

Supplemental Material S1. Detailed summary of intervention procedures.

EMT Intervention Features

EMT is an evidence-based, naturalistic language intervention for children aged 18 – 60 months (Kaiser & Hampton, 2016). The intervention is rooted in developmental and behavioral principles (Adamson et al., 2020; Schreibman et al., 2015) and is designed to help children learn from natural contingencies, using child interests and initiations to model and prompt language in everyday contexts. EMT includes six key research-based language facilitation strategies: (1) *environmental arrangement*, (2) *responsive interaction*, (3) *matched turns*, (4) *modeling target level language*, (5) *linguistic expansions*, (5) *time delays*, and (6) *milieu teaching* (Kaiser & Hampton, 2016; See Figure 1). Adults use EMT strategies to increase the frequency, diversity, and complexity of the child's language while promoting spontaneous and social language use (Kaiser & Roberts, 2013; Roberts & Kaiser, 2015).

Adapting Intervention Components for Children with DS

Communication Challenges in Children with DS	Intervention Components
Weak auditory memory	Model, recast and expand at child's target expressive language level
Good visual memory skills	*Increase salience of language input by pairing words with AAC (iPad)
Low speech intelligibility	*Teach words +AAC as an initial mode
	*Phonologically recast unclear utterances
Poor generalization across partners and activities	Embed systematic teaching in sustained and engaging play routines across settings & people
Low rate of communication	Embed opportunities through environmental arrangement
	Respond to all child communication attempts
Low rates of instrumental requests	Use environmental arrangement to promote requesting
Delayed expressive language relative to comprehension	Teach specific expressive vocabulary targets
Mental-age-appropriate play skills but difficulty sustaining engagement in play interactions	Teach language during episodes of developmentally chosen play targets and appropriate expansions of play
Limited symbol-infused joint engagement	Model communication in joint engagement episodes
	Teach symbols (language) during episodes of joint engagement and child's attentional focus
Limited generalization across partners, contexts	Teach parents specific language support strategies
	*Teach parents to model AAC usage with spoken language models (aided AAC modeling)
	Teach across settings, activities, routines
Difficulty transitioning to multiword utterances	Teach approximately 100 single words (signs, or symbols) to fluency; teach verbs.
	Model grammatical expansions

Intervention Procedures

The SLP taught EMT strategies sequentially in four tiers consistent with procedures applied in Quinn et al., 2021. Each tier had a target EMT strategy: (1) *matched turns*, (2): *expansions*, (3): *time delays*, (4) *milieu teaching episodes*. The SLP introduced each set of EMT strategies through a workshop session and then continued to provide instruction during weekly practice sessions using the Teach-Model-Coach-Review approach. All intervention sessions followed the same sequence of activities (1) Family Update, (2) Teach, (3) Model, (4) Coach, (5) Review. The main difference between workshop and practice sessions was the length of the *Teach* activity (minutes for workshop sessions and minutes for practice sessions).

Workshop Sessions. The first intervention session in each tier was a scripted instructional workshop. The goal of each workshop session was to provide initial instruction on EMT language support strategies. Workshops began with the SLP gathering a family update (e. g., “Tell me about what’s been going on since our last visit.”). Then the SLP presented a scripted PowerPoint presentation that taught caregivers by (a) defining the EMT strategy, (b) giving the rationale for the strategy, (c) explaining how to use the strategy, (d) sharing video examples, (e) role playing the strategy with the caregiver, and (f) discussing how and when to use the strategy with their child (*Teach*). Next the SLP demonstrated using the EMT strategy and SGD with the child for minutes, narrating for the

caregiver what strategies she was applying and providing a rationale for her choices (*Model*).

After demonstrating for the caregiver, the SLP encouraged the caregiver to practice using the EMT strategies with their child during 10 minutes of play with toys and during a 5-minute home routine (*Coach*). Once caregivers finished practicing the strategy during play and routines, the SLP facilitated caregiver reflection on their performance (e.g., What did you notice about how [Child’s Name] was interacting with you while you practiced expansions)? Last the caregiver and SLP reviewed the session activities and made a plan for the next visit (*Review*). Workshops lasted an average of 72.99 min ($SD = 32.06$ min, $Range = 31.95 - 147.23$ min). All four

3. Balance Your Turns

- Take turns communicating with {Your Child}
- Allow time for {Your Child} to communicate.
- Play a game of “communication catch”
 - {Your Child} communicates
 - You respond (and wait)
 - {Your Child} communicates
 - You respond (and wait)
- Only say something after {Your Child} communicates
 - Gesture, Vocalization, Word



Example slide from the “Enhanced Milieu Teaching Workshop 1: Setting the Foundation for Communication” workshop

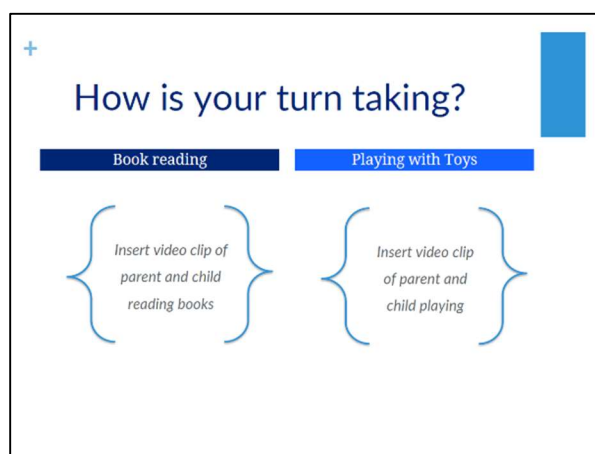
workshops were delivered in-person for Dyads A and B. As a result of lockdowns during the COVID- pandemic, Dyad C had two in-person workshops and two workshops via telepractice.

Practice Sessions. After completing the workshop session in each tier, caregivers received instruction and coaching during practice sessions that occurred once or twice weekly. The goal of these practice sessions was to promote mastery of the EMT strategies for caregivers. The SLP began each session by asking the caregiver to share updates about the family and child and to describe their experiences implementing the EMT intervention strategies since their last practice session. During the family update (5 min) the SLP listened, answered questions about EMT strategies, and problem solved with the caregiver to improve their implementation of EMT strategies (Woods, 2021). Next, the SLP began the four part Teach-Model-Coach-Review instructional approach.

During the *Teach* component (10 min), the SLP reviewed the EMT strategy with the caregiver, briefly demonstrating the EMT strategy. The SLP also presented graphed data of the caregiver's performance from the previous session and discussed performance goals for the current session.

During the *Modeling* component (10 min), the SLP and caregiver watched short video clips (1-2 min) of the caregiver using the EMT strategy during the previous session. While the videos played, the SLP facilitated a discussion, reflecting on the caregiver's use of the EMT strategy in past sessions, and planning for the current sessions. For in-person practice sessions, modeling included the SLP demonstrating the EMT strategy with the child, narrating what techniques she was using, providing rationale for her choices, and highlighting how her actions influenced the child's behaviors. For telepractice sessions, modeling included the SLP role playing the strategy with the caregiver and viewing additional video clips of the SLP implementing the strategy.

During the *Coach* component (15 min) the caregiver and child interacted during a 10-minute play activity with toys and -minute home routine while the SLP

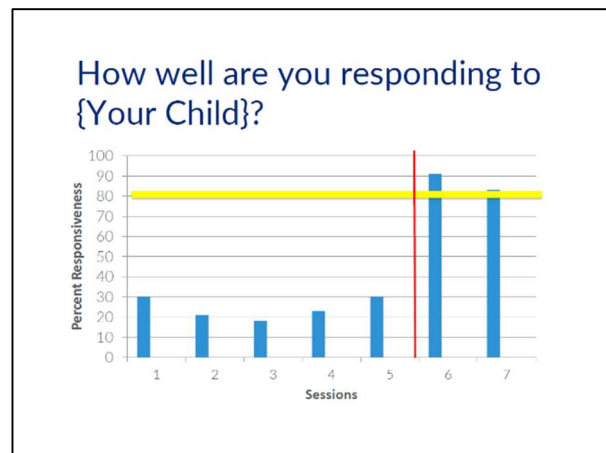


Example slide from the "Enhanced Milieu Teaching Workshop 1: Setting the Foundation for Communication" workshop

observed the caregiver child interaction and provided feedback building on the caregiver's strengths (Woods, 2021). Coaching strategies included: (a) direct teaching: sharing information about a specific strategy or child development, (b) guided practice: explaining a strategy and then encouraging the caregiver to practice using the specific strategy or component, (c) specific performance feedback: comments about the caregivers use of strategies with the child or about the child's behavior responses, (d) problem solving: collaborative discussing strategies to improve routines or strategy implementation, (e) reminders to use specific strategies; and (f) and general praise (e.g., "good idea"). Coaching statements were brief, positive in tone, and intended to support caregivers' EMT strategy use during the immediate interaction.

During the Review component (10 min), the SLP encouraged the caregiver to self-reflect on their performance using the EMT strategies during the session. The SLP also highlighted any caregiver behaviors which facilitated their child's communication. For example, "when you offered {Child's Name} a choice between the bottle and the blanket, it encouraged him to make a choice. Without the choice as an encouragement, it's unlikely he would have said 'bottle' on his own. At this time, the SLP and parent made a plan for practicing EMT strategies during specific home routines and discussed any anticipated challenges with the proposed plan.

Each module included at least five sessions and continued until the caregiver met the learning criterion for the target strategy. Once the caregivers met the learning criterion for the target EMT strategy in a module (tier), a new set of EMT strategies was introduced until caregivers completed all four modules. Treatment intensity was similar to prior studies of EMT including those using hybrid telepractice models (See Supplement A4; Quinn et al., 2021).



Example slide from the "Enhanced Milieu Teaching Workshop 1: Setting the Foundation for Communication" workshop