Article

The effectiveness of Colourful Semantics on narrative skills in children with intellectual disabilities in Sri Lanka

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Abstract

Background: Children diagnosed with intellectual difficulties experience difficulties with narrative skills, due to limited syntactic knowledge. The Colourful Semantics approach with thematic roles and a colour coding system may encourage syntactic development in children experiencing intellectual disabilities. Aim: To evaluate the effectiveness of using the Colourful Semantics approach to develop narrative skills in Sri Lankan Tamil-speaking children diagnosed with intellectual difficulties. Methods: Thirty Sri Lankan Tamil-speaking children identified with intellectual difficulties were included. The Colourful Semantics approach was offered twice a week for 6 weeks, facilitated by the class teachers. Pre- and post-intervention narrative skill assessments were undertaken and analysed for content and syntactic structures. Results: The results indicate positive changes post-intervention on the qualitative and quantitative narrative skills measures undertaken on content and syntactic structures. Conclusions and Implications: The Colourful Semantics approach is an effective therapy approach to support development of narrative skills in children with intellectual difficulties.

Keywords

Colourful Semantics, intellectual disabilities, language difficulties, learning disabilities, narrative skills

Introduction

Narrative skills are an amalgam of abilities, including language proficiency, cognitive skills, understanding and worldly knowledge and listener needs. It refers to our ability to recount a sequence of events. Narrative skills are strongly associated with our conceptual and language

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development (Morrow, 1985; Vygotsky, 1962), connected to later literacy proficiency and academic achievement (Bishop and Edmundson, 1987; Boudreau and Hedberg, 1999; Chang, 2006; Hedberg and Westby, 1993; Westby, 1984; Wetherell et al., 2007) and socialization skills (Wetherell et al., 2007). Children experiencing language-learning difficulties are particularly susceptible to difficulties with the production of coherent and lucid narratives (Botting, 2002; Norbury and Bishop, 2003; Reilly et al., 2004; Tsai and Chang, 2008). They encounter particular difficulties with organizing stories and in using relevant vocabulary and suitable syntactic structures when generating narratives (Boudreau and Hedberg, 1999; Pearce et al., 2003; Reilly et al., 2004). Within this article, the focus is on spoken narratives and not on the written form.

Children as young as 2 years 5 months are aware of stories (Applebee, 1978). In addition, by the age of 4 years, children are able to recall and follow stories (Stein and Glenn, 1982). Several studies have uncovered a marked difference in syntactic complexity and accuracy between children with language-learning difficulties or children with specific language impairment (SLI) and their typically developing peers (Boudreau and Hedberg, 1999). Botting (2002) reports on a clear distinction between children diagnosed with SLI and their typically developing peers on the accurate use of tense markers on *The Frog Story* and *The Bus Story*. Similarly, Norbury and Bishop (2003) found significant differences in the complexity of sentences produced and in the syntactic errors observed between groups of children with language-learning difficulties and a control group of participants. Nevertheless, they did not uncover a significant difference in the three clinical groups: SLI, primary language impairment and autism spectrum disorder.

Colourful Semantics (Bryan, 1997) is a speech and language therapy intervention approach, which aims to support the development of syntactic structures using a semantic route. Its basis is in three main theories of bootstrapping (Chiat, 2000), functional (verb) argument structure (Black and Chiat, 2003; Garrett, 1980) and non-argument structure (Black and Chiat, 2003; Pinker, 1989). Using a colour coding system, the Colourful Semantics approach helps children to better understand and respond to key question words including 'who', 'what', 'where' and 'why' and to identify thematic roles in a sentence (e.g. agent in the sentence). Whilst previous studies have been primarily on children with SLI, it was hypothesized that the dual routes of visual and auditory, with the visual support provided by the colour codes, the gestural cues via the signs used for the 'wh' key words (i.e. who, what, where, etc.), together with the spoken words could support language development in children with intellectual disabilities who may find language-learning difficult via a purely auditory route, given the challenges of limited attention and memory experienced.

The Colourful Semantics approach has been used successfully with children experiencing language-learning difficulties to further develop vocabulary and syntactic skills (Bennington, 2011; Bryan, 1997; Ebbels and van der Lely, 2001; Morrissy, 2010; Wade, 2009). In an initial study by Bryan (1997), the Colourful Semantics approach had been used effectively with a boy of 5 years 10 months experiencing language-learning difficulties. Bryan notes language gains of between 12–18 months in the child's use of expressive language including the use of verbs and argument structure, with some evidence of generalization of these skills outside of the therapy context. Upholding the above concept, Spooner (2002) reports on similar success with the approach when used with a child aged 6 years 3 months to increase the use of argument structure.

Adding to this evidence, Bolderson and colleagues (2011) also report on the successful use of clinic-based Colourful Semantics with 5 to 6-year old children to improve syntax and mean length of utterance (MLU). In contrast, the younger child aged 6 years 10 months in Guendouzi's (2003) study had reportedly shown limited gains in language skills, with more positive improvement noted for an older child aged 7 years 0 months in an approach similar to Colourful Semantics. In

contrast, Spooner (2002) found the Colourful Semantics approach less effective with an older child aged 9 years 9 months. This variation in the level of success may be due to the difference in the focus of therapy such as vocabulary or syntax. In addition, a small sample size, a narrow age range and the lack of a control group have hindered the generalizability of many of these studies.

Addressing some of these shortcomings, the Australian project of Oral Language Supporting Early Literacy (OLSEL) (Morrissy, 2010) has included Colourful Semantics as one of its approaches. The premise for incorporating Colourful Semantics into a programme to promote early literacy development is the assertion that oral language competence compliments successful literacy acquisition. Colourful Semantics had been chosen as it is deemed to encourage language exposure and oral language development as a classroom approach. Evidence at present suggests higher literacy gains in children with low, average or above-average literacy skills attending the research schools in comparison to those going to the control schools (Morrissy, 2010). The initial results disseminated do not specify either the number of participants who benefitted from the programme or any information on how different age groups of students were assisted by this programme. That said, a case study example has been documented of a student aged 6 years 9 months with a diagnosis of moderate–severe receptive and expressive delays who indicates a qualitative difference in the sentence structures produced pre- and post-intervention on the Renfrew Action Picture Test.

Whilst it is acknowledged that the children with intellectual disabilities are not directly comparable to the children with SLI, primary language impairment or language-learning difficulties included in the published studies reviewed, they do all have associated language difficulties. That said, it is noteworthy to acknowledge the impact of different etiologies of intellectual disabilities on the nature of speech and language difficulties. The symbiotic relationship between language and cognition, as well as the influence of auditory memory and attention skills on language acquisition, could result in receptive and expressive language difficulties in children with intellectual disabilities. The difficulties with attention experienced by children with intellectual disabilities impact orientation to a task, selective attention and sustaining attention (Wenar and Kerig, 2006), whilst the memory difficulties experienced are with both short-term and working memory (Swanson and Jerman, 2007). Children with intellectual disabilities have been reported to be at high risk of developing a speech and language disorder (Memisevic and Hadzic, 2013), with an estimated prevalence figure of approximately 55% (Lesser and Hassip, 1986). These include difficulties with vocabulary skills, both receptive and expressive vocabulary; difficulties with receptive language and therefore with understanding and following instructions, particularly complex commands and with understanding questions; and difficulties with word order and syntax such as morphological aspects of tense markers or plurals and with social communication (Memisevic and Hadzic, 2013; Torgesen, 2000). The language-learning difficulties also significantly impact on the acquisition of academic skills, including reading and mathematical reasoning (Beirne-Smith et al., 2006; Torgesen, 2000; Tylor et al., 2005) and generalizability of learnt skills to other settings and material (Wenar and Kerig, 2006). The current study aimed to measure the potential effectiveness of the Colourful Semantics approach on developing narrative skills in children diagnosed with intellectual disabilities and language-learning difficulties.

Methods

Participants

Thirty children aged between 3 years 2 months and 15 years 0 months, diagnosed with intellectual disabilities and language-learning difficulties, were included in this study. The 22 male and

Table 1. Key demographic details of the participants of the younger group.

No.	Age (year; month)	Gender	Cognitive skills	Language skills	Additional difficulties and medical diagnosis
1	6;0	M	Mild intellectual disability	Mild receptive and moderate expressive language skills	Cerebral palsy; Mild visual difficulties
2	5;3	M	Moderate intellectual disability	Moderate receptive and expressive language skills	ADHD
3	6;6	M	Moderate intellectual disability	Moderate receptive and expressive language skills	ADHD
4	6;1	M	Mild intellectual disability	Mild receptive and expressive language skills	Global development delay[a]
5	6;4	M	Mild intellectual disability	Mild expressive language skills	Cerebral palsy
6	3;2	M	Mild intellectual disability	Mild receptive language skills	ADHD
7	4;1	M	Moderate intellectual disability	Moderate receptive and expressive language skills	Down syndrome
8	3;6	M	Mild-moderate intellectual disability	Mild receptive and moderate expressive language skills	Cerebral palsy
9	4;6	M	Mild-moderate intellectual disability	Mild receptive and moderate expressive language skills	Cerebral palsy
10	6;4	M	Mild intellectual disability	Mild expressive language skills	Cerebral palsy
11	3;2	M	Mild intellectual disability	Mild receptive language skills	ADHD
12	4;7	M	Moderate intellectual disability	Moderate receptive and expressive language skills	Down syndrome
13	4;6	M	Moderate intellectual disability	Moderate receptive and expressive language skills	Cerebral palsy
14	4;6	M	Moderate intellectual disability	Mild receptive and moderate expressive language skills	Cerebral palsy

Note: ADHD = Attention-deficit hyperactive disorder.
[a]According to the medical notes.

8 female children attended a special school conducted in the Tamil medium. The students were from four classes of 6, 8, 10 and 6, respectively, in the same school. The participants were grouped into two age bands of 3–7 years (younger group) and 7 years and 1 month to 15 years and 0 months (older group). Key demographic details are provided in Tables 1 and 2.

Workshop training programme

All the teachers of the school were invited to a half-day workshop training programme on Colourful Semantics at the school, conducted by the researcher, a linguist and a social worker. The workshop included a brief overview of the approach including the theories of bootstrapping (Chiat,

Table 2. Key demographic details of the participants of the older group.

No.	Age	Gender	Cognitive skills	Language skills	Additional difficulties and medical diagnosis
15	9;0	F	Moderate intellectual disability	Moderate receptive and expressive language skills	ADHD
16	8;0	F	Mild intellectual disability	Mild receptive and severe language skills	Cerebral palsy
17	9;2	M	Mild intellectual disability	Mild expressive language skills	Cerebral palsy
18	8;3	M	Moderate intellectual disability	Moderate receptive and expressive language skills	Autism spectrum disorder; ADHD
19	11;6	M	Moderate intellectual disability	Moderate receptive and expressive language skills	Autism spectrum disorder
20	10;0	M	Mild intellectual disability	Mild expressive language skills	Cerebral palsy
21	13;0	F	Moderate intellectual disability	Moderate receptive and expressive language skills	None
22	11;3	M	Mild intellectual disability	Mild expressive language skills	Cerebral palsy
23	12;2	F	Moderate intellectual disability	Moderate receptive and expressive language skills	None
24	15;0	F	Mild intellectual disability	Mild receptive and expressive language skills	None
25	13;2	M	Moderate intellectual disability	Moderate receptive and expressive language skills	Visual difficulties
26	10;0	M	Moderate intellectual disability	Moderate receptive and expressive language skills	Cerebral palsy
27	13;0	F	Mild intellectual disability	Mild receptive and expressive language skills	None
28	11;3	M	Mild intellectual disability	Mild expressive language skills	Cerebral palsy
29	12;2	F	Mild intellectual disability	Mild receptive and expressive language skills	None
30	13;2	F	Moderate intellectual disability	Moderate receptive and expressive language skills	Visual difficulties

Note: ADHD = Attention-deficit hyperactive disorder.
[a]According to the medical notes.

2000), functional (verb) argument structure (Black and Chiat, 2003; Garrett, 1980) and non-argument structure (Black and Chiat, 2003; Pinker, 1989), an introduction to the colour coding system with simple experiential games for each (wh) question format, word-webs and colour code symbols as well as typical and atypical speech examples together with opportunities to use picture naming and picture description tasks and storytelling/narrative tasks to colour code language samples. The workshop offered opportunities for small group work, individual work and for close supervision of the attempts at using Colourful Semantics. The teachers were observed in the classroom by the researcher in two follow-up visits, given feedback as required and opportunities for troubleshooting.

Procedures

All the students were offered twice weekly whole-class Colourful Semantics intervention facilitated by the class teacher for 6 weeks. The teachers followed the order of introducing each (wh) question format and the relevant colour coding system as discussed at the workshop. They were also guided by the simple games and narrative tasks trialled during the workshop.

The language of instruction was Tamil, which is a Dravidian language different in word order to English. For example, to the subject–verb–object pattern in English, Tamil uses a subject–object–verb pattern (Suseendirarajah, 1999). Therefore, whilst the colour codes of the original Colourful Semantics framework for English were used in this study, the order of the colour blocks for the sentence strips were changed to match the word order of Tamil. The (wh) question prompts were translated into equivalent Tamil words and used in the programme. We also incorporated the simple Makaton signs for each of the wh words of who, 'what doing', what, where and why. The Makaton signs were favoured over target signs from Sri Lankan sign language, as the former has been specifically simplified for use with children with intellectual disabilities and the latter is not well known by teachers, being arguably limited to use with the deaf community in the country.

Data collection and analysis

The research project received approval from the Ethics Review Committee of the Faculty of Medicine of the University of Kelaniya, Sri Lanka. The parents of each participant were given a written information sheet and in turn provided written consent for their children to be part of this study.

Each participant's narrative skills were measured before and after the intervention programme. The assessment tasks included:

1. An adapted version of *Peter and the Cat* (Leitao et al., 2003), which was used as a story-retelling task
2. *Saman and the baby elephant* (created by the author), which is a picture-based story-generation task.

Although the *Peter and the Cat* (Leitao et al., 2003) assessment is recommended for use with children over the age of 5 years due to its length and complexity, this was favoured over the more age-appropriate *Renfrew Bus Story* assessment (Renfrew, 1997) within this study. One reason for this choice was because the storyline of *Peter and the Cat* was deemed to be more concrete and therefore more likely to be within the experiences of the children with intellectual disabilities included in the story. Conversely, the storyline of the Bus Story, though shorter in length and simpler in syntax, was thought to be less likely to be within the children's experiences, given the challenges faced by children with disabilities of using local public transport. The test was not used as a standardized assessment tool as neither test has been validated for use in Tamil. Instead, the test was used qualitatively, and the story presented was adapted and simplified in Tamil. Reflecting the robust association between microstructural analyses of linguistic form and content and macrostructural analyses of story grammar, the current study incorporated measures of both. The language data generated were analysed qualitatively with regard to the type and complexity of sentence structures used and the Applebee (1978) stages. Applebee's (1978) six developmental stages of narratives focus on the child gaining mastery at focusing on a topic or 'centring' and in 'chaining' or sequencing the action of the story (Table 3).

Table 3. Applebee's (1978) developmental stages for narratives.

Stage	Description
Stage 1: heaps stage	In this stage, children label and describe the action or event, with no observable organization on central theme.
Stage 2: sequence stage	In this stage, children label events connected to a central character, theme or setting, with no discernible plot.
Stage 3: primitive narratives	In this stage, children generate narratives on a central theme, containing an initial event, followed by an action and consequence, with no clear ending.
Stage 4 and 5: unfocused or focused chain narratives	The children use the three-story grammar elements on a central theme as in stage 3, but also incorporate the character's motivation. The story is either fluctuating in focus (unfocused) or display linked events (focused), but the plot remains weak.
Stage 6: true narrative	In this stage, children use a coherent, logical plot with a central theme and character(s). They have mastered the four- story grammar elements of the previous stage and now include a resolution to the 'problem'.

Stein and Glenn (1982) extend narrative skill development to include the basics of story grammar. For the purpose of this study, a 'compound' sentence was defined as comprised of two independent clauses joined by a coordinator (e.g. The cat was stuck on the tree and the boy helped to rescue him). A 'complex' sentence was said to contain an independent clause joined by one or multiple dependent clauses (e.g. The cat who was stuck on the tree looked scared and the boy was able to rescue it with help). Spoken language, signs or gestures and a combination of spoken language and signs were all accepted and included in the analysis. The quantitative measures included paired *t*-tests on the Statistical Package for the Social Sciences (version 16.0) on the *MLU*, *content* of the narratives and the *syntactic structures* produced.

Results

Overall, the 30 participants showed a noticeable positive change on all the narrative measures and analyses undertaken, both qualitative and quantitative.

Qualitative results

Applebee stages. With regard to the Applebee stages (Applebee, 1978), 22 of the children showed evidence of a qualitative change from 'heaps' (stage 1) to 'sequences' (stage 2) post-intervention. Table 4 provides examples of this change.

Two of the children moved from the sequences stage to the 'primitive narratives' stage. Examples of this change are evident in the text given in Table 5.

Complex or compound sentences. Eight of the children were observed to produce at least one complex or compound sentence post-intervention. A representation of these sentences is presented in Table 6.

Quantitative results

Mean length of utterance. On the measurement of the MLU in the whole participant group ($N = 30$), the mean pre-intervention assessment score of $M = 1.86$ ($SD = 1.33$) changed to $M = 3.59$

Table 4. Changes from Applebee stages 1 to 2.

Pre-intervention	Post-intervention
Original Tamil data *Backo (digger). Digging. Elephant.* (P5) /bæko:/ /to: nɖudu/ /jɑ: nə/ (S) (V) (S) (English translation: Digger. Digging. Elephant.)	Original Tamil data *Man Backo (Digger) driving.* (P5) /manidan bæko: və o: ʈʈura: ru/ (S) (O) (V) (English translation: The man is driving the digger.)
	Man digging. /manidan to: nɖura: ru/ (S) (V) (English translation: The man is digging.)
	Man elephant help(s). (P5) /manidan jɑ: neiku udavura: ru/ (S) (O) (V) (English translation: The man help(s) an elephant.)
Ball. Bat. Running. (P2) /bo: l/ /bæʈ/ /o:ɖura: n/ (S) (S) (V) (English translation: Ball. Bat. Running.)	Boy playing (with) friends. (P2) /podʒijan frendso:ɖə villəja:ɖura: n/ (S) (S) (V) (English translation: The boy is playing with friends.)
	Boy batting. /podʒijan bæʈ pannura: n/ (S) (O) (V) (English translation: The boy is batting.)
	Boy searching. (P2) /podʒijan te:ɖura: n/ (S) (V) (English translation: The boy is searching.)
Elephant. Fall. Boys. (P24) /jɑ: nə/ /vilu: du:/ /podʒijangəl/ (S) (V) (S) (English translation: Elephant. Fall. Boys.)	Elephant hole falling. (P24) /jɑ: nə kulijil viludu/ (S) (O) (V) (English translation: The elephant falls into the hole.)
	Elephant crying. /jɑ: nə ɑluhirədu/ (S) (V) (English translation: The elephant is crying.)
	Elephant help. /jɑ: nə kɑ: pɑ: tu/ (S) (V) (English translation: The elephant shouts for help.)

(SD = 2.01) post-therapy. This positive change was statistically significant at 0.05 level, t (58) = –3.93, $p < 0.001$. The individual participant scores are presented in Figure 1. Thus, the post-training mean on MLU was statistically significantly higher than the pre-training mean score.

With regard to the two age groups, the older group (N = 16) indicated a change of the mean score of M = 2.19 (SD = 1.25) to M = 4.20 (SD = 1.98) post-intervention. Similarly, the younger

Table 5. Changes from Applebee stages 2 to 3.

Pre-intervention	Post-intervention
Original Tamil data *'Baby elephant. Fall.'* (P12) / kuʈʈi jɑ: nə/ /vilu: du:/ (S) (V) (English translation: The baby elephant falls (is falling).)	Original Tamil data *'Baby elephant pit fall boys getting help'* (P12) / kuʈʈi jɑ: nə kulijil viludu (S) (O) (V) poɖijangəluku udəvi keɖekudu/ (S) (V) (English translation: The baby elephant falls into the pit and the boys are getting help.)
'Boy. Bat. Ball. Throw.' (P27) /poɖijɑn/ /bæʈ/ /bo: l/ /vi: su:/ (S) (S) (S) (V) (English translation: Boy. Bat. Ball. Throw.)	'Boy bat playing. Boy ball throwing. Ball going up. Boy, friends searching.' (P27) /poɖijɑn bæʈ pɑnnurɑ: n/ (S) (O) (V) (English translation: Boy batting.) /poɖijɑn bo: l vi: surɑ: n/ (S) (O) (V) (English translation: The boy is throwing the ball.) /bo: l me: lə po: vudu/ (S) (V) (English translation: The ball is going up high (in the sky).) /poɖijɑn nɑnbarhal te:ɖurɑ: n/ (S) (S) (V) (English translation: The boy and his friends are searching (for the ball).)

Table 6. Production of complex or compound sentences.

Pre-intervention	Post-intervention
Original Tamil data *'Boy bat play.'* (P29) /poɖijɑn bæʈ villəjɑ:ɖurɑ: n / (S) (O) (V) (English translation: The boy is playing with the bat. / The boy is batting.)	Original Tamil data *'Boy ball hitting ball going far'* (P29) /poɖijɑn bo: l ɑɖikurɑ: n bo: l du: rə pohudu/ (S) (O) (V) (O) (V) (English translation: The boy is hitting the ball and it is going far.)
Elephant fall. (P21) /jɑ: nə vilu: du:/ (S) (V) (English translation: The elephant falls down.)	'Elephant pit falls can't come up.' (P21) /jɑ: nə kulijil viludu me: le: vɑrɑmuɖijɑ: du/ (S) (O) (V) (V) (English translation: The elephant falls in the pit but can't come up.)

group ($N = 14$) showed a change in the mean score of $M = 1.48$ ($SD = 1.37$) pre-intervention to $M = 2.90$ ($SD = 1.86$) following on from the programme offered. Both the older group ($t(30) = –3.43$, $p < 0.002$) and the younger group, $t(26) = –2.28$, $p < 0.032$, showed significant results, although the results of the older group were highly significant (Figures 2 and 3).

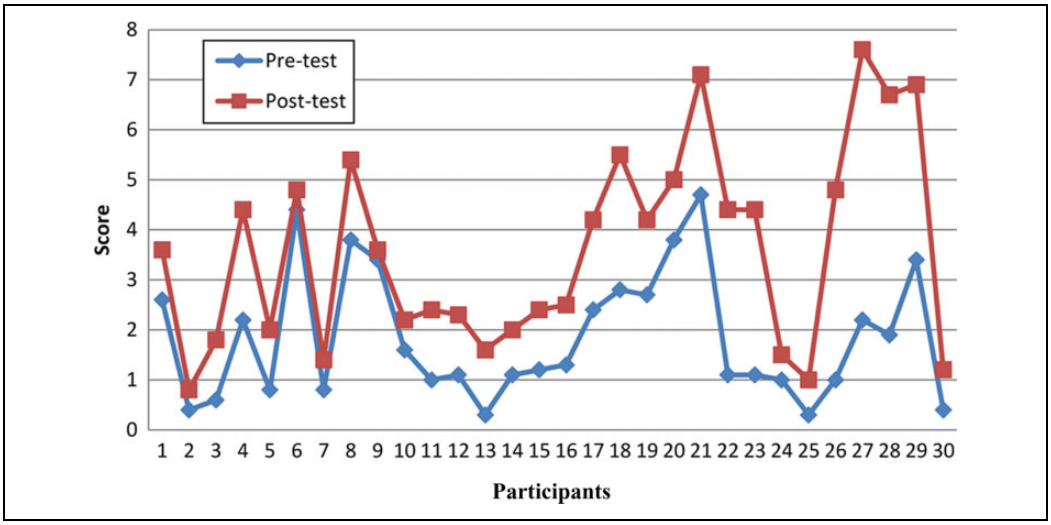

Figure 1. Pre- and post-intervention scores on Mean Length of Utterance (MLU).

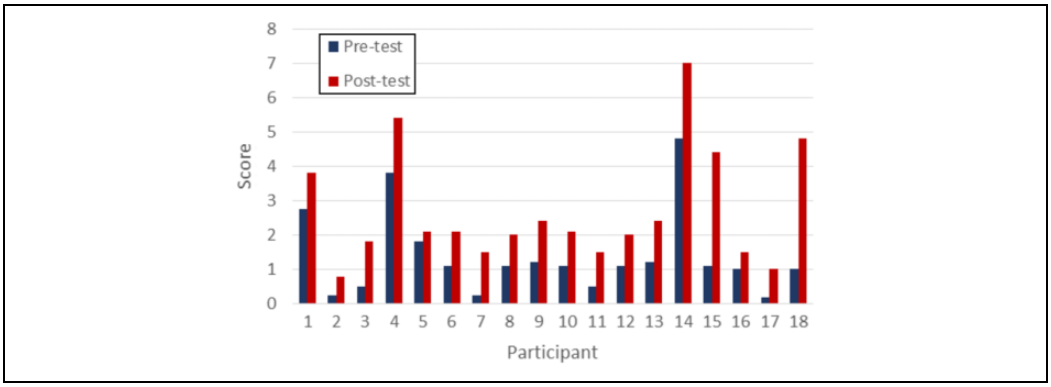

Figure 2. Pre- and post-intervention scores on Mean Length of Utterance (MLU) for the younger group.

Content

The content of the narrative tasks was gathered via an 'information score' based on the production of key aspects of the story. At a group level ($N = 30$), the information mean score of $M = 13.17$ ($SD = 5.40$) on the narrative task before intervention was seen to increase to a mean score of $M = 24.23$ ($SD = 6.50$) after the therapy programme on the same narrative task. The individual participant scores are presented in Figure 4.

The age group analysis indicated that with regard to the information or content scores (Figures 5 and 6), the mean score of $M = 13.44$ ($SD = 6.06$) pre-intervention changed to $M = 24.31$ ($SD = 7.62$) post-intervention for the older group ($N = 16$), whereas the mean score of $M = 12.86$ ($SD = 4.75$) prior to the programme changed to a mean score of $M = 24.14$ ($SD = 5.23$) after the programme for the younger group ($N = 14$). With regard to the two age groups, the older group, $t(30) = -4.47$, $p < 0.001$, and the younger group, $t(26) = -5.97$, $p < 0.001$, indicated statistically highly significant results.

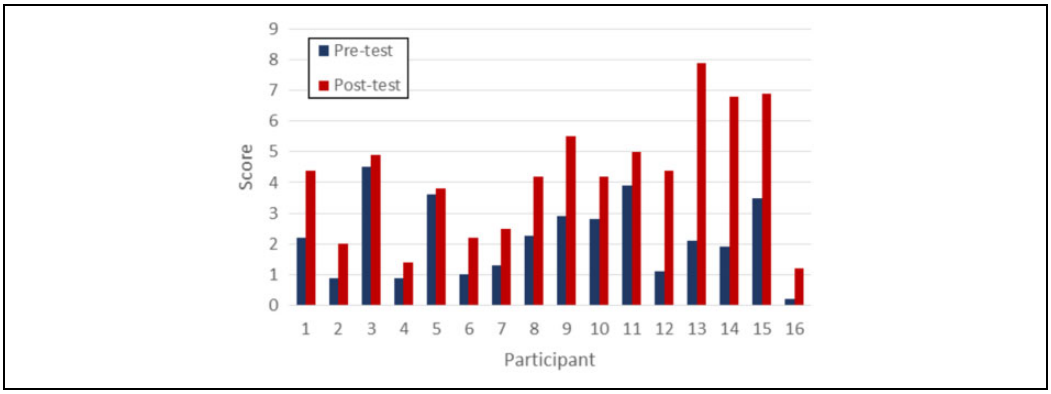

Figure 3. Pre-and post-intervention scores on Mean Length of Utterance (MLU) for the older group.

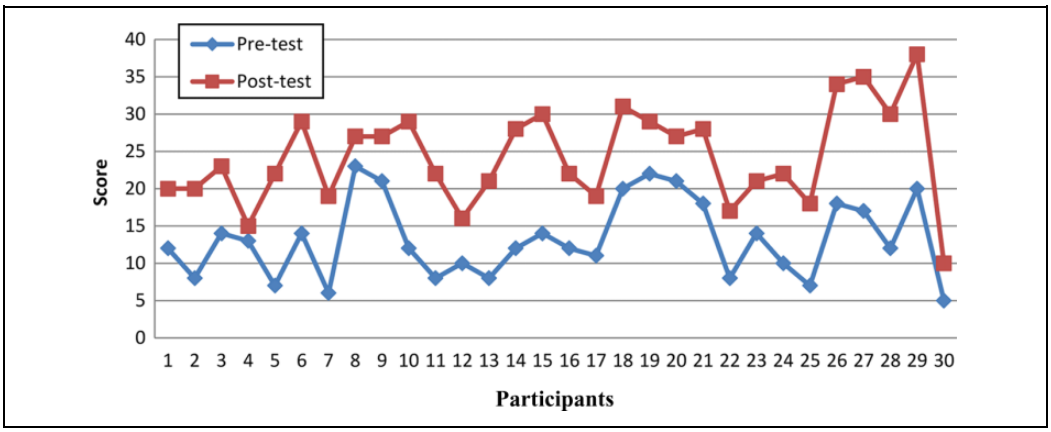

Figure 4. Pre- and post-intervention information or content scores. This positive change gained statistical significance at a 0.05 level, $t(58 = -7.17, p < .001$.

Syntactic structures. Eight of the children produced eight complex or compound sentences, an average of $M = 0.27$ across the participant group on the pre-intervention task. This had increased to 51 complex or compound sentences by 22 children at an average of $M = 1.70$ on the post-intervention task. The individual participant scores are presented in Figure 7. This positive change in the number of complex or compound sentences produced by the participants ($N = 30$) reached statistical significance at $t(58) = -4.91$, $p < 0.001$.

With regard to the older and younger age groups, the mean score of $M = 0.25$ ($SD = 0.44$) before the intervention programme changed to a mean score of $M = 1.94$ ($SD = 1.65$) at the end of the programme in the older group ($N = 16$). A change of a mean score of $M = 0.29$ ($SD = 0.46$) to $M = 1.43$($SD = 1.39$) after the intervention programme was observed in the younger group ($N = 14$). The group analysis showed that the older group ($t(30) = -3.94$, $p < 0.001$) and the younger group, $t(26) = -2.90$, $p = 0.008$, both showed significant results, although the results of the older group were highly

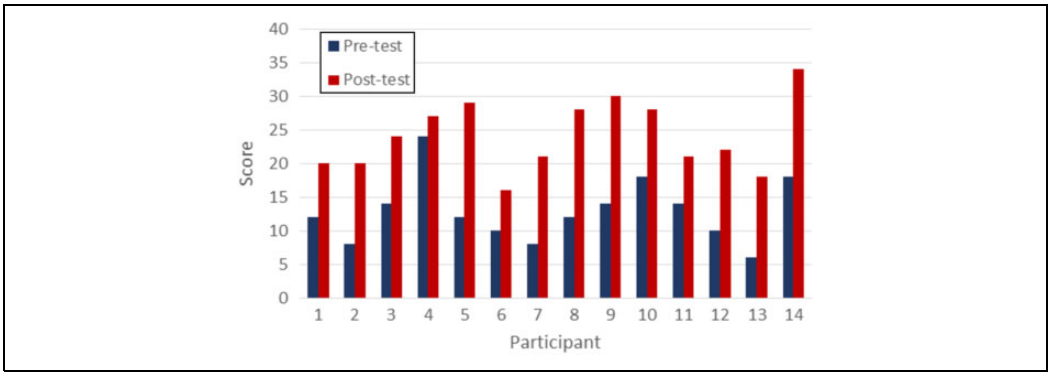

Figure 5. Pre- and post-intervention information or content scores for the younger group.

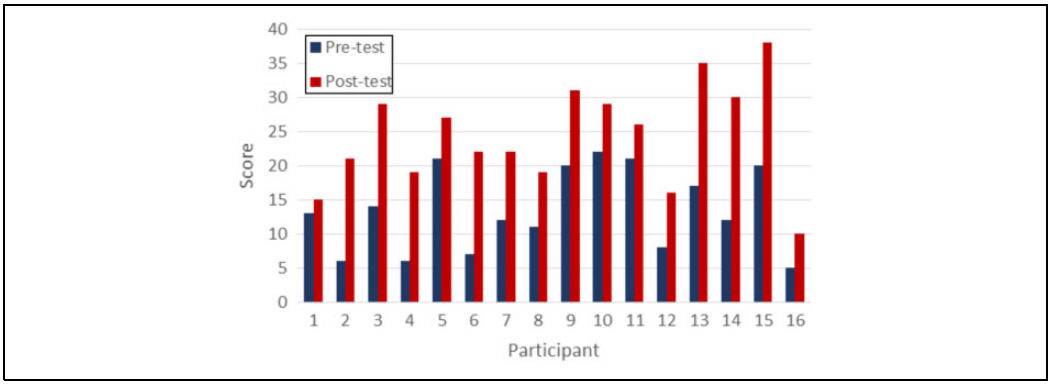

Figure 6. Pre- and post-intervention information or content scores for the older group.

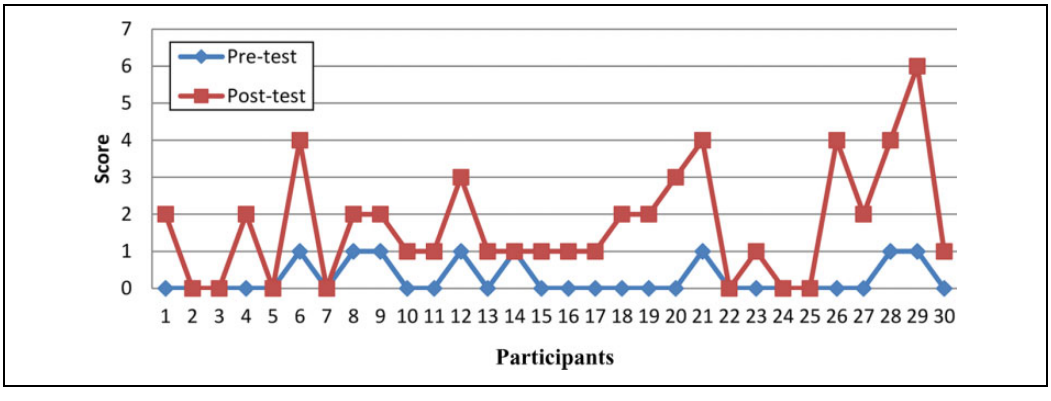

Figure 7. Pre- and post-intervention production of complex or compound sentences.

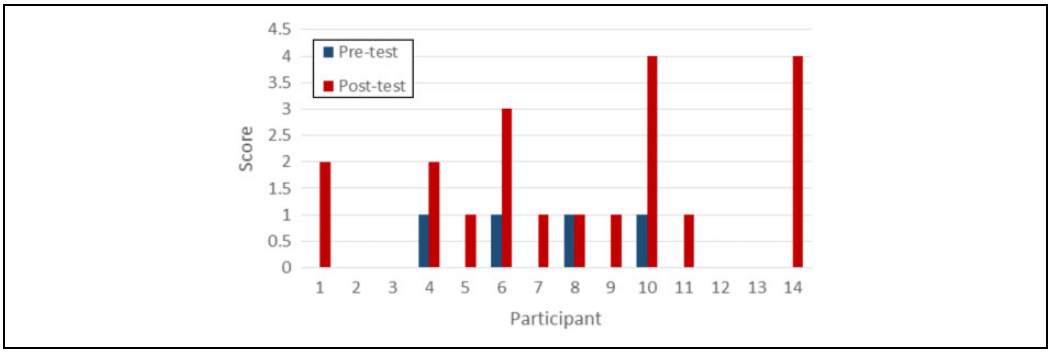

Figure 8. Pre- and post-intervention scores for complex–compound sentences for the younger group.

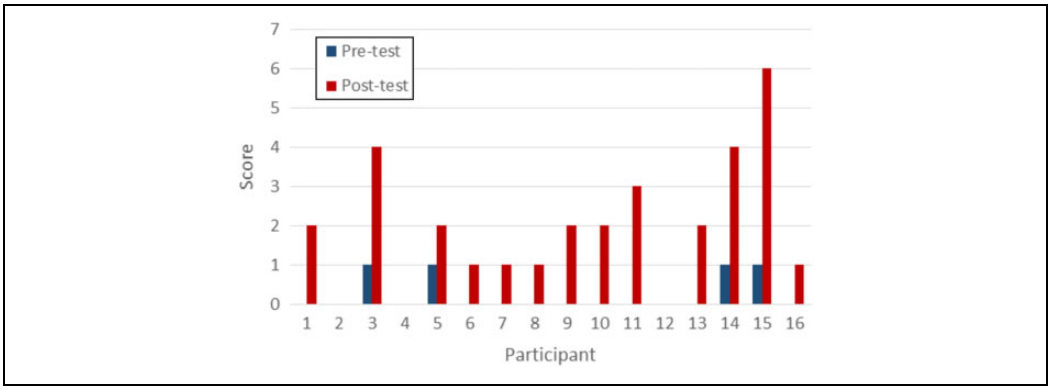

Figure 9. Pre- and post-intervention scores for complex–compound sentences for the older group.

significant. Figures 8 and 9 provide a visual representation of the changes in test scores for the younger and older groups of participants.

Discussion

In summary, the *Colourful Semantics* intervention approach was offered as a whole-class programme twice weekly for 6 weeks via teachers for 30 children who experience cognitive and language-learning difficulties at a special school. As a group, the children showed a significant positive difference on all language measures of narrative skills following therapy. There were comparable language gains post-intervention in both the younger and one older participant groups.

The improvement in language structures required for narrative skills observed in the current study adds to the small but growing evidence base for this approach and for approaches using similar principles (Bolderson et al., 2011; Bryan, 1997; Guendouzi 2003; Spooner, 2002). The findings of the current study also support classroom programmes to improve narrative skills in particular, commensurate with the results of the OLSEL study (Morrissy, 2010).

The effectiveness of the Colourful Semantics approach as a whole-class intervention method promotes the use of trained facilitators as part of an alternative service delivery model to traditional

clinic-based intervention to offer language-enrichment programmes to groups of students in the school context. Whilst there is a lack of consensus in the literature on whether Colourful Semantics better supports older or younger children who experience difficulties with language or literacy acquisition (Bryan 1997; Guendouzi 2003; Spooner, 2002), the results of the current study display comparable language gains in the younger and older groups of participants.

That said, the strength of the OLSEL study and of the study by Bolderson and colleagues (2011), and by extension the limitation of the current study, is the availability of comparative test score data from children not receiving therapy. The results do not take into account the influence of maturation and therefore limit the generalizability of the findings. Nevertheless, in contrast to the OLSEL study, which included a combination of approaches, the present study focused solely on the Colourful Semantics approach. So, whilst it may be difficult to isolate the benefits of Colourful Semantics alone in the former study, the findings of the present study clearly indicate positive language gains for the participants undergoing the programme. Yet another limitation of the current study was that it did not include spontaneous narratives or analyse syntactic errors (Wetherell et al., 2007). The analyses undertaken of a combination of microstructural and macrostructural measures were able to generate appropriate data showing gains in narrative skills following therapy. However, it must be acknowledged that the analyses adopted of Applebee's and Stein and Glenn's models reflect European storytelling traditions, which may differ from South Asian culture. It may be important to note the influence of culture on the tradition of storytelling. Arguably, though Sri Lanka is multicultural, it has a long oral tradition of storytelling that is mainly of Buddhist tales, together with some shared children's folktales such as the stories about 'Andare' (tales of a courtier). It is, therefore, a tradition that is more reliant on the auditory than on a visual picture-based storytelling tradition. Alhough this may be more reflective of the Sinhala language storytelling traditions in Sri Lanka, Tamil language speakers too may have imbibed this tradition, showing evidence of a similar Hindu-narrative tradition. This needs to be investigated further.

The sample size of 30 children in the current study is a strength of the methodology. The majority of the studies undertaken on Colourful Semantics therapy so far have been single case studies or included fewer than 10 participants (Bolderson et al., 2011; Bryan, 1997; Guendouzi 2003; Spooner, 2002). The findings, though favourable, may also be reflective of the data collection methods used. In the current study, the reliance was on using informal assessments or adaptations of assessment procedures, as no formal, standardized assessments are available at present for measuring narrative skills in the Sri Lankan Tamil language. Therefore, although the results cannot be easily compared across studies, it does provide important preliminary findings.

Close observation of the results indicate that participants 26, 27, 28 and 29 made the most progress in the language gains noted on the assessments post-intervention. One possible explanation for the marked improvement in the language measures post-intervention in these participants could be that all of them were from the older age group. Therefore, this finding is in line with the results reported by Guendouzi (2003) who found better language gains for an older child, though this is in contrast to the findings of Spooner (2002). Yet another plausible explanation for three of the four participants who benefitted the most from the intervention may be their diagnosis, which is of 'mild' learning difficulties, with presumably more cognitive potential to learn language compared to a child diagnosed with 'moderate' or 'severe' intellectual impairment.

In addition, it is acknowledged that the repeated language measures completed 8 weeks after the baseline measurement may be a limitation. It is possible that the improvement observed in the post-intervention results could reflect a 'learner effect' or recall of the test stories resulting in better

narrative generation as the duration between the test and retest language measurements is less than 6 months, the usual time period specified between testing. That said, it is unclear how much this learner effect might be, given the memory difficulties and language-learning difficulties experienced by children with intellectual disabilities. It may be of benefit to retest the participants 6 months and 12 months post-intervention to determine the generalizability of the language gains observed and to document whether the gains increased, decreased or were maintained with time. Arguably, given the particular difficulties experienced by children with intellectual disabilities with generalizing language skills gained within the therapy context to the outside compared to children with SLI, re-testing at particular intervals post-therapy may be valuable.

Conclusions and clinical implications

The results of the present study promote the use of Colourful Semantics as a whole-class intervention approach, delivered via the class teacher to support the development of narrative sills. The training of teachers to facilitate the Colourful Semantics approach holds the potential to reach more children and to thereby make speech and language therapy intervention more accessible in resource poor settings.

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