Teaching South African Center-based Caregivers to Implement Augmentative and Alternative Communication Strategies

Kerstin Tönsing and Shakila Dada

Centre for Augmentative and Alternative Communication, University of Pretoria

Author Note

Kerstin Tönsing https://orcid.org/0000-0003-1317-0474

Shakila Dada https://orcid.org/0000-0001-6170-4763

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Correspondence regarding this article should be addressed to Kerstin Tönsing, Centre for Augmentative and Alternative Communication, University of Pretoria, Hatfield, 0002, Pretoria, South Africa. Email: kerstin.tonsing@up.ac.za

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Abstract

In South Africa, many children with extensive support needs – including children who require AAC - are accommodated in care centers rather than the public schooling system. Caregivers employed at these centers need training in order to support children's communication using augmentative and alternative methods. A total of 29 center-based caregivers took part in this study. A single group pretest-posttest design was used to evaluate the effect of a 5-day training workshop on caregivers' ability to demonstrate and implement five AAC strategies. The effect of the workshop on caregivers' perceptions of their own skills as well as the social validity of the training were also evaluated. Results suggest that the workshop effectively taught caregivers to demonstrate the skills in a simulated roleplay situation. A proportion of caregivers also supplied video footage after the workshop that suggests the ability to implement the strategies in the care center contexts. Caregivers also perceived their own skills to have improved post workshop, and evaluated the training positively.

Keywords: Augmentative and alternative communication; Center-based caregivers; Children in need of AAC; South Africa; Training workshop

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Communication is integral to our positive functioning and well-being as humans. It is fundamental to participation in valued life activities including social life, education and leisure activities. Children with extensive support needs who require AAC typically require support in the form of augmentative and alternative communication (AAC) in order to realize their abilities to communicate (Beukelman & Light, 2020). Such support can assist to promote their participation with in their families, peer groups and communities (Light & McNaughton, 2015).

While the right to appropriate education and rehabilitation for children with extensive support needs is enshrined in the South African Constitution (Republic of South Africa, 1996) and is further mandated by the Schools Act (Republic of South Africa, 1996) and the Children's Act (Republic of South Africa, 2005), the realization of these rights remains elusive for most. A White Paper on inclusive education was published by the Department of Education in 2001 (Department of Education, 2001), but has as yet not passed into law. More than half of all school-aged children with disabilities are still excluded from the basic education system (Department of Education, 2015; Human Rights Watch, 2015). Learners with extensive support needs (including physical and intellectual disabilities) are instead often accommodated in care centers (Geiger, 2012; McKenzie et al., 2017). These centers are typically established by parents of children with extensive support needs in an effort to provide care and supervision for their own and other children from the community to enable parents respite and the opportunity to work (Geiger, 2012). Most centers receive minimal or no financial support from government and are run on inadequate budgets. Minimally trained staff or volunteers (often parents) generally lack the knowledge to provide more than basic physical care such as feeding and hygiene (McKenzie et al., 2017). Rehabilitation services are typically either not offered within these centers, or may depend on ad hoc support from therapists funded by non-governmental

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organizations (NGOs) (Geiger, 2012). A court order handed down by the Western Cape High Court in 2010 (Murungi, 2011) confirmed the right to education for all children, and obliged the government to provide equitable and appropriate education for children with severe intellectual disabilities. Remedial actions by the National Department of Education have included the provision of training programs for care center staff (Sekatane & Orlandi, 2021). Various ad hoc workshops and training events have been initiated; however, not all trainings are necessarily effective (Walton et al., 2014).

Although official statistics are not available, it is likely that many children who attend care centers present with receptive and/or expressive communication disabilities. As communication is both a basic human right and a foundational skill to meaningful participation and learning, addressing the communication needs of children with extensive support needs in care centers is an urgent necessity.

Training communication partners (e.g., parents, teachers, educational assistants, and peers) to implement AAC has been found effective to improve a range of communication outcomes for children who require AAC, including pragmatic, semantic and morpho-syntactic outcomes (Biggs et al., 2019; Kent-Walsh et al., 2015; Muttiah et al., 2022; Shire & Jones, 2015). A strategy instruction model (Kent-Walsh & McNaughton, 2005) has been used in many AAC partner training studies (e.g., Douglas, 2012; Timpe et al., 2021). Various training activities form part of this model, such as (a) verbal strategy descriptions, (b) video demonstrations, (c) live strategy demonstrations, (d) behavioral rehearsal and role play with feedback, and (e) the provision of written materials such as workbooks and reminder sheets (Kent-Walsh & McNaughton, 2005). Both one-on-one training sessions and group formats have also been used (e.g., Fäldt et al., 2020; Meuris et al., 2015; Romski et al., 2010; Rensfeld Flink et al., 2022).

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With regards to care center staff training in South Africa, Geiger (2012) provided a descriptive preliminary report on basic communication training incorporating some AAC strategies provided to center-based caregivers at sixteen care centers in the Western Cape. The author emphasized the importance of a participatory approach that allowed caregivers to identify their needs and priorities and build on the skills they already had, the need to train caregivers to implement group activities rather than activities that would focus on individual children, the need to avoid theoretical overload and complex English language written materials, and the importance of self-reflection after each training session. Outcomes were reported qualitatively. However, more rigorous studies are needed to establish an evidence base for effective training.

When choosing AAC strategies appropriate for implementation in South African care centers, both the evidence base as well as the context need to be considered. Regarding the context, such strategies should be low in cost and implementable in contexts with limited infrastructure. They should also be easily incorporated into various group activities (e.g., those as set out in the draft learning program for learners with severe and profound intellectual disabilities by the Department of Basic Education, 2016) for the benefit of multiple children rather than being aimed at one particular child.

There is research evidence for the effectiveness of various AAC strategies that comply with these contextual requirements. Visual activity schedules, for example, have been effectively employed in classrooms to increase on-task behavior and independent transitioning between activities (Bryan & Gast, 2000; Cihak, 2011; Spriggs et al., 2007). Aided augmented input entails simultaneously speaking a word and pointing to a symbol (e.g., a picture symbol) representing the word. It has been successfully used in a group setting to promote learner's comprehension of new vocabulary (Dada & Alant, 2009; Laher & Dada, 2023). Key word

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signing entails the simultaneous verbalization and manual sign production of a word, and has been successfully taught to and implemented by school staff (Dolly & Noble, 2018). It has been found to be implemented and positively viewed by teachers of children who require AAC in education contexts around the world (Byrne et al., 2019; Sheehy & Budiyanto, 2014; Sheehy & Duffy, 2009) including South Africa (McDowell & Bornman, 2022). Within adult group homes, training caregivers to use key word signing positively impacted on the communication skills of adults who require AAC (Meuris et al., 2015). Paraeducators have been successfully trained to prompt children who require AAC to use SGDs (including single message SGDs) within classroom settings, leading to increased communication by the children (Bingham et al., 2007). Parents have been taught to offer choices to their children using AAC as part of a comprehensive AAC training program (Douglas et al., 2017, 2018), which resulted in child communication gains. Calculator (2009) described how choice-making can easily be employed in a classroom setting for the benefit of students using AAC.

Apart from learning to implement AAC-specific strategies, communication partners such as educators and caregivers also need the skill to select appropriate learning activities for children with severe and multiple disabilities. Although the latter is not an AAC strategy, communication requires a meaningful context, and relevant activities are therefore fundamental to implementing AAC (Beukelman & Light, 2020).

Adult learning theory can be useful in structuring the training of adult communication partners, including care center staff. According to this theory, a number of principles should be adhered to when structuring learning activities for adults (Clapper, 2010; Knowles et al., 2015). Adult trainees need to feel safe and respected, and need to be treated as autonomous and capable individuals. This is especially important with regards to care center staff in South Africa, whose

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work may not be held in high regard by communities where children with extensive support needs still experience a lot of stigma (De Sas Kropiwnicki et al., 2014). Furthermore, the experience that adults bring to the learning task needs to be acknowledged early on in the learning task and needs to be validated and incorporated into the training. Learning environments should be safe, active, and collaborative; and opportunities for ongoing reflection should be created. Adults need to have a clear idea why they are required to learn something, and learning should be directly applicable to their lives and workplaces (i.e., possess social validity). When stakeholders perceive the AAC strategies taught as significant, appropriate, and important; such stategies are likely to be implemented in practice (Snodgrass et al., 2018). Positive emotional engagement further heightens motivation to learn and fosters higher order learning (Dirkx, 2008). Assessments need to be experienced as non-threatening opportunities for further improvement rather than as potentially embarrassing failures (Brookefield, 1995). Feelings of competence need to be fostered, as these can lead to better performance and motivation to persist with a task (Bandura, 1997; Schunk, 1990). In addition, materials and activities should be aligned to language and literacy levels (Mbanda et al., 2021).

Given the need for appropriate and effective AAC training for South African center-based caregivers, the first three aims of this study were to evaluate the effect of a training workshop on (a) caregivers' ability to demonstrate five AAC strategies – namely, use of a visual schedule, aided augmented input, key word signing, offering choices, and using a single message SGD - during a simulated (role play) activity; (b) caregivers' ability to implement these strategies at the care centers post-training (in-situ; generalization); and (c) caregivers' perceptions of their own abilities to implement each of the five strategies and also to select appropriate activities for the children at the center. The effect of training on caregivers'

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perceptions of their own abilities was evaluated in order to ascertain whether the workshop heightened their sense of competence. A fourth aim was to determine caregivers' perceptions of the social validity of the training. The social validity of the training was evaluated in order to determine whether caregivers were likely to implement the strategies for the benefit of the children attending the centers. Capturing stakeholders' perceptions about the training also had the potential to help the research team revise and improve the training for future iterations.

Method

Participants

A total of 30 caregivers were selected by the provincial education department to take part in the workshop. These caregivers worked at 30 different care centers, situated across all four educational districts in the Mpumalanga province. On the first day of the workshop, the participants were provided with an information letter and a consent form in Easy English (Center for Inclusive Design, 2020) with visual support. The letter explained that data would be collected from them before and after the training as part of the agreement with the education department, and that the trainers were asking them to provide consent to use the data for research purposes. One of the trainers (first author) read the letter aloud and provided additional verbal explanations. Participants were told that they were free to grant or decline consent to be part of the study and that this would not influence their participation in the workshop in any way. Of the 30 participants, 29 granted consent for their data to be used in the study.

There were two male caregivers and 27 females. Their highest qualifications were diploma (n = 1), completed secondary school (i.e., Grade 12[1] or Matric; n = 19), Grade 11 (n = 6), Grade 10 (n =1), and Grade 8 (n = 2). Of the caregivers, 19 had received additional training related to childcare, early childhood education, or childhood disability. The training was

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provided by adult basic education institutions, the Department of Basic Education, as part of staff training initiatives, or NGOs. None of the caregivers spoke English as a first language.

Caregivers were asked to provide some information about the children attending the care centers. This information was sought in order to understand the work contexts of the caregivers. Caregivers were not asked to provide the children's diagnoses, as many children in South Africa do not receive a formal diagnosis. In alignment with a functional description of disability as proposed by the Washington Group on Disability Statistics (2020), caregivers were asked to provide an estimate of the number of children that had difficulties with eight different functional skills. Difficulties with learning were mentioned most frequently. Just over a quarter of the children were reported to have expressive and/or receptive communication difficulties. Additional demographic information about the caregivers and the children at the centers is provided in Table 1.

Setting

The training took place at a training site with overnight accommodation arranged for participants and trainers due to the traveling distance. A central venue (hall) was used, furnished with loose chairs and tables as well as a screen and power point projector. For most activities, the central venue was set up to allow six groups to sit around each of six tables in a way that still allowed each person a view of the screen. All 30 trainees and the two trainers were present in the training room during training activities. Smaller break-away rooms were used for collecting pre- and post-training data on participants' ability to demonstrate the five AAC-related skills in a simulated role play activity. Each room had at least two chairs and a table for displaying materials. A camera was set up on a tripod in each room. Participants met one-on-one with the data collectors in these rooms.

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Research Design

A quasi-experimental pretest-posttest design was used to determine the effect of the training on (a) caregivers' ability to demonstrate five AAC strategies during a simulated (role play) activity, (b) caregivers' ability to implement these strategies at the care centers post-training (in-situ; generalization), and (c) caregivers' perceptions of their own abilities to implement each of the five strategies and also to select appropriate activities for the children at the center. Because the participants took part in a scheduled workshop, it was impractical to identify a control group. Also, as the workshop took place over the course of 5 days and the participants were evaluated immediately before and after the training, it is unlikely that extraneous factors caused the change in their skills. A proportion of the participants sent video footage of their implementation of the strategies in their centers 3-5 weeks post-training. Their ability to implement the strategies was compared to their pre-training performance. The social validity of the training was evaluated by means of a questionnaire with closed and open-ended questions.

The study was approved by the Research Ethics Committee, Faculty of Humanities, University of Pretoria; and the provincial education department of the province in which the training took place. All institutional requirements for including participants in research studies were met.

Researchers

The research team comprised of the first and second author, who conceptualized the training and interpreted the results of the study. Each of the authors has a postgraduate qualification in AAC and over 20 years of experience providing training and conducting research in the South African context. In this study, the first author also acted as trainer, co-presenting the

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5-day workshop together with another experienced AAC trainer. Six research assistants were also involved. Three of these assisted the first author and trainer with data collection. The fourth assistant was trained to identify frequency counts of caregiver behaviors pre- and post-training and to use these counts to assign goal attainment scaling (GAS) scores. The last two assistants helped to enter data from questionnaires into a spreadsheet and check these entries respectively.

Materials

A short biographical questionnaire was drafted to obtain background information. A 6-item rating scale (available as supplemental material) was developed to enable caregivers to rate their own ability to implement the five AAC strategies and also their ability to select appropriate learning activities for the children at their center. The scale was set up similar to a semantic differential scale with seven scale points between two opposing statements that described the ability or inability to implement a specific strategy (e.g., "I can use picture pointing during different activities" – "I cannot use picture pointing during different activities"). Each statement was also represented with a picture adapted from the Picture Communication Symbols[2] (PCS) library using the Boardmaker[2] software. The scale points were represented by seven blocks between the two statements. The blocks nearer to the two ends of the scale were shaded in darker colors to represent a stronger agreement with the statement nearest to the blocks, while the blocks in the middle had a lighter shading to indicate less agreement. The visual nature of the scale was intended to make it easier to understand for persons with limited English literacy skills. Lastly, a training evaluation form consisting of a 11-item 3-point Likert scale and three open-ended questions was also developed (available as supplemental material). The items consisted of nine positively and two negatively worded items related to the trainers' skills, materials, usefulness and applicability of the training, and pace of the training. Pictures were used to

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support the three scale points (agree/unsure/disagree). Open-ended questions required participants to indicate what they liked about the training and what should be changed in the future. They also had the option to provide any further comments on the training.

The materials used during training included a training manual containing content summaries and space to record answers during group activities; daily power point presentations; videos to illustrate the strategies; and aided AAC materials such as picture- and object-based schedules, A3- and A2-sized boards with PCS symbols as well as English, Sepedi and isiZulu gloss[3] to facilitate aided augmented input (aided input boards), and Talking Tile[4] single message SGD. Objects for demonstrating a greeting activity, a song activity, arts and craft activities, gross motor activities, and storybook reading were also used. On Friday each caregiver received a pack with all materials needed to implement the AAC strategies within these five types of activities at their centers.

All materials were composed in Easy English (Center for Inclusive Design, 2020). Written text was supplemented with photographs, illustrations or graphic symbols where possible.

Procedures

Training

Trainers and trainees met for 5 days. The training commenced on Monday afternoon, and ended on Thursday afternoon. Monday morning and Friday were dedicated to pre- and post-training data collection. Daily training was presented during two morning sessions and one afternoon session, interspersed with a tea and a lunch break. The total time of training amounted to 2 hr on Monday, and 5.5 hr per day from Tuesday to Thursday. The training schedule is provided in the supplemental material, Table S1.

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On the first day of training, the aims were to establish an open and non-threatening climate among group participants, to establish a rationale for the training and to promote emotional engagement to heighten motivation to learn. The day commenced with an ice breaker activity that encouraged trainees to get to know each other in a fun and non-threatening way, while also confirming identity beyond the job description as caregiver. This was followed by a group discussion regarding the dreams they have for their own (biological) children or grandchildren (personal emotional connection), and comparing these to the dreams they may have for the children at their centers. The concepts of inclusion and participation emerged from the discussion and these concepts were linked to communication as a tool for these processes. Caregivers then discussed within the six smaller groups the challenges they experienced in their workplaces specifically with regards to children who require AAC, as well as the solutions they had already found. Each group then reported back to the whole group. Seven short video clips of children using different forms of AAC were then shown, and a short introduction to AAC was given, supported by three power point slides.

Active and collaborative learning activities were used to teach the five AAC strategies during Days 2-4 of the training. Each strategy was first introduced using an interactive presentation with accompanying power point slides (between four and 11 slides per strategy) as well as short video clips demonstrating the use of the strategy . The introduction included a rationale for using the strategy, a strategy definition and a description of how to use the strategy. Demonstration and practice followed pertaining to five group activities, namely greeting time, song time, arts and craft activities, gross motor play, and story time. For each activity, trainers demonstrated how the strategy or strategies could be applied in the group activity. Thereafter, participants practiced and demonstrated the strategy/strategies within the group activity. In small

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groups, participants took on roles of caregivers and children and role-played how a caregiver would facilitate the activity, while implementing the specific strategy to engage the children. Groups then had a chance to demonstrate this role play to the bigger group. Constructive feedback was then given by trainers and other participants. Each day ended with a reflective group activity that encouraged participants to identify what they had learned and how they might apply this in their work contexts.

Data Collection

On the morning of the first day of the workshop, participants were each provided with hard copies of the biographical questionnaire and the 6-item rating scale pertaining to their perception of their own abilities. The trainers projected each questionnaire item via a power point presentation, read it aloud, and explained it to assist participants in understanding the questions. Participants then completed the item before the trainers explained the next item. Thereafter, the whole group were taught to sing a simple greeting song (tune and words) in preparation for the individual demonstrations that followed. They were then informed that the purpose of the demonstrations was not to test them, but to help the trainers understand what the participants already knew, so that training would focus on what they did not yet know. For the demonstrations, caregivers were seen individually in five breakaway rooms in order to videotape a demonstration of their skills with regard to the five strategies targeted in the training. The two trainers were assisted by three research assistants. Each caregiver was provided with an aided input board pertaining to the greeting song, a picture-and-object schedule showing seven center activities including a greeting time activity, as well as a Talking Tile with one loose printed picture symbol (*HELLO*). They were also given the printed words of the song. Research assistants and trainers used a standard script to introduce the caregivers briefly to the materials,

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and then asked them to demonstrate how they would sing this song as part of a greeting activity with the children at their center, repeating the song twice. They were informed that they were free to use or not use any of the provided materials. Caregivers were given time to familiarize themselves with the materials. Once they felt ready, their demonstration was videotaped. No assistance was provided, nor were any prompts given by the trainers or research assistants.

After the last training session on Thursday afternoon, caregivers again completed the 6-item rating scale pertaining to their perceptions of their own abilities, with the same support provided by the trainers. On Friday morning, the individual demonstrations were repeated. The same materials were provided, and instructions were identical, except that caregivers were reminded to demonstrate the strategies they had been taught. Again, their demonstrations were videotaped. Finally, participants completed the training evaluation form. Again, the items were presented by the trainers and read aloud orally to ensure understanding. As some participants needed to leave earlier due to transport arrangements, only 24 caregivers completed the training evaluation form.

In order to measure the implementation of strategies in situ (generalization), all participants were requested to send a video recording via WhatsApp or multimedia messaging service (MMS) of themselves facilitating a greeting activity using the greeting song in their care center two weeks post-training. They were instructed to ensure that the video would only focus on them and not the children's faces. Of the 29 caregivers, 13 sent such a video within 3-5 weeks post-training. Regrettably many care centers started closing during this time due to Covid-19-related lockdown measures.

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Data Analysis

Goal attainment scaling (GAS) was used to evaluate the caregivers' abilities to demonstrate/implement the five strategies taught. GAS has been used in clinical outcome studies to evaluate a client's progress towards a specific goal (Schlosser, 2004). GAS entails that interventionists (or, as in this study, the trainers) predict a continuum of levels of performance that the clients (or trainees) are anticipated to exhibit after they have received intervention (or training). Specific behavioral criteria are attached to each of five levels of performance, namely the expected level of performance (0), less than expected (-1), worst expected (-2), more than expected (+1), and best expected (+2). The levels of anticipated performance for each of the five strategies are provided in Table 2.

A research assistant (speech language pathologist with Master's qualification and 13 years of experience) was trained to observe all videos and tally the occurrences of behaviors needed to assign GAS scores (e.g., identifying the number of steps completed by caregivers in implementing a schedule, counting the number of times a caregiver simultaneously pointed to a symbol and spoke a word, etc.). She then assigned GAS scores based on the criteria specified (see Table 2). This was done for pre-training, post-training and generalization videos. In order to ensure that the scoring had been completed reliably, 20% of all videotaped demonstrations per phase were analyzed and scored by a second observer (first author). The percentage agreement on assigned GAS scores was compared per demonstration and per participant. An agreement was scored where the same GAS score was assigned, and a disagreement when a different GAS score was assigned. The number of agreements was divided by the sum of the number of agreements and disagreements. Percentage agreement was found to be 97% (range: 80% - 100%) for the pre-training demonstrations, 93% (range: 80% - 100%) for the post-training demonstrations, and

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87% (range: 80% - 100%) for the in-situ implementation (generalization). The scoring was therefore deemed reliable. Where disagreements occurred, the first author re-analyzed the videos and made a final decision on the score. Thereafter, an overall GAS score was calculated for each caregiver by averaging the five scores obtained. Descriptive statistics were used to determine the mean and median GAS scores across participants.

Non-parametric statistics were used in the next step as normality could not be established for the five variables (GAS scores for each of the strategies) and the average GAS score. The Wilcoxon Signed Rank test was therefore used to measure the effect that the training had on caregivers' abilities to demonstrate each of the strategies in a role play activity, and also on their ability to implement the strategies at their centers. The test was used to firstly compare the pretraining and post-training GAS scores of all participants. Secondly it was used to compare the pre-training GAS scores to the GAS scores assigned to the in-situ implementation for the 13 participants who had sent in videos. An alpha level of 0.05 was predetermined.

Regarding caregivers' perceptions, the data from the 6-item rating scale was entered into an excel spreadsheet. Average ratings for each strategy (the five that were trained as well as ability to select appropriate activities) were calculated. As normality could not be established for the ratings, non-parametric statistics were once again used in the next step. The Wilcoxon Signed Rank test was used to determine the effect of the training on caregivers' perceptions of their own abilities, by comparing their pre-training ratings to their post-training ratings.

In order to process the data about social validity, scores between 1 and 3 were assigned to the ratings on the evaluation form. Agreement with a positively worded item was assigned a score of 3, and disagreement a score of 1. Disagreement with a negatively worded item was also assigned a score of 3, and agreement a score of 1. All neutral responses were assigned a score of

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2. A brief content analysis was undertaken of the answers to the open-ended questions, to identify the most frequent words and topics appearing in the answers.

Procedural Integrity

In order to ensure that the trainers and research assistants followed the procedures during the demonstrations with integrity, an independent observer (research assistant who completed GAS scoring) scored adherence to procedures using a checklist that she completed while watching 20% of pretraining videos, and 33% of post-training videos. The percentage adherence to procedures was then calculated by dividing the correctly executed steps by the total number of steps. Percentage adherence was 100% for pre-training demonstrations, and 95% (range: 75% - 100%) for post-training demonstrations.

Results

Caregivers' Ability to Demonstrate Five AAC Strategies

The mean and median GAS scores before and after training as well as the results of the Wilcoxon Signed Rank Test are summarized in Table 3. The mean and median scores show that caregivers exhibited limited or no use of the five AAC strategies during demonstrations before training. The post-training scores show that the frequency with which they used the strategies increased after training – in all cases to roughly to expected levels or beyond, except for choice making, where levels were still somewhat low. The biggest improvement on scores was observed for key word signing. Results from the Wilcoxon Signed Rank Test show that there was a statistically significant difference between participant's pre-training and post-training ability to demonstrate the strategies, with the values of *z* ranging from -2.97 to -4.796, and *p*-values ranging from <.001 to .003. Using Cohen's (1988) criteria for effect sizes (0.1 = small, 0.3 =

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medium, 0.5 = large) , the *r*-values suggest a large effect on all strategies, except for offering choices, where a medium effect was observed.

Caregivers' Ability to Implement Strategies at Care Centers

Regarding the second aim, Table 4 shows that the 13 participants who sent in videos after the training were all able to implement four of five strategies in their classroom contexts with a frequency that was expected or higher than expected after training (see mean and median GAS scores for implementation). Once again, their levels of offering choices were still lower than expected. According to the results of the Wilcoxon Signed Rank Test, they all significantly increased the frequency with which they implemented the strategies when comparing their performance in the role play situations before training to their performance in the classrooms at their centers post-training, with the values of *z* ranging from -2.041 to -3.275 and the values of *p* ranging from .001 to .041. Once again, the *r*-values suggest a large effect on all strategies, except for offering choices, where a medium effect was observed. When comparing mean GAS scores before and after training, the biggest improvement on scores was once again observed for key word signing, while the least improvement was seen on the ability to offer choices.

Caregivers' Perceptions of Their Abilities

The training had a significant effect on participants' perception of their abilities to use the five AAC strategies, as well as their perception of their ability to select appropriate learning activities (see Table 5). Although the mean ratings (range: 2.38 – 5.97) and median ratings (range: 1 – 5) show that they perceived themselves to possess a fair level of ability in relation to most strategies before training (except for the ability to use a single message SGD, which would have been foreign to many of them), post-training ratings show more even positive perceptions, with median ratings between 6 and 7 and mean ratings of 5.97 – 6.72. The results of the

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Wilcoxon Signed Rank Test show that perceptions of skills improved significantly after the training, with *z*-values ranging from -3.123 to -4.708, and *p*- values ranging from <.001 to .002. The *r*-values suggest a large effect on all strategies, except for offering choices, where a medium effect was observed. Although caregivers rated their ability to offer choices highly after training, they had also rated this ability quite highly even before training, and therefore the change in perception was not as great. Interestingly, effect sizes with regard to the improvement in the ability to offer choices in a simulated and an authentic classroom context were also lowest (see Tables 3 and 4). However, the reasons were different – caregivers actually exhibited a frequency of offering choices before training, which increased somewhat post-training, but not to the expected level.

Caregiver Evaluation of Training

The participants rated the training very positively, with an average score of 2.97 across items and participants. Most items received a mean rating of 3.0. Lower ratings were assigned to items concerning the pace (*too fast* – $M = 2.79$; *too slow* – $M = 2.71$) and usefulness ($M = 2.92$). In the responses to open-ended questions, the participants used many positive words to describe the training as a whole, such as “enjoyable,” “excellent,” “amazing,” and “fun.” Five comments related to respect – participants enjoyed that a respectful climate was created between trainers and trainees and also among the group. The trainers were commended for teaching well, and in a way that was understandable. Demonstrations were highlighted as useful. Trainer soft skills were also positively remarked upon, for example, their patience and consideration of every person. Regarding the content, sign language was highlighted most often as useful, with further positive comments about schedules and choice-making also being made. The participants highlighted that they would be able to apply the strategies they had been taught to benefit children who require

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AAC at their centers. A total of 18 participants requested more training in response to the open-ended questions, with six participants particularly interested in learning more about key word signing. Only five participants suggested changes – two suggested a longer training, one suggested that the training booklet give more detailed information especially regarding signs, and two comments related to the venue and accommodation.

Discussion

The results of the study show that the multi-day group training effectively enabled caregivers to demonstrate and implement five AAC strategies within the context of a simulated as well as an authentic group activity aimed children with disabilities attending care centers in South Africa. The study confirmed the effectiveness of a strategy instruction model (Douglas, 2012; Kent-Walsh & McNaughton, 2005; Timpe et al., 2021) that included strategy descriptions, demonstrations, as well as practice and role-played presentations in enabling caregivers to acquire five specific AAC strategies. The study also illustrates that communication partner training can effectively be conducted within a large group setting (30 trainees), thereby adding to the literature on group training formats (e.g., Fäldt et al., 2020; Kent-Walsh et al., 2010; Rensfeld Flink et al., 2022). While one-on-one training formats allow trainers to individualize the training to the specific needs and abilities of the trainee, such formats place high demands on trainers in terms of effort and time. In view of low ratios of AAC-trained professionals in low- and middle-income countries (LMICs) (Muttiah et al., 2022), group trainings may be more appropriate and realistic in reaching larger numbers of trainees. Group training affords the possibility of caregivers learning from each other and forming support networks that may outlast the training. The importance of such networks is not to be underestimated, as caregivers share the lived experience of working in the care centers and may be able to jointly problem solve how to

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appropriate the strategies within their contexts (cf. the concept of a community of practice; Quinn et al., 2019).

The effectiveness of the training can be attributed to a number of factors. The training was conceptualized with adult learning principles in mind (Knowles et al., 2015) and from the participant feedback it is clear that many of the principles were successfully implemented. Participants reported that they felt acknowledged and respected, that the training was enjoyable, and that it was relevant and applicable to their contexts. A sense of community was created through collaborative activities. Small-group demonstrations (role play) with large group feedback provided non-threating assessment opportunities. Daily reflections provided another opportunity to internalize and consolidate learning.

The training was also tailored to bridge possible barriers due to training being presented in a language other than the participants' home language and limited English literacy skills. The use of Easy English in all written materials as well as visual support (for example, PCS to illustrate key concepts) may have assisted to make the training accessible and understandable to participants. Visual supports such as pictograms, pictures, and graphics have been found to benefit adults with low literacy skills to access educational materials (Mbanda et al., 2021).

It was interesting to note that caregivers performed beyond expectation when it came to demonstrating and implementing the use of key word signing. While it is possible that the expectations of performance were set too low, the finding that this strategy was highlighted most often as useful in response to open-ended questions suggests that it is highly relevant and caregivers may have been motivated to learn it. More training on key word signing was the most frequent request for further training on a specific strategy as indicated on the evaluation form. Key word signing is an unaided strategy with many advantages, such as no need for additional

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resources, no added visual focus point outside of the communicator's body, and easy and cost-effective implementation (Tönsing & Dada, 2023). A recent study showed that it was implemented in various special education contexts in South Africa, and was valued as an appropriate and effective method of supporting communication for learners who require AAC (McDowell & Bornman, 2022).

In contrast, the frequency with which caregivers offered choices did not increase to the levels expected. According to Shevin and Klein (2004), choice making is often overlooked in the educational programs of children with disabilities, possibly because children without disabilities learn this skill without much training. While choice making is an important strategy to encourage autonomy and to motivate children to communicate, child autonomy may not be culturally appropriate or desired in all contexts (see also Morelli et al., 2018).

As expected, caregivers' perceptions of their own abilities became significantly more positive after the training. It was encouraging to see that caregivers felt competent to implement the strategies post-training, as a positive belief in one's own abilities can lead to better performance and higher levels of motivation to persist (Bandura, 1997; Schunk, 1990). It was interesting to note relatively high ratings of their own abilities to implement four of the six strategies even before training. Only their ability to implement key word signing and a single message SGD was, on average, rated below the scale midpoint. The higher ratings on the other four strategies seemed to contrast with their limited frequency of demonstrating these strategies. Social desirability may have played a part in their more positive estimations. Alternatively, these four strategies (selecting appropriate activities, using a schedule, using picture pointing during activities, and giving choices) may have seemed to be common knowledge, whereas using signs from sign language and using a single message SDG clearly required training. Also, limited

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abilities in a specific domain can at times lead to limited insight into one's lack of competence (Kruger & Dunning, 1999). A gain in abilities, in turn, can promote more realistic estimations. Post-training, caregivers generally reached expected levels of competence and also estimated themselves as having competence.

Implications for Practice

Center-based caregivers are important and frequent communication partners for many children who require AAC in the South African context. They therefore urgently require training in AAC in order that children's rights to participation, communication, and education are met. In an attempt to meet its obligations, the education department has provided funding for various training initiatives. As most caregivers have limited professional education, training focusing on theoretical aspects of pedagogy and rehabilitation may not be appropriate, and the aims and intended outcomes of the training need to be carefully considered. Furthermore, establishing the effectiveness of such training is of utmost importance, as not all training (especially a once-off workshop) is effective (Walton et al., 2014), suggesting that funding may be spent on training that does not result in any change or improvement.

The results of the current study are encouraging as they show that the training was effective to change caregivers' abilities and also their perceptions of their own competence. In addition, the caregivers rated the training materials and procedures as appropriate, and the strategies as relevant and implementable. All these factors can contribute to sustained implementation in practice (Schunk, 1990; Snodgrass et al., 2018). Although a more rigorous evaluation is needed (including assessment of caregiver practices in situ as well as child behavior before and after training), the current study shows that the training holds potential. The careful selection of five empirically validated AAC strategies together with a focus on strategy

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implementation during the training was experienced as meaningful and doable by the caregivers. The group training format and the incorporation of adult learning principles also likely contributed to the effectiveness. These aspects should be considered in future trainings for center-based caregivers on the topic of AAC and other educational and therapeutic topics.

Limitations and Future Directions

One important limitation of the study is the limited measurement of actual implementation of the strategies in the care centers. Only 13 of 29 caregivers sent video footage post-training to show how they were implementing the strategies for the benefit of the children at the center. Also, the videos only focused on the caregivers, and no data were obtained on the children's responses or behaviors. Neither were pre-training measurements on possible strategy implementation by the caregivers in the centers obtained. The use of a quasi-experimental pretest-posttest design is furthermore open to various threats to internal validity. While maturation and history are unlikely to have influenced the post-training results due the short time period and limited likelihood that AAC strategies could be acquired outside of the training, the influence of the pre-training assessment cannot be ruled out. The completion of the rating scale and the demonstrations may have encouraged caregivers to think about their practices, and could have already influenced their abilities. Future studies are required where both caregiver and child behavior are measured before and after training – ideally with a delayed treatment group that could act as control. Alternatively, a single case experimental design employing continuous measurements may also be used to give more rigorous evidence of effectiveness than is possible with a quasi-experimental design.

Although the use of GAS entailed setting observable, quantifiable levels of performance, the expected level of performance was subjective. It is therefore possible that certain

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performance levels may have been set at a level that was either very easy or very hard to realistically achieve. Also, the use of a controlled simulated situation where caregivers had to role play the use of the strategies may have offered limited opportunities for them to display their abilities and skills. These factors would have influenced the measurements of the variables. The arbitrary nature of performance levels is inherent to GAS scaling and can be mitigated in some way by having multiple trainers with experience confer and agree on the levels (Malec, 1999). In the current study, two trainers with training and classroom implementation experience set the goals, and the results suggest that most were set at a realistic level.

In the present study, the participants did not have any input into the training or the goals set for them ahead of time. Although the training evaluation suggests that the training was experienced as meaningful and appropriate, a more participatory stakeholder-driven process of designing the training and collaborative goal setting may have increased buy-in, and should be considered in future studies and training.

Conclusion

Providing relevant and appropriate AAC training to persons with minimal professional qualifications is a great need, specifically in LMICS, where there is a dearth of trained professionals. This exploratory study represents one initial attempt to structure such a training in a relatively cost-effective and efficient way. Results showed that a multi-day group workshop focused on AAC strategy implementation was effective to train caregivers to demonstrate the strategies in a simulated environment. There was also evidence that a proportion of the participants implemented the strategies with the children at their centers. While more rigorous studies are needed to determine the effect of training not only on caregiver but also on child

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behavior, these findings suggest that the current training has the potential to provide caregivers with skills to better meet the communication needs of children with extensive support needs.

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Endnotes

[1] In South Africa, basic education consists of 12 years of schooling (Grades 1-12). School attendance is compulsory between ages 7 and 15 (typically Grades 1-9). The last 3 years of schooling (Grades 10-12) are optional.

[2] PCS and Boardmaker are trademarks of Tobii Dynavox LLC, Pittsburgh, PA. All rights reserved. Used with permission. https://us.tobiidynavox.com/

[3] Sepedi and isiZulu are among the languages that are commonly used in the Mpumalanga province (Statistics South Africa, 2012).

[4] Talking Tiles™ are a product of Talking Products Ltd. of Romsey, Hampshire, England, https://www.talkingproducts.com/

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Table 1

Participant Demographics and Description of Children at the Centers

Variable	Value	Range
Participant mean age (years)	40.9	23-57
Participant mean years working with children with disabilities	7.4	1-20
Mean number of children at the centers	42.2	13-180
Mean number of caregivers at the centers	6.9	2-44
Mean ratio of caregivers to children	1:8	1:2.7-1:15
Estimated percentage of children with difficulties:		
talking	25.1%	
seeing	3.8%	
walking	20.6%	
moving their hands	9.2%	
hearing	4.9%	
understanding	25.6%	
learning	37.2%	
regulating their behavior	23.7%	

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Table 2

Criteria for Levels of Performance for Each Strategy as per Goal Attainment Scaling Score

GAS score	GAS level of performance	Strategy 1: Use of a schedule to introduce and end an activity	Strategy 2: Providing aided augmented input during an activity	Strategy 3: Using keyword signing during an activity	Strategy 4: Offering choices during an activity	Strategy 5: Using a single message SGD during an activity
+2	Best outcome	Completes all 7 expected steps[a]	Points to pictures in tandem with speaking for 80-100% of opportunities[b]	Uses more than 5 signs	Offers 4 choices	Programs the single message SGD for use, adds picture symbol, and gives to child to expect use
+1	More than expected outcome	Completes 5-6 expected steps	Points to pictures in tandem with speaking for 61-80% of opportunities	Uses 4-5 signs	Offers 3 choices	Programs the single message SGD for use and either (a) uses it appropriately in the activity; or (b) remembers to add the picture symbol
0	Expected outcome	Completes 3-4 of the steps	Points to pictures in tandem with speaking for 41-60% of opportunities	Uses 3 signs	Offers 2 choices	Programs the single message SGD with an appropriate message
-1	Less than expected outcome	Completes 1-2 of expected steps	Points to pictures in tandem with speaking for 20-40% of opportunities	Uses 1-2 signs	Offers 1 choice	Attempts to use the single message SGD but unable to program message
-2	Worst expected outcome	Does not refer to schedule	Points to pictures in tandem with speaking for less than 20% of opportunities	Does not use any signs	Offers no choices	Does not attempt to use the single message SGD

[a]Steps: (a) Name activity, (b) point out symbol on schedule, (c) move marker to symbol, (d) take symbol off and show to children, (e) at end of activity, verbalize: "We are finished with….", (f) remove marker (move it on), (g) put symbol in container. [b]An opportunity presented itself when the caregiver spoke a word for which a picture representation was available on the aided input board of the song activity.

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Table 3

Wilcoxon Signed Rank Test comparing Pre-training and Post-training GAS Scores (N = 29)

	Pre-training		Post-training				
Variable	*Md*	*M*	*Md*	*M*	*z*	*p*	*r*
Use of schedule	-2	-1.90	0	-0.21	-4.796	<.001	.63
Aided augmented input	-2	-1.86	+2	+0.90	-4.327	<.001	.57
Key word signing	-2	-1.83	+2	+1.10	-4.537	<.001	.60
Offering choices	-2	-2.00	-2	-1.31	-2.970	.003	.39
Using a single message SGD	-2	-2.00	+1	+0.45	-4.505	<.001	.59
Overall use of strategies	-2	-1.91	+0.2	+0.18	-4.709	<.001	.62

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Table 4

Wilcoxon Signed Rank Test comparing Pre-training and Implementation GAS Scores (N = 13)

	Pre-training		Implementation				
Variable	*Md*	*M*	*Md*	*M*	*z*	*p*	*r*
Use of schedule	-2	-1.85	-1	+0.07	-3.108	.002	.61
Aided augmented input	-2	-2.00	-1.75	+0.67	-2.807	.005	.55
Key word signing	-2	-1.92	1	+1.61	-3.275	.001	.64
Offering choices	-2	-2.00	-2	-1.00	-2.041	.041	.40
Using a single message SGD	-2	-2.00	-0.5	+0.69	-2.989	.003	.59
Overall use of strategies	-2	-1.95	+0.4	+0.39	-3.184	.001	.62

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Table 5

Wilcoxon Signed Rank Test comparing Pre-training and Post-training Self-rating of Abilities (N = 29)

	Pre-training		Post-training				
Variable	*Md*	*M*	*Md*	*M*	*z*	*p*	*r*
Selecting appropriate learning activities	5	4.72	6	6.10	-4.075	<.001	.54
Use of schedule	5	4.24	7	6.62	-4.141	<.001	.54
Aided augmented input	5	4.83	7	6.59	-3.891	<.001	.51
Key word signing	4	3.38	6	5.97	-4.236	<.001	.56
Offering choices	6	5.97	7	6.72	-3.123	.002	.41
Using a single message SGD	1	2.38	7	6.31	-4.427	<.000	.58
Overall use of strategies	4.17	4.25	6.5	6.39	-4.708	<.000	.62

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Supplemental material

Training evaluation form

	Agree 	Maybe/ Unsure 	Disagree 
1. The training was useful to me.			
2. I enjoyed the training.			
3. I learnt new skills.			
4. I will be able to use the skills I learnt at my centre.			
5. The pace was too fast.			
6. The pace was too slow.			
7. The booklet was helpful.			
8. I will be able to use the materials I received.			
9. The facilitators were well prepared.			
10. The facilitators included everyone in the group.			
11. The facilitators were repectful.			

Note. Images adapted from Picture Communication Symbols2 (PCS) library using the Boardmaker software. Picture Communication Symbols and Boardmaker are registered trademarks of Tobii Dynavox of Pittsburg, PA, https://us.tobiidynavox.com

What did you like about the training? _____

_____

What should be changed? _____

_____

Comments: _____

_____

_____

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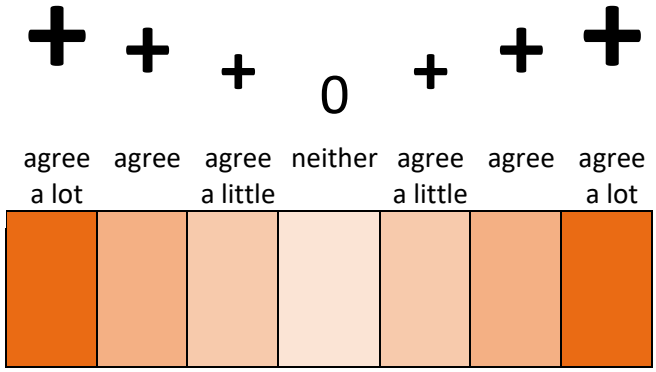
Supplemental material

My Skills

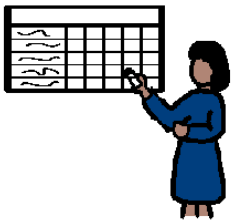
1. Selecting activities

I can think of many activities that will help children learn.

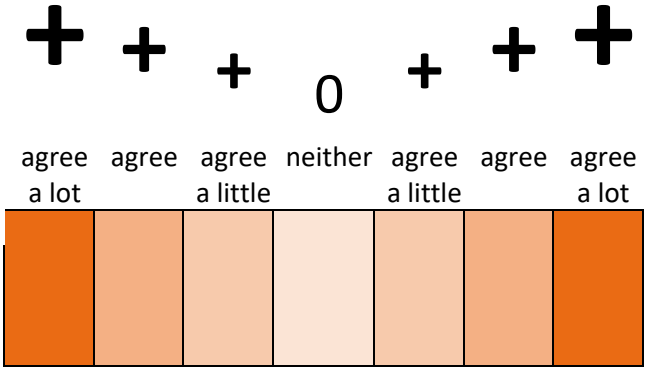


I cannot think of any activities that will help children learn.

2. Schedule



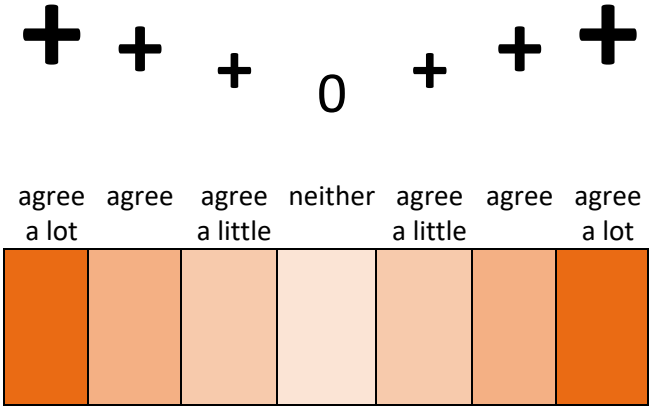
I can use a schedule to tell children about the day.



I cannot use a schedule to tell children about the day.

3. Picture pointing

I can use picture pointing in different activities.



I cannot use picture pointing in different activities.

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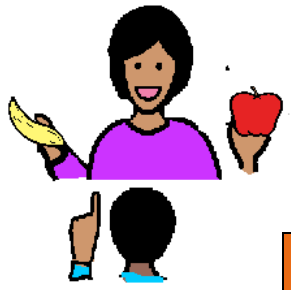
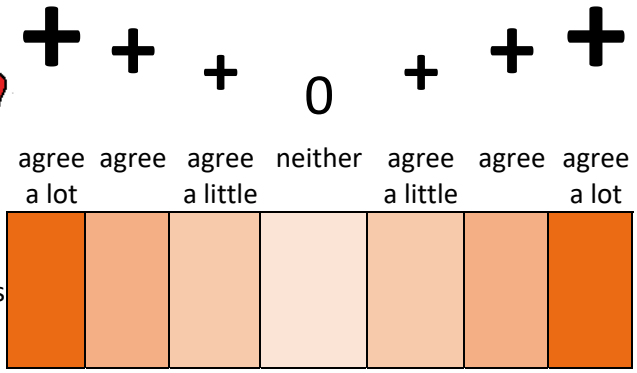
4. Choices



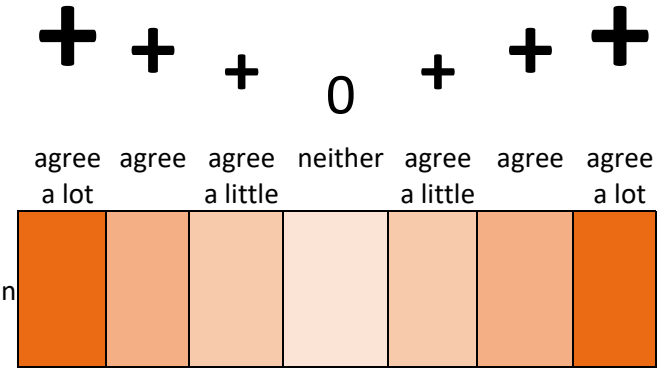
I can give many choices to children in my class.



I cannot give any choices to children in my class.

5. Talking machine

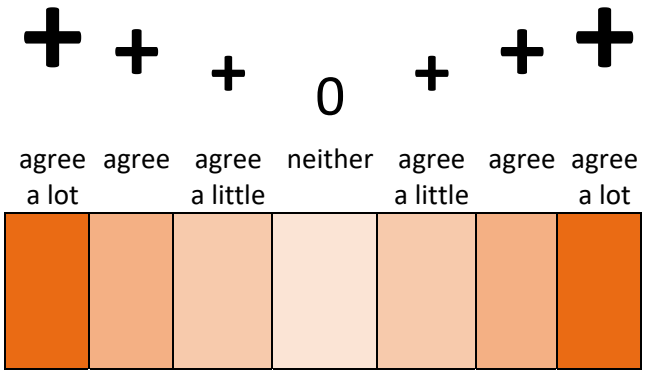
I can use a talking machine to help children talk.



I cannot use a talking machine to help children talk.

6. Hand signs

I can use many hand signs to help children in my class.



I cannot use any hand signs to help children in my class.

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Table S1

Schedule of Training Activities for Centre-Based Caregivers

Time	Day 1	Day 2	Day 3	Day 4	Day 5
9:00 a.m.-10:30 a.m.	Welcome/ introductions	Group discussion: Benefits of routine	Group discussion: Recap of what was learnt on Day 2	Group discussion: Recap of what was learned on Day 3	Posttest: Caregiver perception scale
	Overview of week	PowerPoint: (a) Suitable care center activities; (b) Strategy 1: Using a visual schedule	PowerPoint: (a) Strategy 3: Offering choices; (b) Strategy 4: Key word signing	PowerPoint: Strategy 5: Using a single message SGD	Group discussion: Why play is important; barriers to play for children with high support needs
	Completion of biographical questionnaire	Demo and practice [a] of Strategy 1: Daily schedule; handwashing schedule			PowerPoint: Making toys from household materials for children with various support needs
	Pretest: Caregiver perception scale	Practical activity: Customize the daily schedule			
11:00 a.m. - 1:00 p.m.	Pretest: Individual demonstrations in break-away rooms	PowerPoint: Strategy 2: Aided augmented input	Demo and practice of Strategies 3 and 4 during morning ring, song activity, arts, and crafts	Demo and practice of Strategy 5 during morning ring, song activity, arts and craft	Practical activity: Making toys from household materials
	Presentation by adult using AAC	Demo and practice of Strategy 2 during morning ring, song activity, arts and craft			Posttest (concurrent with practical activity): Individual demonstrations in breakaway rooms

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Time	Day 1	Day 2	Day 3	Day 4	Day 5
2:00 pm - 4:00 pm	Ice breaker	Demo and practice of Strategy 2 during gross motor activity and storybook reading	Demo and practice of Strategies 3 and 4 during gross motor activity and storybook reading	Demo and practice of Strategy 5 during gross motor activity and storybook reading	Closing ceremony: Handing over of certificates of attendance and material pack
	Group discussion: (a) Dreams for children; (b) challenges and solutions for children in need of AAC	Daily reflection on learning	Daily reflection on learning	PowerPoint: What's in the bag (introducing the material pack that caregivers received on Day 5)	Completion of training evaluation form
	Viewing video clips: Children who use AAC			Daily reflection on learning	
	PowerPoint: Introduction to AAC				

[a] Demo and practice consisted of (a) strategy demonstration by facilitators, (b) practice to use the strategy/strategies in small groups, (c) demonstration by one group of participants, (d) feedback from other trainees and trainers.

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