

RESEARCH ARTICLE

Helping Young Children Develop Emergent Language and Literacy Skills: The Roles of Curriculum, Training, and Coaching

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This article discusses the need for accessible, practical, and cost-effective professional development for Head Start teachers in developing emergent language and literacy skills. We describe the components of *ABCDuet*: teaching materials, professional development and personalized coaching. The program is designed to make training and coaching in language and literacy teaching practices more effective, accessible, user-friendly, and sustainable, using innovative software and video assets. We report findings on the feasibility and efficacy of *ABCDuet* implementation on teacher and child outcomes from an evaluation of the program in 21 Head Start classrooms. Outcome data indicate the program can be implemented in authentic preschool settings by teachers with varied educational backgrounds and experience, serving children with a wide range of emergent language and literacy skills.

Keywords: emergent language and literacy, professional development, video technology

INTRODUCTION

Reading ability is powerfully affected by the emergent language and literacy skills children acquire in early childhood (Dickinson et al., 2003; Landry et al., 2017; McCardle et al., 2001; National Early Literacy Panel, 2008; NICHD Early Child Care Research Network, 2005). Important developmental precursors to later conventional reading skills include: phonological awareness (Castles et al., 2010; Gunn et al., 2001) alphabetic understanding and letter writing (Catts et al., 2005; Molfese et al., 2011; Scarborough, 1998; Schatschneider et al., 2004), and vocabulary and oral language (Lonigan et al., 2000; Sénéchal & LeFevre, 2002; Storch & Whitehurst, 2002). The

importance of teaching these early literacy skills is represented in the learning goals and curriculum frameworks across a broad range of early childhood policy reports (NAEYC, 2018; Head Start, Early Reading First: Jackson et al., 2007; Reading First: Gamse et al., 2008). Despite recognition of the significance that preschool emergent language and literacy activities play in laying a foundation for long-term learning, many children, especially those living in poverty, still have limited access to high-quality emergent language and literacy experiences in early childhood, and begin elementary school less prepared than their peers (Chatterji, 2006; Hart & Risley, 1995; Lee & Burkham, 2002; Storch & Whitehurst, 2002). Language and literacy gaps accumulate and grow over time, and students in the U.S. continue to struggle with reading. According to the 2017 National Assessment of Educational Progress, 32% of all fourth graders cannot read at a basic level, and most students (63%) are still not proficient readers by the time they finish high school.

Early Childhood Language and Literacy Curricula

With the growing knowledge base on the mechanisms underlying reading acquisition, there is general consensus among policymakers, practitioners, and researchers of the need for commercially published preschool programs that develop the early literacy and language skills that provide a foundation for early reading development (Dickinson et al., 2003; NICHD, 2005; McCardle et al., 2001). Most current preschool programs include instruction in the components of emergent language and literacy and most place a strong emphasis on developing these skills through activities that integrate thematic content and age-appropriate activities. However, they do not give pre-school teachers sufficient directions on instructional approaches to maximize learning for all children, especially those with limited home learning experiences (Dickinson & Brady, 2006; PCERC, 2008). This includes lack of specific guidance on how to explicitly present activities and how to provide sufficient practice, feedback, and review. Furthermore, while most preschool curricula now include instruction in the evidence - based components of early language and literacy, most program designers attend only superficially to the introduction and sequencing of this content, which overlooks the importance of providing teachers with a theoretically sound instructional design to follow. These gaps are particularly critical for those children with early language and learning delays who will need extra support to overcome their initial inequalities and catch up to their typically developing peers. Indeed, the curricula that have been evaluated scientifically have failed to show positive effects on children's literacy development (PCERC, 2008). Many fail to include specific approaches that are effective for improving children's learning, having been developed through market research instead of a formative process to identify the critical ingredients of the instruction (Clements, 2007).

Professional Development and Personalized Coaching

Growing evidence from early childhood research points to a related and important need for accessible, practical, and cost-effective professional development (PD) to support teachers in giving their children targeted, age-appropriate instruction that engages them and supports their development (Barnett, et al., 2003; LoCasale-Couch et al., 2016; Piasta et al., 2020; Wasik & Hindman, 2011). The traditional one-size fits all 'in-service' model for training teachers in evidence-based practices offers limited opportunities for the ongoing practice and follow-up

coaching feedback necessary to fully master and implement new teaching practices within a dynamic classroom environment. Typical PD also provides limited avenues for helping teachers reflect on, and adjust their teaching practices, especially in preschools with limited resources to provide teachers with extended support.

Coaching has been shown to improve teachers' instructional efficacy in elementary school classrooms (Denton & Hasbrouck, 2009; Joyce & Showers, 1996; Reinke et al., 2014). In a summary of research on teacher training, Joyce and Showers (2002) found that training limited to presentation and theoretical discussion of skills, resulted in modest gains in teacher knowledge and in their ability to demonstrate the skill in the protective learning environment. However, there was no transfer of the skill to the classroom. The addition of demonstration contributed to gains in knowledge and in teacher's ability to demonstrate the skill in the learning environment, but again these gains did not transfer to the classroom. The addition of classroom coaching to the previous modalities, however, had a dramatic impact on all three aspects of teacher learning (knowledge, skill demonstration, and classroom implementation). These findings on the effectiveness of coaching in elementary classrooms are bolstered by current research on the positive impact of coaching on Head Start teachers (e.g., Diamond & Powell, 2011; Snell et al., 2019), and the impact of coaching on effective teacher-child interactions for boosting children's development (Domitrovich et al., 2009; Downer et al., 2012; Hamre et al., 2012).

OVERVIEW OF *ABCDuet*

Preschool teachers and their assistants need evidence-based teaching tools, training, and coaching to help children develop emergent language and literacy skills. As part of a strategy to improve long-term health and education outcomes, the National Institute of Child Health and Human Development (NICHD) funded the development and evaluation of *ABCDuet* to support teachers and make training and coaching in foundational emergent language and literacy teaching practices more effective, accessible, user-friendly, and sustainable. *ABCDuet* aligns with the practice-based coaching model currently used in Head Start centers, and offers a solution for early education programs seeking effective training and coaching resources. *ABCDuet* uses technology and multimedia to bring active and responsive training and coaching tools directly to teachers' classrooms. The 29-unit program offers tools for teachers, coaches, and support staff to strengthen emergent language and literacy routines and build a strong foundation for positive reading, academic, and health outcomes.

In this section, we give an overview of development of *ABCDuet*, and describe the teaching tools, training and coaching components. The initial goals of the program were to use the evidence base on effective pre-k professional development and coaching approaches, combined with an innovative media-enhanced technology platform to provide cost-effective and accessible training and coaching to Head Start teachers and assistants. In addition, we explicitly incorporated the instructional design and delivery features in the *ABCDuet* instructional strand that we used in our previous curriculum development work (e.g., Gunn et al., 2011; Sprick et al., 2004).

Development

We developed *ABCDuet* in three stages, over a 2-year period. In Stage 1, the formative research process, we created a design matrix that spelled out requirements and specifications for each component, and provided a blueprint for building the program's content and format elements. In constructing the matrix, we elicited formative feedback from (a) expert consultants, (b) key informants, such as Head Start stakeholders and other service providers, and (c) focus groups of Head Start teachers. In Stage 2, the development process, we developed the *ABCDuet* content in collaboration with Head Start teachers and administrators. This included the video scripts, text-based teaching materials and activities, technical requirements for the web and mobile applications, visual design requirements, production of media assets, user alignment with Head Start reporting requirements, and usability testing. In Stage 3, we conducted an evaluation of the completed *ABCDuet* program in 21 Head Start classrooms.

Teaching Tools and Materials

ABCDuet teaching tools and materials are colorful, durable, and portable materials designed for carrying out teaching and learning routines. The goal in developing the materials was to reduce the burden on teachers to search for, or create these tools themselves, so they can focus more of their teaching effort on meeting children's learning needs. The supporting materials include alphabet wall cards, ABC picture word cards, and letter air trace cards. The teaching materials support brief routines that provide teachers and other support staff with a reliable and consistent approach for delivering critical language and literacy learning experiences. They are centered on a series of four brief, engaging, developmentally appropriate teaching and learning routines that address the primary domains of emergent language and literacy: print awareness, alphabetic understanding, phonological awareness, and vocabulary and oral language. As a foundation for these learning domains, the *ABCDuet* teaching routines include a focus on the underlying behaviors, (e.g. sitting in a circle, keeping hands and feet to self, looking at and listening to teacher) that support language and literacy. Delivered in 2-3 minutes or less, these predictable routines support small, incremental learning steps that strengthen children's neural pathways, transfer new knowledge into their long-term memory, and build their confidence and motivation. Over the course of a school year, these daily teaching routines cover a comprehensive scope and sequence of foundational emergent language and literacy skills that prepare children for kindergarten and future reading success.

Sequencing of *ABCDuet* Instruction

The sequencing of new content and skills in the *ABCDuet* instructional modules is designed to give children multiple opportunities, within and across units, to use their new knowledge (Levin, Shatil-Carmon, & Asif-Rave, 2006; Piasta & Wagner, 2010). Once new content and skills have been taught and practiced, review is programmed into the program scope and sequence giving children opportunities to practice and use what they have learned. In the first three modules, children learn simple behavioral routines for participating in circle time activities. These routines are practiced and re-taught as needed. The activities in the following 26 modules focus on teaching

letter names and their most common sounds, how to form the letters of the alphabet using gross-motor skills, and developing vocabulary and oral language through interactive read-alouds and child-centered conversations using new vocabulary words. Newly taught skills are repeated and reviewed on an ongoing basis to build on children’s growing knowledge. For example, when the letter M is introduced in circle time, teachers and children play an interactive picture/word card game with words beginning with M (e.g., M says /mmm/ in Mouse), air trace the letter M, and identify capital and small letter M on the alphabet wall cards. During small-group and choice time, children who need more support can engage in activities with the teacher or aide to reinforce the name, sound and shape of letter M. *ABCDuet* also provides guidance for additional brief interactive reviews of previously taught letter names and sounds during transition activities such as handwashing and lining up to go outside. The same activities are used for each new letter and sound, so children become familiar with the activity routines and can focus on learning and using new skills rather than on learning a new activity or procedure. In follow-up feedback from the *ABCDuet* study, many teachers commented on the growth they experienced as teachers and the results they saw in their children’s skill development. A number of teachers highlighted the positive effects of practice and review for children who typically struggle with attention and behavioral challenges.

Prioritizing Activities

We learned from our previous curriculum development activities and our work in Head Start classrooms (Gunn et al., 2011) that teacher time and the attention span of young children are both precious and limited commodities. With that in mind, and based on field observations and teacher feedback, we developed only those activities that have the strongest instructional value and are the most engaging for children.

ABCDuet is designed to give teachers the basic structure to teach language and literacy skills successfully to children with diverse literacy backgrounds. This approach recognizes that some children may need many opportunities to practice and learn new skills, while others may need less. Teachers are provided with documentary video examples of preschool teachers teaching the routines to their children as well as segments that model coaching interactions on key instructional details such as how to use attention signals, how to pace instruction to keep children engaged, how to make feedback most effective for children, and how to differentiate instruction for English language learners. The discrete, step-by-step structure of the program also makes it appropriate for use by assistant teachers whose training needs are frequently unmet due to centers’ limited resources.

ABCDUET TRAINING AND COACHING

ABCDuet draws from training and coaching approaches used in other fields in which professionals carry out critical routine practices in high stakes or challenging situations, such as medicine, aviation, athletics, and performing arts. To support teachers and help ensure their teaching success the components of the *ABCDuet* framework include:

Online Platform

This web-based application for computer or mobile app for tablet or smartphone provides teachers and their support staff with on-demand access to a systematic training and coaching framework for strengthening emergent language and literacy teaching skills in the classroom environment. The platform facilitates the ongoing modeling, practice, and feedback necessary to master and implement critical teaching practices.

Multimedia

We designed the video presentations to give teachers easy access to the evidence and rationale for the routines and teaching practices. They also provide critical models of the routines being carried out with children in real classrooms. Learning the research rationale behind each routine and seeing the references motivated teachers to implement the teaching strategies. This, paired with examples of real teachers teaching the routines in real classrooms helped teachers prepare the routines, feel confident to try them in a busy classroom, and get ideas for environmental changes to support children's attention skills and language and literacy learning. Teachers said it was helpful to have ongoing access to the model videos, so they could re-watch them after having some time to practice.

Coaching

ABCDuet's coaching framework helps teachers and coaches engage in specific, responsive, and supportive feedback interactions that strengthen teaching practices in the classroom environment. Video sharing and collaborative procedures for evaluation and feedback help teachers refine teaching practices and tailor their instruction to the needs of their classrooms. Teachers watch the videos of teachers teaching the routines, and then rehearse the routines by role-playing with their coach. By role-playing both the roles of the teacher and child in each of the routines, teachers are able to experience the routine from the child's point of view and gain a deeper understanding of the impact each teaching practice has on children's learning, sense of security, and motivation. Teachers learn and practice one new routine at a time, and video record their instruction to share with their coach. Teachers in the study reported that they valued the step-by-step approach to coaching, with minimal demands on their time. Watching the model videos before meeting with the coach helped them prepare for the session. Role-playing the routine together helped teachers prepare to teach the routines with children. Reviewing and reflecting on the teacher-made videos of each routine in the classroom helped teachers master teaching skills. Several teachers shared that it was challenging to record themselves at the beginning, but they found it beneficial to see what worked, what could be improved, and notice details that were difficult to catch in real-time.

ABCDUET STUDY

After the components of *ABCDuet* were fully developed, we conducted a 10-week study to test the feasibility and efficacy of implementing the program in Head Start classrooms. We randomly

assigned 21 classrooms in two Oregon Head Start centers to one of two conditions, *ABCDuet* (intervention) or control (wait-list), in which teachers participated in the usual language and literacy PD provided by their Head Start centers and used their usual literacy activities. We asked the following research questions:

1. Do teachers in the intervention group use the evidence-based language and literacy instructional practices presented in the *ABCDuet* training, coaching, and teaching modules more than teachers in the control group?
2. How satisfied are intervention teachers with the training, coaching and instructional materials and technology features of *ABCDuet*?
3. Do children of teachers in the intervention group demonstrate greater growth in knowledge of letter names and sounds than children of teachers in the control group?

Participants

Teachers were assigned within their center to condition. Of the 14 teachers at Center #1, eight were in the *ABCDuet* group and six were in the control group. Of the seven teachers at Center #2, four teachers were in the *ABCDuet* group and three were in the control group. After randomization of the 21 classrooms one teacher dropped out because she was assigned to a new job, so the final sample was 20 teachers. At the beginning of the study, all teachers provided us with teacher and child demographic information. Table 1 summarizes teacher demographics by condition.

Table 1

Teacher Demographic Characteristics

| | | <i>ABCDuet</i> | Control |
|--------------|---------------|----------------|---------|
| Total Sample | | 11 | 9 |
| Gender | Female | 10 | 9 |
| | Male | 1 | 0 |
| Ethnicity | Hispanic | 2 | 0 |
| | Non-Hispanic | 9 | 9 |
| Education | AA Degree | 5 | 6 |
| | BA /BS | 6 | 2 |
| | Post Graduate | 1 | 1 |

All children in study classrooms participated in the circle time activities, but only children who were entering kindergarten in the fall of 2019 were given the letter assessment to measure their knowledge of letter names and sounds. Seventy-two children in the control group and 64 children in the *ABCDuet* group completed the pre and post assessment. The number of English Learners (ELs) in the control classrooms ranged from zero to nine, and in the *ABCDuet* classrooms from one to 15. All ELs spoke Spanish as their first language. The number of children with an

Individualized Family Service Plan (IFSP), ranged from one to nine in the control classrooms, and in the *ABCDuet* classrooms from zero to six.

Training

The twelve teachers in the *ABCDuet* condition received a two-hour orientation from one of the investigators and the project research assistant. They showed the teachers how to access the *ABCDuet* web-based application and mobile app by projecting the *ABCDuet* technology onto a screen. The trainers also demonstrated for teachers how to navigate through the modules, how to access components (video, print, and interactives), and how to progress through the course.

Module 1 components provided teachers with a preview of what to expect with regard to the course content, teaching practices and coaching. Teachers also accessed organizational materials, such as the Scope & Sequence, to guide their language and literacy teaching schedule.

Module 2 components provided teachers with foundational content on emergent language and literacy domains, the basic principles of explicit instruction, and how to set up the environment for language and literacy learning.

Teachers were asked to review Module 3 (Behaviors for Language & Literacy Learning) independently the week after the orientation, and to connect with their coach via the *ABCDuet* platform to set up a 30-minute coaching session via teleconference. All teachers were successful in downloading the application and contacting their coaches.

Coaching

Coaching was provided by the investigator and the research assistant who conducted the trainings. During the 10-week study teachers completed four, 30-minute coaching sessions via the Zoom video conferencing service. Each coaching session focused on one of the four teaching routines (Circle Time Behavior, Picture Word Card, Air Trace, and Read Aloud). The coaches asked the teachers to prepare for each coaching session by reviewing the associated module's video and print materials. —Each module had an interactive checklist component that guided the coaching procedures.

In each session, teachers and coaches discussed what was going well, problem-solved challenges and used role-playing to refine previously learned teaching routines and to learn the new module's routine. Each module's 'Teach Take Away' provided a step-by-step framework to review and reflect on the newly learned teaching routines. Teachers also submitted videos of the routines in their classroom, so teacher and coach could use the classroom video as a tool to reflect, refine and problem solve challenges in the context of the actual classroom.

Teacher Measures

At the beginning of the study, teachers completed a brief (13-item) demographic survey on years of teaching experience, gender, ethnicity, first language, and education. A summary of the teacher demographics is provided in Table 1.

We conducted the pre and post observations of teachers doing a circle time language and literacy activity, using a measure we developed in Phase 1, to document the alignment of their instruction with the skills presented in the *ABCDuet* teaching modules. The instrument documents (a) content area, (b) instructional grouping, and (c) the nine evidence-based aspects of instructional delivery from *ABCDuet* teaching modules with ratings of present (1), partial (0.5), and absent (0) to document use of each skill during the activity. The project research assistant and the two developers conducted the observations. Before conducting the first set of observations, they reviewed the operational definitions in the observation codebook for each aspect of instructional delivery. They then practiced coding videos of teachers teaching a language and literacy activity, until they reached inter-observer agreement. During the study, the research assistant and one of the developers also observed a subset of the teachers together to compare scoring and to maintain inter-observer reliability.

At the end of the study, we assessed intervention teachers' satisfaction with the *ABCDuet* training, coaching, and materials with a measure we developed and modeled after surveys we used for previous projects. The 37-item anonymous survey asked intervention teachers to rate the:

- a) quality of the program overall (e.g., How easy is it to implement *ABCDuet*?)
- b) quality of the individual program components (How satisfied are you with the web-based application?)
- c) ease of use of the components (e.g., How easy is it to use the mobile app?)
- d) helpfulness of the components (e.g., How helpful are the classroom materials?)
- e) quality of *ABCDuet* training (e.g., How valuable is the *ABCDuet* training in developing children's language and literacy skills?)

The Likert response scale ranges from a score of 1 to a score of 5.

Child Measures

At pre- and post-test, the children in participating classrooms, who were going to kindergarten in the fall of 2019, were given a 10-item measure of letter names and sounds that were taught by *ABCDuet* intervention teachers during the study. Children were shown a card with the upper- and lower-case letter, one at a time, and asked to say the letter name and its most common sound. The letter cards were presented in the following order: A M K S T F D U H B. If the child did not respond, or gave an incorrect response, the tester told the child the letter name or sound and encouraged them to say it with them, followed by specific praise.

RESULTS

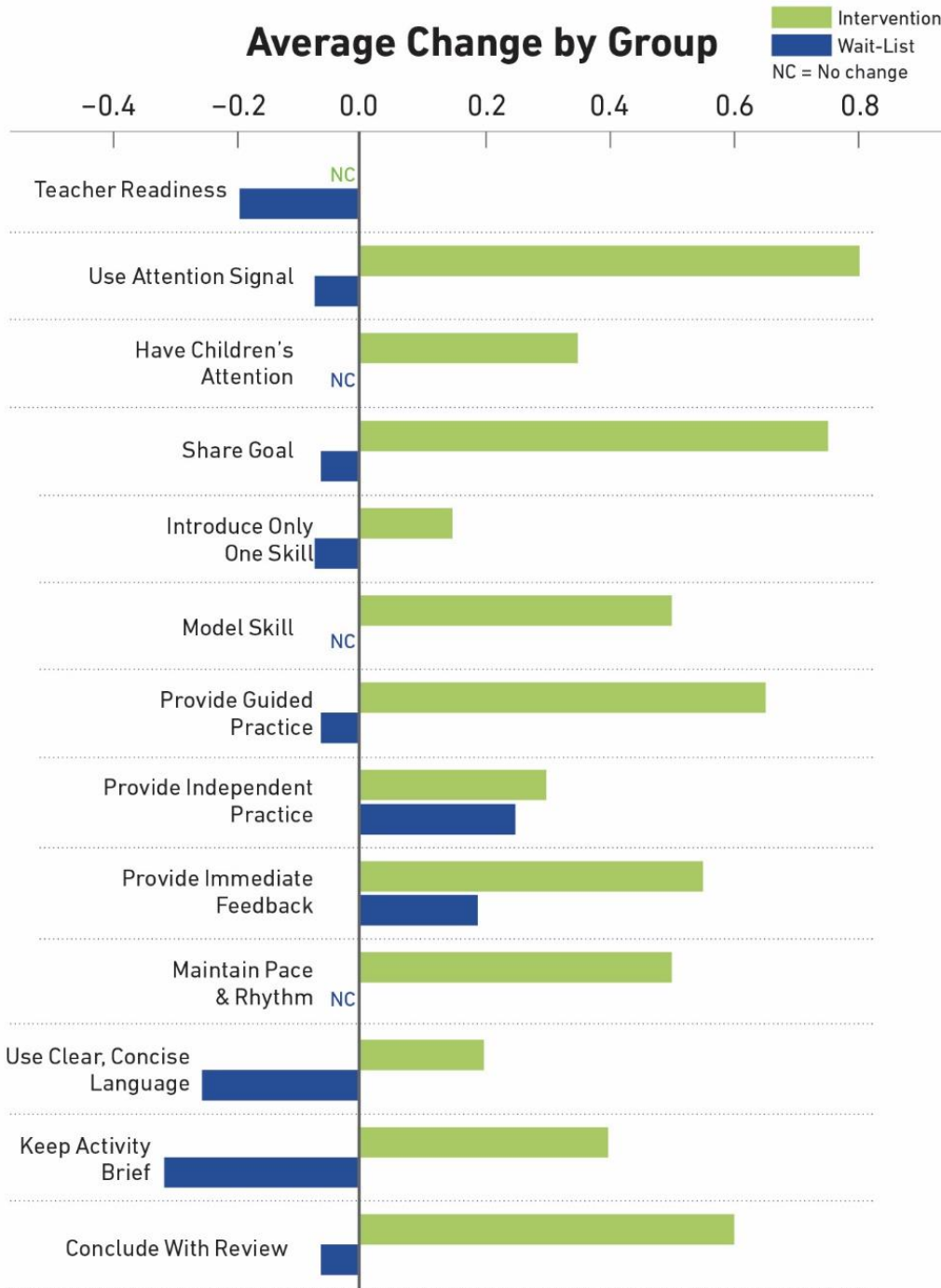
The purpose of this study was to test the feasibility and efficacy of implementing *ABCDuet* in Head Start classrooms. We asked three research questions to measure teacher use of evidence-based instructional practices, intervention teacher satisfaction with the *ABCDuet* program, and child growth in knowledge of letter names and sounds. The following is a summary of our findings.

Teachers

As a development project, the purpose of the teacher assessments was to measure growth in the teaching practices that *ABCDuet* was designed to support, and to measure teacher satisfaction with the PD and coaching. Figure 1 shows the gains that teachers in the *ABCDuet* intervention group made in their use of evidence-based teaching practices from pre to post training and coaching. Overall, *ABCDuet* teachers made clear gains in their use of evidence-based teaching practices compared to the control teachers. Table 3 summarizes the *ABCDuet* intervention teachers' feedback on the *ABCDuet* program. Teachers rated items on a scale of 1 to 5, with 1 as the lowest and 5 as the highest. The table reports teacher responses for the two highest ratings for each question, with teachers reporting high levels of satisfaction across all aspects of the program.

Figure 1

Change by Group in Use of Evidence-Based Teaching Practices



Note: Have materials ready, Use attention signal, Get children’s attention, Share goal, Teach one skill at a time, Model the skill, Provide practice together, Provide independent practice, Provide immediate specific feedback, Use appropriate pace & rhythm, Keep lesson clear, concise, & brief, Review and practice skill

Table 2*Intervention Teacher Feedback on ABCDuet*

| <i>ABCDuet</i> Overall | Rating Scale | Percent Agreement |
|--|-----------------------------|-------------------|
| Quality of the program | Above Average to Excellent | 90% |
| Easy to be trained | Easy to Very Easy | 100% |
| Easy to implement | Easy to Very Easy | 73% |
| Recommend to other teachers | Likely to Very Likely | 100% |
| <i>ABCDuet</i> compared to other training and coaching experiences | Somewhat to Much Better | 73% |
| Likely to use <i>ABCDuet</i> again | Likely to Very Likely | 91% |
| Provides valuable training in creating a predictable learning environment | Agree to Strongly Agree | 100% |
| Provides valuable training in developing children's language and literacy skills | Agree to Strongly Agree | 100% |
| Provides valuable training in teaching letter names and sounds | Agree to Strongly Agree | 100% |
| Provides valuable training in teaching how to trace letters | Agree to Strongly Agree | 100% |
| Provides valuable training in teaching vocabulary and oral language | Agree to Strongly Agree | 100% |
| Training Videos | | |
| Satisfied with the videos | Satisfied to Very Satisfied | 91% |
| Easy to use the videos | Easy to Very Easy | 100% |
| Videos were helpful | Helpful to Very Helpful | 100% |
| Coaching Experience | | |
| Satisfied with the coaching | Satisfied to Very Satisfied | 100% |
| Easy to receive the coaching | Easy to Very Easy | 100% |
| Coaching was helpful | Helpful to Very Helpful | 100% |
| Mobile App | | |
| Satisfied with the mobile app | Satisfied to Very Satisfied | 91% |
| Easy to use the mobile app | Easy to Very Easy | 91% |
| Mobile app was helpful | Helpful to Very Helpful | 73% |
| Web App | | |
| Satisfied with the web app | Satisfied to Very Satisfied | 100% |
| Easy to use the web app | Easy to Very Easy | 100% |
| Web app was helpful | Helpful to Very Helpful | 100% |
| Classroom Materials | | |
| Satisfied with the materials | Satisfied to Very Satisfied | 100% |
| Easy to use the materials | Easy to Very Easy | 100% |

| | | |
|------------------------------|-----------------------------|------|
| Materials were helpful | Helpful to Very Helpful | 100% |
| Planning Tools | | |
| Satisfied with the tools | Satisfied to Very Satisfied | 91% |
| Easy to use the tools | Easy to Very Easy | 91% |
| Tools were helpful | Helpful to Very Helpful | 91% |
| Text-Based Materials | | |
| Satisfied with the materials | Satisfied to Very Satisfied | 91% |
| Easy to use the materials | Easy to Very Easy | 91% |
| Materials were helpful | Helpful to Very Helpful | 91% |

Children

Due to the short duration of the study, we chose to measure child gains in letter names and sounds that were taught in the intervention condition. Children in the *ABCDuet* condition learned about 1.43 letter names from pretest to posttest while children in the comparison classrooms improved by 0.56 letter names, a statistically reliable difference of 0.87 ($t_{18} = 3.03, p = .0072$). Children in the control condition gained about 1.22 letter sounds, intervention children gained about 1.65 letter sounds, but the difference of 0.42 was not statistically significant ($t_{18} = 0.89, p = .3819$).

DISCUSSION

ABCDuet is designed to meet the needs of all preschool children, especially those with weak or limited early literacy skills who are at risk for later reading problems. Preliminary findings from our evaluation indicate that the program can be implemented by teachers with varied educational backgrounds and experience and for children with varying entry levels of literacy skills, including English language learners. As noted, teachers reported that having the *ABCDuet* ready-to-use classroom materials made it easier to teach the routines. They valued the model videos to see what the routines looked and sounded like with real teachers and children, and the step-by-step approach to coaching.

We asked the teachers who participated in the study to also describe challenges and suggestions to improve the program. Their feedback will inform continued program development to better meet the needs of teachers and their classrooms. Suggestions included showing teachers implementing *ABCDuet* activities while navigating challenging child behaviors to demonstrate different approaches to completing the activities in more of the varied situations teachers encounter daily.

Teachers also requested a slightly smaller version of the Alphabet Wall Cards to place in transition areas (e.g. hallway, lineup areas etc.) to facilitate review activities. While several teachers experienced challenges finding a place for the Alphabet Wall Cards at children's eye-level, they valued the environmental change to encourage eye-level and hands-on access to the alphabet. With respect to the technology, teachers experienced some challenges viewing and sharing videos in the mobile app only, and some struggled to unlock new modules. The technology issues were addressed by the developers by the end of the project.

Based on positive and constructive teacher feedback we believe these preliminary outcomes, taken with the growth made in teaching practices by *ABCDuet* teachers, show the promise of this multimedia, interactive approach for training and coaching in early childhood classrooms. We also believe that the promising outcomes are a direct result of the close collaboration between us as curriculum developers-researchers and the teachers, resulting in an evidence-based language and literacy curriculum that can be feasibly and successfully used by teachers and their assistants.

It was encouraging that despite children's brief exposure to the instructional routines, there was a significant difference between the two conditions for letter names. In future studies we hope to study the effectiveness of the *ABCDuet* training and coaching when it can be implemented at the start of the year with adequate time for instruction and measurement. In a longer trial we will also be able to measure vocabulary growth as a result of the read aloud routines.

Future Directions

Head Start is the single largest provider of preschool education in the United States. The 2007 Head Start Reauthorization Act called on teachers to improve children's school readiness by strengthening language and literacy skills. This has been supplemented with the 2017 mandates to implement a research-based coordinated coaching strategy, with a focus on practice-based coaching, giving Head Start and Early Head Start teachers the opportunity to work closely with coaches in improving their teaching practices.

ABCDuet aligns with the practice-based coaching model and offers a solution for early education programs seeking effective training and coaching resources in emergent language and literacy. *ABCDuet's* training and coaching framework and assistive technology offer an effective, user-friendly, and sustainable model for providing high-quality professional development in critical teaching practices that support children's behavioral and emergent language and literacy development. As part of an ongoing iterative design process, the project team plans to incorporate teachers' valuable feedback into *ABCDuet's* technology and its components. We also plan to share our findings with early education stakeholders so that we may best prepare *ABCDuet* for distribution in the early education marketplace.

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