expected performance of children within their age group. Therefore, where the Speech Bubbles programme is found to be raising children's performance out of the red or amber category and into the green it is possible to conclude that the programme has brought a child up to the level of their peer group.

Two measures of children's overall speech, language and communication ability were used for the purposes of this analysis. The first measure establishes whether children are meeting expectations based on whether their average score across all six attributes is within the green category (the 'average measure'), whilst the second measure is based on whether children's minimum scores are within the green category (the 'minimum measure').

Table 6 below shows the proportion of Speech Bubbles participants that reach the expected SLC performance of their peers based on each measure.[13] The estimated impact of Speech Bubbles is calculated by starting from each pupil's pre-programme test score, adding to this the average improvement over time, and then adding the average treatment effect, to derive a synthetic post-treatment score. The percentages refer to the proportion of the treatment group that reach scores above 12 due to the treatment effect taking them above that threshold.

Table 6: Proportion of children lifted out of SLCN due to Speech Bubbles programme

Programme measure	Proportion lifted out of SLCN
Minimum impact	8%
Average impact	18%

Source: EY analysis

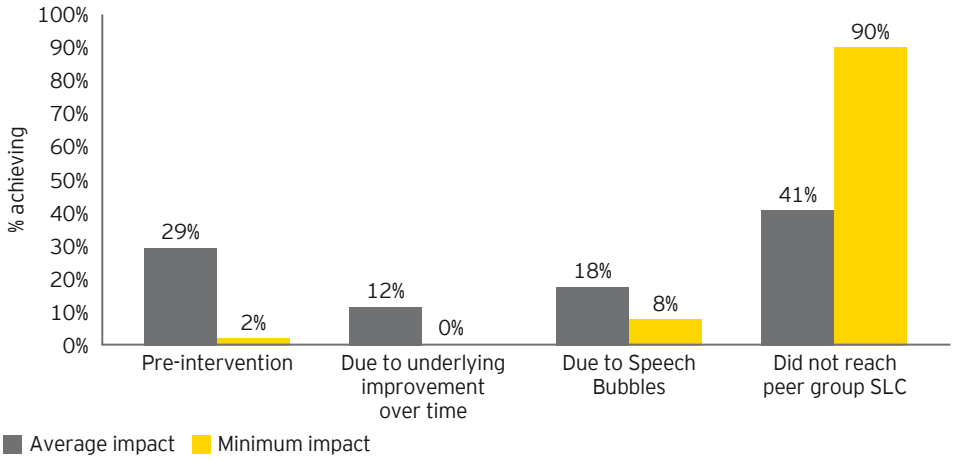
On this evidence, Speech Bubbles raises between 8% and 18% of participants up to a level of SLC ability that is in line with expectation of their peer group. As before, this is after controlling for the underlying improvements in children's abilities over time and for the differences in the underlying characteristics of the treatment and control groups.

[13] The impact has been calculated with outliers included in the dataset. The regression analysis was repeated excluding outliers and yielded very similar results.

Figure 11 below shows how these proportions compare to the outcome for all Speech Bubbles participants, using both the minimum and average measures of children's SLC abilities. On the average measure, 29% of Speech Bubbles participants were achieving a level of SLC that is in line with their peer group before the intervention took place. A further 12% of participants are estimated to have achieved this level of SLC ability independently of the programme.[14] The Speech Bubbles programme is then estimated to have resulted in 18% of participants reaching SLC ability in line with their peer group, whilst 41% of participants did not achieve this level of SLC ability.

By contrast, fewer Speech Bubbles participants meet the more restrictive minimum measure of aggregate SLC ability. Overall, 90% of Speech Bubbles participants do not meet this level. Of the 10% that do, the majority (8% of participants) do so as a result of the Speech Bubbles programme itself, whilst 2% of participants were at this level before the intervention took place.

Figure 11: Breakdown of treatment group achieving scores above 12 (peer group SLC ability)



Source: EY analysis

Note that considering only the proportion of children lifted out of SLCN understates the overall impact of Speech Bubbles. Many children make significant improvements but remain in the amber SLCN range of test scores, and some children make improvements due to Speech Bubbles but would have reached good scores anyway without the programme. The improvements that these children make are also important to understanding the effectiveness and success of Speech Bubbles.

[14] This is not to suggest that they have not benefitted from the programme, but that progression over time would likely have allowed these children to progress at least over this threshold.

5. Value for money assessment of Speech Bubbles

5.1 The framework for cost-benefit analysis

Decision-makers in central and local government and other funding bodies (e.g., charitable foundations) need to know that they are funding programmes that provide the best possible value for money. To this end Cost-Benefit Analysis (CBA) provides an assessment of the overall net benefit of a programme.

CBA is an analysis that quantifies in monetary terms as many of the costs and benefits of a project or programme as practically feasible. The output is commonly expressed as the ratio of benefits to costs (Benefit-Cost ratio, or BCR), which allows direct comparison of value for money across a range of competing projects or programmes. In a CBA the relevant costs and benefits to society of all options should be valued, and combined to give the benefits net of costs.

Related to this, cost-effectiveness analysis compares the costs of alternative ways of producing the same or similar outputs. Best practice for CBA is set out in HM Treasury's Green Book publication.[15]

It is useful early on in the CBA process to consider what potential costs and benefits may be relevant. Costs and benefits are typically based on market prices as they usually reflect the best alternative uses that the goods or services could be put to (the opportunity cost). Wider social and environmental costs and benefits, for which there is no market price also need to be brought into any assessment, although they will often be more difficult to both quantify and obtain monetary values for.

5.1.1 Estimating costs

Costs should include both the direct costs and relevant opportunity costs of unpaid inputs. An example of the latter may be the value of volunteer teaching assistant time; even if it is given at no charge by the school, that time could have been used in other productive ways by the school. All costs should be comprehensive, e.g., staffing costs should include pensions, national insurance and any other payments, as well as basic salaries.

In future funding decisions the costs of goods and services that have already been incurred and are irrevocable should be ignored, as these are 'sunk costs'. However, in evaluating a programme such as Speech Bubbles, the vast majority of the costs are variable (at least to the funder), so the issue of sunk costs is not material and the full economic cost should be considered.

5.1.2 Estimating the value of benefits

The purpose of valuing benefits is to consider whether a programme's benefits exceed its costs, and to allow alternative options to be systematically compared in terms of their net benefits or net costs.

Benefits should be valued unless it is clearly not practicable to do so. Real or estimated market prices provide the first point of reference for the value of benefits. In the case of Speech Bubbles the primary benefit can be captured through the additional lifetime earnings that Children can expect as a result of their improved SLC abilities, since this measures the market value placed on their expected increased productivity, and this is a common approach to studies of the impact of educational interventions. Although earnings is a narrow measure of overall welfare, it is positively correlated with other factors, including health, social inclusion and wellbeing, Further benefits may also result from reduced costs to society, such as through reduced crime and improved health outcomes. The potential for wider impacts warrants further study, but falls outside the scope of this value for money assessment.

Distributional issues may also arise, such as impacts on income groups and differing impacts according to age, gender, ethnic group, health, skill, or location. The Speech Bubbles programme is aimed at children in disadvantaged areas where there is a greater prevalence of SLCN. However, the beneficiaries are children and there is no data on the income of their parents, so there is insufficient data to make an explicit distributional adjustment.

[15] See: www.gov.uk/government/publications/the-green-book-appraisal-and-evaluation-in-central-governent

5.1.3 Discounting

Discounting is a technique used to compare costs and benefits that occur in different time periods. It is a separate concept from inflation, and is based on the principle that, generally, people prefer to receive benefits in the present rather than in the future. This is known as 'time preference'. In addition, future generations tend to be richer (have higher incomes), therefore, given the concept of diminishing marginal value of income, future benefits (and costs) are weighted less than current benefits (and costs).

The government's recommended discount rate is 3.5%, which reflects the combination of time preference and the inter-generational distribution of incomes. In the context of Speech Bubbles this is used to discount the future stream of lifetime earnings into a comparable current value, which forms the net present value (NPV) of the benefits.[16]

5.1.4 Uncertainty and bias

In the context of Speech Bubbles uncertainty arises over the scale of the impact, due to the calculations that need to be made in moving from measures of speech, language and communication ability for individual components to an overall measure. The analysis allows for this by considering a range of measures of impact.

Optimism bias often arises in programmes that have had little or no prior or pilot stage, or in programmes that are complex to deliver (e.g., infrastructure investments). Neither of these are relevant to Speech Bubbles, which is tried and tested, and has the benefit of impacts being already evaluated. There may, however, be a bias in subject selection (i.e., targeting those most likely to benefit), which means that the results cannot be generalised to a wider population, except in so much as the programme continues to be targeted at those with SLCN.

In practice this means that an increment to earnings in year 10 is discounted by 30% (1/(1+0.035)10), and an increment to earnings in year 20 is discounted by 50% (1/(1+0.035)20) etc.

The full formula for calculating the NPV of benefits discounts each future year of earnings by the appropriate discount factor is:

$$\text{NPV} = \text{year 0 value} + \frac{\text{year 1 value}}{1.035} + \frac{\text{year 2 value}}{(1.035)^3} + \frac{\text{year 3 value}}{(1.035)^3} + \frac{\text{year 4 value}}{(1.035)^4} \text{etc}$$

[16] For long-term impacts over thirty years a declining schedule of discount rates could be used, in line with HM Treasury's Green Book guidance (Annex 6).

5.2 Benefits of Speech Bubbles programme[17]

Section 4.1.6 summarised the impact of Speech Bubbles in terms of the percentage of children lifted out of SLCN due to the programme. The different levels of impact estimated through the minimum and average progression tool scores can be used to provide 'baseline' and 'higher' levels of impact:

- **Baseline:** 8% based on the increase in minimum SLC ability
- **Higher:** 18% based on the increase in average SLC ability

Together these give a range of the impacts. The preferred estimate, based on its strong statistical significance and its direct interpretation with children being on a par with their peer group across all measured attributes, is that 8% of children move out of SLCN status as a result of participation in Speech Bubbles.

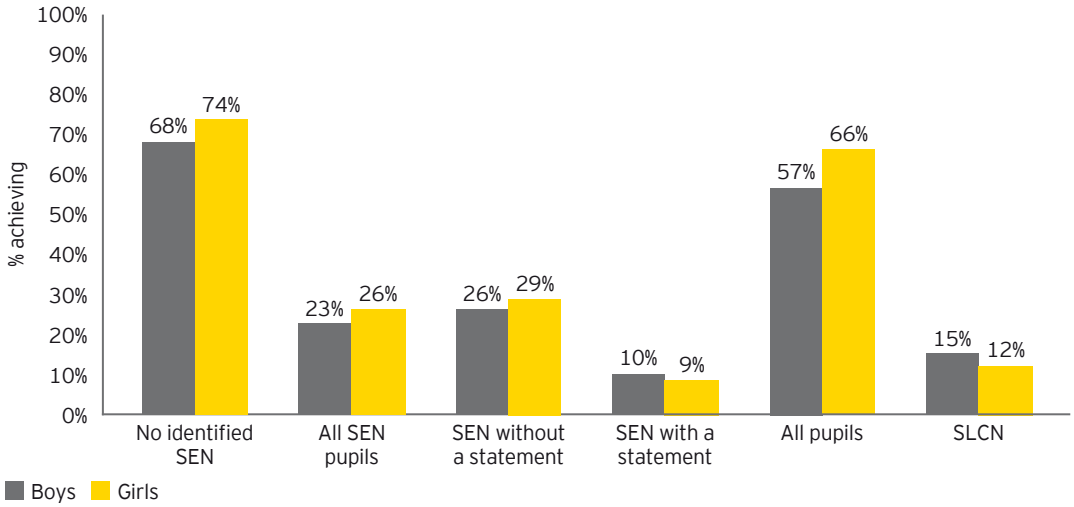
To establish a monetary value of this impact this study draw on published estimates of the relationships between SLCN and lifetime earnings:

1. The proportion of SLCN children achieving good GCSE grades – Source: DfE – Children with special educational needs: an analysis – 2014.
2. The proportion of the differences in SLCN children's educational attainment that can be explained by children's SLCN status.
3. The difference good GCSE grades makes to lifetime earnings – Source: DfE – GCSEs, A levels and apprenticeships: their economic value – 2014.

Figure 12 shows the proportion of children achieving 5 good (A*-C) grades in GCSEs, including English and Maths, separated between boys and girls. Children with SLCN have a particularly low levels of attainment at GCSE, with 12% of girls achieving 5 good GCSEs and 15% of boys, compared to the average for pupils with no identified special education needs (SEN) of 68% for boys and 74% for girls.

The difference in the educational attainment is notably higher for girls than boys. The proportion of girls with SLCN achieving good GCSEs is lower than boys, whilst the reverse is true for girls with no SEN.

Figure 12: Impact of Special Education Needs on GCSE grades (% of pupils achieving 5+ A*-C GCSE grades including English and Maths)



Source: Department for Education

[17] All values are in 2016 prices.

Whilst these findings help to understand the educational outcomes facing children with SLCN compared to their peers, the DfE information does not represent a direct causal relationship between SLCN and educational attainment. Other factors, such as income, home language, and related conditions may also impact upon children's educational attainment.

Nevertheless, given the pervasive nature of SLC abilities on children's educational attainment, we expect there to be a strong causal link, and there are a number of studies that present strong evidence for such a causal effect. For example, a Save the Children study[18] reported findings on the link between children's language skills at age five and their attainment in English and Maths at ages seven and eleven, based on an analysis of the Millennium Cohort Study undertaken by the UCL Institute of Education. This shows that one in four children who struggled with language at age five did not reach the expected standard in English at the end of primary school, compared with one in 25 children who had good language skills at age five; and one in five children who struggled with language at age five did not reach the expected standard in Maths at the end of primary school, compared with one in 50 children who had good language skills at age five.

The UCL analysis also looks at the impact of language skills on children's attainment at ages seven and 11 when other factors, such as children's experience of poverty, their parents' education and their previous attainment, are taken into consideration. This shows that even when other factors are considered, children who struggle with their language skills at age five are much less likely to meet the expected standard in English and Maths by the end of primary school.

Furthermore, studies such as those conducted by Johnson, Beitchman and Brownlie (2010) and Meschi, Vignoles and Lindsay (2010), which seek to understand the causal relationship between SLCN and educational and broader life outcomes ascribe significant explanatory power to children's SLCN status.[19,20] Nevertheless, isolating the precise difference in educational attainment that is caused by SLCN status is not straightforward. In interpreting the findings of the available evidence, a range of estimated explanatory power is therefore used within this analysis, as follows:

- **Low scenario:**
  SLCN status explains 20% of the observed differences in educational attainment at GCSE between SLCN and non-SLCN children. This is supported by one interpretation of the Meschi, Vignoles and Lindsay study, considering the proportion of the variation in test scores explained by changes in SLCN status.
- **High scenario:**
  SLCN status explains 50% of the observed differences in educational attainment at GCSE between SLCN and non-SLCN children. Again, this is supported by an interpretation of the Meschi, Vignoles and Lindsay study, which identifies the proportion of the total variation in test scores explained by SLCN status and the proportion explained by other control variables.
- **Medium scenario:**
  SLCN status explains 33% of the observed differences in educational attainment at GCSE between SLCN and non-SLCN children. This is chosen as a mid-point between the low and high estimates (35%, rounded to one-third).

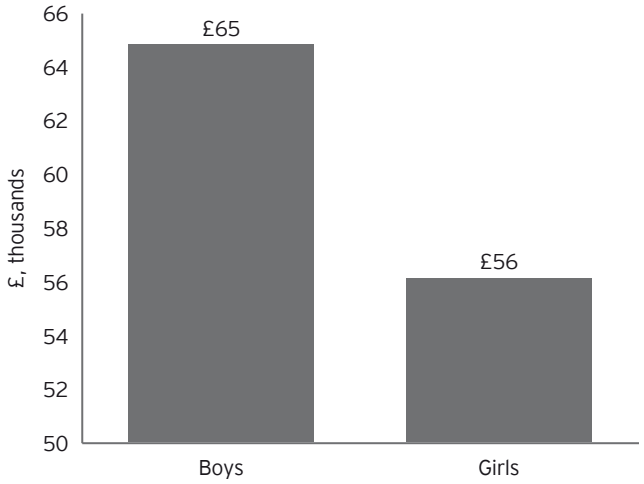
These scenarios provide the basis upon which assumed changes in the SLCN status of children participating within the Speech Bubbles programme can be expected to help children reach the average educational attainment levels of children without SLCN. In the medium scenario, the assumption is that one third of children who move from having SLCN to not having SLCN will achieve GCSE outcomes in line with the non-SLCN average. Or to put this another way, that children moving from SLCN status to non-SLCN status have a 33% chance of achieving average outcome of non-SLCN children. A further underlying assumption behind this analysis is that children who remain within the SLCN category will, on average achieve GCSEs in line with the average of children with SLCN.

Figure 13 shows DfE estimates of the additional lifetime earnings due to achieving 5 or more good GCSE grades. The wage and employment returns to qualifications has been estimated by comparing the wage and employment outcomes of individuals who hold those qualifications to similar individuals qualified to the level below. Through comparing to similar individuals, this approach is intended to be an estimate of the causal or incremental impact of educational attainment. The figures are the NPV of total lifetime incremental earnings – i.e., incremental earnings from having five or more good GCSE grades (compared to anything less), aggregated overall years of a person's working life, and discounted back into today's value using the government's recommended discount rate (3.5%). Three separate estimates are shown – a central, high and low estimate – for each of boys and girls.

[18] *Early Language Development and Children's Primary School Attainment in English and Maths: New Research Findings*.
[19] Johnson, C., Beitchman, J., & Brownlie, E. (2010), *Twenty-Year Follow-Up of Children With and Without Speech-Language Impairments: Family, Educational, Occupational, and Quality of Life Outcomes*, American Journal of Speech-Language Pathology, 19, 51–65.
[20] Meschi, E., Vignoles, A., & Lindsay, G. (2010), *An investigation of pupils with Speech, Language and Communication Needs (SLCN)*, Institute of Education, University of London & CEDAR, University of Warwick [warwick.ac.uk/fac/soc/cedar/better/reportspublications/slcn_meschi_project.pdf]

For boys the central estimate is a gain in lifetime earnings of almost £65,000, which is equivalent to £3,000 per annum. For girls the central estimate is just over £56,000, which is equivalent to around £2,600 per annum.[21]

Figure 13: Impact of achieving good GCSEs (5+ A*-C) on lifetime earnings, £ thousands (2016 prices)



Source: Department for Education

The monetised benefits of Speech Bubbles can now be calculated by the number or percentage of children that, due to Speech Bubbles, are now substantially more likely to achieve good GCSE grades and therefore increased lifetime earnings. The sequence of steps is:

- 8% of children that received Speech Bubbles progress out of SLCN so they increase their probability of achieving 5+ good GCSE grades from 12% (boys)/15% (girls) to 68% (boys)/73% (girls).
- 33% of this difference can be attributed specifically to having SLCN achieving 5+ good GCSEs is worth £65,000 (boys)/£56,000 (girls) .

A further step is needed to translate these into today's values – the DfE estimates indicate the increase in lifetime earnings at the time of undertaking GCSE tests. Since the majority of Speech Bubbles participants will sit their GCSEs 12 years after participation in Speech Bubbles programme, the NPV earnings gains occur in the future (relative to the costs of running Speech Bubbles which occur in the present time period). These DfE estimates of the NPV earning gains therefore need to be further discounted back to today's value through the discounting factor (3.5% real discount rate) and the standard discounting formula (see section 5.1.3). In practice this means that the benefits stated in the DfE paper are multiplied by 0.66 (i.e., the gains in 12 years' time are worth about two-thirds of that in today's value).

For example, under the baseline estimate of the proportion lifted out of SLCN (8%), and the central estimate for the explanatory power of SLCN status, the per-pupil gains for the average Speech Bubbles participant would be calculated thus:

- Boys = 8% * 33% * (68.2 − 15.0)% * £64,852 * 0.66 = £596 gain in lifetime NPV;
- Girls = 8% * 33% * (73.3 − 12.1)% * £65,150 * 0.66 = £600 gain in lifetime NPV.

These are the NPV increase in lifetime earnings of the average Speech Bubbles participant, translated into today's values.

The calculations show that the greater gain in probability of doing well in GCSEs that girls experience when lifted out of SLCN is almost offset by the higher average earnings that boys achieve due to achieving five or more good GCSE grades. Therefore the monetary value is almost exactly the same for boys and girls.

We can also calculate the average gain for those pupils who progress out of SLCN as a direct result of the Speech Bubbles programme:

- Boys = (68.2 − 15.0)% * 33% * £64,852 * 0.66 = £7,450 gain in lifetime NPV;
- Girls = (73.3 − 12.1)% * 33% * £56,150 *0.66 = £7,505 gain In lifetime NPV.

The final step to calculating the programme benefits in monetary terms is to multiply through by the number of participants in the programme, split into the appropriate boys/girl mix. The 2016-17 number of participants in the London Bubble Theatre's programme (i.e., schools in Southwark, Lewisham, Greenwich and Lambeth, but excluding Speech Bubbles' franchises elsewhere) is used, because this will be appropriate for comparison to the cost estimates, which also refer to 2016-17. There were 291 programme participants in the London Bubble Theatre's Speech Bubbles programme in 2016-17. A similar gender split to 2016-17 is assumed, i.e., 60% boys, but the monetary values for boys and girls are almost the same so the calculation is not sensitive to the gender split.

With 291 participants and the baseline estimate of the gains due to undertaking Speech Bubbles, the estimated benefit is £169,000 (i.e., multiplying the benefit per average Speech Bubbles participant by the number of participants):

- Boys = £596 * 175 = £104,000
- Girls = £600 * 116 = £70,000
- Total = £101,000 + £69,000 = £174,000

[21] Assumed to be earnings over 40 years, and a constant discount rate of 3.5%. DfE figures have been adjusted to 2016 values based on Consumer Price Index inflation from Q1 2013 to the average over 2016.

5.3 Costs of Speech Bubbles programme

The costs of the Speech Bubbles Programme can be split into three categories; operational cost, delivery cost and opportunity cost of unpaid resources.

For this analysis any offsetting revenues that London Bubble make from the Speech Bubbles programme (grants, donations, trading income) are ignored. These offsetting revenues would be relevant for the programme's financial business case, but they are not part of the economic cost-benefit appraisal because it needs to account for the full resource cost of running the programme.

5.3.1 Operational cost

Operational costs includes all expenditure involved in organising and running the programme, but excludes costs relating to delivery of the teaching sessions. These costs are similar to head-office or 'back room' functions and comprise of all essential centralised costs that are required to run the programme.

Given that the Speech Bubbles programme runs out of the London Bubble Theatre, to perform a clear and fair CBA the costs that are directly attributable to the Speech Bubbles programme must be separated out. EY met with the Speech Bubbles team and assessed what costs can be included. Within the London Bubble financials, there are employees who work, and facilities that are used, for the multiple programmes run by London Bubbles. The proportion of staff time, project costs and facilities that can be directly attributable to Speech Bubbles is estimated from this breakdown.

Further, the proportion of London Bubble costs that relate to supporting the Speech Bubbles programme run in the outside-London franchises must be deducted. This is because full cost data incurred by the franchises was not available, only the costs incurred by London Bubble Theatre, therefore the focus is on the costs of the 291 participants on the London programme only.

5.3.2 Delivery cost

Delivery costs includes all costs relating to delivering the Speech Bubbles sessions. Whilst the operational costs listed above had to be separated out from the London Bubble's finances, the delivery costs are clearly defined. These include all staff costs and project operational costs for the delivery of the Speech Bubble sessions. Again, only the costs that relate to delivery of the London Bubble Theatre's programme in schools in Southwark, Lewisham, Greenwich and Lambeth ae included, and costs incurred supporting delivery by the franchises elsewhere are excluded.

5.3.3 Opportunity costs of unpaid resources

In addition to the tangible financial costs that are related to the running of the programme, there are additional opportunity costs that must be taken into account when completing a CBA. These opportunity costs are defined as the cost of the use of a facility or staff time that could be used for another form of activity.

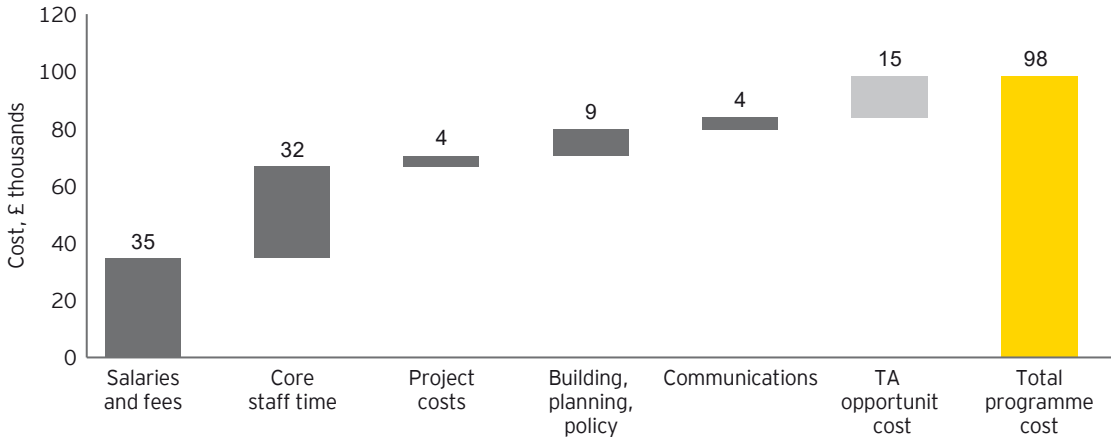
For the Speech Bubbles programme the main opportunity cost is the time a teaching assistant forgoes by being involved in the project. Although the Speech Bubbles programme is not directly paying for the teaching assistant, the teaching assistant's time that is being given to the project is an opportunity cost that must be included. Each teaching assistant must attend a 1 day CPD certified training session, 2 half days to attend the evaluation sessions and 24 half days to deliver the project. This is a total of 14 working days a year that each teaching assistant spends on the project. The opportunity cost is calculated by taking an average teaching assistant salary and pro-rata 14 working days for the opportunity cost. In total this adds £14,650 to the costs of running the Speech bubbles programme.

In addition to opportunity costs relating to staff time, there are opportunity costs relating to facilities. These facilities tend to be at schools or larger community spaces. Given that these spaces are specifically funded for these activities, tend to not be fully utilised or are used for children's activities, the opportunity cost of these is assumed to be negligible and not counted.

5.3.4 Total costs

Figure 14 below shows the build-up of total costs from the component parts above. Total costs for 291 participants are £98,464, which is £338 per participant.

Figure 14: Components of Speech Bubbles cost, 2016–17 academic year, £ thousands (2016 prices)



Source: Bubble Theatre, Office for National Statistics, EY analysis

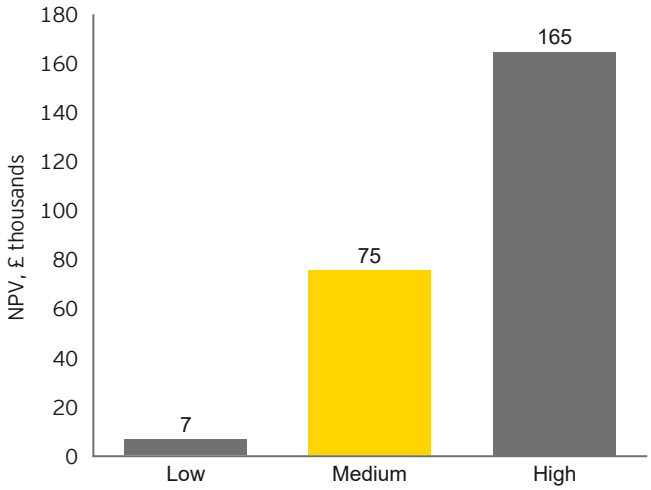
5.4 Cost-benefit appraisal

The net benefits of the Speech Bubbles programme can be calculated from the cost data and programme impacts and their value as set out above. There are two common ways of presenting the net benefits:

- Net Present Value (NPV) = NPV benefits – NPV costs; this is an absolute value in £ of the benefit Or,
- Benefit-Cost Ratio (BCR) = NPV benefits/NPV costs; this is a figure relative to costs and, as such, it can be used to compare across programmes of differing scale.

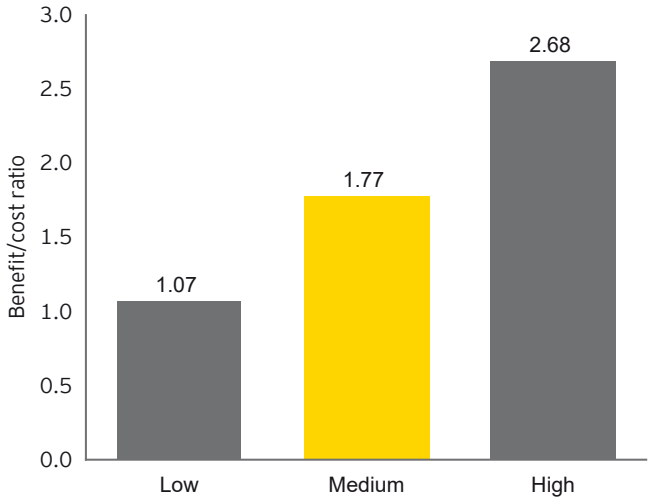
The results using the central estimates of the value of the earnings are presented in Figure 15 and Figure 16 below, under the three different estimates of the range of impact of SLCN on educational attainment (i.e., 20%/33%/50%).

Figure 15: Net benefits (NPV), with central earnings estimate, £ thousands (2016 prices)



Source: EY analysis

Figure 16: Benefit-Cost Ratio (BCR)



Source: EY analysis

The net benefit ranges between £7,000 and £165,000, with a central estimate of £75,000. The central estimate implies a benefit of £259 per Speech Bubbles participant (i.e., divided by all participants). Relative to the numbers who are lifted out of SLCN, the benefits per participant are significantly greater, around £9,800 per participant.

The benefit-cost ratio ranges between 1.07 and 2.68, with a central estimate of 1.77 – i.e., for every £1 spent on running Speech Bubbles the return is £1.77. In all cases these are positive returns relative to the cost, and consistent with the range of benefits seen elsewhere for interventions targeted at improving outcomes for children and education, as discussed in the following section.

The range presented above considers variation in the causal impact of SLCN on GCSE results. Further sensitivity tests can be applied by considering the range of measured impacts. For example, using the central estimate of causal impact (i.e., that 33% of the difference in educational attainment can be attributed to SLCN status):

- Impacts of 18% (based on the average score across all six criteria) give a BCR of 3.97.
- Impacts of just 4.5% (pupils lifted out of SLCN) are sufficient for the benefits to break-even with the costs (i.e., a BCR of 1).

5.5 Comparison with studies of other programmes

The findings of this study can be compared to those of other studies of early years intervention programmes. A useful summary can be found in 'Assessment of the Cost-Benefit Literature on Early Childhood Education for Vulnerable Children: What the Findings Mean for Policy'.[22] This report considered the adequacy of the methodology of a range of studies, before narrowing 150 studies down to just 13 considered to be robust enough for inclusion in the systematic review. [23]

The key findings for BCR's across a range of studies, alongside a direct measure of their impact and a brief study description, is reproduced in Table 7 below (where multiple studies are included for a single intervention, a preferred study is identified based on the review's quality assessment).[24]

Table 7: Comparison to other programme studies

Intervention	Academic study	BCR	Impact measure (change in high school completion rates)	Study description
Perry pre-school (Michigan)			17 percentage point increase	RCT begun in 1960s, 1 site, baseline population characteristics not reported,
	Barnett 1985a	2.04		
	Barnett 1985b	3.55		
	Barnett 1993	8.74		
	Nores et al 2005 and 2006	16.14		
Preferred study	Heckman et al 2010	6.20		
Abecedarian (Carolina)			3 percentage point increase	RCT begun in 1970s, 1 site randomisation methods unclear
Preferred study	Masse and Barnett 2002 and 2007	3.78		
Chicago Child-Parent Centre Programme			7 percentage point increase	Matched control group study across 25 sites
	Reynolds et al 2002	7.14		
	Temple and Reynolds 2007	10.15		
	Lee, Aos and Miller 2008	4.82		
Preferred study	Reynolds et al 2011	10.83		

[22] *Assessment of the Cost-Benefit Literature on Early Childhood Education for Vulnerable Children: What the Findings Mean for Policy*; Dalziel, Halliday and Segal; SAGE Open January-March 2015.

[23] The selection criteria covered the design of the benefit-cost study and of the study from which evidence of impact was drawn, the rigor of cost identification and measurement, reporting of costs and benefits for the early childhood program relative to the control group, validity of the modelling techniques, and the conduct of sensitivity analysis.

[24] Extracted from Table 3 in the Dalziel, Halliday and Segal study.

Table 7: Comparison to other programme studies (continued)

Intervention	Academic study	BCR	Impact measure (change in high school completion rates)	Study description
Even Start			0.06 percentage point increase	RCT of 18 community projects across US; potential for bias significant
	Aos et al 2004	0.00		
Early Head Start			2.2 percentage point increase	RCT from 68 programs across US, 17 selected for research group
	Aos et al 2004	0.23		
Sure Start			0.03 percentage point increase	Non-randomised comparative study of over 500 sites across UK, controls for differences in treatment-control groups
	Meadows 2011	0.057-0.115		

In this context the Speech Bubbles programme appears good value for money compared to similar programmes. Of the programmes considered, only three (the Perry Pre-School program, the Abecedarian study, and the Chicago Child-Parent Program) have BCRs similar to the central findings for Speech Bubbles. These are the two oldest programmes (1960s and 1970s) and both used small randomised control trials of high intensity, compared to more recent large-scale service delivery programmes.

The summary report also states the Net Present Value of benefits and costs per family (in 2011 US$). In some cases (i.e., for the three preferred studies) the benefits are estimated to be in the range $100,000 to $185,000 per family, which is much higher than the Speech Bubbles programme (benefits around £3,000 per participant). However, the costs are also much higher, in the range $9,000 to $45,000 per family (for the same three preferred studies). The Speech Bubbles programme therefore demonstrates good benefits relative to its low cost.

Most of the programmes considered have a randomised control trial (RCT) methodology, and take their evidence of impact from a long-term follow-up through longitudinal studies that track participants through to the end of high school. In that sense they are likely to be significantly more robust than the initial appraisal of Speech Bubbles, which necessarily uses an approximation (lifted out of SLCN) to forecast the impact on educational attainment.

The study also considers how the range of benefits accounted for impacts on the reported BCR, and demonstrates a positive relationship between the number and range of benefits accounted for and the reported BCR. Most of the BCR included education, employment, health, and crime and social welfare impacts. In that sense this appraisal of Speech Bubbles is a conservative estimate, only considering educational/earnings benefits.

A recent (2016) Pro Bono Economics study of the impact of SHINE on Saturday[25] followed a similar methodology; using DfE estimates linking educational results to predicted lifetime earnings in conjunction with the average expected improvement in 'good' GCSEs estimated by regression analysis. From a sample of 148 children who attended the SHINE on Saturday programme between the academic years 2005–06 and 2013–14, the study estimates an overall improvement in additional lifetime earnings in the region of £6.3 million. This estimated benefit is around six times higher than the estimate for Speech Bubbles. However, the costs element is unknown at this stage (no BCR is published), and given the demand on teaching time it may be significantly higher. Moreover, as already noted, this analysis has only been able to quantify the benefits of lifting children out of SLCN, and does not put a value on the benefits to those pupils who improve but still have SLCN, whereas the SHINE study values the benefits to all pupils.

[25] *Scoping a Full Economic Impact Analysis: SHINE on Saturday; Claire Brinkman,* September 2016.

5.6 Wider benefits

The NPV and BCR estimates above only account for one aspect of the beneficial impact, namely the increase in lifetime earnings. This is a common way of appraising the value of educational interventions, so it makes for fair comparison with other interventions.

Wider benefits such as wellbeing, health, reduced crime and social inclusion, are usually positively correlated with education and income, so gains in educational attainment and in lifetime income are a good indicator when assessing total benefits.[26] In comparable studies, these wider benefits are often estimated to be less substantial than estimated impacts on lifetime earnings and are often considerably more difficult to estimate. These wider benefits have therefore not been included in the overall economic impact.

Besides income accruing to individuals, some cost-benefit appraisals also consider revenues accruing to the government through taxes paid or reduced welfare benefits. Clearly, if children end up earning more in adulthood, they will also generate greater tax revenues for the government and are likely to claim lower benefits. The additional tax would already be captured in the value of additional earnings, as any additional tax will be paid out of any extra income earned. However, benefit payments foregone should be incorporated in the sum of economic benefits, although in practice it would be difficult to quantify the linkage between GCSE results and levels of social security claims.

There are a range of other social benefits of improved academic attainment that could be quantified and included in the CBA. Examples include reduced crime, improvements in health outcomes, improved psychological wellbeing, reduced income inequality and improved social mobility. In addition, there can be positive spillover effects from those whose academic attainment improves to the rest of society, e.g., from working collaboratively with more skilled co-workers.

5.6.1 Wellbeing and happiness

A recent theme of economic research has been measuring happiness rather than income per se. The research tends to show a positive but weak relationship between greater income and greater happiness (usually measured through survey techniques). Research by Professor Richard Layard concludes that a child's emotional health is far more important to their satisfaction levels as an adult than other factors, such as if they achieve academic success when young, or wealth when older.[27] This suggests that Speech Bubbles is likely to make a significant direct effect on participant's long-term happiness.

Layard and his team analysed data from about 9,000 people who were born over a three-week period in 1970 and then tracked by the British Cohort Survey, a study that asks them to complete an extensive questionnaire about their lives every five to seven years. They were also asked to rate their satisfaction at key periods through their lives. The team then examined factors including their income, educational achievement, employment, whether they had been in trouble with the law, whether they were single, as well as their physical and emotional health – to gauge how significant these were in determining satisfaction. In addition, a range of factors that affect a child's development – for example, intellectual performance, family socio-economic background and emotional health were also examined.

The researchers say their data makes it clear that money is far less important in determining happiness than emotional health – both in a child and in an adult: 'Income only explains about 1% of the variation in life satisfaction amongst people in the UK – one sixth of the fraction explained by emotional health.'

5.6.2 Health

There is a significant and well established body of literature linking income and health outcomes (for example, the positive correlation between income and life expectancy is well established). A survey of the literature was published by Joseph Rowntree Foundation (JRF) in 2014, which reports around 5000 studies, and looks in depth at 276 of these.[28] There are a number of well-established causal linkages:

- **Direct effects of income** – for example, money buys healthier foods and standards of accommodation.
- **Psychosocial impacts** – for example, the stress of not having enough money may affect health.
- **Behaviours** – people living in disadvantaged circumstances are more likely to have unhealthy behaviours, e.g., smoking tobacco.

Given a statistical relationship between income and health, these health impacts could also be estimated and given monetary values (e.g., using standard Department of Health estimates of Quality Adjusted Life Years). The Speech Bubbles CBA could then be expanded to incorporate the beneficial impact of income on health.

In addition to the impacts on individuals, there may also be benefits to the public purse as improved public health leads to reduced pressure on NHS resources. These could also be quantified and incorporated into the Speech Bubbles CBA.

[26] For example, see *Quantifying the Impact of Investment in Education*; Social Value UK.
[27] *"What Predicts a Successful Life? A Life-course Model of Well-being"*; Richard Layard, Wellbeing research programme at the London School of Economics' Centre for Economic Performance, published in Economic Journal, 2014.
[28] *How Does Money Influence Health?*, Benzeval, Bond, Campbell, Egan, Lorenc, Petticrew and Popham; Joseph Rowntree Foundation, 2014.

5.6.3 Crime and social inclusion

There is evidence of a direct link between SLCN and crime. For example, The Royal College of Speech and Language Therapists[29] reports that:

- 60% of young people in the criminal justice system have SLCN.[30]
- Levels of SLCN may be much higher in the adult prison population than in the general population.
- 20–30% of people in prison are estimated to have learning disabilities, and four-fifths of prisoners with learning disabilities also had difficulties expressing themselves and understanding certain words.[31]
- A project in the Pontypridd Probation Service found that all participants had 'below average' speech, language and communication ability and revealed specific problems experienced with comprehension and expression.

Besides the direct linkages between SLCN and crime, the relationship between income and crime has also been extensively studied and reported in the academic literature. Again, a survey of the literature was published by the Joseph Rowntree Foundation (JRF) in 2014.[32] The review gathered and reviewed 173 of the most cited and/or important articles published mostly between 1980 and 2013 that directly or indirectly tested the poverty and crime link in the US, UK and Europe. The overall method was to triangulate different approaches, methods and data so that the weaknesses of one might be compensated by the strengths of another.

There are two main linkages between poverty and crime:

1. Propensity to engage in criminal activity, due to low incomes and unmet material needs, or to falling into social circles with established criminals. For example, young people from socio-economically disadvantaged families can be caught in a life course in which adverse family, individual, school, neighbourhood and peer factors combine to increase individual susceptibility to crime.
2. Likelihood of falling victim of crime, for example due to living in high crime neighbourhood (more affordable than lower crime neighbourhoods) or needing to take relatively unsafe forms of transport at anti-social times of the day/night.

Assessments of the strength of the relationship between poverty and crime has in the past been subject to considerable disagreement. The JRF authors conclude that poverty generates conditions that make criminal activity more likely than would otherwise be the case. Empirical studies find a strong and direct relationship between socioeconomic status and offending, particularly in respect of childhood poverty and the effects of growing up poor on persistent youth offending. Finally, being a victim of property and violent crime is also statistically more likely if the person is poor.

These impacts are hard to quantify with a wide range of estimates of the impact. They are also hard to attach monetary values to, e.g., how to value the benefit of reduced violent crime against persons. Notwithstanding these difficulties, it seems likely that Speech Bubbles could attenuate some of the tendencies for disadvantaged children to fall into crime, as well as reducing their long-term likelihood of being victims of crime.

Alongside the impacts of crime on individuals, there would also be impacts on the public purse, through the costs of policing and the criminal justice system, which would be more tangible to attach monetary values to and incorporate into a CBA.

The Speech Bubbles CBA could be extended to capture the monetary impacts of reduced likelihood of both falling into and suffering from crime, as well as the associated public finance benefits.

[29] *Written evidence from The Royal College of Speech and Language Therapists - submission to the Justice Committee inquiry into prison reform;* October 2016.
[30] *Prevalence of speech and language difficulties in young offenders,* Bryan, (2004), International Journal of Language and Communication Disorders; 39.
[31] *Prisoners' Voices: Experiences of the criminal justice system by prisoners with learning disabilities and difficulties;* Talbot, (2008) London: Prison Reform Trust.
[32] *Poverty and Crime Review;* Webster and Kingston, Centre for Applied Social Research (CeASR), Leeds Metropolitan University, May 2014

6. Conclusions, limitations and recommendations

6.1 Conclusions

This report focuses on a Value for Money study of the Speech Bubbles programme, using Cost-Benefit Appraisal methods widely used by government and other funding bodies. The report's scope is limited to developing quantifiable measures of impact and translating these into monetised estimates of the net benefits of the programme – a full review of wider benefits is beyond the scope of this work.

The primary measure of impact is the proportion of Speech Bubbles participants lifted out of SLCN due to their participation in the programme. The range for this measure of impact is 8% to 18%. The preferred measure of impact is 8%, from analysis of the minimum score across all six SLC criteria, which is likely to be the best measure of whether children have reached the SLC ability expected of their peer group.

Combining this with Department for Education (DfE) data on children's GCSE results, academic estimates of the causal impact of SLCN on educational attainment, and DfE estimates of the causal impact of 5 or more good GCSE grades on incremental lifetime earnings, a monetary value can be put on the benefit of Speech Bubbles. On the central estimate this is around £174,000 (for 291 pupils on the 2016–17 programme).

Benefits can be compared to costs, which are estimated to be just under £100,000 (for the 291 pupils on the 2016–17 programme). The net benefit in Net Present Value (NPV) terms is therefore £75,000. This is equivalent to £259 per Speech Bubbles participant, or £9,800 for each participant who is lifted out of SLCN.

Expressed as a Benefit-Cost Ratio (BCR), this gives a range of just over 1-to-1 rising to 2.7-to-1, with the central estimate being 1.77-to-1. These NPV and BCR estimates are positive even on the most conservative estimates. On the central estimate for the causal link between SLC ability and educational outcomes, the programme provides a BCR greater than 1 provided that 4.5% or more of participants reach SLC ability in line with their peers as a result of the programme. This is well below the 8% level estimated for the programme.

Overall the analysis suggests that Speech Bubbles is a low cost intervention that delivers Value for Money.

6.2 Limitations

The estimated benefits focus on lifetime earnings. Other benefits (wellbeing, happiness, health, social inclusion) are likely to be correlated to earnings but are not directly measured in this analysis. In particular, the primary aim of Speech Bubbles is to improve the wellbeing of children, and this is not directly measured in the cost-benefit appraisal. However, the work of Dr. Barnes and Professor Layard suggests that the impacts of Speech Bubbles on participant's emotional wellbeing could lead to sustained improvements in their long-term happiness.

The primary measure used to quantify impact is a binary measure; it excludes the value added to pupils who don't pass the threshold, and is therefore a conservative estimate of the benefits of Speech Bubbles. This is because there are no estimates that place a value on the benefit to children who progress but still have SLCN. The binary nature of the benefit also means that the realised benefits will depend upon how close the participants are to the threshold where they pass into the no SLCN category. This means that the impacts could be different if Speech Bubbles were rolled-out to a wider group.

The analysis necessarily uses a forecast of the impact on educational attainment and subsequent lifetime earnings, based on evidence taken from the wider population. In time these projections may be compared with the actual outcomes achieved by the Speech Bubbles children (and their comparator group) to test the accuracy of the projections. At present, this means that there is a degree of uncertainty surrounding the benefits that can be attributed directly to the programme, which has been acknowledged through sensitivity analysis and through the adoption of conservative assumptions within the central impact and BCR reported.

Pupils may slip back and/or those who still have SLCN may improve with more time. Thus the benefits of the Speech Bubbles programme may fade-out over time. In that respect this may be an optimistic estimate of the benefit. That said, UEL's follow-up study on the 2016–17 academic year shows no sign of Speech Bubbles children slipping back in the following year.

6.3 Recommendations

The programme would benefit from a longitudinal study of Speech Bubbles participants and a control group that tracks children's performance through to their GCSE results. This would support a more comprehensive understanding of the longevity of the impact of the programme and may also provide further insight into the breadth of the benefits that are realised by participants. However, given the ethical challenges of maintaining a control group over time, an alternative may be to a monitor participants' SLC abilities and educational attainment relative to their peer group

Furthermore, any future work may benefit from expanding sample sizes. This would allow statistical analysis to drill-down to into analysis of sub-groups of the population (e.g., BME and English as an Additional Language status, or indicators of need such as Pupil Premium or a Statement of Special Education Needs), which may provide valuable insights into which groups of participants may be achieving greater or lesser benefits from participation in the programme.

As part of its commitment to measuring its effectiveness, London Bubble Theatre maintains a record of the performance of children participating within the Speech Bubbles programme (and control group). These anonymised records may be enhanced by inclusion in a non-identifiable database of characteristics and scores against the various SLCN attributes, which would facilitate further analysis and allow for this CBA can be repeated and extended.

The creation of such a database could usefully form part of Bubble Theatre's collaboration with the Royal Society for Arts (RSA) Education Endowment Foundation (EEF), which is funding a Randomised Control Trial (RCT) to assess the effectiveness of the Speech Bubbles programme. This is expected to involve 500 pupils across 25 schools, from September 2018. This is part of a programme of five new trials to find out if different cultural learning approaches can help boost primary pupils' achievement. All five projects will be evaluated by a team of independent evaluators led by the University of London – Institute of Education and the Behavioural Insights Team, looking at the impact on children's learning and development, as well as how different approaches to delivery maximise the benefit to children and schools.

Appendix A Other relevant research into Speech Bubbles

Research into Speech Bubbles

The following studies provide research into the Speech Bubbles programme, including the design of the programme, the scope of its impact and its effectiveness:

- *Everyone's Entitled to a Proper Turn*, Eleanor Samson, M6 Theatre, January 2015.
- *The Arts and Health: Meaning and Fulfilment in an Uncertain Age; a Discussion Paper*; Dr. Jonathan Barnes Sydney De Haan Research Centre for The Arts and Health. Canterbury Christ Church University, 2013.
- *Promoting Social and Personal Well-being in 5–7 Year Olds Through the 'Speech Bubbles' Drama Project*; Dr. Jonathan Barnes. Sydney De Haan Research Centre for The Arts and Health. Canterbury Christ Church University, July 2012.
- *Speech Bubbles: The Art of Building Creative Relationships: Developing Drama Workshops For Small Groups of Referred Children Aged 5–7 Years*; Paula Robinson, Birkbeck, University of London, February 2010.
- *Speech Bubbles: The Art of Building Creative Relationships: Developing Drama Workshops For Small Groups of Referred Children Aged 5–7 Years*; Summary by Adam Annand, London Bubble, February 2010.
- *The Impact of 'Newham Speech Bubbles' on Pupil's Communication and Staff Practice: Perceptions of Teaching Staff at an East London Primary School*; Dissertation by Jo Afful, UEL, 2016.
- *An Exploration into Dramatic Play and Story Drama as a Tool for Supporting Children from a Socio-disadvantaged Background with Speech, Language and Communication Needs*; Dissertation by Mark Lloyd, University of South Wales, 2014.
- *Speak Out: Practice Sharing Report*; Marigold Hughes, February 2012.
- *Evaluation of Speak Out*; Fidelma O'Neil, 2009.
- *A chapter about Speech Bubbles is included in; Drama to Inspire*; Ed by John Coventon; Pub Trentham Books, Oct 2011.

Selected summary of primary age interventions

Summarised below are a sample of existing interventional programmes in education that are designed to improve numerical and literacy skills amongst young children. These provide useful reference points for comparison with the Speech Bubbles programme.

Numeracy Recovery Programme

The programme addresses arithmetical difficulty in pupils aged typically between 6 and 7, using a componential approach based on counting procedures, symbolism, estimation, and word problem solutions. Pupils receive one-to-one sessions for 30 weeks, and are identified by their teachers as having problems with arithmetic. Dowker (2004) shows that the 146 pupils in the intervention group showed significant improvement across these areas.

Numbers Count

Supporting the national curriculum, Numbers Count is designed for those struggling with mathematics up to year 8. Three 30 minute sessions are delivered on a one-to-one basis through a specialised teacher. Delivery focuses on numbers, calculation, and developing numerical aptitude, aiming to raise pupil performance to Level 2C by the end of Key Stage 1. Torgenson et al (2011) found pupils achieve higher mean PIM scores immediately after invention; this is equivalent to 7 weeks improvement leading to an extra 9% of pupils working at the KS1 level. Torgerson concluded there is a clear short-term impact on pupils, but long term lasting effects are inconclusive.

Every Child a Reader

A programme designed for pupils with the lowest literacy levels in their first years of school. Pupils are taught on a one-to-one basis for 30 minutes a day by a specialised teacher for 20 weeks. Reading and literacy issues are tackled during the intervention, including deciphering English text improving silent reading, and encouraging pupils to start new books. Tanner et al (2011) found strong evidence that Every Child a Reader improves reading at KS1, ultimately resulting in a positive impact on reading and writing attainment in the short term. They suggest that writing at this level improves between 4–6 percentage points during the programme's 2nd and 3rd years of delivery.

Catch up programme

Catch up is designed for pupils aged between ages 6–14, and assesses them based on both their attitude and skills to reading. Delivered through a book based approach, the programme uses word recognition and language comprehension processes across varying level of text complexity. Clipson-Boyles (2000) provide an in-depth level of research in to the programme, showing that pupils make an average gain of 8.6 months teaching after 10 weeks. In addition to this, 92% of the children receiving support at age 7 continue to participate fully at the standards required by the national curriculum.

Literature summary and conclusions

The literature indicates that interventional programmes have had overall positive short term impacts on pupil learning in the context of numeracy and literacy achievement. There is however less conclusive evidence that programmes deliver long lasting improvements. A common theme amongst these programmes is the focus on cooperative learning, and pupil engagement.

The drama based initiative offered by Speech Bubbles focuses on child engagement and cooperation. From this perspective, the Speech Bubbles programme uses methods similar to existing programmes and might therefore be expected to have similar positive impacts on pupil learning. Further to this, age demographics of pupils considered fall in line with those at Speech Bubbles, suggesting there could be a similar impact of the programme on overall performance as seen with existing interventional initiatives.

EY | Assurance | Tax | Transactions | Advisory

About EY

EY is a global leader in assurance, tax, transaction and advisory services. The insights and quality services we deliver help build trust and confidence in the capital markets and in economies the world over. We develop outstanding leaders who team to deliver on our promises to all of our stakeholders. In so doing, we play a critical role in building a better working world for our people, for our clients and for our communities.

EY refers to the global organization, and may refer to one or more, of the member firms of Ernst & Young Global Limited, each of which is a separate legal entity. Ernst & Young Global Limited, a UK company limited by guarantee, does not provide services to clients. For more information about our organization, please visit ey.com.

Ernst & Young LLP

The UK firm Ernst & Young LLP is a limited liability partnership registered in England and Wales with registered number OC300001 and is a member firm of Ernst & Young Global Limited.

Ernst & Young LLP, 1 More London Place, London, SE1 2AF.

ED None

EY-000059113.indd (UK) 04/18. Artwork by Creative Services Group London.

ey.com/uk