

## Article

# Supporting Emergent Writing in Preschool Classrooms: Results of a Professional Development Program

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**Abstract:** Emergent writing is a key component of early literacy development and contributes to later school success, yet it receives little attention in most preschool classrooms. This paper presents results of a quasi-experimental study of a teacher professional development package that included writing as one of four focal areas. The study was conducted in 15 Head Start classrooms located in the U.S. state of Hawai'i. The participants were 39 lead and assistant teachers and 240 children. Intervention teachers had higher quality writing environments and overall classroom environments, while intervention children showed better outcomes on emergent reading and upper case letter knowledge. Emergent writing was assessed only in the intervention group, where children showed large gains along with changes in code-related skills needed for invented spelling. Results are discussed in terms of recommended practices for early writing instruction and teacher professional development.

**Keywords:** emergent writing; preschool; early childhood education; teacher professional development

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## 1. Introduction

Writing is a complex, integrative process that requires the coordination of skills from multiple domains: oral language, visual-motor integration, phonological awareness, alphabet knowledge, print conventions, and executive control [1–5]. A writer must first formulate the meaning or content of their intended message. They need to detect and sequence the phonemes comprising the words within their message and know the sounds and graphemes of the letters used to represent those phonemes. A writer needs fine motor skills sufficient to produce a reasonably legible written copy of these letters. They should also follow print conventions such as directionality, word spacing, capitalization, and punctuation. All of this must be done while dealing with working memory limitations. As a result, writing is a challenging task for young children that requires considerable self-regulation and effortful control [6,7]. Emergent writing, or the initial steps towards becoming a competent and conventional writer, is a key cognitive developmental process in early childhood that is also important for later school success. Despite its contribution to school readiness, emergent writing has received relatively little attention compared to other aspects of emergent literacy [8,9].

### 1.1. The Nature and Developmental Significance of Emergent Writing

As early as ages two or three, children develop the first foundational concepts of print, i.e., that print is different from drawing and it carries meaning that (at least other) people can decipher [4,10,11]. Children's own writing attempts follow a fairly reliable developmental progression. This starts as undifferentiated drawing or scribbling, followed by using letter-like forms, word-like units or random letter strings, then using a single letter to represent a word's initial sound, and then increasingly sophisticated invented or phonemic spelling [11,12]. Children often learn to write their name by rote before producing other recognizable words, and may use different forms of emergent writing in different settings, e.g., sign their name carefully to a birthday card vs. using rows of scribble to represent a menu during dramatic play. Preschoolers also come to appreciate

different functions and genres of print and can apply this knowledge in dramatic play [11]. Emergent writing acquisition shows similar patterns for mono- and dual language learners, across different languages, and even across writing systems [13,14].

Although authors use different terms, conceptual models of emergent writing include similar components [9,11,15]. Writing concepts comprise the general understanding of the functions of print, e.g., that writing is a distinct symbol system conveying meaning, and conventions of how print is organized on a page. Composition refers to the ideational content of children's writing, i.e., how children determine and organize the message they wish to write. Transcription involves putting the message on paper. Many researchers further separate transcription into two domains, handwriting and spelling. Handwriting relates to the formation of written letters or marks that represent letters. Spelling encompasses children's orthographic knowledge and application of the alphabetic principle, i.e., using letters to represent the sounds in words.

Many early literacy-related skills develop in a reciprocal manner [16]. This mutual reinforcement occurs between the components of early writing described above. For example, when children practice composition by generating meaningful texts in the context of dramatic play, they deepen their understanding of writing conventions [1,11]. Reciprocity is also seen across the main domains of early literacy, e.g., phonological awareness, alphabet knowledge, and emergent reading and writing. While some degree of both phonological awareness and alphabet knowledge is needed to produce invented spelling, engaging in invented spelling focuses children's attention on component sounds within spoken words and letter-sound correspondence, thus strengthening their appreciation of the alphabetic principle [17]. In another example of bidirectional influence, Diamond et al. (2008) found that children's growth on name writing across the preschool year was associated with growth on print concepts and letter knowledge during the same time period.

Longitudinal studies show that emergent writing in the preschool period predicts more conventional literacy skills in early elementary school. Controlling for nonverbal IQ and a number of early literacy skills, Hand et al. found that early writing (and invented spelling in particular) predicted unique variance in decoding and reading comprehension when children were in kindergarten, and pseudo-word decoding in Grade 1 [18]. Using similar designs, kindergarten emergent writing has been found to predict Grade 1 reading [16], while written fine motor control in preschool predicted Grade 3 reading and math achievement [19]. Finally, the National Early Literacy Panel [20] determined that early name writing is one of the six best predictors of later decoding, reading comprehension, and spelling. Given the implications it holds for early school performance, emergent writing should be incorporated into the preschool curriculum and instruction.

### *1.2. Effective Emergent Writing Pedagogy*

Effective emergent writing instruction combines the general principles of developmentally appropriate practice (DAP) with science-based understanding of early writing development. Within the DAP framework, early childhood educators are encouraged to view development as a holistic process and integrate learning across developmental domains and content areas. Teachers should appreciate and capitalize on the extent to which learning occurs in everyday, playful contexts. They can promote children's motivation and agency by building on what is familiar and interesting, and use supports and scaffolding to challenge children to perform just a little above their current level of competence [21,22]. Consistent with the DAP focus on integration, implications from the research literature include the need to address all components of emergent writing and provide a solid foundation in the inter-related domains of emergent literacy, namely, oral language, alphabet knowledge, phonological awareness, and concepts of print.

Professional guidance for teachers often presents the writing-rich environment as a *sine qua non* of good practice. Teachers are urged to have a well-stocked writing center with diverse writing materials, to have writing tools and props in all areas of the room, and to include environmental print that reflects classroom routines or themes and highlights

children's own writing [23,24]. Many authors also emphasize the need to support children's meaning making and composing, especially when writing is embedded in child-led play [11,25]. Almost all stress that writing should be used for authentic purposes that children can understand and enjoy, such as creating a recipe to use while pretending to cook or signing in to use the classroom computer (e.g., Bingham et al., 2018). Advice on specific teaching strategies includes (a) modeling writing for children, and while doing so, drawing attention to the process of composition, transcription, and/or revision; (b) shared writing where teachers and children work on a piece together; (c) accepting all writing attempts and encouraging children to read back what they wrote; and (d) providing sensitive scaffolding [11,24–27].

### 1.3. Emergent Writing in Preschool Classrooms

Studies of emergent writing instruction in preschool classrooms raise concerns about the typical quality of classroom practices. First, there is considerable room for improvement in terms of environmental support. Almost all classrooms contain environmental print, such as classroom labels or alphabet posters; however, only about one half post children's own writing, and fewer show evidence of engagement in meaningful writing, such as center sign-in sheets, child-made books, or child-made classroom signs [28–30]. Almost all classrooms have basic writing supplies, e.g., paper, pencils, and crayons, but only about one third stock more diverse materials such as envelopes and letter stencils [29,30]. The majority of classrooms have a dedicated writing center, but most often, writing materials are found only there, missing opportunities to engage children in writing in other contexts, such as science, math, or dramatic play [28–30].

Time devoted to emergent writing is limited. Writing centers are open for about one hour per day [28] and children engage in writing activities for about 2–6 min per observation period, which typically are of 1.5–3.5 h duration [29,31,32]. Writing represents about 2% of individual children's classroom time and 10% of the total time they spend in any literacy activity [32]. Often, only one to three children per classroom are seen writing, and the absence of any writing activity is common (30–55% of classrooms) [29,32].

Teacher–child writing interactions, beliefs, and knowledge have also been examined. In marked contrast to their practices involving read-alouds, teachers in one study reported that they never or rarely plan writing activities in advance and only about one third wrote with a group of children two or more times per week [33]. A series of studies from another research collaborative (with potentially overlapping samples) found that classroom practices are often imbalanced and unsophisticated. Teachers' support strategies focused heavily on handwriting (58%) with less attention to spelling (36%) and minimal attention to composition (7%) [8]. The lion's share of the time (87%), these teachers provided low-level supports that were repetitive or rote in nature and did not serve to expand children's knowledge, e.g., telling children to sign their artwork, or providing letters to trace. An earlier analysis from the same team found that 21% of teachers provided no scaffolding of children's writing attempts [28].

Why might we see this gap between recommended pedagogical practice and actual classroom experience? Teachers may have insufficient conceptual knowledge of emergent writing. They may feel pressure to focus on conventional school readiness, even if this contradicts their beliefs about developmentally appropriate practice. They may also lack a rich repertoire of writing activities, or find it difficult to scaffold and individualize either writing instruction in particular or learning interactions in general.

It is important to address these deficiencies, as what teachers know and do has consequences for children's development. Teachers with broader and more sophisticated knowledge about emergent writing devote more classroom time to this subject, engage children in more writing-related talk, and offer higher-quality support [31]. Environmental and interactive supports, in turn, predict growth in children's writing over the school year [28,30].

#### 1.4. Teacher Professional Development

The literature on professional development, grounded in adult learning theory, is quite consistent when it comes to recommended practices for supporting the continued learning and growth of in-service teachers. Professional development should be highly relevant to teachers' daily work and address key child learning goals [34,35]. Training sessions should build on what teachers already know and do, include a mix of conceptual learning and hands-on practice, and be followed with immediate in-class practice and implementation [35–37]. Supports must be of sufficient intensity and duration, i.e., total hours spread out over a long enough time for teachers to master new techniques [38,39]. A multi-component approach is usually thought to be more effective [35,36,39], although not all evidence supports this assumption [40].

Coaching is increasingly seen as an essential component of professional development [35,36,41,42]. Coaches' duties include modeling new techniques, observing teachers and providing feedback, assisting teachers with goal setting and self-reflection, sharing assessment data, and holding teachers accountable [35,36,42,43]. Coaching is especially helpful when coaches establish strong, nonsupervisory relationships with the teachers they serve [42]. Additional hallmarks of effective professional development include creating a community of learners, fostering an open and positive organizational culture, and giving teachers ownership of their own learning [35,36,44]. The advantages of designing training around a target curriculum are less clear [39,45]; an alternative is to focus on instructional skills that can be applied regardless of curriculum [41,46].

Professional development packages specific to early childhood educators have been developed to address oral language instruction [47], early literacy broadly defined [48], social-emotional learning [49], as well as multiple content domains [50]. With one recent exception—reported by Gerde and Bingham—systematic professional development interventions have not had a comprehensive focus on emergent writing [3].

#### 1.5. The Present Study

The body of applied research reviewed above points to the need for more widespread and effective professional development on emergent writing. The purpose of this study is to evaluate the outcomes of an intensive early literacy professional development package that included emergent writing as a core component. The package included a lesson-based curriculum, quarterly in-service workshops, an optional no-cost college course, and weekly in-class coaching. The package was intended to provide teachers with the knowledge and skills needed to maintain a rich literacy environment, implement evidence-based learning activities with high fidelity, assess children's progress, effectively individualize literacy instruction, and scaffold learning interactions.

The change model underlying the intervention design assumed a reciprocal and dynamic relationship between teacher knowledge and beliefs about early literacy development and instruction, classroom practices, and child outcomes. Lasting and sophisticated change in teacher behavior unfolds over time. If teachers try out new techniques and see some positive effects on the children they serve, they are motivated to become fluent in the new practices and eventually consolidate these experiences into their professional identities and belief systems [44].

Participants were from Head Start sites in the U.S. state of Hawai'i. Head Start is a federally funded preschool program intended to ameliorate the effects of poverty and social inequity. Head Start provides early learning, health, and family support services at no cost to children from families below the government-defined poverty level. See <https://www.acf.hhs.gov/ohs> (accessed 5 July 2023) for more information. Although this was a multi-year program (starting mid school year and continuing for three additional full school years), this particular study focuses on teacher and child outcomes in the final project year.

Research questions addressed whether professional development on emergent writing embedded in the context of a broader emergent literacy intervention can affect teachers'

beliefs and practices, and improve children's learning outcomes. The specific hypotheses were as follows:

- Teachers will come to hold beliefs consistent with science-based evidence about emergent writing.
- Teachers will increase their use of recommended instructional practices and improve the quality of the general classroom environment as well as the writing environment.
- Children will show gains on emergent writing and related literacy skills.

## 2. Materials and Methods

### 2.1. Participants

Participants included 230 children and 42 teaching staff from 15 Head Start classrooms sponsored by the same parent agency located in the City and County of Honolulu in the U.S. state of Hawai'i. Three teachers were hired at the start of the final project year and were not included in this report, resulting in an analysis sample size of 39 teachers. The child sample included all consented children with matching fall and spring data on at least one assessment measure. Parental consent was obtained for 100% of the children in control classrooms and over 90% in control sites. Ten consented children were excluded because of missing data.

On average, children were 46.80 months old at the start of the school year (range 32–61 months,  $SD = 6.53$ ). The majority of children (66.5%) were age-eligible for kindergarten in the next school year and 17% had enrolled in Head Start as three-year-olds and were returning for a second year of school. Slightly more than half were boys (52.8%), 13.0% were dual language learners, and 6.1% had an Individualized Education Plan. The children's ethnic diversity was as follows: 39.9% Native Hawaiian or part Hawaiian, 28.9% Asian, 16.2% Pacific Islander, 6.6% White, 4.4% Hispanic, 2.2% African American, and 2.6% Other.

Most lead teachers held an associate's (47%) or bachelor's degree (35%), while most assistant teachers had either a CDA credential (33%) or an associate's degree (33%). Lead teachers had more teaching experience than assistant teachers ( $M = 17.88$  and  $7.86$  years,  $SD = 7.56$  and  $6.27$ , respectively) and were older ( $M$  age =  $43.93$  and  $35.65$  years,  $SD = 10.25$  and  $8.78$ ). The teaching staff were ethnically diverse: 48.7% Asian, 28.2% Native Hawaiian or part Hawaiian, 7.7% each White and Pacific Islander, 2.5% Hispanic, and 5.1% not reported. All teachers were female.

### 2.2. Procedure

There were eight intervention classrooms and seven control classrooms. Classrooms were in the final year of the Hui A'o Mua multi-year early literacy intervention project. The original timeline was to have included a spring semester orientation period, followed by two full school years of implementation. However, the grant supporting this work was given a fourth, no-cost extension year. During this time, lead teacher staffing remained stable, but there was some turnover among assistant teachers, resulting in a variation in exposure to the program.

Using a quasi-experimental design, intervention and control classrooms recruited at the start of the project were matched as closely as possible on classroom type (part-day, full-day, special education inclusion), teacher experience and credentials, and the predominant ethnic groups served at each site.

In the fall and spring of the classroom year, a team of trained evaluators conducted classroom observations and administered individual child literacy assessments. Teachers were also administered surveys at these two time points. Additional assessments collected only for intervention children were administered by the project coaching staff. To avoid any familiarity bias on the part of the tester, staff did not test children in classrooms that they coached. For the purpose of this study, classroom and teacher data were taken from the first (baseline) and last (spring of the final year) assessment waves. Three teachers did

not return final surveys, so their answers from the fall of the final year were substituted. Child data were taken from the fall and spring waves of the final project year.

All classroom staff in the intervention condition—lead and assistant teachers—received the professional development experiences described in the section below. The project did not provide specific supports to control teachers but did offer an annual incentive of USD 500 per classroom to purchase educational materials. As part of ongoing organizational practices, teachers in the business-as-usual control condition received less intensive and more broadly focused individual coaching delivered on an ad hoc basis by Head Start mentoring staff. All classrooms participated in annual training organized by their Head Start program and all used the same base curriculum.

### 2.3. The Hui A'o Mua Intervention

The Hui A'o Mua intervention package included four components: an emergent literacy enrichment curriculum called Learning Connections, child progress monitoring, ongoing professional development, and family engagement support. Intervention classrooms used Learning Connections as a supplement to the baseline Creative Curriculum required by their Head Start agency. Learning Connections is a research-based, skills-focused curriculum that addresses the domains of oral language, phonological and phonemic awareness, alphabet knowledge and print concepts, and emergent writing [51,52]. A teacher's manual included over 140 developmentally sequenced activities and guidance on how to modify each activity to make it more or less challenging [53]. See Table 1 for a list of curriculum domains and learning goals, and Table 2 for sample emergent writing activities.

Teachers were given all needed classroom materials and weekly lesson plans that included one daily large-group and 2–3 daily small-group activities. A parallel home curriculum included weekly take-home activities for children and family members that extended the classroom curriculum content [54].

Literacy skills were taught within the context of monthly units of study, e.g., nutrition, domestic animals, or marine life. While daily large-group activities were included, most instruction was delivered to small groups of 2–5 children. Each lead and assistant teacher was responsible for his or her own small group; this was intended to facilitate close teacher-child relationships and allow teachers to develop in-depth knowledge of each child's needs. Teachers administered a curriculum-based assessment on a monthly basis for the purpose of individualization and child progress monitoring.

University faculty and project staff provided 24 h of annual in-service workshops. Topics included (a) early language and literacy development and the rationale behind the Learning Connections curriculum, (b) guided practice of curriculum activities, (c) environmental design, (d) assessment and individualization, (e) family engagement, and (f) developing lesson plans and units of study. Over the duration of the project, approximately 15% of training time was devoted to emergent writing. Each classroom also had a weekly in-class team coaching session of 4–5 h led by a master's-level literacy coach. Coaching activities included modeling and co-teaching lessons, providing one-on-one feedback, and sharing classroom evaluation data. Coaches also worked with teachers on environmental design, selecting goals and creating formal action plans, lesson planning, and reviewing children's progress.

### 2.4. Measures

#### 2.4.1. Teacher-Reported Beliefs and Practices

Teachers' emergent writing beliefs and instructional practices were measured using a subset of items from a longer survey developed by the author for this project. Three items were used to measure emergent writing beliefs: "Preschoolers can use print or writing attempts to communicate with other children", "Preschool teachers do not need to be concerned about a four-year-old's reading and writing development" (reverse coded), and "Preschoolers can use invented spelling". Items had a five-point response scale (from strongly disagree to strongly agree). The mean of the three items comprised the writing

beliefs score. Internal consistency was very low at both time points ( $\alpha = 0.48$  and  $0.49$ ). This might be expected, given the small number of items and modest inter-item correlations. It has been suggested that teachers' beliefs about early writing are diverse and not always aligned with research-based evidence, making accurate assessment a challenge [55,56].

**Table 1.** Curriculum domains and learning goals.

| Oral Language                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>To follow two-step and multi-step directions</li> <li>To communicate needs, questions, emotions, and thoughts with increasing sophistication</li> <li>To use increasingly diverse and sophisticated vocabulary</li> <li>To engage in conversations of increased length and complexity</li> <li>To increase English language competence while maintaining heritage language growth</li> </ul>                                                          |
| Phonological and Phonemic Awareness                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <ul style="list-style-type: none"> <li>To recognize and discriminate environmental sounds</li> <li>To segment and blend compound words and syllables</li> <li>To recognize and generate rhyming words</li> <li>To segment and blend onsets and rimes</li> <li>To recognize and generate words with the same initial and final sounds</li> <li>To segment and blend phonemes in consonant-vowel-consonant words</li> </ul>                                                                    |
| Alphabet Knowledge and Print Awareness                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <ul style="list-style-type: none"> <li>To show independent interest in and use of books and print materials</li> <li>To recognize and identify letter symbols and letter names</li> <li>To identify letter-sound correspondences</li> <li>To track print from left to right and top to bottom</li> <li>To be aware of the functions of print</li> <li>To make use of environmental print</li> <li>To use print to convey meaning</li> <li>To read consonant-vowel-consonant words</li> </ul> |
| Emergent Writing                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <ul style="list-style-type: none"> <li>To use writing to convey meaning</li> <li>To strengthen fine motor skills and use tools in preparation for writing</li> <li>To use increasingly higher levels of emergent writing</li> <li>To use a left-to-right and top-to-bottom orientation when writing</li> <li>To begin to spell simple words using letter-sound correspondence</li> </ul>                                                                                                     |
| Approaches to Learning                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <ul style="list-style-type: none"> <li>To increase attention and persistence when doing LC activities</li> <li>To incorporate newly learned skills in free play</li> <li>To use prediction, comparison/contrast, definitions, and taxonomic knowledge in the context of discussing LC activities</li> </ul>                                                                                                                                                                                  |

Six items were used to measure emergent writing practices. Sample items included “Using letter templates, sand paper letters, or other tools to help children learn to form letters”, “Integrating writing into different classroom centers”, and “Using invented spelling”. Teachers rated each item on a six-point scale (from once a month or less to several times per day). Items were averaged to create a single score ( $\alpha = 0.74$  and  $0.80$  at fall and spring, respectively). Self-reports of teacher behavior are not often used, as direct observation is considered more objective. However, there is some evidence that observations converge with teachers' narrative descriptions of their writing instruction strategies [29]. And given that writing instruction comprises a small portion of classroom time, observers may have minimal opportunity to record such events, which speaks in favor of including teacher reports.

**Table 2.** Sample writing activities.

| Activity           | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Transferring       | Children transfer items (e.g., water, rice, small pompoms) from large to small containers, crossing body midline from left to right. Materials are sequenced to move from shoulder to finger control, e.g., pour, scoop/spoon, tweezer/dropper.                                                                                                                                                                                                                       |
| Sand writing       | Children write letters of the alphabet with a finger or writing tool in a container of sand or other tactile medium.                                                                                                                                                                                                                                                                                                                                                  |
| Morning message    | During circle time, children compose 2–3 sentences about the upcoming day. The teacher models/discusses the writing process. The teacher may also ask children to give written responses to specific discussion questions, or co-write a more complex product such as a graph of classroom data.                                                                                                                                                                      |
| Journaling         | Children write in their journal in response to a prompt related to another classroom activity, e.g., what we saw in the garden today, or a pair of rhyming words I like. The teacher scaffolds as the child plans, writes, and rereads their message, with the goal of eliciting a slightly more advanced level of emergent writing than the child could do without assistance. Children are encouraged to write in their journal independently whenever they choose. |
| Family/class books | Children compile photos of themselves, their family, or class members in a self-made book, and write something about each photo. Or, working together, children each write and illustrate a page of a book related to the current theme. Adults take dictation or annotate if needed. Books are read aloud and placed in the library.                                                                                                                                 |
| Classroom print    | Children create environmental print to be used in the classroom, e.g., signs and labels, word cards for a classroom message board, or props for dramatic play.                                                                                                                                                                                                                                                                                                        |

#### 2.4.2. Classroom Writing Environment

The writing and print subscale of the Early Language and Literacy Classroom Observation (ELLCO) served as an objective measure of emergent writing support [57]. This subscale has three items: early writing environment, support for children's writing, and environmental print. Each item was scored on a five-point scale. Descriptive anchor terms provided by the ELLCO authors are as follows: 1 = deficient, 3 = basic, and 5 = exemplary. To ease interpretation, ELLCO data are reported as the average item score. The sample data showed high internal consistency ( $\alpha = 0.83$  and  $0.93$  for first and last observations, respectively).

The full ELLCO instrument was also used. The General Classroom Environment domain includes items related to staffing, scheduling, environmental design, and behavioral guidance, while the Language and Literacy domain addresses curriculum, classroom materials, and interactions that support language and literacy. Usually these two domain scores are reported separately. However, they were very highly correlated in our sample, so we used the mean of the 19 ELLCO items to measure overall classroom quality ( $\alpha = 0.97$  for both first and last observations).

#### 2.4.3. Child Emergent Writing and Literacy Skills

The Peabody Picture Vocabulary Test (4th. Ed.) (PPVT) [58] and the Test of Early Reading Abilities (3rd. Ed.) (TERA) [59] are widely used and validated tools that were used to measure receptive vocabulary and emergent reading, respectively. PPVT items are uniform in presentation: from an array of four line drawings, the child is asked to point to the one named by the tester. Content covered on the TERA includes print, concepts of alphabet knowledge, and use of environmental print. Both tests provide age-normed

quotient-type standardized scores, i.e.,  $M = 100$  and  $SD = 15$ . However, norms for the TERA only apply to children 42 months of age and older.

Knowledge of upper case letters was the total number of letters named by the child from a deck of 26 cards.

For the emergent writing assessment, the child was asked to write their name, followed by a list of any letters or words they knew. The scoring rubric was based on Sulzby et al. [12]. The name writing level was scored as follows: 0 = no attempt, drawing, or random scribble; 1 = linear scribble; 2 = letter-like units; 2.5 = mix of letters and units; 3 = letters that do not fully spell the first name; 4 = name in one consistent case; 5 = name in mixed upper and lower case; and 6 = name with correct capitalization. The list writing level (which was based on the most sophisticated entry in the list) was scored as follows: 0 = no attempt, drawing, or random scribble; 1 = linear scribble; 2 = letter-like units; 3 = mix of letters and units; 4 = letter strings; 5 = recognizable word (not own name, not copied from nearby print); and 6 = multiple recognizable words. The number of discreet recognizable letters and the number of different recognizable words in the list were also recorded. The four component scores were summed to form the emergent writing total. Due to limited resources and to reduce burden on control sites, writing assessments were collected for intervention children only.

Additional measures of alphabet knowledge and phonological awareness were also collected only for intervention children. For lower case letter names and lower case letter sounds, assessors went through two card decks of lower case letters, first asking children to name each letter and later asking children to produce the letter sound. For intervention children only, a total alphabet knowledge score was created by summing the results for upper and lower case letter names and lower case letter sounds.

Phonological awareness was the sum of the rhyme and alliteration subtests of the Get It, Got It, Go! individual growth and development indicators [60,61]. This is a short test where children have two minutes each to identify which pair among four pictures named by the tester either rhyme or have the same initial sound.

### 3. Results

#### 3.1. Group Equivalence in the Fall

Intervention and control classrooms were well matched. There were no significant group differences on teacher background characteristics, e.g., age, education and experience, child demographic factors, or years enrolled in Head Start. The two groups were also equivalent on baseline classroom quality, teacher-reported beliefs and practices, and pretest TERA-3 and upper case letter knowledge. There was a trend in the direction of intervention children having higher fall PPVT scores  $t(235) = 1.73, p = 0.085$ .

#### 3.2. Intervention vs. Control Comparisons

Data were analyzed using a mixed design analysis of variance with treatment condition as the between-groups factor and time as the repeated measure (see Table 3). This approach was chosen over analysis of covariance controlling for initial level because three of the six variables of interest did not show homogeneity of regression. The traditional criterion of  $p < 0.05$  was used as the threshold for statistical significance. Effect sizes were expressed as the partial eta-squared statistic ( $\eta_p^2$ ) provided by the SPSS 29 statistical package. Cohen suggested descriptive benchmarks for interpreting  $\eta_p^2$ , with 0.01 = small, 0.06 = medium, and 0.14 = large [62]. However, others have cautioned that it is preferable to judge the magnitude of effect sizes in comparison to findings from similar studies in the research literature, e.g., Lakens [63].

##### 3.2.1. Teacher Beliefs and Emergent Writing Practices

There were no significant effects for teacher beliefs about emergent writing. At both time points, intervention and control teachers had mean scores close to 4.5 on a five-point

scale (i.e., agree to strongly agree), indicating that teachers shared similar perspectives about emergent writing development.

**Table 3.** Group means, standard deviations, and significant effects for teacher, classroom, and child variables.

| Dependent Variable              | Intervention |          |           |          |           | Control  |          |           |          |           | Effects         |
|---------------------------------|--------------|----------|-----------|----------|-----------|----------|----------|-----------|----------|-----------|-----------------|
|                                 | Time 1       |          |           | Time 2   |           | Time 1   |          |           | Time 2   |           |                 |
|                                 | <i>n</i>     | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> | <i>n</i> | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> |                 |
| Writing beliefs <sup>a</sup>    | 25           | 4.64     | 0.44      | 4.35     | 0.50      | 14       | 4.45     | 0.44      | 4.57     | 0.52      |                 |
| Writing practices <sup>a</sup>  | 25           | 4.36     | 0.80      | 5.15     | 0.54      | 14       | 3.87     | 1.04      | 4.64     | 0.76      | T ** G *        |
| ELLCO writing <sup>a</sup>      | 8            | 3.62     | 0.55      | 4.79     | 0.25      | 7        | 3.006    | 0.90      | 2.67     | 0.51      | T * G ** GT **  |
| ELLCO total <sup>a</sup>        | 8            | 3.41     | 0.47      | 4.85     | 0.17      | 7        | 3.18     | 0.55      | 3.33     | 0.58      | T ** G ** GT ** |
| PPVT-4 <sup>b</sup>             | 141          | 91.47    | 14.94     | 95.32    | 12.96     | 85       | 88.59    | 19.99     | 93.86    | 16.61     | T **            |
| TERA-3 <sup>b</sup>             | 105          | 87.76    | 13.14     | 94.32    | 12.97     | 68       | 90.41    | 14.70     | 90.53    | 15.43     | T ** GT **      |
| Upper case letters <sup>b</sup> | 142          | 8.82     | 9.87      | 17.99    | 8.99      | 85       | 8.25     | 9.74      | 13.76    | 10.02     | T ** G * GT **  |

Note. \*  $p < 0.05$ , \*\*  $p \leq 0.001$ . <sup>a</sup> For teacher and classroom measures, time points are the baseline and final assessment periods. <sup>b</sup> For child measures, time points are the fall and spring of the final project year.

The results for emergent writing practices showed significant effects of time ( $F = 18.35$ ,  $p < 0.001$ ,  $\eta_p^2 = 0.33$ ), and group ( $F = 7.38$ ,  $p = 0.019$ ,  $\eta_p^2 = 0.17$ ) (all  $df = 1, 37$ ). Both groups of teachers reported increases in the frequency of developmentally appropriate writing instruction, and intervention teachers rated their practices more highly overall.

### 3.2.2. Classroom Environment

The results for the ELLCO emergent writing subscale showed significant and strong effects of time ( $F = 10.83$ ,  $p = 0.006$ ,  $\eta_p^2 = 0.45$ ), group ( $F = 24.74$ ,  $p < 0.001$ ,  $\eta_p^2 = 0.66$ ), and a group by time interaction ( $F = 35.10$ ,  $p < 0.001$ ,  $\eta_p^2 = 0.73$ ) (all  $df = 1, 13$ ). While the writing environment improved over time and intervention classrooms were higher overall, these main effects are of less interest than the interaction. The general shape of the interaction suggested that both groups were similar at baseline and different at exit. To explore this further, a follow-up test of the simple effects of time was conducted using Bonferroni corrections. The results confirmed that control classrooms were similar at both time points, while intervention sites rose from baseline to exit ( $F = 45.50$ ,  $p < 0.001$ ). At baseline, classrooms scored close to the midpoint of the ELLCO scale, or basic; control classrooms remained similar over time, while intervention classrooms ended the project close to the ceiling level of exemplary.

The pattern was quite similar for the ELLCO total. There were significant effects of time ( $F = 50.78$ ,  $p < 0.001$ ,  $\eta_p^2 = 0.80$ ), group ( $F = 217.18$ ,  $p < 0.001$ ,  $\eta_p^2 = 0.57$ ), and a group by time interaction ( $F = 33.46$ ,  $p < 0.001$ ,  $\eta_p^2 = 0.72$ ) (all  $df = 1, 13$ ). Again, both groups were similar at baseline, and follow-up tests of the simple effects of time showed change for the intervention group only ( $F = 51.61$ ,  $p < 0.001$ ). Again, control classrooms started and remained close to the midpoint of the ELLCO scale (basic), while intervention classrooms also started at the midpoint but ended the project close to the ceiling level exemplary).

### 3.2.3. Child Language, Emergent Reading, and Upper Case Letter Knowledge

The results for the PPVT showed a time effect only ( $F(1, 224) = 32.81$ ,  $p < 0.001$ ,  $\eta_p^2 = 0.13$ ). Intervention and control children showed similar gains from fall to spring, with an average of 4.21 points.

On the TERA, there were significant effects of time ( $F = 12.76$ ,  $p < 0.001$ ,  $\eta_p^2 = 0.07$ ), and a group by time interaction ( $F = 11.88$ ,  $df = 1, 171$ ,  $p < 0.001$ ,  $\eta_p^2 = 0.07$ ) (all  $df = 1, 171$ ). TERA scores remained essentially stable in the control group while intervention children

gained an average of over 6.5 points. Follow-up tests of simple effects of time confirmed no change in the control group and significant change for intervention children ( $F = 31.33$ ,  $p < 0.001$ ). Because children younger than 42 months at pretest could not be assigned a reading quotient score, the sample size for this analysis is reduced. However, results using raw scores for the full sample of children showed the same pattern.

There was also a benefit of intervention for upper case letters. In this case, there were significant effects for time ( $F = 180.28$ ,  $p < 0.001$ ,  $\eta_p^2 = 0.45$ ), group ( $F = 4.00$ ,  $p = 0.047$ ,  $\eta_p^2 = 0.02$ ), and a group by time interaction ( $F = 11.11$ ,  $p < 0.001$ ,  $\eta_p^2 = 0.05$ ) (all  $df = 1, 225$ ). To explore the interaction, simple effects of condition showed no group differences in the fall and significant differences in the spring ( $F = 10.74$ ,  $p < 0.001$ ). In the fall, both groups of children knew about eight letters. By the spring, children had generally doubled their scores, but intervention children knew about four more letters, on average, than control children. This was a relatively modest difference, as reflected in the effect size statistic.

### 3.3. Intervention Children's Emergent Writing, Alphabet Knowledge, and Phonological Awareness

The results for assessments collected only for intervention children are shown in Table 4. Fall to spring changes were tested using repeated-measures analysis of variance. Because computational procedures for one-way designs are more straightforward and the Cohen's  $d$  statistic may be more familiar to most readers, two effect sizes are reported: both partial eta-squared and a repeated-measures  $d$  based on averaged standard deviations [63].

**Table 4.** Means, standard deviations, and effect sizes for fall-to-spring change for intervention children.

| Dependent Variable     | <i>n</i> | Fall     |           | Spring   |           | <i>F</i> | $\eta_p^2$ | <i>d</i> |
|------------------------|----------|----------|-----------|----------|-----------|----------|------------|----------|
|                        |          | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> |          |            |          |
| Emergent writing       | 142      | 4.75     | 5.77      | 16.96    | 10.32     | 255.37 * | 0.64       | 1.52     |
| Alphabet knowledge     | 136      | 17.92    | 21.29     | 53.10    | 23.49     | 428.83 * | 0.76       | 1.57     |
| Phonological awareness | 144      | 2.35     | 3.52      | 13.24    | 9.72      | 190.36 * | 0.57       | 1.65     |

Note. \*  $p < 0.001$ .

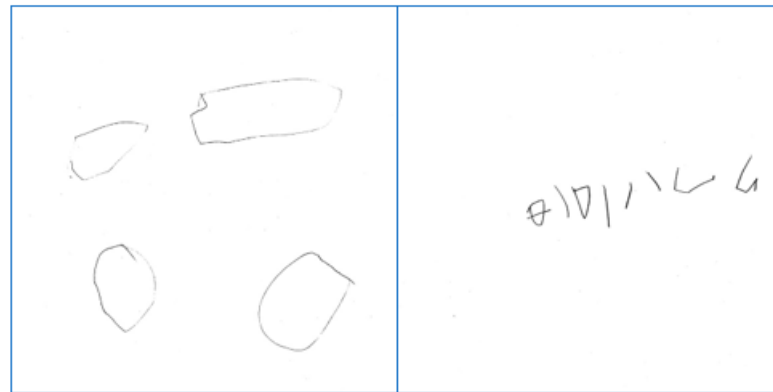
Intervention children showed significant gains on emergent writing, alphabet knowledge, and phonological awareness (see Table 4). The effect sizes were large in magnitude, as might be expected for developmental measures expressed as raw scores, as contrasted with age-normed standardized scores like the PPVT and TERA.

#### 3.3.1. Emergent Writing

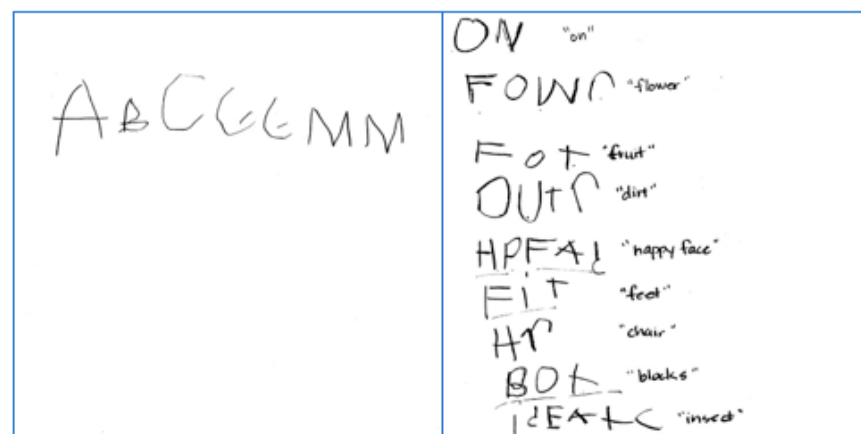
Total emergent writing scores changed from 4.75 to 16.96 points. Looking at the different components of the emergent writing assessment, there were clear changes in children's ability to write their own first name. In the fall, 36% of children had the lowest possible score for name writing (no attempt, drawing only, or random scribble), 22% could spell their name, but only 7% used correct capitalization. In the spring, these scores were 2%, 74%, and 55%, respectively. The list-writing task showed less dramatic change, but provides better insight into children's general word-writing skills. In the fall, 29% of children showed the lowest level of emergent writing on the list-writing task; 70% used some form of linear scribble, letter-like units, or random letters; and only 1% produced any recognizable words. A sizable minority of children (42%) include no letters on their fall list; the average number for those who did was 4.20 letters. On the spring assessment, only 10% of children scored at the lowest level on list writing, while 16% wrote at least one recognizable word. Only 16% of children included no letters on their spring list, but those who did used an average of 10.06 different letters.

To illustrate patterns of change on the list-writing task, samples are shown in Figures 1–3. Child A showed a typical level of growth for children who started the year with minimal emergent writing skills. Child A progressed from a score of 0 to a score of 2. Child B's samples illustrate the typical change for a preschooler who starts the year able to write

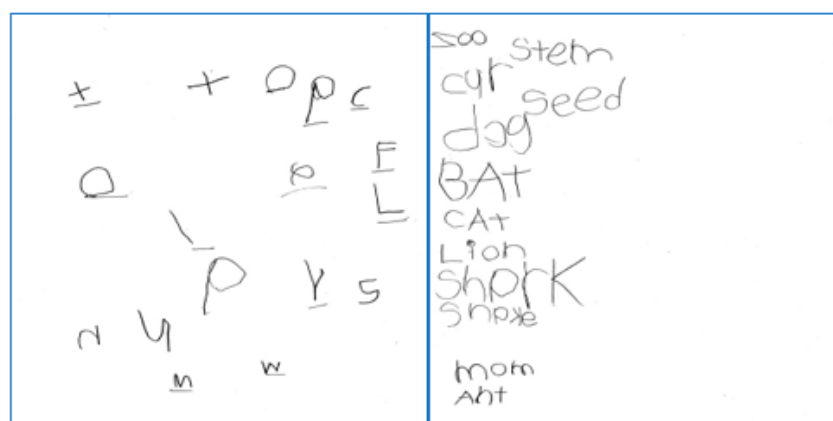
letters. Child B produced clearly written letter strings in the fall and used advanced invented spelling in the spring. Child B's scores rose from 4 to 23. Finally, Child C showed unusually large gains, as she moved from using mixed letters and forms to producing a long list with conventional spelling (scores of 3 and 38). Note that it is possible that Child C's spelling had an element of rote, while Child B clearly used letter-sound correspondence.



**Figure 1.** Fall and spring writing samples for Child A.



**Figure 2.** Fall and spring writing samples for Child B.



**Figure 3.** Fall and spring writing samples for Child C.

Due to the sample size, there were limited options to conduct predictive analyses of fall-to-spring change on emergent writing, i.e., the ratio of subjects per potential independent variables was small. As an exploratory approach, we computed a series of partial correlations between spring emergent writing and a set of potential associated factors, controlling for fall emergent writing. The partial correlations showed that spring emergent writing was lower for children with an IEP ( $r = -0.22, p < 0.01$ ) and higher for older children ( $r = 0.21, p < 0.02$ ) and those with better school attendance ( $r = 0.34, p < 0.001$ ). Spring emergent writing scores were also higher for children with higher fall scores on the TERA ( $r = 0.28, p < 0.005$ ), phonological awareness ( $r = 0.33, p < 0.001$ ), and alphabet knowledge ( $r = 0.17, p < 0.05$ ). There were no significant associations between change on emergent writing and child gender, dual language learner status, or fall PPVT. These results suggest that familiarity with skills essential to cracking the written language code, along with more exposure to the curriculum, make it easier to progress towards higher levels of emergent writing. Not surprisingly, children with special needs found it challenging to make gains in this area. Note, however, that these associations were small in magnitude and some variables had minimal variation in the fall, when writing, alphabet knowledge, and phonological awareness were close to floor level for many children.

### 3.3.2. Alphabet Knowledge and Phonological Awareness

Fall-to-spring changes on alphabet knowledge and phonological awareness were similarly robust to those found for emergent writing. At the start of the year, alphabet knowledge was typically limited to a small number of upper case letters. By the spring, children who knew a particular letter tended to know both upper and lower case forms and the letter sound. This more robust understanding of letter forms and sounds was a primary focus of the Learning Connections curriculum alphabet activities and was intended to support the development of invented spelling. At pretest, most children found the phonological awareness task to be quite challenging and the large majority of children had scores of zero. In the spring, only 8% and 22% of children were unable to correctly identify any rhyme or alliteration items, respectively. Rhyming items, however, remained easier than first sounds.

## 4. Discussion

The goals we set for teachers and children, the classroom activities, and the instructional strategies promoted in the Hui A'o Mua intervention classrooms were consistent with conceptualizations of best practices in early writing instruction [3]. Results of the project show that an emergent writing component embedded within a more comprehensive early literacy professional development package can improve the classroom writing environment and aspects of children's code-related skills that support emergent writing.

Compared to a control group with equivalent teacher and child characteristics, intervention sites showed positive gains on environmental support for emergent writing, included writing materials, interactions, and environmental print. This occurred within the context of positive gains on the full ELLCO scale, indicating that both emergent writing and overall literacy practices improved. Compared to control children, intervention children showed greater gains on emergent reading and upper case letter knowledge over the school year, but no differences on receptive vocabulary. Intervention children also made considerable gains on emergent writing, phonological awareness, and alphabet knowledge (i.e., upper and lower case letter names and letter-sound correspondence). Since these last three skills were not assessed in the control group, causal conclusions cannot be made. However, given the inter-relatedness of the various literacy skills addressed and the magnitude of the intervention group's fall-to-spring change, it is reasonable to infer that the program may have played a role in strengthening children's emergent writing, phonological awareness, and alphabet knowledge.

Only a limited number of classroom intervention studies include emergent writing as an outcome. A meta-analysis of preschool intervention studies focused in whole or

part on emergent writing found only 18 studies published over a 23-year period, with an average effect size of 0.44 [64]. One recent large-scale, randomized control study of a comprehensive language and literacy intervention provided 30 workshop hours on environmental design, oral language, emergent reading, emergent writing, and enhancing learning during play [65]. The three conditions included in this study were training with or without monthly coaching and a business-as-usual control. The quality (but not the quantity) of observed classroom writing practices improved only in the training plus coaching condition. A rare example of a professional development intervention specific to emergent writing comes from a multi-state collaboration between Gerde and Bingham [3]. Their iWRITE PL program for Head Start teachers addressed teacher knowledge, the writing environment, and writing instruction. The intervention was delivered via a series of online modules that included video vignettes of high-quality practices that were annotated to draw teachers' attention to what makes these interactions effective. Knowledge was assessed using online quizzes, and coaches provided biweekly feedback on videos of teachers' implementation in their own classrooms. The results showed positive effects, but only for teachers who engaged fully with the program. High-level adopters showed faster growth and higher end-of-year performance on observational measures of the writing environment and interaction quality. Children in these classrooms also had better emergent writing outcomes. Thus, the findings of the Hui A'o Mua project are similar to those of these two larger and methodologically superior studies.

Our results are also consistent with the larger body of research on literacy interventions and teacher professional development. Meta-analytic studies found that professional development efforts, on average, have moderate effects on teachers (effect sizes in the range of 0.4–0.7), and that changing classroom environments is easier than changing teachers' instructional interactions [39,40]. Fewer studies measured child outcomes, but when they did, these same meta-analyses found that effect sizes are typically small, slightly more than one tenth of a standard deviation. Of note is the finding that preschool language and literacy interventions appear to be more successful than professional development addressing other content areas and/or for teachers of older children [40,45]. The reasons for these patterns are not clear; however, it is possible that early literacy is especially malleable, that preschool teachers are highly motivated to address this content area, or that variation in career preparation makes professional development especially helpful for early childhood educators. It is also noteworthy that preschool literacy interventions are more likely to improve children's code-related skills than their oral language [45,65]; this may be due to the finding that it is extraordinarily difficult to change the sophistication of teacher–child language interactions [46,66].

The Hui A'o Mua intervention did not affect teachers' beliefs about emergent writing or the frequency of self-reported writing instruction strategies. Both the intervention and control groups held similar beliefs that were consistent with the scientific literature on writing development. However, the belief measure had only three items and may not have been sensitive to more subtle, albeit important, variations in what teachers think. Control teachers were exposed to program-wide in-service training on the Head Start standards where they likely received messages about the nature of early writing development consistent with our professional development content. Social desirability may also have been a factor, leading teachers in both groups to endorse the presumed correct answers for both the belief and practices scales. Finally, it is also possible that teachers simply were not highly accurate judges of their own classroom behavior; this would be consistent with our finding of intervention effects for observed classroom quality in the absence of differences on teacher self-reports. Our null results regarding teacher self-reports are in line with meta-analytic findings of no overall effects of professional development on teacher knowledge [39]. Hamre et al. were able to change both conceptual knowledge and beliefs via a course designed specifically to focus on such outcomes [67]. Still, they found little association between changes in teachers' cognitions and their classroom behavior.

Much of the Hui A'o Mua program design was consistent with recommended practices in effective professional development. The package employed multiple components and offered many hours of training and coaching over an extended period [39,45]. The workshop and course content explicitly addressed the Head Start standards on which teachers and their program were judged [34,35]. The teachers were supported in the use of a validated, research-based curriculum [45]. Ongoing, in-person coaching included modeling, co-teaching, and feedback on live and videotaped teaching interactions [35,36,38]. The assessment tools were explained in detail, and data on teacher, classroom, and child progress were shared and used as a basis for reflection and action planning [35,36,38]. Finally, a learning community was fostered by working with all staff, not just lead teachers, and promoting interaction and peer consultation across the teacher cohort [38,44]. An area in which the program fell short of recommended best practices concerned the lack of online resources to illustrate high-quality practices [3,41,46].

Hui A'o Mua was distinctive in its intensity and particularly distinctive in spanning multiple years. Professional development programs that allow for prolonged participation are rare. This is unfortunate, as two other research groups have found that a second year led to further improvements in interaction quality and/or stronger effects on child outcomes [48,68,69]. Closer inspection of our own results on a year-by-year basis found continued growth in classroom quality, implementation fidelity, and child outcomes with each successive year [51]. With multi-year programs, teachers can circle back to earlier content and address issues at a more sophisticated level [68], and this is exactly what we did in our workshop agendas. In the later years, we also gave teachers a leading role in lesson planning and had them apply their content knowledge to the development of new learning activities and units of study. An unanswered question is where the tipping point may be, i.e., where prolonging professional support has diminishing returns. It may well be the case that two years of intensive support, following by less frequent booster sessions, can maintain teacher's gains.

The limitations of this study are the use of a quasi-experimental design, small sample size, and measuring several key child outcomes in the intervention group only. The greatest threat to the validity of this study was not having collected emergent writing data from the control group children. Because of this design flaw, we cannot conclude that the Hui A'o Mua program caused the fall-to-spring changes seen in the intervention group, and our results must only be seen as suggesting the possibility of intervention effects. Some measures used were also less than optimal. Belief systems are very difficult to assess, and our three-item measure of teachers' writing beliefs was cursory at best. The child emergent writing assessment was also limited in scope; it measured emergent writing level and conventionality in a single, artificial context and did not address children's understanding of print concepts or varied use of writing in authentic activities.

A simplified, linear model of the logic underlying professional development programs posits that changes in teacher knowledge and beliefs affect classroom practices, which in turn affects child outcomes. In reality, the process is more complex. Substantial and lasting changes in teachers' knowledge and beliefs develop over time and are reciprocally strengthened by reflection and experimentation, successful implementation of new strategies, and seeing positive evidence of child outcomes [44]. Future research on interventions to improve the quality of emergent writing instruction in particular, as well as early childhood practices in general, should be designed to better measure and understand the unfolding of this dynamic transactional process.

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**Data Availability Statement:** Data are available upon request from the author.

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