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Intervention for children with language impairments: A model of evidence based outcome research

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Abstract

Over the past 30 years successive governments in the UK have endeavoured to make the statutory framework suitable for children with special educational needs (SEN). More recently efforts have been made to personalise children's learning, making educational experience more innovative and responsive to the diversity of need in schools. A drive in both health and education to develop and evaluate intervention strategies for children with language impairments is now emerging that is both methodologically challenging and rewarding. The current review demonstrates difficulties encountered with using outcome based research with such children. Many studies have inherent methodological problems, including small sample sizes and ill matched groups, with designs that are difficult to replicate or compare. Such approaches are unlikely to yield significant results, or if they do, then it is difficult to devise clear guidance regarding choice of intervention strategies. In the light of these difficulties, theoretical, methodological and practical issues are discussed and a model is proposed to assist in enabling interventions to be identified, and the results shared with educators. We suggest use of this model ensures a more rigorous approach when undertaking large scale systematic, evidence-based research into the effective approaches to teaching children not only with language impairments, but across the field of special needs education.

Key words; language impairment, teaching, research methods, evidence based practice.

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Introduction

Teachers and therapists all seek the best possible outcome when choosing a method or intervention strategy to enable a child to learn and communicate effectively. They are keen to know unequivocally whether this has taken place, why, and how much has been gained and retained over time. As McCartney (1999) states, both teachers and therapists are educated to be self-reflective, evaluating their practice on a session by session or lesson by lesson basis. However, although health centred services have been pro-active in prioritising the gathering of evidence to evaluate effectiveness and efficacy of intervention methods (see Law, Garrett, & Nye, 2004; Pring, 2006; Robey & Schultz, 1998 for examples), there has been no major rift in views on the research models applied to examine such efficacy; researchers and clinicians being in broad agreement that such models differed primarily in emphasis rather than substance, (Pring, 2006). It was not until comparatively recently education services have sought so overtly to choose this avenue of inquiry to ask or seek answers to this type of question.

Developments of a more collaborative approach to research evaluation and systematic reviews across disciplines can be seen for example in the development of the DfEE Centre for Evidence informed Policy and Practice in Education (EPPI-Centre) in the UK and the Campbell Collaboration in the USA (which is also involved in social work and interventions in the field of criminal justice). Similarly, the demand for evidence of effective intervention strategies has been high in the National Health Service (NHS) and services allied to medicine for some time, though the views expressed in the research literature reports have been mixed (Law, 2000; McCartney 2004). As in Speech and Language Therapy (SLT) which is primarily funded by health and allied Children's Services in the UK, educational research exploring the efficacy of teaching strategies for language impaired children has largely ignored the approaches used in outcomes research (Pring, 2004; 286), although this is slowly beginning to change (Mercer, Dawes, Wegerif & Sams, 2004; Dockrell and Shield, 2006). This, one may argue, is in part attributable to the resistance of education-based practitioners to the idea of using control groups and randomised control trials as a means of informing or evaluating outcomes of treatments, therapy or teaching approaches. At a time when therapists and teachers are increasingly being encouraged to work together collaboratively (Wright & Kersner, 2004; Lacey, 2001) can we combine the best of the medical model with its implicit experimental (and quasi-experimental) designs, and emphasis on precise measurement and evaluation, with what has hitherto traditionally been regarded as a more qualitative approach, often utilising small scale series of case studies and exploration of emergent themes and trends from semi-structured interviews? In other words, can we combine investigations of what works and what is measurably effective with what that effectiveness (or lack of it) 'feels' like? We are right to question the methodological approach of a research study, because as May and Pope (2000) state, the status of all forms of research

depends on the quality of the methods used. This is exemplified in the increasing desire of researchers to define means of guidance for conducting and judging both qualitative, quantitative and mixed method research (May & Pope, 2000). This issue of 'quality' is now becoming a much debated issue in both health (Blaxter, 1996; May & Pope, 2000; Murphy et al, 1998; Olson, Voigt, Begg & Weiss, 2002) and education (Evans & Benefield, 2001; Feurer, Towne & Shavelson, 2002; McCardle & McWilliam, 2005; Oancea, 2005) – with solutions to problems posed not always quite so evident in terms of application to therapy or classroom contexts. Although we are quick to describe what is wrong, we are not always so clear or concise in our evaluation of which interventions are right or most appropriate. While this paper cannot do justice to this broadening epistemological debate, it nevertheless intends to address this issue by looking at examples of intervention research surrounding a particular subgroup of children with language impairment and the type of interventions open to them.

Aims of the current review

It is argued by Pring (2004) and others (e.g. Pennington, Goldbart and Marshall, 2004) that RCTs (randomised control trials) and systematic reviews are essential if we are to ensure suitable levels of rigour in researching evidence-based or evidence-informed practice. This paper seeks to demonstrate that as in the planning of systematic reviews, such processes can be adapted for use in designing trans-disciplinary, mixed method designs – which increase both the efficacy and effectiveness of evidence informed outcomes following intervention led by health and educational practitioners. Because speech and language therapists and teachers commonly work together to support children with Specific Language Impairments (SLIs), we decided to explore this area of reported intervention, based on work carried out on a scoping study with colleagues for the Department for Education and Skills (Davis *et al*, 2004), with the intention of providing a process model against which research practitioners could test their research designs as a means of ensuring robust, efficacious and effective evidence based outcomes.

Defining the areas of interest

What are interventions?

Defining what we mean by intervention is not straightforward, because professionals approach its use from a range of philosophical stances. Treatment, therapy, teaching method, implementation plan and intervention strategy could all, one might argue, be used interchangeably. However, we felt that 'intervention' was essentially the focus of our investigation in the context of language impaired children in educational settings. Bunning (2004) offers several working definitions, most of which are in broad agreement that an intervention reflects a shared aim to instigate and achieve change in a child's existing situation by utilising a defined strategy or approach. This process involves selection and use of an optimal method to arrive at a desired outcome. This process inevitably involves movement and change, which may

be cyclical or sequential in nature, and/or a dynamic interaction between given factors and variables. Thus a teaching programme may be continually refined, added to and adjusted to meet the changing needs of the child. In order to rationalise, achieve and replicate such processes we perceive to be successful, we need to be able to draw on reliable evidence.

Literature reporting on intervention studies is beginning to reflect an increasing demand in education to follow the systems model set by the NHS in its quest for evidence based outcomes and examples of 'best practice'. McCartney (2004; 1999) and Rinaldi (2000) have argued that such a model demonstrates the efficacy of joint working, target setting and monitoring and evaluation of a child's progression through a range of services. Evidence that supports practice that is not necessarily context specific (yet is rigorous in its theoretical grounding and methodological approach) is becoming increasingly important. This has become apparent as 'effectiveness' seeks to be justified by the meeting of targets and demonstration of satisfactory evidence based outcomes.

There is considerable research surrounding methods of intervention used for raising the levels of achievement in children with SEN (Special Educational Needs). However, much of it in schools tends to be small-scale and short term, weakening its validity and generalisability, (Humphrey and Parkinson, 2006; Davis *et al*, 2004). Our intention is to explore theoretical, methodological and to a lesser extent practical limitations of some of the existing published SLI intervention research, highlight shortfalls in the current literature and make some tentative suggestions for a framework for further study. Finally, we provide some 'guiding principles', drawn from the considered evidence gathered in this review, that teachers and therapists may use to inform their own future research and practice with children who have language and communication impairments.

Our review drew upon national and international publications including, (i) reviews of research findings, (i) individual research reports, (iii) official government initiatives, and (iv) professional guidance for teachers. Rather than provide a comprehensive review (recent erudite examples of extensive reviews of the literature already exist – e.g. Adams, Byers, Brown & Edwards, 1997; Law 1997; Law, 2000; Law, Garrett and Nye, 2003, 2004; McCartney 2004; Tallal, 2000) our intention is to focus in some detail on the theoretical and methodological issues underpinning the intervention strategies being used currently in the classroom and/or in combination with SLT. Thus, there has been an endeavour here to select approaches that are representative of current methods of working. In this regard we realise that there will always be unambiguous exceptions to the points made and conclusions drawn in this article. Unlike some literature reviews where the focus tends to address the question "What approach shall we adopt?", the emphasis here is on the quality and nature of the research design, process and outcome measures used, whether the work is generalisable to other aspects of SEN or indeed all mainstream children, and whether rigorous measures were used to support the claims made. Success may only be claimed if the means by which the success observed is robust, replicable and definitively measurable.

What is specific language impairment?

Specific language impairment is a form of communication difficulty that is known to affect about 7.4% of the population (Tomblin, Records, Buckwalter, Zhang, Smith & O'Brien, 1997). Children with this difficulty are sometimes referred to as having Specific Speech and Language Impairment (SSLI) or Difficulties (SSLD) (Dockrell and Lindsay, 2000). Haynes and Naidoo (1991), in their landmark study of SLI, describe these children as being "unable to understand and express themselves in the same, effortless way as their peers", where their impairment cannot be attributed to a physical or sensory impairment. Like Dockrell and Lindsay (ibid), Haynes and Naidoo include children with phonological problems in their SLI cohort. Used in DSM-IV (American Psychiatric Association, 1994) and ICD-10 (World Health Organisation, 1992), these definitions are primarily of best use in clinical diagnosis and are therefore not of great assistance in planning education and monitoring in schools. Consideration of the relative methods of inclusion and exclusion criteria in defining this group of 'language disordered' individuals can be found in an authoritative review of the literature by Lees and Urwin (1998).

Conti-Ramsden, Knox, Botting and Simkin (2002) cite literature (eg Lindsay and Dockrell, 2002), stressing how such an impairment may be under-estimated in the extent to which it may exert an adverse effect on many aspects of these children's lives with particular difficulties likely to be experienced in educational contexts. This arises because the nature of curricula design and delivery assumes the child has a level of working knowledge of language form, conceptual understanding and use to enable them to read, write and participate in educational activity. However, literature appears to indicate that persistent under-identification is still evident. Botting, Conti-Ramsden and Crutchley (1998) and others observe that in the past there has been a tendency, prior to the introduction of language units attached to schools, for studies to take a fairly narrow view of SLI. However, since research such as the longitudinal study undertaken by Conti-Ramsden and colleagues, and work reported by Dockrell and Lindsay, it has now become more widely recognised that teachers are faced with a group of children presenting with a diversity of difficulties, for which many teachers are still ill-equipped to cope (Miller and Wright 1995). This approach also demonstrated how children's language impairment changes over time. Abilities such as vocabulary acquisition and phonological development were noted by Botting and Conti-Ramsden (1998) as being particularly susceptible to instability.

Theoretical framework for assessment and teaching of children with SLI

Traditionally, SSLD/SLI has been identified on the basis of a discrepant profile of cognitive abilities, with deficits being addressed via formulae using a 'catch up' type of approach. Others have used measurement to 'endorse' the teacher's own opinion of an often idiosyncratic, child specific method of teaching. Dockrell and Lindsay (2000) state that the critical issue for teachers and professionals is the extent to which such considerations are reflected in

provision of placement, intervention strategies and differentiated curriculum provision. There are a range of different types of provision for children with SLI. This may depend on geographical area, whether the language impairment is viewed as primary or secondary to other difficulties (e.g. behaviour problems or attentional difficulties), the stage of educational provision (primary or secondary), and the degree to which other support services such as Speech and Language Therapy are involved (see Law *et al* (2000) for a review of provision in England). Therefore, the nature of the problem and the age at which the language difficulty is recognised will to a certain extent, dictate the type of teaching approach available. There are a number of narrative literature reviews in this area (e.g. Law (1997); Law, Boyle, Harris & Harkness (1998)).

In recent years, The Standards Fund has become an integral part of provision of services to support children with SLI/SSLD. Its instigation and role have been reviewed by Law, Luscombe and Roux (2002). Alongside work carried out by Law and colleagues (Law et al (2001)), there still seems to be a view that more collaboration is needed between health and education services if the Fund is going to be used to greater effect to enable teachers and therapists to meet the needs of LI children.

Insight into the educational prognosis of SLI has changed in recent years from being viewed purely as a condition that required support in KS1 and 2 to now extending to KS 3 and 4 (Lees and Urwin, 1998). Researching potential factors that aid or inhibit language impaired children's progress provides insight into the educational profiling of children as they develop academically and socially. Dockrell and Lindsay suggest this can be approached by plotting the range of difficulties with which a child presents in the classroom, noting the diversity of need and considering ways that inclusive policies need to be structured to meet the difficulties experienced by the children in accessing the curriculum. In order to put these approaches to teaching and support in place, Conti-Ramsden et al (2002) indicate that both time and financial management of clinical and educational services need to be in place if the child is going to make progress. This view is supported by research carried out by Davison and Howlin (1997) and Wright and Kersner (1998). Law (2000) feels that one should also take into consideration the experience of the clinician and/or teacher, and the extent to which the child's family and carers are involved in the intervention within the context of what is available at the point of service delivery. He also warns that the intervention literature is not generally as methodologically sound as that found when running research projects involving trials methodologies. Thus a study may describe a child or children as language disordered but provide little further detail (see earlier discussion on terminology). Specific measures may be used to describe change or improvements in certain skill or areas of ability, but these rarely relate to specific, academic subject teaching or Key Stages. Another problem experienced when evaluating intervention literature is the extent to which the child can generalise newly learned skills across subject areas and social as well as educational contexts. The impact and strength of an intervention strategy is much improved if its effect can be demonstrably sustained. This is important in the light of literature highlighting how language impairment

problems may extend into secondary education and beyond (Stothart, Snowling, Bishop, Chipchase & Kaplan, 1998; Johnson, et al, 1999). These areas of concern therefore make it difficult to accurately evaluate the evidence in an empirical manner. Nevertheless there is a body of literature that can act as sources of evidence on teaching approaches and examples of best practice in supporting children with language impairments, even if they are sometimes only experimental, single case or quasi-experimental studies (Law 2000).

While some studies have measured improvement in terms of 'catch up' (see review of studies by Law et al, 1998), others have looked at progress in terms of the type of intervention synonymous with certain placements, e.g. schools for language disordered children, language units, or specialised support in mainstream classrooms (Stothart et al 1998). Others looked at outcome in terms of psychometric measurement with no mention of the kind of teaching approach the child had had in order to achieve the stated outcomes. Conti-Ramsden, Knox, Botting and Simkin (2002) feel that such data, combined with sensitive measures of language and literacy skills could provide valuable indicators of likely educational achievement and contribute to the development of national assessment and teaching programmes, attuned to the particular needs of children with SLI.

Application of the Process Model

Efficacy studies examine process and outcome under optimal conditions, with defined criteria of who are the intended target population or 'group of interest'; whereas effectiveness studies investigate what happens when such approaches are applied in 'real life' situations - that is to say, in the clinic or the classroom. As we have seen, some studies of intervention strategies combine elements of effectiveness and efficacy without detriment to either stance (see the model for sound research methodology applied to educational practice adopted by Mercer, Dawes, Wegerif and Sams, 2004). However, while as researchers we might call the claims made in some studies into question, this should not lead us think that certain interventions are ineffective, or that teachers and therapists should not adopt them in certain contexts. Likewise, while individual case studies may become lost in larger studies of intervention programmes, this should not invalidate their success when a satisfactory outcome has been achieved. However, it does present us as researchers in both education and the therapies with a challenge if we are to continue to endeavour to generate a sound evidence base for informing educational practice.

We chose to focus on research studies involving children with SLI because of a) the first author's length of clinical and research experience with this group of interest b) because of the authors previous work reviewing the interventionist literature in this area (DfES, 2004) and c) previous reviews by Law and colleagues have highlighted the paucity of and tendency for lack of clarity in research looking specifically at effectiveness and efficacy of intervention strategies for children with (specific) language impairments.

How can we take this issue forward? In an article struggling with similar issues in the context of SLT, Pring (2004) proposed that clinical researchers would benefit from adopting a model first set out by Roby and Schultz (1998) in outcome based research. We suggest that this model could be adapted for use in educational research. It is a sequential process covering five phases or stages (see Figure 1).

Phase One

At this point a potential teaching method or intervention strategy is selected that is felt to be beneficial with a child or children where known (defined) difficulties have already been confirmed through preliminary investigations, e.g. pre-school statutory assessment procedure with a Speech and Language therapist or educational psychologist. Evidence is drawn at this stage from individual case study reports or small experimental studies such as that undertaken by Gill, Klecan-Aker, Roberts and Fredenberg (2003). These authors examined children with SLI with poor verbal memory and recall, and found systematic training to follow verbal directions via rehearsal and visualisation to be of benefit in remediating these difficulties. They drew upon earlier work by Bishop (1992) and others, which indicated that children with SLI have a limited capacity to process increasing amounts of verbal information.

Phase Two

At this stage, the researcher attempts to ascertain precisely why a given approach works. As many extraneous or confounding variables as possible, are accounted for and excluded at this point in the research. Thus, Gill et al (2003) defined their participating children with specific inclusion criteria matching them in terms of low auditory comprehension scores (falling between one and two standard deviations on the listening section of a standard language comprehension test battery, a prescribed diagnosis of SLI, normal hearing and English as their first language. They then ran a small programme with three groups (n = 30) given differing interventions – rehearsal strategy training with and without visualisation strategy and traditional 'therapy' (where the remediation method was not specified). Outcomes were pre-determined and reported in some detail once the set duration of the intervention strategy's implementation was completed.

Phase Three

This is where larger scale studies are undertaken. There is, for instance, enough detail in the Gill et al (2003) report on which a large scale replication study could be initiated to test the efficacy of a combined rehearsal/visualisation strategy in LI children at different ages, and obtain stronger, more robust evidence that this approach does indeed work.

Phase Four

It is at this point that the intervention is tested out under a range of conditions. Administration at specific key stages for example or with varying frequency, intensity or subject specific contexts could be explored. Effectiveness needs to be ascertained through measures of real improvement in academic performance and monitoring retention that demonstrates long term, lasting benefit. Sharpening of inclusion criteria, that is to say, which children with LI

would benefit most from this type of intervention, can also be clarified at this stage.

Phase Five

Effectiveness studies are still to be encouraged at this stage, to ascertain cost effectiveness and long term benefit both to the child's learning and quality of life. Exploration of potential, secondary benefits in terms of reduced need for on-going specialist support as the child moves into secondary education for example, should also be considered.

Further Discussion

This exploration of intervention studies for children with LI reinforces McCartney's (2004) acknowledgement of the importance of utilising types of research designs that are regarded as most robust. This drive for stronger methodological approaches is increasingly being applied to health service research, where the demand for evidence of effectiveness is high. In the drive to control for the multi-factorial influences particularly inherent in language intervention research, the randomised control trial is regarded as the most robust, but in educational contexts, the most difficult to achieve, although Torgerson and Torgerson (2001) suggest some ways this might be feasible. The prospect of using randomised control trials (RCTs) no doubt discourages the intending researcher since one is faced at the outset with the problem of randomised assignment to intervention groups before the study starts. This is not easy to instigate if, for example, the child is already in receipt of services dictated by a Statement of Special Educational Needs (SEN). It is also not easy to assess a child without knowledge of the intervention the child has received, yet to have this knowledge could be regarded as leaving the way open for research bias. For these and other reasons, examples of RCTs in the literature are few and far between. Cohort studies and case studies series are more prevalent (Conti-Ramsden et al's longitudinal studies - 1992 & 2002; and Van Slyke's (2002) case study series), and are much more amenable to fitting into the Roby and Schultz model, since they include defined groups of children, with set criteria for entry into their respective studies, where each child is tracked, assessed and followed up over varying lengths of time. If comparisons with other cohort studies can be made where either the type of intervention or time frame, or conditions under which the intervention was given are controlled for, then this strengthens any results gained from the original cohort or case study series. However, we can only control for the potential 'variables of influence' that we know about. Hence the necessity to follow up such work with further more extensive cohort studies across or between whole LEAs (local education authorities) (see Phases 4 and 5).

Summary and Conclusions

Many of the recommendations provided by Law et al and Fletcher-Campbell et al (DfEE 2000) still have relevance today in the context of SLI (DfES, 2004). According to the literature in both health and education, there are still

driving needs for evidence based research to be undertaken in order for the following issues to be rigorously evaluated both in terms of efficacy and effectiveness. These include inter-disciplinary agreement on the terminology used in reviews and research reports, ways of working, and conceptualisation of the issues to be investigated; adopting a methodology which builds in the impartiality of the researcher; that takes heed of the feasibility of replication in either the same or carefully controlled diverse contexts; a research focus that importantly maintains relevance to the practitioner, and ensure both reliability and generalisability (particularly in the field of developmental language disorders where definitions are not always uniform). The present paper has looked at examples of intervention in SLI with a view to exploring their strengths and weaknesses in evidence of effectiveness for practitioners and children and has sought to propose a more ordered way both educationalists and professions allied to medicine (in this instance, SLTs), may adopt a more logical, sequential approach that applies to both qualitative and quantitative research looking at evidence-based or evidence-informed outcomes.

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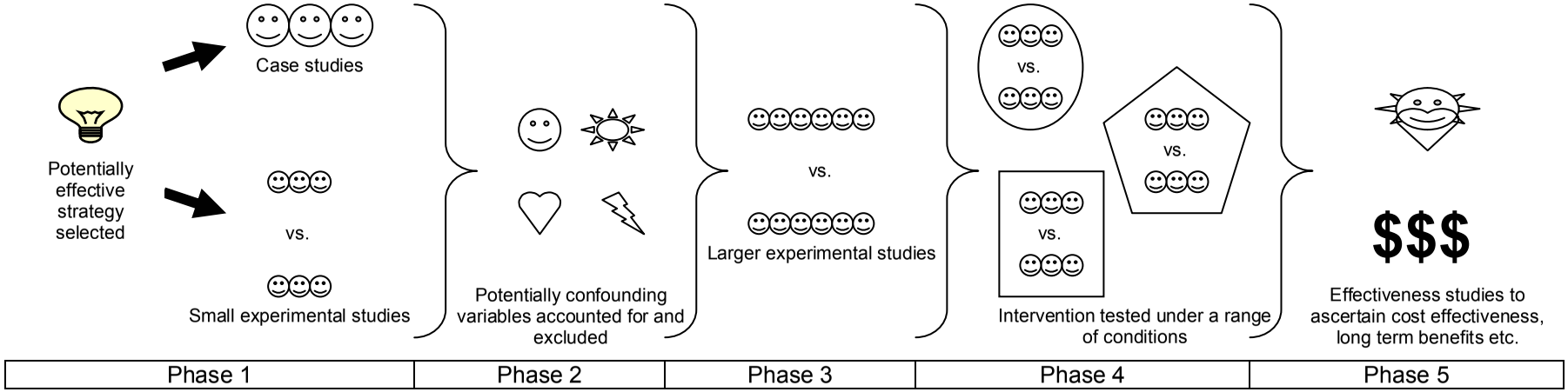

Figure 1. A proposed model for use in educational intervention research (adapted from Roby & Schulz, 1998 and Pring, 2004).