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Increasing teachers' use of communication-supporting strategies: findings from an exploratory study using the Communication Supporting Classroom Observation Tool (CSCOT) in primary schools in Brunei

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The Communication Supporting Classroom Observation Tool (CSCOT) is used in the UK to identify how teachers support children's communication development. This study evaluates the feasibility and impact of collaborative training for teachers using the CSCOT, delivered by specialist teachers and a speech and language therapist. Classroom practice was observed twice using the CSCOT before the collaborative training (repeated baseline). Five teachers then received the collaborative training, informed by their baseline CSCOT

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results. The training consisted of detailed feedback, target setting and support from the school Special Educational Needs Assistant (SENA) over a period of 20 weeks. Five further teachers did not participate in this training but acted as a control group. The CSCOT observations were then repeated for all 10 classroom teachers. The total score of the CSCOT significantly increased for the five teachers who received training only. There was no increase during the repeated baseline phase, suggesting that the increase was due to the training. All five teachers who participated in training increased their use of their targeted communication-supporting strategies. The CSCOT can be used as part of collaborative training to increase teachers' use of communication-supporting strategies in primary schools in Brunei.

***Key words*: communication supporting classroom observation tool, teacher intervention, teacher training, language disorder, collaboration.**

Introduction: the importance of communication-friendly classrooms

Language skills are important for children's educational outcomes (Duncan *et al*., 2007). A language-enriching classroom environment is essential for children's language and communication development (Auten, 1985; Martin, 2000; Justice, 2004). Spoken language is also a medium for classroom learning and instruction, as teacher talk is used to convey and exchange the meanings core to learning (Alexander, 2001). Children use spoken language to make new meanings and to rehearse and develop new ideas (Barnes, 2010). Spoken language is therefore central to classroom learning across the curriculum (Jones, 2016). Communication supporting classrooms are designed to facilitate talk for learning for all children.

In addition, communication supporting classrooms can also support children who are behind in developing their language and communication skills. Around 3%–10% of children will have language disorders, depending on age and threshold of severity applied (Tomblin *et al*., 1997; Reilly *et al*., 2010; Norbury *et al*., 2016). Communication supporting classrooms offer an opportunity to take a preventative whole-class approach, given that children will have different trajectories

of language growth during the pre-school and early primary years (McKean *et al*., 2015) and that screening and identification of language disorders can be challenging (Wallace *et al*., 2015). This means that all children receive and benefit from high-quality teaching to support early language and communication skills.

Language rich classroom environments

Justice (2004) details the key components of language-rich and communication supporting classrooms as follows: designated and responsible staff who collaborate to define a philosophy for supporting spoken language in the classroom; designing a physical space in the classroom to allow children to be exposed to diverse language in terms of language content, form and use; delivering daily language objectives accessible to all children; and ensuring quality teacher-child interactions. The physical environment of the classroom should be print-rich to allow interaction with letters and numbers. There should be open space and clearly identified learning areas (e.g. a story corner, a set up for imaginative play). Children should be able to access materials and props in order to play and problem-solve. Set ups for play settings should rotate (e.g. shops, airports, hospital scenes) and be varied and rich, to allow engaging and diverse socio-dramatic play (Justice, 2004). Real world props and materials should be provided, including literacy artefacts.

Language-learning opportunities should be provided daily, so the focus on spoken language development is deliberate and consistent (Justice, 2004). Examples of evidence-based language-learning opportunities are: interactive or dynamic story-telling (Dowdall *et al*., 2020), structured peer discussion with pupils with higher language abilities (Mashburn *et al*., 2009), and opportunities for discussion with adults (Dockrell *et al*., 2010). Ensuring the quality of adult-child conversations is also important, building on a social-interactive perspective of child language acquisition (Justice, 2004). Language-learning interaction strategies include commenting on what children are currently doing, confirming children's utterances and providing verbal routines for familiar activities (Justice, 2004; Dockrell *et al*., 2010; Cabell *et al*., 2011).

The Communication Supporting Classroom Observation Tool (CSCOT) (Dockrell et al., *2012)*

The CSCOT was developed to support the development of communication-supporting classroom environments across three dimensions: the

Language-Learning Environment (LLE), the Language-Learning Opportunities (LLO) and the Language-Learning Interaction (LLI) (Dockrell *et al*., 2012, 2015). The CSCOT was piloted in 101 classrooms in 39 schools across the UK, including classrooms in reception ($n = 38$), year one ($n = 35$) and year two ($n = 28$). Classrooms across all 3-year groups scored significantly higher in the LLE dimension compared to the other two dimensions, with scores in the LLI dimension also significantly higher than the LLO dimension. This indicates classrooms were providing children with a structured language-learning environment (including labelling of areas and resources, teacher strategies for transition or noise management, and use of teaching materials) but did not provide sufficient opportunities for developing children's language (interactive book reading, structured conversations with adults and peers, and inclusion of all children in small group tasks). In the LLE dimension, year two classrooms scored significantly lower than reception, suggesting structured language-learning environments for children was not consistent in classrooms for older children.

Training teachers to support communication-friendly classrooms

The CSCOT has been used to audit and describe classroom practice in the UK (Dockrell *et al*., 2012, 2015; Law *et al*., 2019). However, Law *et al*. (2019) call for studies which investigate the impact of interventions derived from the CSCOT on classroom practice.

Some very early research has started to examine whether the CSCOT can be used to support teachers' communication-supporting practice in the classroom, rather than just measure it. Bakopoulou *et al*. (2019) present a series of nine descriptive case studies, each involving collaboration with a primary school to increase support for spoken language in the classroom. These schools were based in South East England. All schools implemented a range of changes to increase the support for spoken language over one school year. Each school had a different focus, with changes related to teachers' professional development, a new communication buddy system, or by increasing teacher knowledge of bilingualism. Some schools focused on increasing the use of specific support for communication such as vocabulary teaching, use of visual materials or increasing good quality spoken interaction. All schools had access to the CSCOT as part of the study, as well as access to support from outside facilitators with specialist knowledge of spoken language. The case studies showed that the schools made positive changes to their

practice. However, the study did not examine the utility of the CSCOT to measure change and CSCOT observations were not a central part of the teacher training.

Nordberg (2021) used the CSCOT to identify how children's language skills could be further supported in nine Swedish preschools. They used 30 minute videoed classroom observations to complete the CSCOT and discussed results in 'collegial reflections' with preschool teachers, involving middle leaders within schools. This model of professional development resulted in changes to the CSCOT scores 6 weeks later, as presented in the descriptive tables of the CSCOT item scores for each preschool. The most commonly improved item regarding the Language-Learning Environment was the 'labelling a majority of learning resources with pictures/words' and similarly, more symbols and pictures were used during interactions to reinforce language. Nordberg (2021) concludes that the CSCOT observations were useful as a flexible starting point for developing classroom practices and finding target areas for specific actions for preschool teachers.

The current study explores the use of the CSCOT as the basis of collaborative training involving Special Educational Needs Assistant teachers (SENA), and class teachers working together to create communication-friendly classrooms in Brunei. The use of the CSCOT in teacher training is advocated by the CSCOT authors (Dockrell *et al*., 2012, 2015), and has been used as part of teacher training in the UK (Bakopoulou *et al*., 2019) and Sweden (Nordberg, 2021). However, there is a need to examine first if the CSCOT has applicability outside of Europe and second if and how the CSCOT can be used to as part of collaborative training.

The overall aim of this study is to investigate the feasibility and impact of collaborative training based around the CSCOT to increase teachers' use of communication-supporting strategies in primary classrooms in Brunei. The study asks the following questions:

1. What is the feasibility of using the CSCOT to increase classroom teachers' use of communication-supporting strategies, when incorporated into collaborative training with speech and language therapist and Special Educational Needs teacher colleagues?
2. Do classroom teachers increase their use of communication-supporting strategies after participating in such collaborative training with a speech and language therapist and their school's Special Educational Needs teacher, as informed by the CSCOT?

Methodological orientation and context

The study was conducted in five schools in Brunei and involved ten class teachers (five trained teachers and five control teachers). The CSCOT was completed twice in two observations to form a repeated baseline phase. The first author (a speech and language therapist) and the schools' SENA teachers then worked with the five intervention teachers to deliver a 20-week training programme based on collaborative discussions. The CSCOT results were used as a basis to provide feedback, identify targets based on CSCOT items, and coach the class teacher to work towards their targets to increase the communication-supportiveness of their classrooms. After the training, the CSCOT was repeated. The final CSCOT observation outcome was compared with that of five control teachers who had not received any feedback on their initial CSCOT results or any collaborative training.

The study received full ethical approval from the Health Sciences School Ethics Committee, University of Sheffield.

Special education in Brunei: scene setting

Brunei is a small country covering an area of 5,765 square kilometres and is located along the South China Sea (The Brunei Economic Development Board, 2016). It is divided into four districts, where the capital city, Bandar Seri Begawan and the most densely populated area is Brunei-Muara (Oxford Business Group, 2013; E-Darussalam, 2016). The Ministry of Education (MoE) of Brunei provides its citizens with 12 years of free education (Oxford Business Group, 2013; Ministry of Education, 2015). Seven years in primary education (including a year in pre-school), and 5 years in secondary education (3 years in lower secondary and 2 years of upper secondary, vocational or technical education) (Oxford Business Group, 2013; Ministry of Education, 2014a). Brunei signed a pledge during the United Nations Convention on the Rights of the Child in 1989 which supports the basic right of every child to have access to education (Koay, 2007; Ministry of Education, 2008; Mundia, 2009; United Nations Educational Scientific and Cultural Organization, 2009). In 1994, Brunei was among 92 government representatives and 25 international organisations that attended the World Conference on Special Needs Education in Salamanca, Spain (Koay, 2007, 2014; Ministry of Education, 2008). Brunei became a signatory member in embracing and advocating the statements and framework of actions specified during the conference (Koay *et al*., 2006;

Ministry of Education, 2008). This involved all the member countries and organisations to 'adopt as a matter of law or policy the principle of inclusive education' (UNESCO, 1994, p. ix) and all children should be in mainstream schools despite differences in their 'physical, intellectual, social, emotional, linguistic, or other' needs (UNESCO, 1994, p. 6). Subsequently, the MoE created the Special Education Unit (SEU), now known as the Department of Special Education, as the main agency to support the educational needs of these children (Ministry of Education, 2008, 2014b). Established in 1994, its main aim is to support the planning, coordination and implementation of school-based special education programmes for children with special educational needs (SEN) (Hamid, 2000; Sim and Koay, 2004; Wong and Mak, 2005; Koay, 2014).

The research process

Five primary schools in the Brunei-Muara district (the capital city and most populous district) were recruited to the study. In each school, two classroom teachers were recruited, one training teacher and one control teacher. The inclusion criteria for recruiting teachers included teaching either pre-school (equivalent to reception classrooms in the UK or kindergarten in the USA), year one or year two classes, no knowledge of the CSCOT prior to their participation in the study, and at least one child in their class with a speech, language and/or communication difficulty.

The ages of the children in the teachers' classes ranged between 4 years 9 months to 5 years 9 months (pre-school), 5 years 9 months to 6 years 9 months (year one), and between 6 years 9 months to 7 years 9 months (year two).

Details of the participating schools, teachers and classrooms are shown in Table 1.

The number of children in the training classrooms ranged from 17 to 20 and from 13 to 24 in the control classrooms. The children were not assessed as part of the study. While it is important to consider the impact of a communication supporting classroom on children's language development and educational outcomes, this was beyond the remit of the current project.

The CSCOT (Dockrell *et al*., 2012, 2015) was used to assess the teachers communication supporting practice, to identify individual teacher targets and inform the collaborative intervention. The CSCOT is completed during an observation of typical classroom practice, typically lasting approximately 1 hour.

Table 1. Details of the participating teachers

School	*Year group*	*Training or control group*	*Number of children in class*	*Number of children in class with identified SLCN*	*Subject specialism of class teacher*
1	Pre-school	Training	18	2	Literacy
		Control	20	1	Integration
2	Year 1	Training	18	1	English
		Control	24	3	Malay
3	Pre-school	Training	17	2	Phonics
		Control	14	1	Maths
4	Year 2	Training	20	1	English
		Control	19	1	Science
5	Year 1	Training	17	1	English
		Control	13	1	English

The CSCOT has three dimensions; Language-Learning Environment (LLE), Language-Learning Opportunities (LLO) and Language-Learning Interaction (LLI).

- The LLE dimension has 19 items and scored as 'not seen' or 'observed' (range 0–1).
- The LLO has 5 items, and each can be observed up to a maximum of five times during the observation, resulting in a range of scores between 0 and 25 for the LLO.
- the LLI dimension has 20 items, and again each can be observed up to a maximum of five times during the observation, resulting in a range of scores between 0 and 100 for the LLI.

Scoring for the classrooms' scores on the CSCOT are therefore converted to proportion scores, to account for the different number of items across the three dimensions (Dockrell *et al*., 2012). Proportion scores are the actual number of observations divided by the total number of possible observations in each dimension. This results in a score from '0' (no occurrence) to '1' (maximum number of occurrences) for all three dimensions.

It is not expected for classrooms to demonstrate all the items in the CSCOT at all times.

In Brunei, each primary school has a SENA teacher who provides specialist support for children with special needs across the school. This is roughly equivalent of the Special Educational Needs Co-ordinator role in the UK. The SENA teacher in each of the five schools worked with the first author on the project. First, the SENA teachers completed a full-day introduction to the CSCOT, involving an overview of the CSCOT and the evidence behind it, discussion of each item, information about how to identify communication supporting factors, and how to rate LLO and LLI on a frequency of 0–5. The first author and the SENA teacher then completed classroom observations together using the CSCOT and compared results, discussing any disparities (for classrooms not involved in the project, as part of the SENA training).

The SENA teacher then worked on the project and in each school they co-conducted the CSCOT observations of the teachers recruited to the project (with the first author). The SENA teacher also worked with the first author to co-delivered the initial feedback and target setting session with the five training classroom teachers. They then followed up independently with the classroom teachers, providing training via collaborative discussions with the training teachers over a period of 16 weeks. The collaboration between the speech and language therapist (first author) and the SENA was an important feature of the project, as it allowed the training to be situated in the context of each individual school and to build on and utilise existing collegial relationships.

CSCOT classroom observations: The CSCOT was carried out in the two baseline phases: Time 1 (T1) and Time 2 (T2) and after the intervention at Time 3 (T3). Table 2 shows the timeline of the study. Each observation took place in the morning during one whole lesson, lasting approximately 1 hour.

Repeated baseline: These were the classroom observations using the CSCOT at T1 and T2 for both intervention and control teachers. This was to determine

Table 2. Timeline of the study

	Week 1	*Week 3/4*	*Week 4–19*	*Week 20*	
	Time 1	*Time 2*	*Intervention*	*Time 3*	
Control classrooms ($n = 5$)	Baseline CSCOT	Repeated baseline CSCOT T2	No training	Post-intervention CSCOT	Feedback on CSCOT
Training classrooms ($n = 5$)	Baseline CSCOT	Repeated baseline CSCOT T2	Training	Post-training CSCOT	Final review

stability in CSCOT scores over time. Four schools had a gap of 1 month between T1 and T2 observations, and the remaining school had a space of 3 weeks.

Inter-rater reliability: In each school, the CSCOT was completed by both the SENA teacher and the SLT (the first author) in both the intervention classroom and the control classroom independently. It was important to identify if there was agreement between the SENA teacher and the SLT in their scoring of the CSCOT. This agreement is termed inter-rater reliability. The inter-rater reliability between the scoring of the SENA teacher and the SLT was calculated manually using statistical analysis (Cohen's Kappa (Cohen, 1960) and Intra-class correlation coefficient (Landis and Koch, 1977)).

Across the three time points, percentage agreement values for the CSCOT scoring of the training teachers ranged from 63% to 89% (LLE), 40% to 80% (LLO) and 75% to 100% (LLI). For the CSCOT scoring of the control teachers, agreement values ranged from 58% to 95% (LLE), 60% to 80% (LLO) and 55% to 100% (LLI).

Cohen's kappa (k) values showed good agreement, particularly at T3, suggesting agreement improved with time for all three dimensions. The details of this statistical analysis are presented here. The kappa values for the training teachers ranged from 'slight agreement' at T1, $k = 0.18$ (95% CI, −0.27 to 0.64), $p = 0.419$, to 'almost perfect agreement' at T3, $k = 0.100$ (95% CI, 1.00 to 1.00), $p < 0.001$ (LLE), ranged from 'poor agreement' at T1, $k = 0.15$ (95% CI, −0.97 to 0.66), $p = 0.709$, to 'moderate' at T3, $k = 0.55$ (95% CI, −0.17 to 1.26), $p = 0.171$ (LLO) and ranged from 'fair agreement' at T1, $k = 0.77$ (95% CI, −0.19 to 0.77), $p = 0.197$, to 'almost perfect agreement' at T3, $k = 1.00$ (95% CI, 1.00 to 1.00), $p < 0.001$ (LLI). For the control teachers, the kappa values ranged from 'fair agreement' at T1, $k = 0.27$ (95% CI, −0.19 to 0.73), $p = 0.241$, to 'almost perfect agreement' at T3, $k = 0.90$ (95% CI, 0.70 to 1.10), $p < 0.001$ (LLE), ranged from 'slight agreement' at T1, $k = 0.17$ (95% CI, −0.71 to 1.04), $p = 0.709$, to 'substantial' at T3, $k = 0.62$ (95% CI, −0.01 to 1.24), $p = 0.136$ (LLO) and ranged from 'slight agreement' at T1, $k = 0.15$ (95% CI, −0.17 to 0.47), $p = 0.369$, to 'almost perfect agreement' at T3, $k = 1.00$ (95% CI, 1.00 to 1.00), $p < 0.001$ (LLI).

A further statistical analysis using the Intra-class coefficient (ICC) was completed to identify if the SENA teacher and SLT scored a similar frequency or occurrence of the behaviours in each of the LLE, LLO and LLI dimensions. This is a further way to understand if there is agreement between the scoring of the SENA teacher and SLT using the CSCOT. Intra-class coefficient (ICC) scores ranged between

'poor' to 'excellent' agreement for the LLO dimension and between 'good' to 'excellent' agreement for the LLI dimension across schools, classrooms and time points. This indicated the two scorers rated the occurrence of the behaviours similarly, especially for the LLI dimension. For the training teachers, ICC scores ranged from 'poor' ICC (3,2) = −0.22, 95% CI (−10.69, 0.87), $F(4,4) = 0.82$, $p = 0.573$ at T1, to 'excellent' at T3, ICC (3,2) = 0.95, 95% CI (0.55, 1.00), $F(4,4) = 21.40$, $p = 0.006$ (LLO) and scores ranged from 'good' ICC (3,2) = 0.69, 95% CI (0.23, 0.88), $F(19,19) = 3.26$, $p = 0.007$ at T1, to 'excellent' at T3, ICC (3,2) = 0.82, 95% CI (0.55, 0.93), $F(19,19) = 5.58$, $p < 0.001$ (LLI). ICC scores for the control teachers ranged from 'fair' ICC (3,2)= −0.51, 95% CI (−3.67, 0.95), $F(4,4) = 2.06$, $p = 0.251$ at T1, to 'excellent' at T3, ICC (3,2) = 0.88, 95% CI (−0.12, 0.99), $F(4,4) = 8.60$, $p = 0.030$ (LLO) and scores ranged from 'fair' ICC (3,2) = 0.50, 95% CI (−0.12, 0.67), $F(19,19) = 1.99$, $p = 0.072$ at T1, to 'excellent' at T3, ICC (3,2) = 0.96, 95% CI (0.90, 0.99), $F(19,19) = 26.26$, $p < 0.001$ (LLI).

In summary, there was good inter-rater reliability between the SENA teacher and the SLT. This was higher for the LLE and LLI dimensions than the LLO dimension where there was less agreement and more variability in the scores of the SENA teacher and the SLT. The analysis showed good agreement in the scoring of the CSCOT and therefore the CSCOT is a robust measure to use to understand how teachers support children's communication development in the classroom.

The collaborative discussion-based training for classroom teachers

For the five training teachers, a training package was offered based on the CSCOT results (from T1 and T2). These training packages were designed to be teacher-led and individual to the needs of each teacher and school. However, they all involved a series of collaborative discussions between the classroom teacher, the SLT and the SENA teacher. They all used the CSCOT outcomes as the basis for target setting. In each school, teachers worked with the SENA teacher to develop towards these specific targets, in order to create a more communication supporting classroom.

- Feedback session. The SLT (first author) and SENA teacher met with each training classroom teacher individually and explained and presented the results of the CSCOT observations. The results were discussed with the training classroom teacher, and for each item we talked through the observed score and whether the teacher felt this was a fair representation of their classroom practice. The discussions included: (a) what we mean by communication supporting environments, opportunities and interactions; (b) what each item means (e.g. what is a 'structured

conversation with peers'; how can adults use symbols, pictures and props to reinforce language) and (c) why the communication supporting behaviours are important. The SLT and SENA teacher highlighted strengths for each teacher. They also agreed with the classroom teacher a number of CSCOT items to focus on, as targets further development. Most teachers selected the CSCOT item with the lowest score as one of their targets. The teachers could select up to 3 items on the CSCOT as their targets to improve. This was teacher-led: the SENA teacher and SLT advised but the teacher decided what their own priorities were. This joint feedback session lasted between 1 and 2 hours. Two extracts from the discussions are included below to highlight the types of challenges the teachers were experiencing.

Extract 1: Training classroom teacher describing an area targeted in the LLI dimension: 'I was interested in the last part … adult modelling language … Yeah actually it's quite challenging … that part because I noticed my kids this year their vocabulary is very limited compared to last year'.

Extract 2: Training classroom teacher describing an area targeted in the LLE dimension: 'Actually … just one day, for example today I would display the children's work but then the next day it will be gone. That's why it is difficult to display children's work because it will be destroyed'.

- Action planning. The SENA teacher and the SLT met with each classroom teacher to agree an action plan based on the identified targets. This involved: what needed to be done, who was responsible for taking action, any resources that were required, and a timeframe for action. Some examples of action planning are:
    - Teachers in two schools planned team teaching sessions with the SENA teacher to work towards their targets.
    - One teacher requested visual cards to be used as part of praising listening skills for teachers, which the SENA teacher produced and provided.
    - Teachers in two schools worked with the SENA teacher to identify parts of the classroom that could be labelled with symbols and words. Resources provided included paper, card, laminating film, Velcro.
- Modelling and support by the SENA. Having been trained by the SLT, the SENA teacher was able to provide modelling and support for the classroom teachers, where this was requested and felt to be appropriate. Some examples of modelling and further support provided by the SENA teacher:
    - SENA teacher went into class to provide further feedback on 'praising listening skills' and to model what this would look like.

    - SENA teacher went into the classroom to observe practice further and suggest specific opportunities for small group work.
    - SENA teacher did some 'team teaching' sessions with classroom teachers, to model how specific communication supporting opportunities and interactions could be applied in the specific classroom. Opportunities for further discussion and questions followed the team teach sessions.
- Further training. The SENA teacher provided informal discussion-based training as need, for example one teacher wanted further information on supporting children to make choices. The SENA teacher talked through how a classroom teacher could embed this into their everyday practice, with examples and use of specific toys and objects of reference. The collaborative support provided by the SENA teacher was individual to each school and teaching partnership. SENA teachers were encouraged by the SLT (first author) to be led by the classroom teachers to provide support, further information and resources as requested.
- Progress monitoring. Two months after the feedback sessions, each SENA teacher and training classroom teacher met individually to discuss perceived progress on the targeted areas. Discussions covered: whether teachers were happy with their selected targets; any challenges to working towards targets; any further advice, support, training or resources required; any perceived successes so far.

Final review

After the final CSCOT observation at T3, the SLT (first author) and the SENA teacher met with training classroom teachers to share and discuss the T3 CSCOT scores, compare these final observations with previous baseline observations at T1 and T2 and to discuss the outcomes of the project and how they would continue to make progress towards creating communication supporting classrooms.

Control teachers

Five teachers (one from each school) were observed using the CSCOT at the three-time points but did not see their CSCOT results and they did not participate in any specific discussions with the SENA teacher or SLT about communication-supporting strategies. They received feedback on their CSCOT results only after the project had ended. After the T3 observation, the SENA teacher, control teacher and first author met to discuss the CSCOT scores taken at the three assessments points. This control group was included to explore whether any changes to classroom practice were specific to the training and CSCOT feedback provided.

Analysis

Data were inputted and analysed using the Statistical Package for the Social Sciences (SPSS) version 22 (IBM Corp., 2013). The CSCOT data from all three-time points was not normally distributed due to the presence of outliers and significant values for Shapiro–Wilk tests. As a result, non-parametric tests were conducted to analyse the data.

The patterns of performance in the individual dimensions of the CSCOT were examined to explore if there were any changes across the time points. The Friedman's ANOVA tests compared the scores. Any significant differences were analysed with a series of Wilcoxon signed-rank tests to determine between which time points the changes in the scores were significant. The CSCOT scores from the intervention teachers were compared to control teachers using Wilcoxon signed-rank tests to determine changes at the level of each group.

Results

The following three tables present item by item scores on the three dimensions of the CSCOT, presenting Time 2 (before the training period) and Time 3 (after the training period) for both the teachers who received training and the teachers who formed a comparative control group. This presentation of results is similar to the study by Nordberg (2021) in comparing any changes in scores by the teacher groups, pre and post training (Tables 3–5).

Table 6 shows the proportional scores in each of the three dimensions of the CSCOT (Language-learning environment; language-learning opportunities; language-learning interactions) for the intervention teachers and the control teachers, for each of the three observation time points (Times 1–3). It also shows the total proportion scores when the three dimensions were combined.

Statistical analysis was completed to understand if the teachers who received the training made more changes in their communication-supporting strategies than the teachers who did not receive the training (comparative control group). A series of Friedman's ANOVA examined the significance of differences across time points for each dimension for the teachers who received the training and those who formed a comparative control group. Where significant differences were found, follow-up analyses using Wilcoxon signed-rank tests were

conducted to determine where the changes in the scores reached significance. The Bonferroni corrections were applied to the p-value, to account for the three comparisons between T1–T2, T2–T3 and T1–T3. As a result, the significance of these follow-up tests was reported at 0.017 (0.05/3) significance level.

For the training teachers, the proportion score in the LLE dimension did not significantly change across the time points ($\chi^2(2) = 5.16$, $p = 0.076$). Significant changes in the scores were found in the LLO dimension ($\chi^2(2) = 9.33$, $p = 0.009$) for training teachers, with non- significant changes in scores between T1 to T2 (T = 0.00, $p = 0.042$, $r = -0.64$ and T2 to T3, T = 15.00, $p = 0.039$, $r = 0.65$). Significant changes were found in the LLI dimension ($\chi^2(2) = 8.400$, $p = 0.015$) and Wilcoxon tests showed non-significant differences between T1 to T3 (T = 15.00, $p = 0.043$, $r = 0.64$, and T2 to T3, T = 15.00, $p = 0.043$, $r = 0.64$). Although the scores increased from T1 to T3 in each dimension, these changes did not reach significance at the 0.17 p value.

Similarly, for the control teachers, there was a significant change in the proportion score with time in the LLE dimension ($\chi^2(2) = 7.68$, $p = 0.021$), with non-significant changes between T2 and T3 (T = 15.00, $p = 0.042$, $r = 0.64$). In the LLO ($\chi^2(2) = 5.20$, $p = 0.074$) and LLI dimension ($\chi^2(2) = 2.80$, $p = 0.247$) no significant changes in the scores were observed.

Table 6 also shows the changes in the overall CSCOT scores (with the LLE/LLO/LLI scores combined) across the three-time points for both the teachers who received training and those who formed a comparative control group. Wilcoxon signed-rank tests were used to determine if there were any significant differences between T1 to T2 and T2 to T3 for each teacher category. The intervention teachers had significantly higher T3 than at T2 scores ($z = 2.02$, $p = 0.043$, $r = 0.64$). The scores were higher at T1 than at T2, but these differences were not significant ($z = -1.83$, $p = 0.068$, $r = -0.58$). For the control teachers, the scores reduced from T1 to T2 ($z = -2.02$, $p = 0.043$, $r = -0.64$) and increased slightly at T3, but no differences reached significance.

Table 7 shows a closer look at the progress on specific targeted items of the CSCOT for the teachers who received training. At the second baseline (T2), all of the intervention teachers scored 0 or absent on all of their targeted CSCOT items, indicating the absence of the strategy in supporting children's communication. At T3, all the teachers who had received training scored present or with a number for their targets and therefore progressed on all of their selected targets.

In summary, for the overall CSCOT score there was a significant increase in the total score between T2 and T3 for the teachers who received training but not the control teachers. This means the teachers who received the training made more changes in their communication-supporting strategies than the control teachers.

Discussion

The overall aim of this study was to investigate the feasibility and impact of collaborative training based around the CSCOT, to increase teachers' use of communication-supporting strategies in primary classrooms in Brunei. The CSCOT was used as both an outcome measure and a facilitator for change, with discussion around the CSCOT scores informing how teachers selected goals to work on, to increase the communication-supporting strategies used in their classrooms. Five teachers worked with a speech and language therapist from outside their school and the school's own SENA. Teacher over 20 weeks, receiving bespoke collaborative training related to their chosen targets. This training included options like team teaching with the SENA teacher, being provided with additional resources, and participating in further discussion and feedback about how to support children's communication skills development.

A repeated measures design was employed to measure the use of communication-supporting strategies by these five teachers who received feedback on their CSCOT scores and training (training teachers). Progress on reaching three specific targets based on their initial CSCOT scores were measured. Overall CSCOT score was also analysed over time. The outcomes for these teachers post-training were compared to the use of communication-supporting strategies by five teachers who did not receive any feedback on their CSCOT performance nor any training (control teachers).

The results of this exploratory study are promising. The post-training CSCOT scores confirmed a significant increase in the use of communication-supporting strategies by the intervention teachers which was not observed in the control teachers. All five teachers achieved all of their targets, progressing from an absence of the communication supporting strategy at Time 1 and 2 to the presence of the strategy in their classroom practice at Time 3. The study suggests that it is feasible to use the CSCOT to increase classroom teachers' use of communication-supporting strategies, when incorporated into collaborative training with speech and language therapist and Special Educational Needs teacher colleagues. Classroom teachers increased their

Table 3. Differences between observed Language-Learning Environment CSCOT items before (Time 2) and after (Time 3) the staff's collegial training

	Training teachers										*Control teachers*									
	Teacher 1		*Teacher 2*		*Teacher 3*		*Teacher 4*		*Teacher 5*		*Teacher 1*		*Teacher 2*		*Teacher 3*		*Teacher 4*		*Teacher 5*	
	Before	*After*	*Before*	*After*	*Before*	*After*	*Before*	*After*	*Before*	*After*	*Before*	*After*	*Before*	*After*	*Before*	*After*	*Before*	*After*	*Before*	*After*
Open space	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Defined learning areas	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Labelled learning areas: pictures/words	**No**	**Yes**[a]	No	Yes[a]	Yes	No	Yes	Yes	No	No	No	No	No	Yes	No	Yes	No	Yes	No	No
Quiet areas	Yes	Yes	No	No	Yes	Yes	Yes	Yes	No	No	Yes	Yes	No	No	Yes	Yes	No	No	No	No
Children's work displayed/ labelled	Yes	Yes	**No**	**Yes**[a]	Yes	Yes	Yes	Yes	No	Yes[a]	Yes	Yes	No	No	Yes	Yes	No	No	No	Yes
Comments on displayed items	No	No	No	No	No	Yes[a]	Yes	Yes	No	No	No	No	No	No	No	No	No	No	No	Yes
Book specific areas	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes	Yes	No	No
Literacy-specific areas	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
Noise levels, hear with ease	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
Transition times with appropriate noise levels	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
There is good light	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table 3. (Continued)

	Training teachers										*Control teachers*									
	Teacher 1		*Teacher 2*		*Teacher 3*		*Teacher 4*		*Teacher 5*		*Teacher 1*		*Teacher 2*		*Teacher 3*		*Teacher 4*		*Teacher 5*	
	Before	*After*	*Before*	*After*	*Before*	*After*	*Before*	*After*	*Before*	*After*	*Before*	*After*	*Before*	*After*	*Before*	*After*	*Before*	*After*	*Before*	*After*
Majority learning resources labelled with pictures/ words	Yes	Yes	No	No	No	No	**No**	**Yes**[a]	No	No	No	No	No	No	No	No	No	No	No	No
Free play items reached by the children	Yes	Yes	No	No	Yes	Yes	No	No	No	No	Yes	Yes	No	No	No	Yes	No	No	No	No
Appropriate range of books is available	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes[a]	No	Yes[a]	Yes	Yes	No	No	Yes	Yes	No	Yes	No	No
Interesting books available in other learning areas	Yes	Yes	No	No	Yes	Yes	No	No	No	No	Yes	Yes	No	No	No	No	No	No	No	No
Outdoor play includes imaginative role play	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
Quality toys available	Yes	Yes	No	No	Yes	Yes	No	No	No	No	Yes	Yes	No	No	No	Yes	No	No	No	No
Musical instruments and noise makers available	No	Yes[a]	No	No	No	No	No	No	No	No	No	Yes	No	No	No	No	No	No	No	No
Role play area is available	Yes	Yes	No	No	Yes	No	No	No	No	No	Yes	Yes	No	No	Yes	Yes	No	No	No	No

Note: Bold figures = targeted items. Items on the LLE section of the CSCOT are marked as either present ('yes') or absent ('no') during the observation.
[a]Indicate that items were observed following training only.

Table 4. Differences between observed language-learning opportunities CSCOT items before (Time 2) and after (Time 3) the staff's collegial training

	Training teachers										*Control teachers*									
	Teacher 1		*Teacher 2*		*Teacher 3*		*Teacher 4*		*Teacher 5*		*Teacher 1*		*Teacher 2*		*Teacher 3*		*Teacher 4*		*Teacher 5*	
	Before	*After*	*Before*	*After*	*Before*	*After*	*Before*	*After*	*Before*	*After*	*Before*	*After*	*Before*	*After*	*Before*	*After*	*Before*	*After*	*Before*	*After*
Adult facilitated small group work	0	0	**0**	**2**[a]	0	2[a]	2	1	**0**	**1**[a]	0	0	0	0	0	0	0	0	0	0
Opportunities to engage in adult-facilitated interactive book reading	0	0	0	0	0	0	0	2[a]	0	1[a]	0	0	0	0	1	0	0	0	0	0
Opportunities to engage in structured conversations with teachers/adults	1	2	0	0	1	3	0	1[a]	1	1	0	1	0	0	1	2	1	1	1	1
Opportunities to engage in structured conversation with peers	0	0	0	0	0	0	0	0	0	1[a]	0	0	0	0	0	0	0	0	0	0
Active inclusion of all children in small group activities	1	2	1	3	2	2	2	4	1	4	2	1	0	0	3	2	2	3	2	1

Note: Bold figures = targeted items. Items on the LLO section of the CSCOT are scored in terms of frequency of observed opportunity (up to 5 times).
[a]Indicate that items were observed following training only.

Table 5. Differences between observed language-learning interaction CSCOT items before (Time 2) and after (Time 3) the staff's collegial training

	Training teachers										*Control teachers*									
	Teacher 1		*Teacher 2*		*Teacher 3*		*Teacher 4*		*Teacher 5*		*Teacher 1*		*Teacher 2*		*Teacher 3*		*Teacher 4*		*Teacher 5*	
	Before	*After*	*Before*	*After*	*Before*	*After*	*Before*	*After*	*Before*	*After*	*Before*	*After*	*Before*	*After*	*Before*	*After*	*Before*	*After*	*Before*	*After*
Using children's name	5	5	4	4	5	5	5	5	5	5	3	5	2	3	5	5	5	5	5	5
Getting down to child's level	2	3	3	3	2	5	4	3	2	5	1	2	0	0	3	5	3	4	3	1
Using natural gestures	5	5	2	5	5	5	5	5	5	5	5	5	2	5	5	5	5	5	5	5
Using symbols (pictures) to reinforce language	3	3	4	3	4	5	3	3	5	5	2	3	1	2	3	4	3	2	4	2
Slow pace during conversations	5	5	3	4	3	5	5	5	4	5	4	3	1	3	5	5	3	3	4	2
Pauses to encourage turn taking and active participation	5	5	4	3	3	5	5	5	3	5	3	5	0	4	5	5	3	3	5	5
Confirming children's intention	5	5	2	3	5	5	5	5	5	5	1	5	2	1	5	5	5	5	5	2
Imitating what child says more or exactly	5	5	3	1	2	5	5	4	3	4	1	5	0	2	4	5	3	5	2	2
Commenting on children's communication	3	2	1	4	2	5	2	3	4	2	0	0	0	0	2	5	4	3	3	3

(Continues)

Table 5. (Continued)

	Training teachers										*Control teachers*									
	Teacher 1		*Teacher 2*		*Teacher 3*		*Teacher 4*		*Teacher 5*		*Teacher 1*		*Teacher 2*		*Teacher 3*		*Teacher 4*		*Teacher 5*	
	Before	*After*	*Before*	*After*	*Before*	*After*	*Before*	*After*	*Before*	*After*	*Before*	*After*	*Before*	*After*	*Before*	*After*	*Before*	*After*	*Before*	*After*
Extending children's language	5	5	1	0	4	5	5	5	4	3	0	5	0	1	5	5	5	5	5	3
Labelling unfamiliar items/ actions	2	5	1	0	4	5	2	3	5	5	0	4	1	1	5	3	3	4	5	5
Encouraging use of new words	1	5	0	0	3	5	2	3	1	5	0	3	0	0	5	5	1	2	2	0
Using open questions	4	5	5	2	2	5	5	5	3	3	5	5	1	1	5	5	5	1	5	4
Oral scripting of activities	2	1	1	2	3	2	2	1	2	2	1	2	2	2	1	3	2	2	1	1
Providing clear language choices	0	0	**0**	**1**[a]	0	0	0	1[a]	**0**	**2**[a]	0	0	0	0	0	0	2	0	0	0
Using contrasts	3	2	1	0	4	4	0	1[a]	0	5[a]	1	3	0	0	4	2	1	1	3	0
Modelling language that the children are not producing yet	**0**	**5**[a]	0	1[a]	4	3	0	2[a]	1	4	0	5	0	0	3	2	0	2	1	0
Encouraging turn taking	3	4	2	2	3	5	3	5	3	2	1	1	1	0	3	2	1	3	2	2
Supporting listening skills	**0**	**4**[a]	0	0	**0**	**1**[a]	**0**	**1**[a]	**0**	**5**[a]	0	0	0	0	0	0	0	0	0	0
Praising non-verbal communication	0	3[a]	0	0	**0**	**5**[a]	**0**	**2**[a]	0	4[a]	0	0	0	0	0	1	0	0	0	0

Note: Bold figures = targeted items. Items on the LLI section of the CSCOT are scored in terms of frequency of observed interaction feature (up to 5 times).
[a]Indicate that items were observed following training only.

Table 6. CSCOT scores across the three-time points for the Training and control teachers

CSCOT dimension	*Time point*	*Training teachers (**n** = 5) mean (SD)*	*Control teachers (**n** = 5) mean (SD)*
LLE	T1	0.54 (0.16)	0.49 (0.17)
	T2	0.58 (0.19)	0.44 (0.21)
	T3	0.65 (0.16)	0.56 (0.19)
LLO	T1	0.22 (0.07)	0.15 (0.05)
	T2	0.10 (0.05)	0.10 (0.07)
	T3	0.26 (0.07)	0.10 (0.07)
LLI	T1	0.61 (0.17)	0.47 (0.19)
	T2	0.53 (0.09)	0.45 (0.23)
	T3	0.70 (0.18)	0.51 (0.18)
Overall CSCOT scores	T1	1.36 (0.31)	1.12 (0.36)
	T2	1.22 (0.29)	0.99 (0.36)
	T3	1.61 (0.29)	1.16 (0.41)

Abbreviations: LLE, language-learning environment dimension of the CSCOT; LLI, language-learning interaction dimension of the CSCOT; LLO, language-learning opportunities dimension of the CSCOT; *n*, number of classrooms; SD, standard deviation; T, time point.

use of communication-supporting strategies after participating in such collaborative training with a speech and language therapist and their school's Special Educational Needs teacher, as informed by the CSCOT.

Results are promising because changing teachers' use of communication-supporting strategies can be challenging (Dickinson, 2011). Collaboration between classroom and SENA teachers in Brunei can also be challenging, particularly when collaboration seeks to go beyond the identification of children with special educational needs towards providing effective support (Taha *et al*., 2004). In Brunei, classroom teachers typically perceive the special educational needs of children are the responsibility of the SENA teachers. However, this study enabled the development of focused, supportive, cross-disciplinary and collaborative relationships.

The study adds to research demonstrating that training teachers in modifying their interaction skills does result in teachers becoming more responsive to children (Girolametto *et al*., 2003; McDonald *et al*., 2015; Romano and Woods, 2018). Future research is needed to examine the impact of this responsiveness on children's language development and classroom engagement.

Table 7. Targeted CSCOT items at T2 and T3 for the teachers who received training

			Score		
Teacher	*Target*	*CSCOT item description*	*Before training (Time 2)*	*Before training (Time 2)*	*After training (Time 3)*
1	LLE 3	Learning areas are clearly labelled with pictures/words throughout the classroom	Absent	Absent	Present
	LLI 17	Adult models language that children are not producing yet	0	0	5
	LLI 19	Children's listening skills are praised	0	0	4
2	LLE 5	Children's own work is displayed and labelled appropriately	Absent	Absent	Present
	LLI 15	Adult provides children with choices	0	0	1
	LLO 1	Small group work facilitated by an adult takes place	0	0	2
3	LLI 19	Children's listening skills are praised	0	0	1
	LLI 20	Children's non-verbal communication is praised	0	0	5
4	LLE 12	The majority of learning resources and materials are labelled with pictures/words	Absent	Absent	Present
	LLI 19	Children's listening skills are praised	0	0	1
	LLI 20	Children's non-verbal communication is praised	0	0	2
5	LLO 1	Small group work facilitated by an adult takes place	0	0	1
	LLI 15	Adult provides children with choices	0	0	2
	LLI 19	Children's listening skills are praised	0	0	5

Results add to growing body of research that applies the CSCOT to audit and describe classroom practice in the UK (Dockrell *et al*., 2012, 2015; Law *et al*., 2019) and Sweden (Nordberg, 2021). It extends this work to investigate the impact of training derived from the CSCOT on classroom practice. The study builds on early findings by Bakopoulou *et al*. (2019) in South East England, though these nine case studies of classroom practice did not include CSCOT observations as a central part of the teacher training. Nordberg (2021) also successfully used the CSCOT to identify how children's language skills could be further supported in nine Swedish preschools and to provide bespoke collaborative training discussions between classroom teachers and school middle leaders. They used 30-minute videoed classroom observations to complete the CSCOT and discussed results in 'collegial reflections' with preschool teachers, over 6 weeks. Classroom practice was then videoed again, and scores were compared. The current study is the first to (a) use the CSCOT outside of Europe and (b) examine the potential of the CSCOT within collaborative training, using a repeated baseline design and comparison of a group of teachers from within the same schools who did not receive CSCOT feedback or training.

Study evaluation

This study includes a small cohort of teachers, with five receiving training and five who did not receive training acting as a comparison group. The intervention and control teachers were not matched on the baseline CSCOT scores and therefore may have varied according to factors such as teacher experience or the characteristics of pupils in their class. Future studies should recruit larger cohorts of teachers to examine the impact of using the CSCOT as part of collaborative, multidisciplinary training, with matched training and comparison groups.

It was not possible to conduct the final CSCOT observations blind to whether the class teacher had received the training intervention or not. This will have influenced the findings, though both the SENA teacher and the first author completed all the observations to attempt to counter such potential biases. Blind assessment was not possible due to the nature of the training intervention and due to limited resources in this study. Future research should investigate the use of the CSCOT to increase teacher's use of evidence-based communication-supportiveness, using a more robust design.

To the best of the authors' knowledge, the CSCOT is the only evidence-based tool available to identify how teachers support children's communication development

in the classroom (Dockrell *et al*., 2012). The CSCOT was developed in the UK and therefore it is important to acknowledge its limitations in considering cultural differences between the educational contexts of different countries. This study did not attempt to incorporate any cultural differences and further research must address this.

Future research should also examine the impact of increases to communication-supportiveness of classrooms resulting from use of the CSCOT on the children themselves, in terms of child communication development and broader outcomes such as educational attainment, literacy development and wellbeing. The CSCOT is an evidence-based tool, based on a detailed review of evidence-based communication-supporting strategies (Dockrell *et al*., 2012). However, the direct impact of increased CSCOT performance in the classroom and child outcomes has not yet been investigated.

Conclusion

This exploratory study suggests that teachers increase their use of communication-supporting strategies in the classroom, following collaborative training delivered in partnership with SENA teachers and an SLT, and informed by CSCOT observation results. Teachers increased their use of three targeted communication-supporting strategies (based on items of the CSCOT) after the 20 weeks, bespoke collaborative training. They also increased their overall CSCOT score. The teachers who acted as a comparison group did not increase their CSCOT scores over time. The study is the first to examine the use of the CSCOT in training using a repeated measures design and with a comparison study of teachers who did not receive feedback or training on the CSCOT. The promising early results add to emerging research about the utility of the CSCOT to go beyond auditing classroom practice, towards developing communication-supporting strategies (Bakopoulou *et al*., 2019; Nordberg, 2021). It is also the first study to use the CSCOT to examine classroom practice outside of Europe.

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