'Colourful Semantics' as a whole-class approach with Sri Lankan Tamil-speaking children experiencing language-learning difficulties

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Abstract

The Colourful Semantics approach (Bryan, 1997) has been used effectively as a whole-class approach to support vocabulary and syntactic development in children. Using a colour-coding system and thematic roles, it helps children learn to use and respond to key 'wh' questions. This study evaluated the effectiveness of the Colourful Semantics approach to develop target vocabulary and the use of Subject- Object-Verb (SOV) structures in 30 Sri Lankan-Tamil speaking children experiencing language-learning difficulties. The Colourful Semantics approach was introduced as a whole-class approach via the teacher and incorporated into daily literacy activities for 6 weeks. Pre- and post-intervention assessments were undertaken on five receptive and expressive language and literacy measures of vocabulary and syntax.

There were positive changes in all the vocabulary and syntactic measures undertaken at an individual and group level. The post-therapy language scores on all five measures were highly significant at a $p < 0.05$ level. It is recommended that the Colourful Semantics approach be used as a whole-class intervention approach, facilitated by the teacher under the supervision of a speech and language therapist in deprived and under-resourced areas.

***Keywords*:** Colourful Semantics, Whole-Class, Sri Lankan Tamil, Language Delay

Introduction

Speech and Language Therapy is a relatively new field in Sri Lanka, with little awareness about the scope of the profession among people, particularly outside of the capital. At present, there are approximately 60 speech and language therapists with over 3 years of experience, working mainly in base hospitals, private hospitals or community centres in and around large cities (Doman & Read, 2006; Kodikara, 1999; Morris, 2001). In addition, there are 30 newly qualified speech and language therapists, though none has been absorbed into the government education system. This has resulted in limited access to speech and language therapy services within school, and inequalities in this access across the country.

Children experiencing language-learning difficulties often omit verbs and grammatical elements and fail to complete sentences (Black & Chiat, 2003; Chiat, 2000). Unresolved speech and language difficulties can have long-term implications for social skills, confidence, behavior and literacy skills (Law et al., 2000). In order to minimize the long-term sequelae of early speech and language difficulties, intensive therapy is required. This is a challenge in resource-poor countries, which could be addressed via whole-class intervention approaches delivered through the class teacher.

Whole-class speech and language therapy intervention approaches have the potential to supplement or augment individual speech and language therapy sessions. They can support children experiencing specific speech and language difficulties and provide general language stimulation which could prevent or minimize potential, often undetected difficulties in children in the class.

'Colourful Semantics' (Bryan, 1997) is a therapy approach that can be adapted to be used as a whole-class intervention package focusing on developing the understanding of the role of verbs, encouraging the production of complex sentence structures and word order. The 'Colourful Semantics' approach aims to support syntactic development using a semantic route and is based on three primary theories. The first is 'bootstrapping' (Chiat, 2000), which posits that children use knowledge of phonology or intonation and stress patterns, semantics or the meaning of verbs and syntax or the argument structure to locate and understand the focus of a verb. The next is the theory of 'functional (verb) argument structure' (Garrett, 1980; Black & Chiat, 2003), which acknowledges the existence of an argument structure in all verbs, conveyed as thematic roles. The third is a theory of 'non-argument structure' (Pinker, 1989; Black & Chiat, 2003), which suggests the production of elements within a sentence not directly connected to the verb.

'Colorful Semantics' has the potential to encourage the development of vocabulary, sentence length in the appropriate word order, recognise aspects of grammar and connect

word to text. Within this approach, children learn how to generate and respond to key 'wh' questions. The colour-coding system aims to help recognise thematic roles and generate a range of argument structures. The colour-coding assists language learning in children who require an additional visual facet to learning.

The 'Colourful Semantics' approach has been used effectively to support vocabulary and syntactic development with children experiencing language-learning difficulties (Bennington, 2011; Bryan, 2008; Ebbels & van der Lely, 2001; Morrissy, 2010; Wade, 2009). Case studies have demonstrated the effectiveness of 'Colourful Semantics' (Bryan, 1997; Guendonzi, 2003; Spooner, 2002), although these studies lack a control group. Bryan (1997) reports on the use of colour-coding to highlight the argument structure of sentences when working with a 5; 10 year old boy with language-learning difficulties. Bryan (1997) found language gains of 12-18 months on a single test of expressive language, more accurate use of argument structure, the use of a variety of verbs and a generalization of language gains into spontaneous language at specific times (i.e. "news time").

Similarly, Spooner (2002) reports on progress in the use of argument and adjunct phrases by a child aged 6; 3 years, with less success with an older child aged 9; 9 years. Contrary to this, Guendonzi (2003) found less improvement in the language skills of a younger child age 6:10 years with some language gains observed in the older child age 7;0 in a study using an approach comparable to *Colourful Semantics*. This, however, may be reflective of the type of language difficulty of word finding and not syntactic difficulties experienced by the younger participant.

In a more recent study, Bolderson and colleagues (2011) found 'Colourful Semantics' to be an effective therapy approach for six 5-6 year olds receiving therapy under clinical conditions. Following on from two weekly therapy sessions for 8 weeks, the children gained higher scores on reassessment on the *Renfrew Action Picture Test* information and grammar scores (RAPT, Renfrew, 1988), the Bus story (Renfrew, 1995) information score and on the Mean Length of Utterance. The participants served as their own control group as the researchers had undertaken an assessment 9 weeks prior to the start of therapy, a baseline measurement before offering 8 weeks of therapy and a re-baseline measurement at the end. However, overall, aspects of the study design including the small sample size and the narrow age range have undermined the generalisability of the findings of this and many other studies.

'Colourful Semantics' was also incorporated into the 'Oral Language Supporting Early Literacy' (OLSEL) Project in Australia (Morrissy, 2010), that included work on syntactic understanding, story grammar, reading comprehension, picture vocabulary and phonological awareness. Students attending the 8 research schools had shown better

reassessment scores compared to students attending the 6 control schools. Morrissy (2010) asserts that 'a measurable growth' was evident in literacy skills in students with low, average and above average skill when offered the 'Colourful Semantics' component. She presents a case study of a 6; 9 year old boy diagnosed with receptive and expressive language delay to illustrate the project's success. The language scores gathered at baseline and then 9 months later on reassessment using RAPT (Renfrew, 1988) following on from the OLSEL Project, demonstrated both qualitative and quantitative changes in the information and grammar scores.

Methods

The current study investigated the effectiveness of using the 'Colourful Semantics' approach as a whole-class programme with Sri Lankan Tamil-speaking children experiencing language-learning difficulties.

Specific Objective: To evaluate the effectiveness of using the 'Colourful Semantics' approach to develop target vocabulary knowledge and the use of Subject-Object-Verb (SOV) structures in Sri Lankan-Tamil speaking children experiencing language-learning difficulties.

Participants

Thirty children experiencing language-learning difficulties between 3; 2 and 16; 1 years attending a special school were included in the study. The school is situated in Muttuwal, a deprived area of the country. The participant group consisted of 11 female and 19 male students. The students were all first language speakers of Sri Lankan Tamil, which was also the medium of instruction at the school. The participants were from four parallel classes at the school.

Ethical considerations

Ethical approval was sought and gained from the Ethics Review Committee of the Faculty of Medicine, University of Kelaniya. The parents of the students at the special school were provided with an information sheet and consent form in simple Tamil prior to implementing the study and collecting data.

Training programme

Ten teachers were offered two half-day training sessions on 'Colourful Semantics' at the school. The researcher was supported by a peer who helped to demonstrate the activities while the content of the programme was translated simultaneously into Sri Lankan Tamil by an interpreter who is also a healthcare professional.

The training programme included the following aspects:

- The importance of early remedial support for language-learning difficulties
- Background to the 'Colourful Semantics' approach
- Introduction to the colour-coding system
- Experiential activities for: Who? What is s/he doing? Where?
- Ideas on how to use children's stories

In order to demonstrate the intervention approach, 3 children's storybooks were used. The main text was *The very hungry caterpillar* (Carle, 1969). In addition, the local storybooks *Kude Hora* (Wettasinghe, 1956) and *Keerthihan's Kite* (Meyler & Titus, 2009) were also used to explain the therapy approach. The teachers were observed while they conducted the intervention approach and feedback offered as required.

Intervention programme

The 'Colourful Semantics' approach was offered as a teacher-facilitated, whole-class therapy approach by four teachers. The intervention approach was incorporated into the Literacy lesson everyday for 6 weeks. The focus in the six weeks was on introducing the 'wh' question tags of 'who' and 'what is s/he doing' using stories and action pictures.

Data collection and analysis

The researchers provided the teachers with individual monitoring and feedback sheets for each student. This enabled the teachers to keep a record of any observations they made during the period of intervention. Individual language data was collected by the researcher pre- and post-intervention from all the participants. The measures included:

- Receptive vocabulary of target words (understanding of language): informal picture-based task of target words
- Expressive vocabulary of target words (use of language): informal picture naming task of target words
- Generating Subject-Object-Verb structures (SOV): informal picture description task using target Black Sheep Press pictures
- Mean length of utterance (MLU): An adapted version of the *Renfrew Action Picture* Test (Renfrew, 1988)
- Writing of SOV structures: informal picture description task using target Black Sheep Press pictures

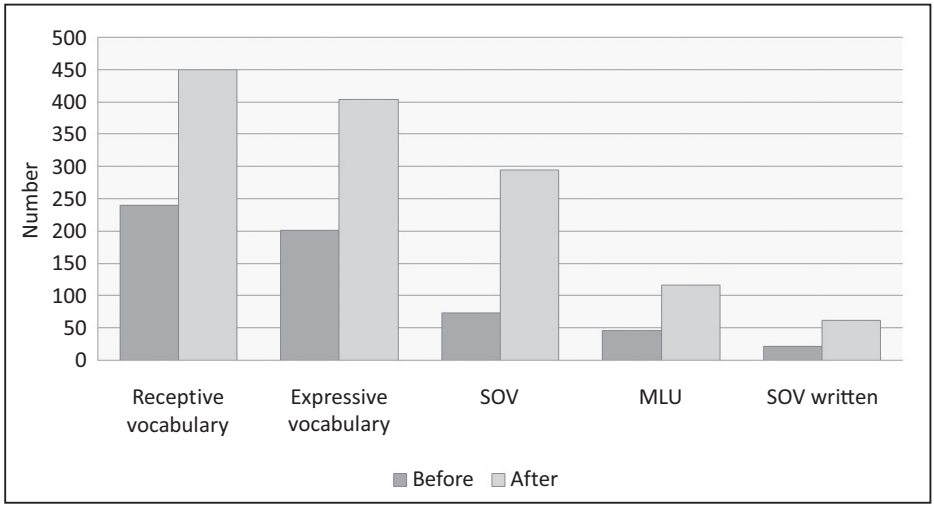
The language data were analysed through comparison of test scores pre- and post-intervention at an individual and group level. Inferential statistics in the form of means and standard deviations were undertaken and paired t-tests were performed on SPSS (version 16.0). In addition, qualitative feedback from the teachers was recorded and a thematic analysis undertaken using aspects of *Framework Analysis* (Ritchie & Spencer, 1994).

Results

Pre- and post- intervention scores were gained on five language measures using informal picture-based tasks and one adapted formal assessment.

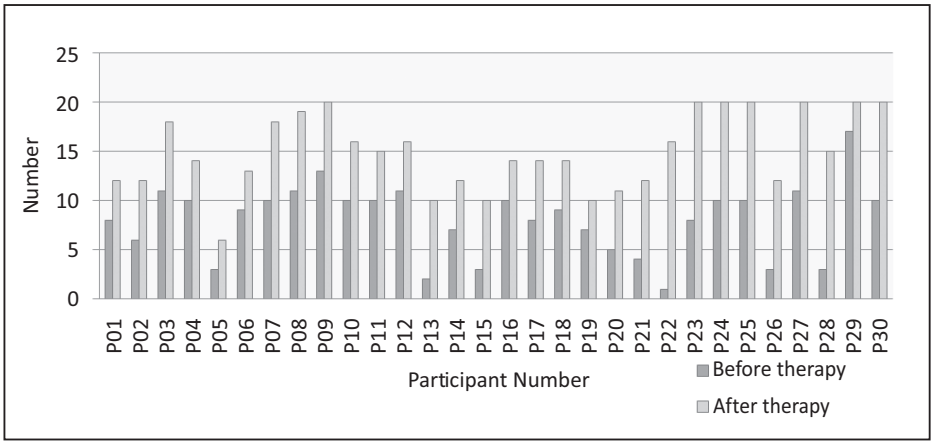
At a group level, the participants showed a marked improvement on all 5 language measures as shown in Figure 1 below.

Figure 1: *Pre-and post-intervention language scores at group level.*



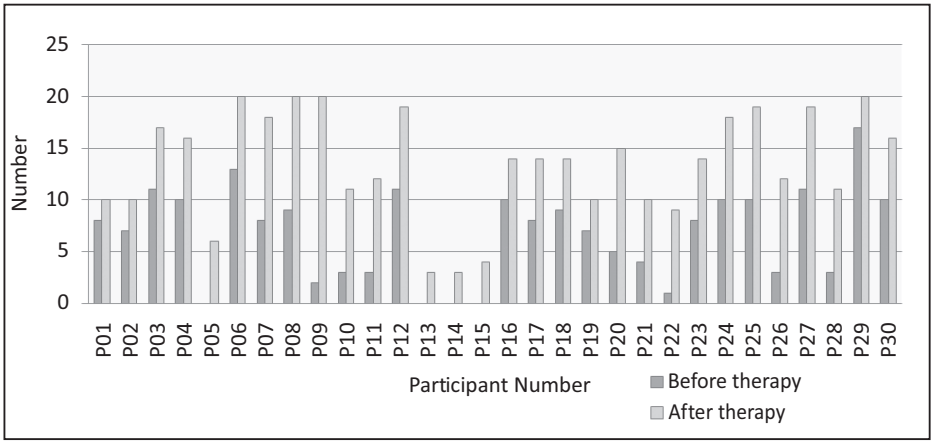
As a group, the participants scored 240 (Mean= 8.00; Standard Deviation= 3.68) on the receptive language task before intervention. On post-intervention language measures, the participants scored 449 collectively (Mean= 14.97; Standard Deviation = 3.88). At an individual level, all the participants displayed higher receptive vocabulary scores post-intervention, as shown in Figure 2. The change in the understanding of the target vocabulary items reached statistical significance ($t(29) = 12.27$, $p < .001$).

Figure 2: *Pre- and post-intervention receptive vocabulary scores.*



All the participants showed an improved expressive language score post-intervention as illustrated in Figure 3. Collectively, the participants scored 201 (Mean = 6.70; Standard Deviation = 4.44) on the expressive language task prior to intervention. Following on from intervention, the participants scored 404 (Mean= 13.47; Standard Deviation = 5.19). At an individual level, the increase in the use of target vocabulary items following the intervention programme was statistically significant (t (29) = 11.42, p =.000).

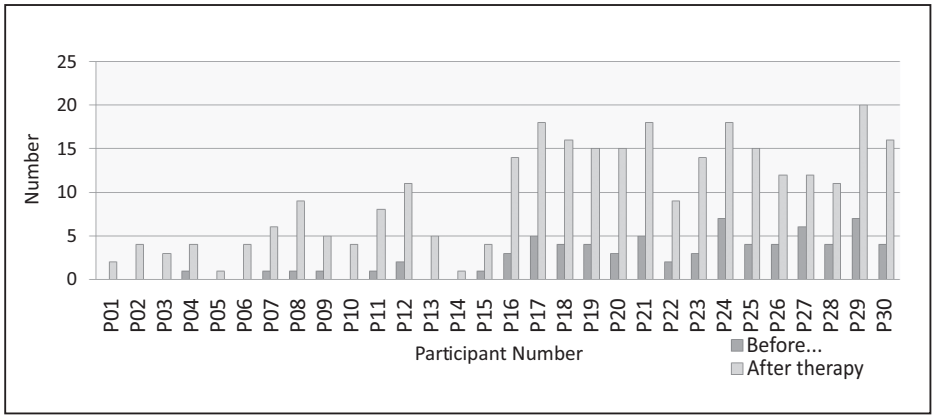
Figure 3: *Pre- and post-intervention expressive vocabulary scores.*



In the measure of the number of SOV structures produced in an informal picture description task, all the participants indicated gains in their scores as shown in Figure 4. The change in scores in this measure too, at an individual level was statistically significant at (t (29) = 10.187, p =.000). The group of participants scored 73 (Mean = 2.43; Standard Deviation = 2.22) together before intervention. The collective score

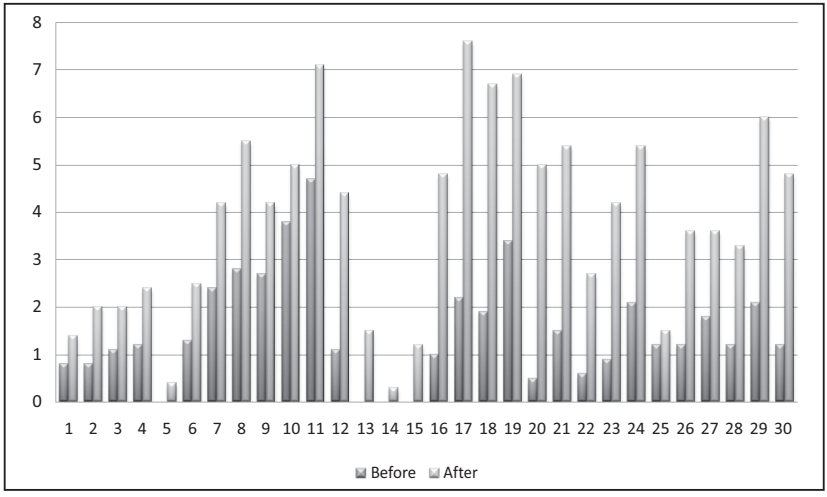
had increased to 294 (Mean= 9.80; Standard Deviation = 5.89) on assessment after intervention.

Figure 4: *Pre- and post-intervention SOV production scores.*



In the language assessment undertaken prior to the intervention programme, the participants gained a collective score of 45.50 (Mean= 1.52; Standard Deviation = 1.14). This increased to 115.60 (Mean = 3.85; Standard Deviation = 2.04) in the post-intervention assessment. At an individual level, there was also a positive change in MLU before and after intervention as indicated in Figure 5. This too, reached statistical significance (t (29) = 8.995, p =.000).

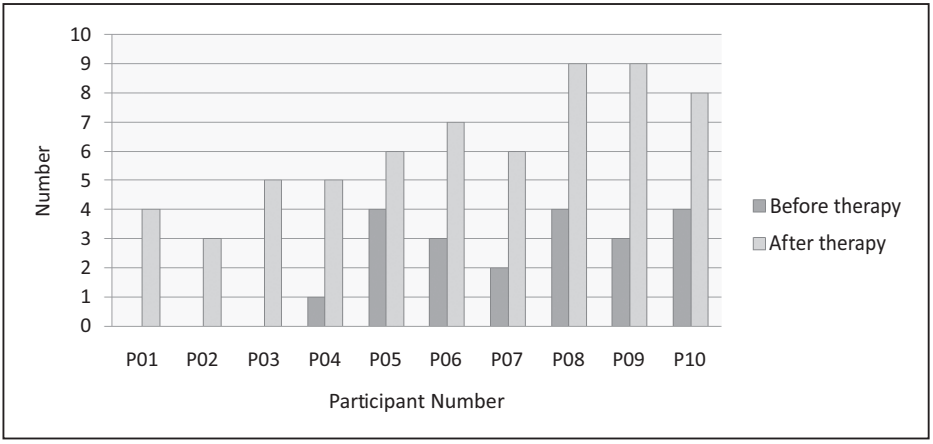
Figure 5: *Pre- and post-intervention MLU scores.*



Data on the writing of SOV sentences could only be gathered from 10 of the participants who were literate, that too with support. The results are presented in Figure

6 below. The group scored 21 (Mean= 2.10; Standard Deviation = 1.73) in the written task before intervention and 62 (Mean = 6.20; Standard Deviation = 2.04) at the end of the whole-class intervention programme. There was a statistically significant difference in the number of SOV sentences written by the participants in the informal task before and after therapy (t (29) = 11.78, p =.000).

Figure 6: *Pre- and post-intervention MLU scores.*



Qualitative findings

The qualitative data gathered through teacher feedback indicate an increase in the level and duration of attention to tasks by the students. The teachers reported a positive change in the level of listening and motivation displayed by the participants during the 'Colourful Semantics' activities in the classroom. They also report evidence of co-operative work by the students in their classes during the target activities.

Discussion

In summary, 30 Sri Lankan Tamil-speaking children with language-learning difficulties were offered a whole-class based 'Colourful Semantics' intervention programme for 6 weeks. Language measures were undertaken before the start of the intervention programme and repeated at the end. On all five language measures of receptive and expressive spoken language and written language, the group of participants indicated an increase in competencies post-therapy.

The effectiveness of the 'Colourful Semantics' approach as seen in the current study is supported by findings from previous studies (Bolderson et al., 2011; Bryan, 1997; Guendonzi, 2003; Spooner, 2002), in spite of differences in study design. The current study was conducted as part of a whole-class intervention approach, in contrast to the clinic-based studies by Bryan (1997) and Bolderson and colleagues (2011). However, it is akin to the Australian OLSEL study (Morrissy, 2010), which offered classroom-based

intervention. The findings thus support the use of non-clinician facilitated intervention (in this case teacher-led) under the supervision of a speech and language therapist. As reported in the systematic review by Law and his colleagues (2000) on the effectiveness of speech and language therapy, the findings from the current study uphold the assertion that therapist-led and non-therapist facilitated therapy can result in similar positive gains in children experiencing language difficulties.

The main strength of the current study is in the relatively large sample size of 30 children, in contrast to previous studies. This strengthens the generalisability of the findings compared to previous single case studies or studies with fewer than ten participants (Bolderson et al., 2011; Bryan, 1997; Guendonzi, 2003; Spooner, 2002). Nevertheless, while we are able to state that the present study provides supportive evidence for the effectiveness of a classroom-based, teacher-facilitated 'Colourful Semantics' programme, it does not have a control group. We are unable, therefore, to directly link the progress made to the intervention provided. Therefore, this lack of a control group is a limitation. In this respect, the present study is similar to previous case studies, which are also limited by this methodological weakness (Bryan, 1997; Guendonzi, 2003; Spooner, 2002). In contrast, Morrissy (2010) had included research schools and control schools, and Bolderson et al (2011) had designed the study with a control measure of initial assessment and baseline assessment 9 weeks later prior to the start of therapy.

'Colourful Semantics' has been used either as a discrete therapy approach on its own or incorporated into a more complex therapy programme consisting of several components. Unlike the successful OLSEL project in which 'Colourful Semantics' formed part of a school-based programme focusing on grammar, vocabulary, reading and phonological awareness, the findings from the current study indicate the effectiveness of 'Colourful Semantics' on its own. Although lacking a control group, the use of a distinct therapy approach is a positive feature of this study.

The current study reports on an intervention programme offered for only 6 weeks, albeit daily, which may not be sufficient. This is at variance with previous studies, which report the duration of therapy as between 3 months (e.g. Bryan, 1997), 5 months (e.g. Spooner, 2002) and 9 months (Morrissy, 2010). Also, with regard to the measures undertaken, most studies have employed a combination of formal assessments (e.g. Spooner, 2002) and informal tasks (e.g. Bolderson et al., 2011). The current study used mostly informal assessment tasks. It can be argued that this too, is a limitation of the study. Yet, it did use RAPT (Renfrew, 1988), though in adapted form as it has been designed to test English sentence structures rather than other languages.

Main limitations of the study

The main limitation of the study was the use of an interpreter during the teacher training sessions and in the assessment and reassessment of the students. However, the student language data included relatively simple language structures. In addition, although 30 participants can be considered comparatively large in relation to previous studies on 'Colourful Semantics', it is still a fairly restricted sample size, which deters the generalisability of the results. Additionally, the present study relied on an adapted formal assessment and mostly informal assessment tasks to generate data. The lack of robust measures to gain language data is a shortcoming of this study. There are currently no formal assessments in Sri Lankan Tamil that can be used in research studies. The current practice of using informal assessment tasks or adapted formal assessments is reflective of this situation. A more comprehensive study with a larger sample of participants across several educational settings and investigating a range of languages (i.e. Sinhala, Sri Lankan Tamil, English, Sri Lankan Sign Language and Sri Lankan Malay) is to be undertaken in the future.

Conclusions and implications

The findings from the current study reveal the effectiveness of the *Colourful Semantics* programme offered through teachers under the guidance of a speech and language therapist to Sri Lankan Tamil-speaking children experiencing language-learning difficulties. The findings of this study have important pedagogical implications as well as consequences for service delivery. At a pedagogical level, the findings support the use of semantic information and colour-coding to encourage the understanding and use of target vocabulary and syntactic structures among children experiencing language-learning difficulties. At a service delivery level, it supports the use of facilitators other than speech and language therapists in delivering intervention programmes (under the direction of a Speech and Language Therapist) to reach a wider group of children. It thereby substantiates the need for teacher training programmes. It encourages collaborative practice and whole-class intervention programmes that have the potential to increase accessibility to speech and language therapy intervention to children hitherto not accessing remedial support at government hospital clinics or private institutions.

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