The Hatchlings Project: Community-Library Partnerships to Reduce Childhood Literacy Inequities

Abstract and Alignment with NLG Goals

The Maryland Initiative for Literacy and Equity (MILE) at the University of Maryland (UMD), in partnership with the Maryland State Library Agency (MSLA) and multiple community partners, is requesting $249,999 to adapt and evaluate a sustainable, asset-based program ("Hatchlings") designed to empower under-resourced[1] new parents to engage their babies in early language and literacy building activities both in and out of the library. This project will leverage the collective, cross-disciplinary expertise of librarians, educators, neuroscientists, speech language pathologists, child development experts, and other partners to establish an *open-access, flexible, and scalable national model* for supporting the foundations of language and literacy development in young children, thus directly addressing NLG Goal 1, to build the workforce and institutional capacity for managing the national information infrastructure and serving the information and education needs of the public. We will accomplish this through a two-phase community-based participatory research (CBPR) approach, in which we will first adapt the Hatchlings program to be maximally flexible and culturally responsive for any potential audience, and then we will evaluate the new program's multi-pronged outcomes including parental self-efficacy, children's language environments, and family library use.

In doing this work, this project will address all three objectives of NLG Goal 1. First, it builds the institutional capacity of libraries to serve the education needs of the public by enhancing, evaluating, and sharing a replicable library program that supports children's early learning (Objective 1.1). Second, it creates and facilitates opportunities for continuous learning for families from diverse cultural and socioeconomic backgrounds, and specifically aims to increase under-resourced parents' self-efficacy to establish the foundation of their children's early learning and literacy development (Objective 1.3). Finally, the program intentionally includes collaboration with formal and informal learning organizations, including community partners such as family resource centers, health departments, cultural community organizations, and Title 1 schools, to optimally reach the families who may most benefit from the programming, but who may not be regular library users (Objective 1.2). The ultimate goal of this project is to reduce socioeconomic and racial/ethnic disparities in literacy and academic outcomes through a culturally responsive prevention model, situated at the intersection of libraries and community partnerships.

Project Justification

The Need for Accessible Early Intervention

For as long as data has been available, the U.S. has experienced persistent inequities in literacy and academic success across socioeconomic status (SES), racial, ethnic, and native language identities (NAEP, 2022). Specifically, children growing up with low income, lower parental education, minoritized racial and ethnic identities, and/or non-native English speaking families are significantly more likely to enter Kindergarten without foundational school readiness skills (including core pre-reading skills), to underperform academically across the school years (especially in reading), drop out of school (Sheng et al., 2011), and not pursue higher education (Isaacs & Brookings Institution, 2012). Research suggests that these "achievement gaps" in learning are measurable as early as the first year of life, when the developing brain is in a critical period and most sensitive to early experiences (Zero to Three, 2023; Werker & Hensch, 2015). Furthermore, these early-arising disparities appear to be largely driven by "opportunity gaps," in which children growing up in under-resourced environments frequently lack access to evidence-based early learning opportunities (Gandhi, 2021; Lindsey et al., 2010). Thus, to eliminate *achievement gaps*, we must address *opportunity gaps* early in child development.

Fortunately, recent research suggests that intervention programs implemented in infancy and early childhood can significantly reduce learning-related disparities in language and literacy milestones (e.g., Ferjan Ramírez et al., 2020), with long-lasting outcomes on achievement, health, and well-being (Campbell et al., 2014). However, these programs often don't reach families early enough to *prevent* disparities during the critical early years of brain development. Thus, one of the most effective ways to improve children's language and literacy development is by increasing the capacity and self-efficacy (i.e., confidence in their capacity) of parents and caregivers to support their children's learning *from birth and before* (Mariani et al., 2023; Amin et al., 2018).

Nationwide, libraries are ideally situated as a powerful and influential community resource for supporting under-resourced parents in becoming their child's first and most important teacher, to help plant the seeds of early language and literacy development (Lopez et al., 2023). As one of the rare non-home and non-work spaces that does not require spending money to participate (compared to other sites of learning and engagement such as zoos and museums), public

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[1] We use the term under-resourced to refer to families with reduced economic resources (e.g., low income, food or housing insecurity), lower educational attainment, immigrants and English language learners, and/or racially/ethnically marginalized identities (e.g., Black, Indigenous, and People of Color - BIPOC). National education data suggest that children growing up with one or more of these circumstances are likely to experience "achievement gaps" (i.e., underperformance) in reading and other academic domains (NAEP, Achievement Gap Dashboard).

libraries have much to offer families in terms of early learning opportunities. A cornerstone of library youth services programming centers on the early preschool years, and in addition to early literacy programs, libraries offer collections of toddler board books and picture books designed for guided reading as well as early learning spaces with manipulatives, puppets, and interactive play items to encourage imagination and creativity. These programs, resources, and spaces encourage exploration and learning through literacy activities and play, preparing preschoolers with a solid foundation for school readiness, especially for families who may be experiencing socioeconomic disadvantage and related stressors who, without their public library, may not have access to such resources (Conger & Donellan, 2007). Despite the many free offerings of children's programming in public libraries, regions of the United States experiencing the greatest material deprivation are also those with the lowest rates of utilization of children's services in libraries (Lopez et al., 2016).

To maximize the impact of early learning programs, we must build on this evidence by developing *scalable, culturally responsive programming* and establishing a *strong research base of efficacy*. This project addresses those aims through a cross-disciplinary approach drawing from the fields of information science, speech language pathology, child development, and education, to ultimately improve, evaluate, and disseminate a maximally impactful program to support under-resourced children's early learning.

The Hatchlings Program

Hatchlings (https://mgol.net/home/hatchlings/) is an innovative newborn component of the Mother Goose on the Loose (MGOL) program, an award-winning early-literacy program for children from birth to age 3 with their parents or caregivers that enhances parent/child bonding, helps with the development of the whole child, and sows the seeds of early literacy development through story, song, and play. Developed by Dr. Betsy Diamant-Cohen, a librarian, early literacy expert, and consultant on this project, Hatchlings aims to build newborns' early cognitive, physical, and socioemotional learning through principles of ritual, repetition, music, movement, and joyful interactive play. Hatchlings includes two components, "Ready to Hatch" (1 session for expecting parents before birth) and "In the Nest" (4 weekly sessions for parents and newborns 0-4 months) which build on each other, but it is not necessary to attend Ready to Hatch before attending In the Nest. The Hatchlings curriculum is designed to be co-taught by librarians and allied community partners such as family resource centers, health departments, cultural community organizations, and Title 1 schools, who have the most contact with under-resourced families who may not be regular library users. Sessions begin with group sharing to promote community amongst caregivers, and then librarians share examples of developmentally appropriate learning materials (e.g., board books, indestructible puppets), reading positions (e.g., tummy time, lap sitting), ways to incorporate language into everyday routines (e.g., transitional songs for clean-up time), and songs and rhymes to support early phonological awareness and infant-caregiver attachment. Interwoven throughout, program facilitators discuss infant
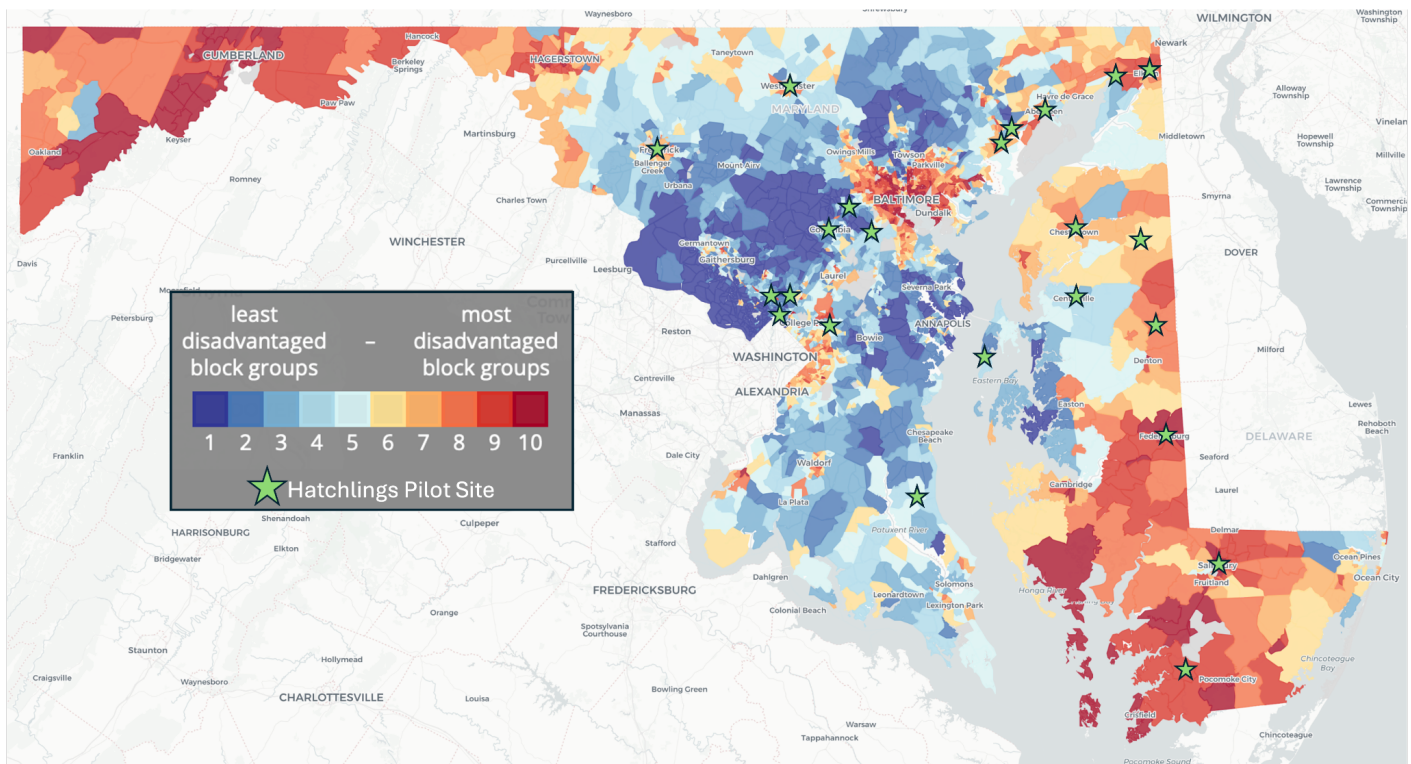

Figure 1: Map of Maryland color coded by area disadvantage Index(ADI) with Hatchlings pilot implementation sites overlaid.

developmental milestones, emphasize the value of talking, reading, sharing books, and playing for early cognitive and socioemotional development, and assure caregivers that they are capable of supporting their baby's literacy development.

Over the last three years (2020-2023), with support from the Maryland State Library Agency, Hatchlings has been piloted at 25 libraries in 13 counties across the state of Maryland, ultimately reaching more than 127 families from diverse socioeconomic, cultural, and geographical backgrounds (Figure 1). Initial evaluations were exceedingly positive, with 98% of respondents reporting that they learned new skills to support their babies' early learning, 100% reporting increased confidence in implementing those skills, and 100% reporting that they plan to make greater use of library programs/materials for their child (Figure 2). Follow-up surveys further found that 100% of parents reported incorporating early literacy activities into their daily routines with their newborns, and that this had helped them bond with their babies and to feel more confident in their capacity to support early literacy development. Testimonials included feedback such as "This was an amazing program! After just one session I was singing new songs to my baby. After the full month I felt much more confident and comfortable singing with my newborn. I also loved connecting with the library community and I now plan on attending more events at the library with my family in the future." Additionally, library facilitators conveyed that they really enjoyed delivering the curriculum, that it was fun and interactive, that they learned a lot themselves, and that they felt like they had a real impact on parent-child interactions.

Figure 2: Summary of survey responses after pilot implementations.

Existing Gaps

Despite this success, these pilot implementations revealed several needs that must be addressed to make the Hatchlings program[2] fully scalable, sustainable, and maximally impactful for participants from all backgrounds and at the national level. First, while the program is strengths-based and empowering, teaching parents that they all possess the capacity to be their baby's first and most important teacher, the curriculum is not fully adapted in a way that makes it culturally responsive to all the demographics it aims to serve. For example, one participant anecdotally mentioned not being familiar with some of the nursery rhyme tunes (e.g., Mary had a little lamb), because this was not something that she grew up with in her culture. Although the Hatchlings curriculum allows for facilitators to go "off script" and encourage participants to engage in songs and rhymes that are part of their cultural tradition, this approach is currently more reactive than proactive. Culturally responsive pedagogy encourages children to make explicit connections between the curriculum and their own cultures, languages, literacies, and life experiences, and use this cultural knowledge as a scaffold to learn new concepts and skills, all within a warm and affirming environment (Ladson-Billings, 1994; Muhammad, 2020). Instruction that accounts for differences in children's experiences can be particularly beneficial for learners from culturally and linguistically diverse backgrounds, for whom traditional instructional approaches are often less effective (Gonzales & Tejero Hughes, 2021; Sanford et al., 2020). Thus, an even more culturally responsive approach to the Hatchlings curriculum will treat parent participants as collaborators in adapting the materials to be more relevant to their own experiences. For example, parents would have the opportunity to contribute to the curriculum by being explicitly asked to reminisce on their cultural traditions with infant rearing to provide songs or nursery rhymes from their own childhood, and then directly incorporate these into the interactive practice. Additionally, the curriculum could provide a "how-to" guide for parents to create their own rhymes and songs for routines relevant to their experiences, such as cooking a meal, visiting relatives, or going to the laundromat. To be maximally relevant for participants from diverse backgrounds, the Hatchlings curriculum would benefit from a process of cultural adaptation, which involves gathering information about target populations, refining the curriculum, and continuing to refine it with feedback from stakeholders (Barrera & Castro, 2006; Castro et al., 2010). Further, to be maximally scalable for all the diverse populations across the US, the adapted curriculum should intentionally contain training and prompts for future facilitators to gain a better understanding of each new group of participants and their needs before and during the program delivery, so that it is ultimately a flexible, "living curriculum" that is optimally impactful for all participants.

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[2] While the proposed approaches can be implemented for both the prenatal Ready to Hatch and the postnatal In the Nest programs, this specific proposal is most strongly focused on the In the Nest program, because it has a wider reach (more parents seek resources once baby is born), and because it has more sessions to evaluate impact over time.

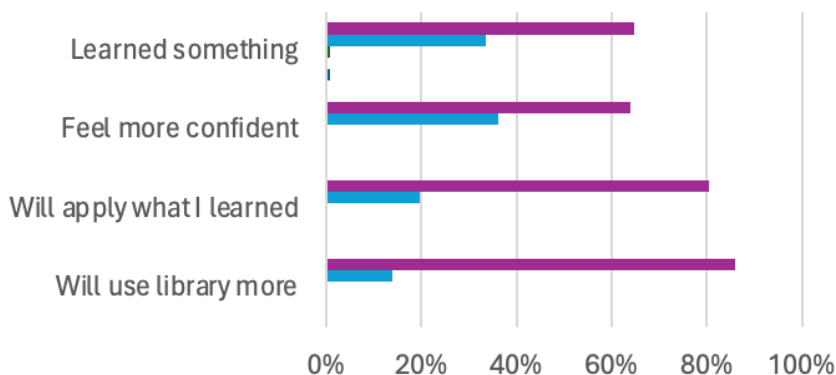Second, while the positive testimonials from participants and facilitators are very promising, evidence-based interventions (EBIs) require objective measures of the program's impact across time and across individual participants. For example, while participants may state that they use their new skills regularly at home, we currently do not have any objective evidence that they do so. By collecting unobtrusive measures of the home language environment before, during, and after the intervention, we can evaluate how children's early language exposure changes throughout the program and persists after its conclusion. Second, while parents report learning skills and gaining confidence, we do not know the magnitude of this effect. By asking participants to rate their knowledge and confidence in supporting their child's early literacy development both before and after the program, we can gain a better understanding of their perspectives at each timepoint and the magnitude of change. Third, we currently have no long-term measures of the program's impact after sessions have ended, including continued use of language-boosting strategies and use of library resources. By conducting a follow-up evaluation four months after the conclusion of Hatchlings In the Nest sessions, we can determine whether the program has lasting effects on families' daily language practices and library engagement. Finally, by collecting demographic data, we can determine whether the program is equally effective for participants from diverse racial, ethnic, socioeconomic, and linguistic backgrounds. These gaps in our knowledge and practice have directly informed our specific project goals.

Specific Project Goals that Build on and Expand Prior Research

The first goal of this project is to create a flexible, culturally responsive adaptation of the Hatchlings curriculum. We will accomplish this through intentional, asset-based co-design with diverse communities across the state of Maryland, including multiple focus groups with families, libraries, and community partners and continuous feedback. Maryland is the ideal place to undergo this initial process, since it is the fourth most diverse state in the country (US Census Bureau, 2021; Davis , 2021), with 37% of Kindergarteners living in poverty, only 29% of whom demonstrate Kindergarten readiness (Hopkins et al., 2023). Furthermore, the mid-Atlantic region of Maryland and surrounding states has the largest proportion of English learners on the east coast (over 10%, more than the national average) (National Center for Educational Statistics, 2023), and for whom poverty is more prevalent (Ryan, 2013). Thus, Maryland is a microcosm of the nation, and an optimal testing ground for a culturally responsive Hatchlings adaptation. From this process, we will create an open-access, scalable version of the curriculum, including a train-the-trainer model, that can be implemented by various libraries and community partners across the U.S.

The second goal of this project is to systematically evaluate the effects of the revised Hatchlings curriculum on multiple family outcomes, including parents' perceived self-efficacy for building their child's foundation of language and literacy skills (measured by survey), potential increases to the naturalistic home language environment (measured using unobtrusive language recorders), ands family library use. Together, these goals directly address all aspects of NLG Goal 1, to build the workforce and institutional capacity for serving the information and education needs of the public by enhancing, evaluating, and sharing a replicable library program that supports children's early learning through increasing under-resourced parents' self-efficacy to drive that learning.

These project goals specifically build on prior research on libraries' engagement in mitigating disparities in children's early learning (e.g., Project SHIELD, LG-250086-OLS-21; Reimaging School Readiness Toolkit, RE-13-19-0061-19), and expand on these projects in novel ways. First, this project focuses explicitly on families with newborns, thus targeting the earliest possible opportunities for enriching learning experiences and at the foundation of parental habit formation. While programming for families with older children is certainly important, there is a need for programming that specifically addresses the unique opportunities and challenges of the first few months of life in a developmentally appropriate way. Second, this proposal integrates a unique interdisciplinary expertise—including clinical experts on children's early language and literacy development, as well as experts on culturally responsive pedagogy and cultural adaptation of interventions—who, in collaboration with librarians with significant youth outreach experience, are well poised to yield novel insights into connecting with hard-to-reach families and supporting them in an asset-based manner (Montiel-Overall et al., 2015). This is further improved through existing intentional collaborations with various community partners who explicitly serve and are trusted by under-resourced families, including family resource centers, health departments, cultural community organizations, and more. Additionally, the use of a participatory design approach with key stakeholders and target communities increases the likelihood of participant buy-in and that the final product is maximally useful to the families it is intended to support. Finally, the proposed mixed-methods evaluation of multiple outcome domains is rigorously designed to better understand how the intervention impacts families both objectively and subjectively in both the short and long term, thus establishing an evidence base for the program to encourage its widespread use. Combined, these approaches will build on and expand prior research findings in novel ways to ultimately best support libraries in fostering children's earliest learning.

Pilot Data that Portends Success

We draw from two sources of data as evidence that suggests our project will be successful: feedback from participating families and libraries after MSLA's initial Hatchlings implementation at 23 sites in 11 counties[3], and a pilot of the newly proposed objective measures from two sites near UMD. First, during the MSLA's initial Hatchling's pilots, all 23 library partners (and relevant community partners) were very willing to provide feedback during multiple debriefing sessions. This suggests that they are also likely to participate in focus groups to help adapt the curriculum. Anecdotally, several counties that serve a high proportion of Spanish-speaking families have already mentioned that they would be happy to participate in this process.

Second, the research team has recently attended two implementations of the In the Nest curriculum at two different sites in Prince George's and Howard County Maryland (locations that were amongst the first adopters of the curriculum). In both locations, the majority of participating families (site 1: 6/9, site 2: 7/13) opted in to participate in parts of the evaluation, indicating a general willingness of participants to complete these extra measures. Many were eager to "track their progress" with the language recorders. While some data is still being processed, preliminary data suggests promising effects: of two parents who completed both pre- and post-implementation survey data, both exhibited increases in their self-efficacy to support their baby's brain and language development; increases to their confidence in book reading, singing, talking, and playing with their baby; and decreases in overall parental stress level (Figure 3). Additionally, of 5 participants with at least two home language recordings, all exhibited an increase in the number of words spoken in the baby's environment, with some increases being quite large (Figure 4). Together, this pilot data suggests that we are well-poised to collect meaningful qualitative and quantitative data that will allow us to address our goals successfully.
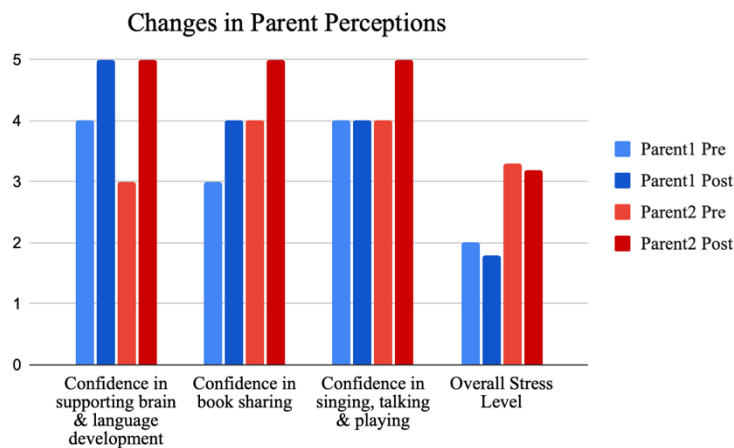

Figure 4: Changes in self-rated confidence and overall stress levels for two parents before and after participating in the Hatchlings curriculum.
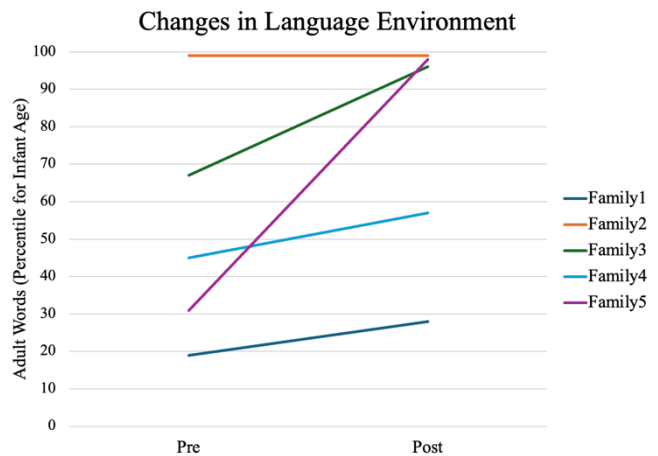

Figure 3: Changes in the number of words spoken by adults in the infant's environment (percentile for age) for five families before and after participating in the Hatchlings curriculum.

Project Work Plan

We will accomplish the proposed project across three years. Importantly, the entire project will follow the principles of CBPR, in which researchers collaborate with community members and other stakeholders throughout the entire project, from design through implementation, interpretation of results, and dissemination (Wallerstein & Duran, 2006). All members of the research team have experience conducting CBPR projects in a variety of community contexts (see Bonsignore, 2016; Diamant-Cohen et al., 2018; Ortiz, 2016; Romeo et al., 2021; Turner, 2021), which ultimately leads to more effective, culturally responsive and sustainable interventions and research outputs.

Year 1: Iterative Feedback and Cultural Adaptation of the Curriculum

In Year 1, the project team will engage in a 4-step cultural adaptation process (Barrera & Castro, 2006), which includes gathering community feedback on previous intervention implementations and community needs, creating a preliminary adaptation(s), getting community feedback on the adaptation(s), and refining the adaptation. This will begin with a series of focus groups to receive initial feedback from a variety of stakeholders, and will intentionally recruit participants from across the state of Maryland to best represent the sociocultural and geographic breadth of the state. The focus group process will be designed and overseen by all project PIs, consultants, and advisors, with specific expertise as noted below.

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[3]The formal MSLA pilot included 23 library sites across 11 counties. Since then, two other sites in two new counties have implemented the curriculum; however, we don't have feedback from those sites, yet they may still be included in focus groups.

One set of focus groups will include families who participated in previous implementations of the Hatchlings curriculum who identify as low-income and/or racial/ethnic/linguistic minorities. The goal will be to better understand their perceptions of the curriculum, how they engaged with it (or not), and any suggestions they might have for creating better connections and/or requests for additional/alternative content. As the target demographic of the program, their feedback will be invaluable to the cultural adaptation process. We will partner with the library facilitators and community partners that worked with these families to reach back out and recruit them to the (paid) focus groups. This set of focus groups will largely be overseen by **Dr. José Ortiz**, a bilingual speech language pathologist (SLP) and expert in equitable access to early childhood language services for non-native English-speaking families.

Another set of focus groups will be with the relevant staff and program facilitators from the 25 libraries in 13 counties that have hosted Hatchlings implementations in the last three years, to gain their perspectives on the program's reach, relevance for diverse communities, any barriers to successful programming (e.g., participant attrition, accessibility needs, etc.). Although we have already conducted some debriefing sessions, these were more open-ended and ended up largely centering around logistics; thus, these new focus groups will allow us to specifically probe facilitators' perceptions on the program's relevance and reach with families from under-resourced and diverse cultural backgrounds. As the direct service providers, their feedback will be critically important to understanding who participated, how engaged they were, and importantly, the members of their community that they know were underrepresented. Additionally, there were 10 counties that did not opt in to initial Hatchlings pilots. Many of these counties have high proportions of under-resourced families that the program is ideally designed to support (see Figure 1), and that we would like to engage in future implementations of the program. A specific focus group(s) with these sites will critically help us understand their unique barriers to implementation, and what kinds of supports would make it easier for them to implement the curriculum with a wide reach and engagement with the target under-resourced families. Because we strive to include these sites during the evaluation phase of this project, they will be invaluable partners in the refinement of the cultural adaptation, ultimately increasing their buy-in for its successful implementation. This set of focus groups will largely be overseen by **Dr. Beth Bonsignore**, an expert in participatory co-design especially as it relates to new media literacies with youth services librarians.

Finally, we will conduct focus groups with the various community partners that were essential to the success of previous Hatchlings implementations. These include multiple Judith P. Hoyer Early Care and Education Enhancement Learning Hubs (or "Judy Centers") which are located at Title 1 and high-needs elementary schools throughout the state, and serve as comprehensive hubs for low-income families to receive a variety of services and ultimately support children's school readiness skills. Additional community partners included local health departments with extensive outreach experience with under-resourced communities, and several cultural community organizations that act as trusted resource centers and cultural hubs for families who identify as racial, ethnic, and/or linguistic minorities. These community partners often co-facilitated prior Hatchlings implementations and supported the recruitment of family participants who were not library users. Their feedback will be essential to better understand the diverse communities we aim to reach, how to better recruit and retain families, and deeply engage them in the curriculum. This set of focus groups will be largely overseen by **Dr. Rachel Romeo**, an expert in community-focused approaches to reducing socioeconomic disparities in children's early learning.

During and after the completion of the focus groups, we will begin to adapt the initial Hatchlings curriculum to be more culturally responsive to the communities we have had discussions with and that were underrepresented in prior pilots. To ensure that the curriculum is accessible and provides meaningful content to participants, the approach to adaptation will include families as collaborators. We will first examine elements of the curriculum (e.g., songs, books, routines, etc.) for sources of potential bias, such as lack of diversity in the representation of cultural backgrounds. Prior to the start of the program, we will collect information from families with the goal of identifying ways in which the curriculum can be enriched by integrating elements that are culturally-relevant for participants. In addition, we will collect ongoing qualitative feedback from participants to ensure the efficacy of adaptations to the curriculum, and make modifications as needed. All methods of measurement will consider differences in the cultural and linguistic background of participants, to avoid potential bias when evaluating efficacy. The adaptation process will be led by all three PIs, along with consultants **Carrie Sanders**, MLSA Youth Services Coordinator and **Dr. Betsy Diamant-Cohen**, original Hatchlings developer, and under the advisement of **Dr. Jennifer Turner**, an expert in culturally responsive pedagogy, especially as it relates to literacy development in Black and racially marginalized communities. Additionally, we will invite several members of the focus groups to participate in and provide feedback on the adaptation process, to ensure that it ideally meets the needs of the various target communities. At the end of Year 1, we aim to have a fully adapted "living" curriculum that is flexible in its ability to engage with families from many diverse socioeconomic and sociocultural backgrounds.

Year 2: Implementation of the Adapted Curriculum and Initial Evaluation

In Year 2, the project team will implement the newly adapted curriculum and collect both quantitative and qualitative data to evaluate its efficacy, feasibility, sustainability, and reach. First, we will recruit and select 10 library sites across the state that serve the under-resourced and culturally diverse families that the adapted intervention is designed to support. We intend for most of these sites to be ones that participated in the focus groups and cultural adaptation process, including counties that did *not* participate in prior pilots, as well as counties that *did* participate but may not have maximally engaged the full diversity of their county's populace (e.g., racial, ethnic, linguistic, and socioeconomic minorities). Each site will be paired with one or more local community partners that will support outreach and will co-facilitate the curriculum (e.g., Judy Centers, health department outreach units, and/or cultural community organizations). This co-facilitation process has been essential to the success of prior pilots in terms of outreach and community buy-in, and it will also support the recruitment and retention of families to participate in the optional evaluative component. **Carrie Sanders**, who coordinated prior Hatchlings pilots across 13 counties, will lead the process of establishing relationships and feedback systems with these sites.

Once the sites have been established, they will identify who will lead the curriculum. In many cases, this is likely to be a pair of co-facilitators—one youth services librarian, and one member of the community partnership group (e.g., an early child educator, family resource liaison, etc.) This co-facilitation process has been very successful in previous pilot implementations. Where relevant, facilitators will be bilingual in the minority language(s) most commonly spoken by the community (in Maryland, these are Spanish, Chinese, and French/Haitian Creole, amongst others; Deloitte & DataWheel). Facilitators will then be trained to implement the adapted curriculum ("train the trainer") by the **PI team** and **Dr. Diamant-Cohen**. While much of the content of training will be similar to prior Hatchlings implementations, the adapted curriculum will have a significant focus on culturally responsive pedagogy, so facilitators will receive targeted instruction in how to make connections between the curriculum and participants' own cultural knowledge and experience in an asset-based manner. Throughout the training process, we will seek regular feedback on the training process from the future facilitators as qualitative data to further refine and improve the training process.

After facilitator training, we will implement the delivery of the adapted curriculum at the times and locations suggested by the sites and community partners (in the past, these have varied between weekdays and weekends, mornings and evenings, and in person and hybrid/virtual). Some sites will likely opt to have multiple delivery options at two different times, to accommodate the most families. After each session, facilitators will be asked to complete a short reflection on what they felt went well and what could be improved, especially as it relates to participant engagement. By collecting this qualitative data immediately, we reduce the chance of recall bias. This data will support further refinement of the curriculum as sites begin to create their own versions of the cultural adaptation.

At the first session, facilitators will invite participating families to further participate in a research evaluation of the program. It will be emphasized that research participation is optional, and that families can participate in the Hatchlings program without participating in the research, and also that they can participate in some but not all components of the research. We aim to enroll 100-150 participating families (approximately 10-15 per site). After informed consent, participating parents will be asked to first complete several surveys, including demographic information and self evaluations on their perceived self-efficacy, or confidence, in supporting their infant's language, cognitive, and early literacy development. Additional surveys will evaluate parent-infant bonding (Brockington et al., 2006) and caregiver stress (Cohen et al., 1994). Surveys will be presented electronically by default, but accommodations will be available for participants with limited literacy or who otherwise prefer to respond orally or on paper. These surveys will be repeated at the conclusion of the program and the four month follow-up to measure any potential changes (see below), and families will be compensated each time they complete the surveys (up to 3 times). We hypothesize that the program will significantly increase self-efficacy and parent-infant bonding, and decrease parenting stress.

In addition to the surveys, participants will also be invited to complete LENA home language recordings (Gilkerson et al., 2017) after each Hatchlings session. LENA (Language ENvironment Analysis) is a small, 2-ounce audio recorder worn in a chest pocket of a specially designed vest, shirt, or onesie (see Figure 5, top). Similar to a "language pedometer," it records up to 16 hours of a child's auditory environment from their own perspective, and then the LENA software estimates several metrics of the child's language environment, including how many words were spoken by adults in the child's vicinity, how many times the child themselves vocalized, how many back-and-forth "conversational turns" occurred between any adults and the child wearing the recorder (i.e., child vocalizes and adult responds within 5 seconds, or vice versa), and an estimate of the child's linguistic development. Together, this provides an estimate of how much of the infant's day was filled with audible language, including singing, and how this is supporting their overall language development. Additional metrics that are automatically estimated but will not be the core focus of this investigation include electronic noise (e.g., TV, iPad, etc) and speech from other children in the environment. (See https://www.lena.org/technology/ for further information on the LENA technology.) Researchers will distribute the LENA recorders at each session and collect them at the next session, or make alternate arrangements to pick up or receive the

recorders by mail. When a LENA recorder is returned, parents will receive a report that shows graphs of their infant's language environment throughout the recording day (Figure 5, bottom), so they can visually see their progress. Families will be compensated each time they complete a recording (up to 5 times). We hypothesize that the program will result in a significant increase in adult words and conversational turns, and that the magnitude of change will correlate with the number of sessions attended. Although we do not have a control group to compare these changes to (because we want all families to get to experience the intervention), there exist large open databases of recording metrics in non-intervention contexts that can serve as a comparison (Vandam et al., 2016).

Ideally, the survey and LENA measures would be completed for the first time *before* any Hatchlings sessions take place, to get a true baseline. However, during our recent piloting of the evaluation process (see Pilot Data, above), we realized that we obtained maximal research participation (55%) if we began recruitment after relationships had already been established. This also does not unintentionally dissuade any families from participating in the Hatchlings curriculum if they do not want to participate in the research evaluation. While this approach may slightly underestimate the effects of the full intervention, it prioritizes relationship building, which is more important. Additionally, by collecting quantitative data at multiple timepoints throughout the program and at a long-term follow up, this allows us to calculate *trajectories* and *duration* of any changes, which is ultimately more valuable than a simple pre-post change measure. Collection and analysis of all evaluation measures will be overseen by **Dr. Romeo**, who has extensive expertise with all survey and LENA measures in both observational and intervention contexts (Romeo et al., 2018a; Romeo et al., 2018b; Romeo et al., 2021), and who oversaw the collection and analysis of the pilot evaluation measures (see above).

Year 3: Follow-up Evaluation, Co-Interpretation of Results, and Dissemination

In Year 3, we will conduct a follow-up evaluation with all research participants 4 months after the final Hatchlings session. Families will complete the surveys again (parental self-efficacy, parent-child bonding, and parenting stress) and an additional LENA recording to evaluate how the effects of the intervention may be sustained, may decrease ("washout" effects) or even increase ("sleeper" effects). This will ultimately help us to understand the duration of effects and longer-term impact of the program, and potentially provide information on whether additional sessions at later developmental stages would be helpful. We will also add additional surveys asking if families continue to use the materials and skills learned during the intervention program, as well as how frequently and in what ways the family used library resources. Since a secondary goal of the program is to introduce families to all the ways the library can support children's early learning, this will help us to evaluate whether they are taking advantage of these resources, and any potential barriers they may experience in doing so. Ultimately, the variety of measures collected at the 4-month follow up will provide important information on the longer-term effects of the Hatchlings program across multiple domains, and assist in further refinements as well as creation of new programs to provide even further support and resources.

Aligned with the principles of CBPR, key stakeholders will be invited to co-interpret the findings and conclusions, including the participating libraries and community partners, as well as members of the initial focus groups who provided feedback on the cultural adaptation. By inviting members of the community to co-interpret the findings, this allows for unique insights that the research team may not realize on their own. This also aids in developing ways to best disseminate results back to the communities of interest, so that results can have maximal, widespread impact.

In addition to disseminating the results within the community, the rest of year 3 will be dedicated to disseminating the curriculum and findings widely to multidisciplinary practitioners (librarians, SLPs, community agencies, etc.) for national, scalable
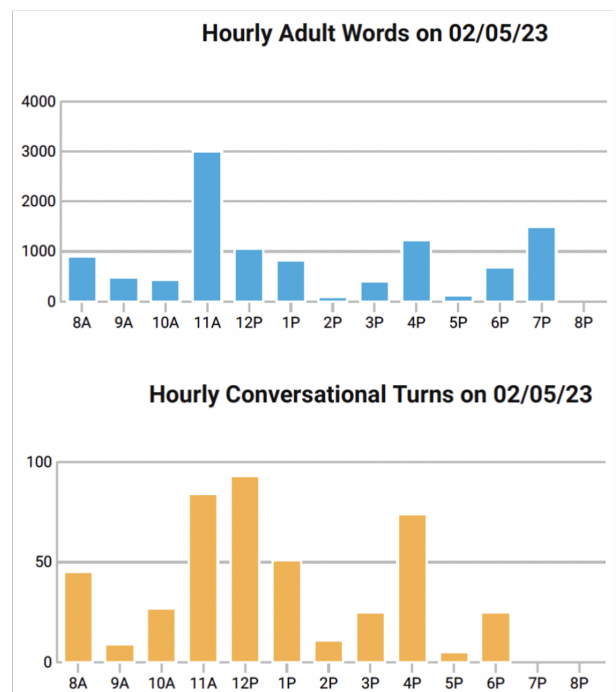

Figure 5: (Top) Picture of child wearing a LENA recording vest and LENA recorder (purple object). (Bottom) Example graphs provided to parents of the infant's language environment across a single day.

implementation across the U.S. This will include the flexible, culturally adapted curriculum (which will allow for further adaptation in new communities), ways to obtain or make the items given to participants (e.g., developmentally appropriate books, finger puppets and musical instruments), and other materials to support implementation (e.g., websites, YouTube channel, and resource guides). All materials will be open-access, and we will make several training options available for new locations to implement the program. Several states have already expressed interest in wanting to implement the Hatchlings curriculum, and they will serve as an advisory board throughout the duration of the proposed project, including providing feedback on the usability of the materials that will be disseminated (see below and in the Digital Products document for description of deliverables).

Results, Dissemination, and Impact:

This project will meet a national, persistent need to reduce socioeconomic and racial/ethnic disparities in literacy and academic outcomes through a prevention model that engages new/expectant parents and caregivers to learn about, co-create, use, and customize early language resources to promote their children's early language and literacy development. Project outcomes include: (1) the curriculum and a flexible set of asset-based co-design plans that guide librarians and literacy practitioners to engage in similar community-focused cultural adaptations of the Hatchlings curricula, customized for their local parent/family communities; (2) a community of trained mentors that can guide library and community staff to expand culturally responsive early literacy programs across public libraries and community centers in a train-the-trainer format; (3) formal, systematic means for assessing and documenting the program's efficacy and reach; and (4) presentations to disseminate the program's curriculum and efficacy. All deliverables will be open-access and provided free of charge on the Hatchlings website.

The primary deliverable of this project will be the adapted curriculum itself, including lesson plans, multimedia songs and videos, and training resources, which will also be accompanied by instructional materials to further adapt the program to interested parties' own specific communities. This will ultimately make Hatchlings an evidence-based "living curriculum" that can be flexibly adapted to serve the unique needs of many diverse and under-resourced communities across the country. Our vision is that this will further equip libraries to be a forefront for serving the information and education needs of our youngest and most vulnerable members of society.

Formal dissemination will include a widely-publicized (free) webinar to describe the curriculum, the adaptation process (and how to further adapt to new communities), and results of the quantitative evaluation. We anticipate wide attendance from libraries across the U.S., given the already significant interest in the initial Hatchlings curriculum (e.g., from the states on our advisory board plus 3 more). Additionally, we will disseminate the curriculum and findings through formal presentations at regional/national conferences and venues hosted by professional organizations such as the Public Library Association (PLA) division of ALA, the American Association of School Librarians (AASL), the Library Learning Experience (LibLearnX), the Chief Officers of State Library Agencies (COSLA), as well as similar organizations for allied professionals, such as the American Speech Language Hearing Association (ASHA, which serves all speech language pathologists nationally), the Society for Child Development (SRCD; academic focused child development research), and Zero to Three (practitioner focused child development work). In addition to disseminating the program through presentations at professional venues, the project team will submit articles about our efforts to professional and research publications such as the Library Journal, Public Libraries Magazine, School Library Research, Reading Research Quarterly, and Children & Libraries, among allied disciplines' journals such as the Journal of Speech Language and Hearing Research, Child Development, and the Journal of Child Language. All webinars, presentations, and publications will be freely accessible on the project's website for interested parties to download/stream. Our project team's consultants, advisors, and community partners will also assist in dissemination activities by publicizing any available materials through their communication channels.

Finally, Dr. Bonsignore, Ortiz, and Romeo will also collaborate with UMD's library preparation, speech pathology, and child development programs to support integration of these deliverables into their curricula. This will support the lasting impact of the program by ensuring that the next generation of librarians, SLPs, educators, and other allied professionals learn how to best support young children's and families' early language and literacy development through interdisciplinary, collaborative means.

Project Team:

This project involves a cross-disciplinary collaboration of researchers, educators, librarians, and community partners with varied expertise, which will support the innovative methods and wide dissemination across disciplines.. Rachel Romeo, PhD, CCC-SLP (PI), Assistant Professor of Human Development, is an expert on early brain development, language/literacy development, and inequities in learning and development, and will oversee all aspects of the project and research outcomes. José Ortiz, PhD, CCC-SLP (Co-PI), Assistant Professor of Hearing & Speech Sciences, is an expert on bilingual language development, identification of language/literacy disorders in children from

culturally and linguistically diverse backgrounds, and intervention for communication disorders in early childhood, and will lead the cultural adaptation process. Elizabeth Bonsignore, EdM, PhD (Co-PI), Assistant Research Professor of Information Studies, is an expert in asset-based co-design with youth and families, has conducted research in new media literacies with youth services librarians, and will support community outreach and co-design processes. Carrie Sanders, MLS (Consultant), Youth Services Coordinator for the Maryland State Library Agency (MSLA), spearheaded the initial Hatchlings pilots, and will provide training, supervision, and consultation regarding the Hatchlings curriculum for the participating library/community partner locations, and will also facilitate communication with libraries/participants from previous implementations and with the multi-state advisory board. Betsy Diamant-Cohen, MLS, DCD (Consultant) developed the original Hatchlings and award-winning Mother Goose on the Loose curricula and has advised on similar IMLS projects (e.g., LG-250086-OLS-21, RE-13-19-0061-19); she will consult on the adapted curricula and train the program trainers, and will also help facilitate communication with the multi-state advisory board. Jennifer Danridge Turner, PhD (Consultant), Associate Professor of Reading Education, is an expert in culturally responsive and equitable teaching approaches for school literacy and African American family literacy practices, and will serve as advisor on culturally responsive pedagogy. To manage progress toward milestones, the project team will hold bi-weekly team meetings to review, document, track progress, and coordinate close feedback with community partners (see Schedule of Completion). In addition to these key personnel, various community partners will collaborate on focus groups, referring families, and co-facilitating the curriculum; these include family resource centers, health departments, cultural community organizations, Judy Centers, Title 1 schools, etc. Finally, a multi-state advisory board will be formed from five states who have already expressed interest in implementing the Hatchlings curriculum (Colorado, Idaho, Indiana, New Hampshire, and Pennsylvania; see letters of support). The project team will meet with the advisory board quarterly throughout the adaptation process and the evaluation process.

Diversity Plan:

This project integrates diversity, equity, and inclusion through its goals, methods, participants/ partners, and research/implementation team. As a multi-racial, multi-ethnic, multi-lingual, and multi-SES research team, we are committed to recruiting participants (focus groups and program recipients) from diverse racial, ethnic, linguistic, socioeconomic, and geographic (urban/rural) backgrounds. The adaptation and evaluation approaches are centered in CBPR co-design principles, and employ an asset-based, culturally responsive curriculum to support underserved families and communities. There are many challenges to accessing educational opportunities in early childhood for children from minoritized communities, related to culture, language, or socioeconomic barriers. Children from language minority backgrounds, for example, may have difficulty participating in enrichment activities that are not tailored to their language experiences. One of the main benefits of our approach is that, by adapting the curriculum in a culturally responsive manner, we can develop a program that is more accessible to families from diverse cultural and linguistic backgrounds. Further, this approach considers differences in individual experiences, and is intended to be modified based on the experiences of participants, and can be flexibly applied to support families from any background. Our approach also leverages existing community resources (i.e., libraries and allied community partners) to provide language enrichment activities to families in their own communities. By offering opportunities to families in this manner, we can help overcome some of the challenges faced by families that live in low-resources areas, in which similar early childhood enrichment would be otherwise inaccessible. In turn, this project can advance libraries' capacity themselves to support the individuals and families who may benefit most from their services.

Conclusion:

In conclusion, the proposed project will leverage the collective, cross-disciplinary expertise of both librarians and allied professionals committed to early childhood development, to establish an *open-access, flexible,* and *scalable national model* for supporting the foundations of language and literacy development in young children. With IMLS support, we aim to reduce socioeconomic and racial/ethnic disparities in literacy and academic outcomes through a culturally responsive prevention model, situated at the intersection of libraries and community partnerships.

Schedule of Completion

Year 1 (2024-2025)

Activity	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul
Obtain IRB approval (modify existing/pilot approval)	X											
Conduct focus groups with the staff and facilitators from libraries that hosted previous Hatchlings pilot implementations		X	X	X								
Conduct focus groups with culturally and socioeconomically diverse families who participated in previous Hatchlings pilot implementations		X	X	X								
Conduct focus groups with community partners involved in previous Hatchlings pilot implementations		X	X	X								
Summarize feedback from all focus groups to inform cultural adaptation				X	X	X						
Create preliminary culturally responsive adaptation of curriculum						X	X	X				
Select diverse members of the focus groups to be a "feedback" group, and provide feedback on adapted curriculum								X	X			
Refine curriculum according to focus group feedback									X	X		
Field test train-the-trainer model with the culturally responsive curriculum											X	X
Submit documents necessary for year 2 funding											X	
PI team meets bi-weekly	X	X	X	X	X	X	X	X	X	X	X	X
PI + Advisory team meets quarterly	X			X			X			X		

Schedule of Completion

Year 2 (2025-2026)

Activity	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul
Recruit/select 10 library sites and a paired community partner .	X	X										
Train facilitators at each site to implement the adapted curriculum.		X	X	X								
Sites begin advertising and recruitment				X	X	X						
Sites implement the adapted curriculum, and invite participating families to further participate in the research evaluation.						X	X	X	X	X		
Collect qualitative data from site facilitators after each session for curriculum refinement.						X	X	X	X	X		
Collect surveys from participating families (after the first and last session), and qualitative feedback on the curriculum after the final session.						X	X	X	X	X		
Collect LENA recordings from participating families (after each session) and provide feedback reports to families						X	X	X	X	X		
Process and clean data for analysis						X	X	X	X	X	X	X
Collect 4-month follow-up surveys and LENA recordings from participating families (starts 4 months after final session)											X	X
Submit documents necessary for year 3 funding											X	
PI team meets bi-weekly	X	X	X	X	X	X	X	X	X	X	X	X
PI + Advisory team meets quarterly	X			X			X			X		

Schedule of Completion

Year 3 (2026-2027)

Activity	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul
Continue collecting 4-month follow-up surveys and LENA recordings from participating families	X	X										
Conduct exit survey with participating families for qualitative data on the adapted curriculum	X	X										
Analyze intervention effects on surveys and LENA data			X	X								
Convey findings to feedback group (from year 1) to co-interpret the conclusions					X							
Disseminate findings to advisory board states for insight on future implementations and how they would like to receive materials						X						
Organize and refine all open-access materials for sharing (curriculum books, further guide to adaptation, videos of sessions, links to obtain physical materials)							X	X				
Make modifications to curriculum based on feedback received from families							X	X				
Disseminate all deliverables to communities of practice (librarians, SLPs, family resource organizations, etc) via webinar, website repository, conference presentations, etc.									X	X	X	X
Disseminate all deliverables and evaluation outcomes to academic communities (information science, communication science, child development, etc) via publications, conference presentations, etc.									X	X	X	X
PI team meets bi-weekly	X	X	X	X	X	X	X	X	X	X	X	X
PI + Advisory team meets quarterly	X			X			X			X		

Digital Products Plan

Product and Type	Availability	Access	Sustainability
Website as a repository for all materials described below	The project team will host all deliverables below on the already existing mgol.net. We will also ensure that all products are 508 compliant.	During the grant, the website materials will be password protected to only allow access to the project team and current facilitators. After the grant concludes, all passwords will be removed and the entire site and materials will be free and open access to all. Except where noted, all resources will be licensed under Creative Commons Attribution- NonCommercial International license (CC BY-NC-SA) to encourage wide and flexible non-commercial use in various settings and practices.	Consultant Dr. Diamant-Cohen, the creator of the original curriculum and owner of the website, has committed to continuing the mgol.net website for the next 8 years. At that time, we will discuss ways to fund its continued existence, with the intention to extend it perpetually.
Culturally adapted Hatchlings curriculum (facilitator facing guide), as implemented in Maryland	Available for download in PDF format the mgol.net website. Those who prefer published materials or have facilities that lack color photocopiers may order a version of the materials for a fee. New information and materials will be uploaded within one month of creation.	Facilitator-facing materials will be password protected during the grant, but freely accessible afterwards. The materials can also be ordered, printed and shipped to any location for a fee. The curriculum will be licensed under CC BY-NC-SA.	The curriculum will be available for the duration of the mgol.net website (5 years after grant conclusion), and we intend to extend its existence further.
Guide to further adaptation in new locations, including steps we took for adaptation and how to implement them in a new location	Available for download in PDF format the mgol.net website. A companion webinar (below) will be hosted to encourage future sites to continue the adaptation process for their own communities.	Facilitator-facing materials will be password protected during the grant, but freely accessible afterwards. The materials can also be ordered, printed and shipped to any location for a fee. The adaptation guide will be licensed under CC BY-NC-SA.	The adaptation guide will be available for the duration of the mgol.net website (5 years after grant conclusion), and we intend to extend its existence further.
Audio recordings (mp3/wav) of all songs that are part of Hatchlings, including any new ones created for the culturally responsive adaptation	Recordings are available to all Hatchlings participants via a QR code presented at the end of each session. They are also accessible to stream or download via mgol.net.	These (and any other parent-facing resources) are freely available to anyone to access anytime. Songs created by the project team will be licensed under CC BY-NC-SA, but existing songs will be CCO as they are already public domain.	Songs are available for the duration of the mgol.net website (5 years after grant conclusion), and we intend to extend its existence further.
With permission from participants, we will videotape certain portions of sessions to demonstrate certain activities.	All videos will be available to stream on both mgol.net and the MGOL YouTube Channel (there is a MGOL: Hatchlings	Existing videos (pre-adaptation) will remain, and new ones on the culturally adapted curriculum will be added at the	We will continue to host and update the YouTube Channel in perpetuity.

If no participants consent to this, we will "stage" videos with fake participants	playlist already available as free resource).	end of the grant. These are freely accessible to anyone at anytime, and will be licensed under CC BY-NC-SA.	
We will conduct a professional webinar to describe the Hatchlings curriculum and its efficacy. It will be recorded as a video for asynchronous viewing	The webinar will be freely open for registration by any libraries and/or community organizations interested in potential implementations. A streamable recording of the webinar along with related materials will be available on the mgol.net website.	This will be recorded and then archived online in year 3. The video will be freely accessible and licensed under CC BY-NC-SA. Additionally, in-person trainings or personalized online trainings may still be offered for a fee.	All dissemination videos will be available for the duration of the mgol.net website (5 years after grant conclusion), and we intend to extend its existence further. Videos will also be available on YouTube in perpetuity.
Links to obtain physical materials suggested in the curriculum (e.g., baby books, finger puppets, and a musical shaker)	Links to purchase items suggested for use in the Hatchlings program will be in the curriculum guides. Many materials can also be hand-made, and instructions will be provided.	The links will be freely accessible to anyone and have no licensing. We do not receive any commission for recommending these. If libraries want these items pre-packaged as a set, we can offer that for a small fee.	The links will be available for the duration of the mgol.net website (5 years after grant conclusion), and we intend to extend its existence further. We will check that the links still work quarterly.
PDF of a white paper we will author describing the effectiveness of the culturally adapted curriculum	Available for free on the mgol.net website and each PI's personal UMD website, and will be submitted to the World Literacy Summit.	The white paper will be freely accessible to anyone and will be licensed under CC BY-NC-ND so that results can be shared but not misrepresented.	The PDF will be available for the duration of the mgol.net website (5 years after grant conclusion) and on the UMD website for the duration of the PIs' tenure at UMD.
Reproductions of any conference presentations (video of talks or PDFs of poster presentations)	Available for free on the mgol.net website and on each PI's personal UMD website.	All presentations will be freely accessible to anyone and will be licensed under CC BY-NC-ND so that results can be shared but not changed or misrepresented.	All presentations will be available for the duration of the mgol.net website (5 years after grant conclusion) and on the UMD website for the duration of the PIs' tenure at UMD.
Anonymized raw data of evaluation measures for other researchers to investigate further (surveys and LENA metadata – no audio)	Raw evaluation data will be housed in a public repository on the Open Science Framework (osf.io). It will be fully anonymized to protect participant confidentiality.	The raw data will be licensed as CC BY-NC so that it can be reused and reanalyzed, but not for commercial benefit.	The OSF repository will exist in perpetuity.
Slack (for project team communication) and Google Drive shared folder (for working items before they are ready for sharing)	Dr. Romeo maintains a paid Slack workspace and will create a channel for this project, to allow easy communication between all project team members. UMD hosts shared Google Drive folders. These will only be available to the PI team and consultants.	Slack and Google Drive are both password protected and require 2-factor authentication. These will not be available to anyone but the project team, so no licensing is relevant.	The slack channel will exist for as long workspace is paid for (intended to be indefinitely). The Google Drive folder will be owned by UMD and exist in perpetuity.