Modelling cost-benefit analysis in a data-scarce environment: developing a heuristic tool

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Abstract

This paper addresses a concern for those involved in the implementation of pilot studies and innovations in any professional service setting. For innovations in which the scales of implementation are small and at an early stage, and where as a consequence performance and impact data does not yet exist, it is difficult to make a persuasive case for it in terms of cost savings to the parent service. Whilst generic statistics will usually exist that are relevant as baseline, contextual or tangentially related data, these will often not be used in anything other than in a background and discursive manner. This paper argues that this often presents a missed opportunity for those lead professionals responsible for the success of pilot initiatives and concerned with their promotion, roll-out and mainstreaming. Using notions such as feasible benefit and plausible scenarios, informed by professional judgement, this paper, argues that cost-benefit modelling can provide the basis for informed professional discussion regarding possible savings to the service, as well as for the design of subsequent cost-benefit analysis once tangible effects begin to appear. This approach is illustrated by a discussion of a cost-benefit modelling exercise developed for a project that involved bringing parents and their babies into school classrooms for a range of hoped-for curriculum-linked and social and emotional behavioural outcomes.

Key Words: cost-benefit analysis; service innovation; small-scale project work; community programmes; involving parents in services

Introduction

Service initiatives are increasingly subject to cost-benefit audits for the purposes of initial or continuing government support. The question at the heart of any public sector cost benefit analysis is: *Do savings to the public purse that result from the initiative justify the expenditure on the programme of work involved?* The ways in which this question is framed with respect to a particular initiative or intervention, and the specific judgements formed based upon cost-benefit calculations, inevitably reflect its social and political context, design characteristics and the local and national agendas informing it. They are also affected by value judgements based upon the worth attached to the effects of a given programme by government and public opinion, irrespective of the financial balance sheet. Cost-benefit analysis, then, rarely conforms to an "ideal-case" scenario, where decisions regarding sustainability are based purely on a quantitative financial calculus. In reality, the interpretation and ultimate meaning of cost-benefit assessments are connected to *perceptions* of social benefit (Dockins *et al.* 2002). This kind of understanding has been incorporated into some approaches to cost-benefit analysis. One example of this is "social auditing" in which service-user experience, stakeholder dialogue and community participation are incorporated into programme evaluations. Another is the "community-benefit measurement" approach that is becoming influential in the US, for the purposes of assessments of tax-exemption status for charities and the non-profit hospitals sector (White 2008).

Approaches to cost-benefit analysis that acknowledge social benefits have become important in public sector settings. As opposed to commercial and business-based models of calculating cost-benefits "social cost-benefit analysis" (SCBA) seeks to include the total benefits of government and public expenditure at the community, regional and national scales. SCBA models will also tend to focus upon savings and investments at the supra-individual level, the distributive effects of government spending and "merit wants" that, whilst difficult to quantify in terms of consumer satisfaction, are nonetheless seen as priority provisions for the public good. Intangible outcomes and benefits that do not convert straightforwardly into financial-metrics also are considered in such socially focussed cost-benefit studies. SCBA approaches have been used widely in assessments of impact of initiatives and programmes in the schools system in the US and the UK (*e.g.* Pianta *et al*., 2009; Belfield *et al.*, 2006; Barnett and Masse 2007).

The application of cost-benefit analysis to public policy areas has been criticised on methodological as well as ethical grounds. Ackerman (2008) for instance, with government expenditure on climate control in mind, has listed "six flaws" in cost-benefit analysis that can be applied to government spending. These include: "pricing the priceless" (placing monetary value on goods and services crucial to human wellbeing and happiness); "troubling trade-offs" (assuming equivalences of value between quantifiable and non-quantifiable outcomes); "uncertainty and precaution" (the tendency to reach for definite quantification of uncertain variables; "distorting the future" (assessing long-term effects with unjustifiable assumptions); "exaggeration of costs" (a tendency to estimate long term costs upon the basis of costs at one point in time); and "partisans and technicalities" (the presence of bias in the interpretation of complex technical data). Studies that seek to achieve "total" and long-term cost-benefit assessments will be especially vulnerable to some of the pitfalls outlined in Ackerman's list, introducing an unavoidable element of in-exactitude, or 'fuzziness', into cost-benefit considerations, where often expectations of fiscal precision prevail. Another cause of lack of precision for cost-benefit analysis—and one that the case study of this paper is designed to address—is the absence or sparse nature of relevant data due to poor evaluation monitoring, small-scale pilot-implementation or early-phase and pre-impact status for service innovations. Cost-benefit analysis or estimates are usually not attempted in such situations.

Drawing upon a study of a small scale service pilot innovation involving parent-carers and babies in schools, this paper argues that this represents an unnecessary gap in the design and development in such service innovations that can be addressed using a "semi-systematic" mode of cost-benefit modelling. Following a survey of the ways in which cost-benefit analysis has been approached with respect to service innovations involving parent-carers, a semi-systematic methodology for cost-benefit modelling will be offered that draws upon the experience of evaluating a small scale schools-based project in an English city. This methodology identifies criteria that can be mobilised to frame cost-benefit considerations with some degree of rigour despite the absence of significant impact data.

Cost-Benefit Analysis in Service Innovations Involving Parent-carers

In some parts of the industrialized world—and especially in the US—financial cost-benefit analysis is now a well-established approach for financial audit, and is frequently found as an element in the design of service innovation delivery, implementation and evaluation. A significant amount of work has been done that looks at the costs and benefits of education, health and social interventions that involve parent-carers (though to varying degrees of rigour). This work has been summarised in a wide ranging UK survey conducted by the research group *London Economics* for the Department for Children, Schools and Families (DCSF) (now the Department for Education). The framework provided by this study will be discussed in more detail following an outline of the

research presented here and a consideration of how "cost-benefit" can be understood for the purposes of this study.

There is a growing awareness of the beneficial effects of involving parent-carers in programmes designed to support children and young people. One location for such programmes is the family home. Studies of home-based interventions have found that, though a certain level of demand is placed upon parent-carers through such approaches, this is offset by beneficial effects, providing that resources are adequate (Trudgeon and Carr 2007). Interventions based around home visits can be especially useful in situations where difficulties of community access resulting from mistrust, or misperceptions, of professionals are an issue (Smith and Randhawa 2006). Where changing child behaviour is the chief aim of an initiative, parent-carer involvement has been shown to be important by many studies. This has been identified as being a significant factor, for instance, in programmes designed to improve the diets of children (Wardle *et al.* 2003) and behaviour at school (Rogers *et al.* 2008). Recent work has also shown that improving parent-carer engagement with the child's school leads to improved relationships at home and greater parent-carer confidence with the child.

Whilst parent-carer involvement can improve the effectiveness of programmes for the child, it may also produce outcomes for parent-carers themselves. Parent-carer participation in early intervention work for children with Autistic Spectrum Disorder, for example, has been shown to lower stress levels for the parent-carer, as well as helping them become better informed about their child's condition (McConachie and Diggle 2007). Furthermore, the connection between treatment costs and the parent-carer's experience of trying to access treatment for their autistic child, (and thus their perceptions of the relevant services,) has been highlighted by Jacobson and Mulick (2000). There is substantial literature also that highlights the importance of including parent-carer perceptions and perspectives in service delivery. A large part of this literature derives from studies conducted in the health agency settings. Assessments of the risks of mental health problems in the child, for instance, can improve the accuracy of early detection and, as a result, lead to significant cost-benefits (Dwyer *et al.* 2006). Group work with parent-carers has also been shown to improve the long-term management of childhood asthma (Hederos *et al.* 2005; Clark *et al.* 2002). Another study has found that where parent-carer perspectives are properly taken into account, a more integrated service can be achieved between agencies based upon improved communications (Smith and Daughtrey 2000).

Positive outcomes for various aspects of community relations also appear to flow from parent-carer involvement in services. One recent study looked at a programme that revolved around a "parenting newsletter" that provided information relating to the different stages of a child's life. This UK initiative was based on a similar programme in the US. The newsletter became highly valued by parent-carers and was reported to be a more valuable source of information than even family and friends (Waterston and Welsh 2007). The longer term effects of parent-carer involvement have also been an area of interest for research. In a follow-up study of the Community Mothers programme in Ireland, the work of "volunteer mothers" in disadvantaged areas was evaluated for its impact after seven years. This study showed that the programme was still having positive effects in the areas of child accident rates; library visits; feelings about being a mother and of parental pride; parent-carer attention to homework; attitudes to physical punishment and completion rates for child immunisation (Johnson *et al.* 2000). Parent-carer involvement in Sure Start projects has also been shown to improve parenting skills and overall confidence in ways that are likely to be beneficial for the parent-carer and child alike in the longer term (Boot and Macdonald 2006).

Finally, the Chicago Longitudinal Study—significant for its large scale in terms of numbers of children included, long time frame, statistical rigour and comprehensiveness with regard to educational outcomes—produced strong evidence that parent-carers' involvement in early interventions does indeed produce lasting effects for later school competence. Reporting after thirteen years from the commencement of the interventions under study, researchers revealed that the element of parent-carer participation was, according to teacher-ratings, strongly associated with improved reading ability, lower rates of keeping back pupils ("grade retention"), and a reduced need for special education placements (Miedel and Reynolds 1999; Reynolds *et al.* 2002).

Whilst acknowledging the numerous ways in which a wealth of qualitative and quantitative studies have demonstrated the links between parenting—parent characteristics (employment status, paternal income, educational level *etc*.) and parent behaviour (disciplining styles, communication, home learning environment *etc*.)—and educational and social outcomes for the child, the previously mentioned 2007 *London Economics* report also highlighted the paucity of studies that consider the economic cost-benefits of interventions involving parent-carers. Nonetheless, the authors produce a useful typology of the cost-benefit studies revealed across their selection of 144 articles. This was organized into a four tier classification:

> • ***Tier 1*** *- Qualitative identification of (main) costs and benefits only (e.g. increased participation);*
> • ***Tier 2*** *- Quantitative assessment of benefits using subjective outcome measures (e.g. behavioural scales) or using less rigorous methodologies;*
> • ***Tier 3*** *- Robust non-monetary quantification of main costs and/or benefits (e.g. 4% increase in the likelihood of children aged 16 continuing in full time education);*
> • ***Tier 4*** *- Monetary quantification of (main) costs and benefits where possible (e.g. 20,000 more young people staying on in full-time education, where lifetime benefit of staying on was £100,000 per person set against the total policy or initiative costs of £200m).* (London Economics p. 6)

This classification will be discussed in the next section.

As alluded to above, the authors make a distinction between "parent characteristics" and "parent behaviour." They see in this a source of complexity in attributing cause and effect for intervention outcomes. This is because many factors in each category are *endogenous* to the parent, raising the problem of causal factors operating that are not recognized or apparent with programmes that focus on one factor in isolation to others. For example parent-carers on low incomes may also live in households with higher levels of relationship strain or have fewer qualifications. Moreover, factors connected to parent characteristics and those connected with parent behaviour will also interact with one another. Long working hours for the parent, for instance, may also mean that they have less time and energy to spend helping children with their homework from school. As the authors are keen to emphasise, these complexities raise serious issues for questions of attribution with evaluations of parent involvement in services as well as difficulties for cost-benefit analyses.

The authors of the survey give five examples of evaluations of parental involvement interventions, with some assessment of the cost-benefit issues related to each. These are referred to here in a summarised form.

The Peers Early Education Partnership. This Oxfordshire-based initiative involved group work with parent-carers and home visits by nurses with children aged birth to five. Benefits were in

the areas of child cognitive development and improvements in care-giving and parent-child interaction.

Family Learning. These are UK based schemes that aim to bring family members together for improved literacy and numeracy. A lasting improvement effect was apparent for children's literacy skills. One evaluation showed that nearly half of the participating parent-carers felt that the scheme had led to their being more involved with their child. Improvements in school performance and child behaviour were also noted.

Bookstart. Bookstart in the UK aims to improve literacy and parent-child interaction by providing books free when the child is 7-9 months old. Non-rigorous evaluations have indicated improvements in later attitudes to reading, teacher assessments of ability and test scores at Key Stage 1.

Parent-Child Home Programme. This US-based programme worked through home visits by volunteers and aimed to boost the quality of verbal interaction between the parent-carer and the child through reading and play activities. Long-term evaluation demonstrated positive outcomes for graduation rates against the control group.

Home Instruction for Parent-carers of Pre-school Youngsters. Now operating in many countries around the world this programme seeks to improve the child's readiness for school. It focuses upon the home as a learning environment, parent-child interaction and the skills of the parent-carer in supporting learning. Evaluations have highlighted beneficial effects in the areas of school suspension rates, classroom behaviour and test scores.

In their discussion of the cost-benefit analyses of these programmes, the authors again stress that few studies have been robust in having measured in-put against out-put monetized cost savings. In fact, of the list given above, just two have been subject to this kind of analysis. Key to the economic analyses that have been carried out, however, has been a careful mapping of the intended or feasible outcomes of the intervention. For the purposes of the evaluations mentioned in this section, the following have been important: crime reduction; lower substance abuse; reduced teen-aged suicides; reduced child abuse or neglect; and, reduced domestic violence. The authors caution that the listing of social costs for these areas of intervention can be misleading in the selection of some factors over others, and in the exclusion of certain benefits due to difficulties of monetisation. Nonetheless, such a mapping exercise is essential to any cost-benefit analysis. Once done, however, benefits can indeed be measured against the investment costs required.

The programme

The study that forms the basis of this paper relates to an initiative that was run in eight primary schools and one secondary school in a deprived urban part of the UK during the 2007/8 school year. The project involved parent-carers bringing their babies (all aged under one year) into class-room to talk to pupils about aspects of babies and their care. Between six and eight of these sessions took place for each school across the year. The aims of the initiative were cross curricular and intended to promote pupils' social and emotional development, the specific purposes of each session depending on the current needs of the teacher and pupil group.

Due to the short time-scales involved for the project, as well as the very small-scale nature of the initiative, project managers faced a challenge in terms of making a persuasive case for more mainstream support and "roll-out" across the city's school service. Indeed, such a situation usually results in no attempt whatever being made to consider cost-benefits in anything more than the

intuitive manner of a "professional-hunch." As part of a research project that had been established around this initiative I was asked to consider how a cost-benefit analysis might be conducted despite there being very little available quantitative, let alone financial, data available with respect to impact or cost savings. This research task then involved gathering what data was available even if this was of merely generic relevance, envisioning plausible scenarios in which the initiative might be of benefit and running speculative cost-benefit calculations on that basis.

One further difficulty in producing a convincing case for mainstreaming this initiative, let alone a credible cost-benefit assessment, was the vagueness of the aims. Senior and executive level managers usually described the introduction of the programme as relating to pupil motivation, pupil engagement and positive social outcomes. Nowhere, however, had these been laid out as clear, quantifiable and therefore measurable targets. Rather the programme had been introduced in a spirit of experimentation inspired by the example of one similar programme based in the US. The education and health professionals who became involved had been told that this was an "opportunity to develop something new" and to "expect the unexpected." In fact class-room teachers quickly set their own rule-of thumb goals based upon what the programme had to offer in the areas of motivation for learning and social inclusion.

Methodology

Interviews

The research for this study comprised eleven interviews with education professionals involved in this initiative. Of these, eight were classroom teachers with direct initiative experience in their schools, one was a head-teacher in whose school the initiative was running and two were senior education administrators with responsibility for the relevant schools. One focus group with five of the classroom teachers directly involved in the programme also took place. The interviews were semi-structured and modelled on the four cost-benefit modelling criteria given below.

Cost-benefit modelling criteria

The research discussions focused upon the following criteria:

C*ontextualisation*. Participants were asked to contextualise the initiative in terms of how it related to the professional and service environments in which they worked. Decisions relating to time-frames over which the cost-benefit modelling exercise was conducted (*e.g.* the school year), the range of different types of professional expertise that needed to be included, the perceptions of service users, *etc.* were all likely to be influenced by such contextual information.

Plausible scenarios. These were constructed using information provided by the education professionals involved. They helped to illustrate the ways in which potential cost savings could be made as well as again providing some guidance as to which types of relevant generic data might be available.

Feasible benefits. This drew upon a consideration of the ways in which the initiative was thought likely to have positive effects in the judgment of the professionals involved. Used as a selection criterion this then guided decisions regarding the selection of the particular costs chosen as inputs or, conversely, ruled out as relevant or likely outcomes.

Impact estimate. For this criterion the participating professionals were asked to describe their sense of the "scale" of any likely effect. The participants were asked to take into account the small-scale nature of this pilot initiative, the small number of schools involved, and the limited resource base with which it was working. They were then asked to imagine how any positive effects of the initiative would work for a mainstreamed, "whole-service" application of the

initiative involving all the schools in the local service, in order to anticipate problems of up-scaling such a model. Finally, participants were asked if they could put a notional "percentage effect" on their estimates.

For the purposes of developing a cost-benefit model for this research task, a brief reflection showed that all four of the tiers identified in the classification offered by the *London Economics* survey identified in the introduction, could be applied.

Tier 1 could easily be applied through a simple "before and after implementation" comparison of the effects of the project in terms of parent participation, child welfare, and pupil engagement. Such a model would need to draw heavily on professional opinion and judgment as to the value-added outcomes generated and the total investment involved.

Tier 2 could be applied through the use of a range of assessment scales used by various professional groups. An obvious example in connection with this project would be the teacher assessment scales used by teachers for pupil attainment. A plausible approach here would be to base cost-benefit analysis upon scaled teacher-assessments across selected curriculum areas over the course of a school year for comparison with previous, non-project, years. The input costs could then be evaluated against any changes in performance.

Tier 3 could be applied through a careful mapping of feasible outcomes in relation to services. Available data on accessing services, for instance, could be scrutinized for any changes that occur whilst a programme is running in an area. If it is the case, for example, that by being involved, parent-carers are more likely to access the services available to them, then this ought to show in the data collected by the relevant agencies. The usual issues to do with attributing cause and effect would be present, and interpretation of correlations would be necessary. Nonetheless, an effect, if it is real, should show in the data, allowing for an impact assessment of the investment into the initiative.

Tier 4 represented the most relevant of the four classifications in terms of executive budget management. Assuming that the relevant financial data was both available and accessible, it seemed possible to construct a reliable cost-benefit model for the project. This then became the focus of this cost-benefit modelling exercise. The crucial requirement for this kind of analysis is an accurate mapping of the relevant agency costs in relation to the feasible outcomes of the programme.

For the purpose of modelling cost-benefit analysis in relation to this project, however, the algebra of cost-benefit analysis is first considered as it might be developed for this project. Adapting a conventional formula provided a simple starting point:

$$\mathbf{V}_C = \frac{\sum_{j=1}^{j=n} \mathbf{S}_j}{\mathbf{C}}$$

Where:

$\mathbf{V}_C$ = the value created for any stakeholder (*e.g.* local authority) across the whole life-cycle (or part) of a programme;

$\mathbf{S}_j$ = satisfaction (measured as an input variable 'j') in terms of tangible (and intangible) benefits;

C = the cost of the programme over its whole life-cycle (or part)**.**

Translating this into terms that relate to the project the formula is adapted as follows:

$\mathbf{V}_C$ = the value ratio of costs to savings to the local authority Children's Services budget produced by the programme over its life-cycle (or part);

$\mathbf{C}_P$ = the implementation and running costs of the project;

S = savings accrued as a result of the programme. (For the purpose of representing "satisfaction" in monetized terms this became Δ **Ć);**

'j' = categories of budgetary expenditure over and above normal social entitlement for the child.

The project formula now appeared as:

$$\mathbf{V}_C = \frac{\sum_{j=1}^{j=n} \Delta \mathbf{Ć}}{\mathbf{C}_P}$$

Problem constraints

The vagueness of the aims of the programme has been noted. This raises a difficulty for the problem constraints that set the terms of this cost-benefit modelling exercise.

Classroom teachers were very forthcoming about the kinds of pupil-benefits and whole-class-benefits they saw when they implemented the programme sessions. As outlined in the next section, they tended to be willing to speculate about the possible future benefits should the programme be continued and extended. After considerable discussion and rumination on various aspects of the programme they were also willing to produce notional percentage estimates of impact for the programme. Importantly also relevant contextual educational data was available from the local education authority that was aggregated and organized in ways that were useable for the evaluation and that were accessible for this study.

Results

The education professionals **contextualised** their involvement in the programme by describing a number of agendas and challenges that were shaping their professional environment and roles. Key examples of these were the following:

1. An increasingly significant social remit to the work of "extended" schools for which classroom teachers are required to work closely alongside of health professionals, social workers, education psychologists, the police *etc.;*

2. More specifically, a government agenda known as *Every Child Matters*, under which aspects of the welfare and development of children (health, child safety, child happiness, sense of contribution and economic well-being) are seen as a part of the role of the school along with their primary remit of educational outcomes;
3. Challenging pupil behaviour exhibited within and outside of the classroom and school;
4. Low levels of engagement-for-learning shown by significant numbers of pupils;
5. The need to improve school-parent and school-community relations in some cases.

Participants described **plausible scenarios** for the ways in which the project could contribute to positive outcomes for pupils. Classroom teachers agreed that the project was beneficial for pupils in the area of personal, social and emotional education curriculum (PSHE). On the whole, pupils were said to respond well to the presence of a baby in class and, as they get to know it as "their" baby, to come to identify with it, looking forward to its visits with the parent and, as a result, growing in their caring and affective capacities. Across the eleven education interviews seven plausible scenarios were described. Indeed these were, in the main, based upon actual observations of how the initiative had worked in the classroom and so, in fact were more extrapolations of things that had indeed occurred. A short summary of each will be given:

1. Pupils in a difficult year group that have shown challenging behaviour become responsible and well behaved in the presence of "their baby" leading to longer-term improvements in overall class conduct and manageability for the teacher;
2. The engagement created by the "baby sessions" produces high quality curriculum content in the areas of PSHE, art-work, numeracy and music;
3. Moments of co-learning between pupils and the teacher occur as the teacher considers their classroom delivery with a new perspective that is influenced by the "baby sessions;"
4. A child with significant care responsibility at home feels more able to talk about how things are at home in the presence of the baby leading to their problems being appreciated more sensitively by their peers;
5. An "equalising" effect occurs across the classroom as pupils who are normally more boisterous exhibit calmer behaviour in the presence of the baby, and those that are normally more quiet feel more able to speak up to ask and answer questions;

6. Pupils have become receptive to positive health-education messages regarding diet, physical activity *etc.* during "baby sessions" and take these home to their parent-carers;
7. Relationships between pupils improve as attention is drawn to affective themes such as caring, empathy, helping and so on, leading to reduced levels of classroom bullying.

When asked to reflect upon how the positive effects of the programme might map on to school budgets to indicate what **feasible benefits** might flow from the programme in terms of cost-savings, a number of elements from the Education Budget Statement of the local Children's Services were highlighted. From the general schools budget these education professionals thought that areas of potential cost savings were in the areas of provision for pupils with special educational needs (SEN); support for inclusion; the costs of Pupil Referral Units; and the costs of behaviour support services. From the special education budget they selected the costs of the educational psychology service; the costs of SEN administration, assessment and coordination; and those of monitoring SEN provision.

When asked to put a notional quantitative **impact estimate** on the possible scale of savings resulting from the programme in a fully rolled-out and whole-service application, a wide range of

responses were given from 100% (in the case of one participant) through to the far more realistic "roughly 10%." Most estimates were between 30% and 10% given as reasonable—though naturally speculative—conjectures for the scale of impact that might be achieved for the programme overall, and for each of the areas of potential savings.

Discussion

Caution was obviously needed for any conclusions that were to be reached on the basis of this study. No strong claim could yet be made for the project in terms of any *proven* effect. The areas of feasible benefit highlighted for the areas of health and education for instance are also hugely complex with regard to causal factors, and no one intervention can be expected to change the social, health or educational status for pupils or communities in any simple or immediate manner. Considering the cost-benefit modelling that follows, it also needs to be understood that budget allocations for such areas as special educational needs or educational psychology cover a wide range of areas of need, many of which lay far beyond any expected, feasible or even potential effect produced.

All the above caveats notwithstanding, it remained reasonable to conjecture—where positive assessments were forthcoming from classroom teachers—that benefits could result for pupils in some aspects of these areas of need. Taking benefits in PSHE-related areas as representing a plausible scenario and taking an aggregate view across the local education service, it is then possible to use the available budget allocations for the city's school service to provide a rough guide to what sorts of savings might accrue from the project.

Given the notes of caution above regarding the complexity of the areas of need which are identified as feasible outcomes, the assumed effect for pupils was set low. Indeed it was set at the lowest notional estimate offered by educational professionals of there being a potential "10% effect." For the purposes of this exercise then, a 10% effect in the areas of feasible benefit is assumed. Whether this was taken to mean a reduction in the numbers of children requiring support over and above their normal educational entitlement, or of the pressures and demands upon the service in other ways, this proportional saving was used to calculate a plausible and professionally informed estimate of savings in direct monetary terms as well as the cost-benefit ratio ($\mathbf{V}_C$).

Combining the notional impact assessment provided by the educational professionals who participated in this study with a selection of budgetary elements informed by their context, scenario and feasible benefit judgments, a cost-benefit model for the project has been constructed. Table 1 gives budgetary data for all school types, drawn from the 2007/08 Education Budget Statement (Section 52 of the Schools Standards and Framework Act 1998) for the area's Children's Services for the provisions that can be considered as covering the feasible potential benefits. These figures were then re-calculated in the second column for an "averaged" cost for seven schools.

Table 1: Education Budget Statement (Section 52 of the Schools Standards and Framework Act 1998)[1]

Category	**2007/08 allocation** (for 181 schools - all categories)	**Averaged allocation** (for seven schools)
Schools budget	£3,446,194	£133,278
Provision for pupils with SEN (including assigned resources)		

Provision for pupils with SEN (including non-assigned resources)	£1,773,803	£68,600
Support for inclusion	£96,067	£3,715
Pupil Referral Units	£1,755,757	£67,902
Behaviour Support Services	£1,282,271	£49,591
Total	*£8,354,092*	*£323,086*
Special Education		
Educational psychology service	£576,062	£22,279
SEN administration, assessment and coordination	£51,315	£1,985
Monitoring SEN provision	£51,315	£1,985
Total	*£678,692*	*£26,248*
Access		
Behaviour Support Plans	£69,594	£2,691
Education welfare service	£1,752,930	£67,793
Total	*£1,822,524*	*£70,484*
Total costs to Children's Services	**£10,855,308**	**£419,819**

[1] School types included in the budgetary breakdown are: nursery (5); primary 134); secondary (28); and special (14). There are also two local academies but they receive their funding direct from DCSF and are not included in the local service budgetary data. This information was provided by the Financial Management Service for the local city council on 15 July 2008.

A figure of seven schools had been chosen based on the available data for the costs of the project. These costs are given in Table 2.

Table 2: Discount Network Rates – based upon 1 secondary school & 6 primary schools and a total of 16 accredited staff[1]

	Connect[2] *version*	*Connect + single user*	*Connect + site licence*
Year 1	*£18,500.00*	*£19,500.00*	*£20,500.00*
Year 2	*£10,000.00*	*£10,000.00*	*£10,000*
Year 3	*£10,000.00*	*£10,000.00*	*£10,000.00*
Total	-	-	**£4,500.00**

[1] Information provided by the relevant consortium partner organisation on 19 June 2008.
[2] The project program was housed on Mind Jet Connect – an online mind mapping system.

The expenditure for the site license for seven schools over three years (£40,500) could now be assessed against the potential gains to the service using real-world data from the Education Budget Statement for the local schools system. Cost-benefit calculations, based upon a notional 10% effect aligned against appropriate elements within the Education Budget Statement are given in Table 3.

Table 3: Cost-benefit calculations

Category	**Notional monetary saving for seven schools** (one year)	**Notional monetary saving for seven schools** (three years)
Cost savings to the schools budget assuming a 10% 'project effect' for seven schools		
Provision for pupils with SEN (including	£13,328	£39,983

assigned resources)		
Provision for pupils with SEN (including non-assigned resources)	£6,860	£20,580
Support for inclusion	£372	£1,115
Pupil Referral Units	£6,790	£20,370
Behaviour Support Services	£4,959	£14,877
Total	*£32,309*	*£96,926*

Cost savings to Special Education assuming a 10% 'project effect' for seven schools		
Educational psychology service	£2,228	£6,684
SEN administration, assessment and coordination	£198	£595
Monitoring SEN provision	£198	£595
Total	*£2,652*	*£7,874*

Cost savings for access assuming a 10% 'project effect' effect for seven schools		
Behaviour Support Plans	£269	£807
Education welfare service	£6,779	£20,338
Total	*£7,048*	*£21,145*

Total cost savings for seven schools $\sum_{j=1}^{j=n} \Delta \acute{C}$	**£41,982**	**£125,946**

These calculations revealed a plausible cost saving of £125,946. Using this notional estimate of a cost-benefit saving to the service for seven schools over three years $(\sum \Delta \acute{C})$, and given a cost of £40,500 (including training and software license for seven schools over three years) (C_P), this discussion can now return to the cost-benefit formula:

$$V_C = \frac{\sum_{j=1}^{j=n} \Delta \acute{C}}{C_P}$$

to arrive at an estimate of the cost-benefit ratio to the service of this small scale project, premised upon a 10% effect.

$$\text{So,} \quad V_C = \frac{£125,946}{£40,500} = 3.1$$

In other words, for every £1 spent on the project in this scenario, it was reasonable to conjecture that £3.10 would be saved by the education service.

Although $\mathbf{V}_C$ value of 1:3.1 was impressive for a scenario premised upon a 10% effect in selected budgetary areas, the plausibility of the scenario itself can of course be called into question. There is reason to believe, however, that the real impact of the project could prove to be better than this. This speculation is based upon three considerations.

The first is that teacher assessments were very positive indeed and suggested some justification in going further than simply acknowledging a feasible benefit in areas connected to PSHE. Classroom teachers and the professionals who had been supporting the project sessions, as well as the parent-carers involved in the programme, had actually reported an "amazing" effect on pupil behaviour in the presence of the baby. Pupils were described as becoming highly attentive to the baby's every movement and gesture, and to have shown great care and regard towards it. Some teachers also reported an effect over time, as pupils looked forward to the baby's visits and then reflected upon each session after it had happened.

Secondly, it should be noted that the use of aggregate data for the notional calculations given above has a mathematical averaging *down* effect. This results from the fact that the expenditure for different budgetary categories would not in fact be evenly spread across schools in the city, but rather, would vary according to the needs of an area and its current cohort of school-aged children. This meant that, where the project was introduced into schools on the basis of assessments of need in the areas of educational welfare, special educational needs or behavioural support, the budget costs were likely to be higher than aggregated data would suggest, and the cost-benefit ratios achieved through successful intervention were therefore also likely to be greater.

Thirdly, a similar point applies in terms of the different categories of school. Again, the use of aggregate data for all types of school, for reasons of brevity and analytical simplicity, was distorting. In reality of course, allocations would not be evenly apportioned across special schools, non-special schools and out-of-school provision. The simplification involved here, however, was again one that favoured an optimistic assessment of the cost-benefit potential of the initiative, and for the same reasons as were given above with respect to school social-demographic profile.

The estimate given here for cost-benefits then, was a conservative one. With the consistent application of the programme, in schools targeted according to need and type, and with proper professional support, it seems likely that the savings in the longer term resulting from the initiative, could indeed be greater than those suggested by these figures. Moreover, as the initiative became embedded it also seemed likely that year-on-year costs would settle and become stable, and that cost-benefits would improve accordingly. This may be all the more true if "whole-school" effects are taken into account, in a situation in which more than one project programme—with their own parent, baby, pupil groups and accredited teacher—were involved in the school.

This is a much-simplified scenario premised upon a 10% effect on the costs to services in the areas of the social and educational needs of pupils that were highlighted as ones of likely effect by classroom teachers. Even on a modest estimate of the feasible benefits of the project in the areas of pupil behaviour, emotional well-being, and possibly also, motivation for learning, it seems reasonable to suppose that savings would be achieved. A comprehensive cost-benefit analysis of the real effects of the project for education budgets would need to be part of a much fuller evaluation. In such a costing exercise the impact of the programme within particular schools would need to be assessed through a scrutiny and analysis of the detail of different strands of school and Children's Services spending over time. Moreover, this kind of study would need to be conducted

with a focus on pupil groups in order to allow meaningful comparisons to be made with previous year groups and/or with comparable "non-engaged" pupil groups. At a different scale of analysis "whole school" effects could be assessed, particularly in schools in which more than one group was running.

Irrespective of financial calculations, and in the assessments provided by classroom teachers, by supporting professionals and parent-carers, this was a hugely worthwhile initiative that deserved to be supported by agencies. Indeed, with respect to considerations of the service cost-savings that could be achieved through this project, it is worth highlighting, in our final reflections, the ethical implications of coming to rely on this kind of service innovation as any kind of *replacement* of existing provision in its areas of feasible benefit. It should never be forgotten that at the heart of this model of practice there must always be a baby and a parent who are enjoying the experience of being involved. A baby is not, of course, an educational resource. Equally, a parent who comes to rely on their involvement in this kind of programme in any sense at all is a parent for whom the boundaries between the public realm of services and the private realm of family life have become blurred.

This said, where any initiative is able to reduce pressures upon a service as well as (more importantly) contributing positive outcomes for pupils, parent-carers and professionals, then this is all to the good. I have attempted to offer plausible scenarios pointing to the kinds of savings that might result from the implementation of such innovations in schools, and possibly other service settings. By describing the ways in which available generic data can be selected for use in a modelling exercise that is grounded in plausible scenarios and professionally informed judgements regarding the feasible outcomes, I have also provided some illustration of how cost-benefit estimates can be given some level of rigour—or at least rationality—even in the absence of robust impact measurement data. This kind of modelling can then be used to inform professional discussions regarding the worth of a service innovation, even if this is in the form of critiques of the cost-benefit conclusions. Moreover, the subsequent refinement of such cost-benefit assessments then can itself become a useful process of professional re-focusing and clarification. Such modelling exercises can also inform the design of actual cost-benefit analysis based upon real impact data after a period of implementation and possible proven effect.

Based upon the testimony of parent-carers and professionals, this project indeed made a difference in the schools that ran it during the school year 2007/8. Those involved had certainly enjoyed it on the whole, even if its impact had yet to be properly evaluated. Yet the indications were that it would prove to be of real worth on many more levels than this. In the experience of those who had the most hands-on involvement in this project, it was a powerful initiative. Indeed the accounts given by research participants during the course of this research were impressive for what they conveyed of the potential for reaching and connecting with pupils in the classroom, and in drawing out very positive affective values of caring, concern for others and social responsibility even in children who were regarded as "challenging" in various ways. This was all the more impressive given the pilot status of the project during the school year 2007/8. As the model underpinning the programme becomes both more embedded and refined, this potential, if indeed it is real, can be expected to prove its value to the services supporting it. As it does so, the cost-benefits that have been speculated upon in this necessarily tentative discussion, would also become more meaningful and more real. Using the kind of semi-systematic cost-benefit modelling suggested by this paper may be one way in which service professionals responsible for the promotion of promising service innovations can bolster their case, despite the absence of hard data that can prove impact at the pilot stage.

About the Author:

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