



LAURA BUSH 21st CENTURY LIBRARIAN PROGRAM

Sample Application RE-260157-OLS-26
Project Category: Early Career Research

Indiana University, School of Library and Information Science

Amount awarded by IMLS:	\$434,691
Amount of cost share:	\$0

In this Early Career Research project, Dr. Yuerong Hu at Indiana University Bloomington's Department of Information and Library Science will focus on early childhood STEM books. Conducted in partnership with the Early Childhood Center and the Center for Survey Research at Indiana University, the project will examine an emerging sub-genre that introduces advanced scientific topics such as Artificial Intelligence (AI) and quantum physics to children ages 0-6. These books have gained visibility through digital marketplaces and social media, yet little empirical research has examined how they are circulated, interpreted, and used by caregivers, librarians, and educators. The project will conduct a mixed-method, multi-stakeholder investigation to advance understanding of early childhood STEM literature and support libraries and families in fostering meaningful early engagement with science.

Attached are the following components excerpted from the original application.

- Narrative
- Schedule of Completion

When preparing an application for the next deadline, be sure to follow the instructions in the most recent Notice of Funding Opportunity for the grant program to which you are applying.

A Mixed-Method and Multi-Stakeholder Investigation into Early Childhood STEM Books

1. Introduction

This project requests \$434,532 in IMLS funds to support a three-year Early Career Research project, “A Mixed-Method and Multi-Stakeholder Investigation into Early Childhood STEM Books,” led by Dr. Yuerong Hu, an Assistant Professor at the Department of Information and Library Science at Indiana University (IU) Bloomington. The project is in partnership with both the Early Childhood Center and the Center for Survey Research at IU. Specifically, this study focuses on board and picture books that feature highly advanced and cutting-edge STEM topics, such as *Quantum Entanglement for Babies*. Although such books have gained substantial commercial success and attention on social media, little empirical research has examined their quality and use, leaving the public and librarians without reliable references to evaluate such books. To fill this gap and to inform reading practices with early childhood STEM literature, this project investigates two primary questions: (1) How are STEM books for early childhood circulated, used, discussed, and evaluated in online book discourse and in everyday reading practices? (2) How do current reading practices inform meaningful engagement with early childhood STEM literature? This research adopts a mixed-method approach, including (1) computational analysis of online book review data, and (2) interviews and focus groups with multiple stakeholders, including caregivers, librarians, education scholars, early childhood professionals, and STEM domain experts. This project will be the first of its kind to (1) produce evidence-based knowledge about early childhood STEM books and their readership; and (2) develop open-source guidelines for stakeholders and the public to evaluate and leverage such books for cultivating STEM literacy in early childhood. This project also supports the Project Director’s career development as an untenured tenure-track library and information science faculty, fulfilling Program Goal 2 - Objective 2.2, extending her long-term research on the social reception of books.

2. Project Justification

2.1. Importance of Early Childhood STEM Education through Books

Cultivating STEM literacy in early childhood (ages 0–6) is widely regarded as foundational for long-term STEM literacy and future workforce participation (Morgan et al., 2016). Research in education, cognitive science, and developmental psychology shows that young children are capable of meaningful engagement with science content when it is taught with proper approaches (Akerson et al., 2011; Duschl et al., 2007; Eshach & Fried, 2005; Giménez & Harris, 2002; National Research Council, 2012). For instance, early exposure to STEM-related vocabulary and concepts—when developmentally appropriate and socially mediated—can support children’s developing interest and identity in science (Clements & Sarama, 2020; Novo & Salvadó, 2022), which research suggests is linked to later persistence in STEM pathways (Tai et al., 2006). In particular, shared book reading is an effective and widely studied method for supporting early STEM learning, as it enables dialogic, embodied, and scaffolded interaction. Books are also relatively low-cost, portable, and widely distributed through public libraries, schools, and community programs, including in rural or under-resourced areas. STEM-themed books for children ages 0-6 have become one of the fastest-growing segments in the global children’s book market (Maughan, 2024), with increasing presence in libraries and outreach programs at educational institutions (Sableski, 2019).

2.2. Necessity of Examining Early Childhood STEM Books Featuring Advanced Topics

As early childhood STEM publishing expands, a striking sub-genre has emerged: board books and picture books introducing highly advanced topics—such as quantum physics, electromagnetism, artificial intelligence, and neuroscience—to infants, toddlers, and preschoolers (Gailey, 2020). Often branded as “Baby University” or marketed as gifts for a “future genius,” these titles have achieved notable commercial success and substantial visibility through digital marketplaces and social media platforms (“Baby Loves Science by Ruth Spiro, Children’s Book Author,” n.d.). Yet despite their popularity, empirical research examining their content, circulation, and reception remains scarce.

Consequently, potential readers, especially caregivers, make decisions about these books in the absence of reliable evidence regarding their developmental appropriateness, pedagogy, or scientific soundness.

Building on the developmental importance of early STEM engagement discussed above, this project represents the first mixed-method empirical investigation of these books. By synthesizing perspectives from caregivers, librarians, early childhood practitioners, education scholars, and STEM experts, it addresses two urgent and interrelated challenges.

First, as demand for STEM-themed children's literature increases, readers need reliable criteria for evaluating their quality and developmental fit. Advanced STEM expertise remains concentrated among a small segment of the population—only about 2% of U.S. adults hold doctoral degrees (National Center for Science and Engineering Statistics, 2024; US Census Bureau, 2025). This suggests that most readers and stakeholders lack specialized training to independently evaluate the scientific accuracy or developmental appropriateness of these books. While existing research confirms that young children's learning is effective when concepts are embedded in socially mediated interaction, guided scaffolding, and language-rich dialogue (Gelman & Brenneman, 2004; Mol et al., 2008), abstract and decontextualized presentation of concepts may limit comprehension and meaningful engagement, particularly without adult scaffolding. A systematic investigation is needed to examine how advanced-topic books are mediated in practice and to develop reliable criteria for evaluating early STEM materials.

Second, these books must be understood within a broader ecosystem of social book reviewing (Hu, LeBlanc, et al., 2023) and critical studies on children's literature (Gailey, 2020; Hoiem, 2025). Currently, public discourse about these books is largely shaped by online testimonials, influencer endorsements, and algorithmically amplified popularity metrics. Additionally, popular reviews mostly come from individuals with STEM backgrounds or industry affiliations. There is limited knowledge about how caregivers with varying levels of STEM familiarity interpret these books, or how early childhood professionals and librarians assess their suitability for shared reading contexts. Given that shared reading is a widely accessible literacy practice—particularly through public libraries serving rural areas and communities with limited education resources (Institute of Museum and Library Services, 2020; Neuman & Celano, 2006)—it is important to understand whether these books function as effective entry points into science or as symbolic markers of STEM literacy (Apseloff, 1987; Gailey, 2020). By facilitating multi-stakeholder dialogue, this project seeks to “demystify” the social reception of these books and move beyond anecdote and marketing rhetoric toward more comprehensive, evidence-based evaluation.

2.3. Broader Implications for Library and Information Sciences and STEM Education in Society.

This project offers timely and practical contributions to librarianship and early STEM education by addressing a rapidly expanding yet underexamined segment of children's literature. Public libraries and their children's departments serve as critical gateways to literacy and educational opportunity (Author, 2013). Nowadays, as librarianship professionals navigate complex book discourse under the impacts of social media, empirically grounded knowledge will help librarians evaluate such books' developmental fit, scientific integrity, and accessibility for young patrons, in support of collection development, reader advisory, and STEM-related children's programming.

Beyond librarianship, the project contributes to broader STEM education goals. When thoughtfully selected and scaffolded, early exposure to STEM-related ideas can cultivate curiosity, foundational reasoning skills, and positive science identities (National Research Council, 2007; Clements & Sarama, 2014). However, access to STEM-themed educational materials remains uneven, and families without specialized expertise may struggle to evaluate such content. By synthesizing perspectives and knowledge from multiple stakeholders, this research supports caregivers and educators in making informed and grounded decisions.

Overall, this project advances applied knowledge at the intersection of children's literature, STEM education, and library practice. It does not presume that advanced-topic STEM books for early childhood are inherently beneficial or problematic; rather, it seeks to clarify the conditions and criteria under which they can support meaningful learning and

broader access. By producing empirically grounded guidance, the project strengthens the capacity of families and librarians, among other stakeholders, to responsibly integrate emerging STEM materials into early literacy ecosystems, thereby contributing to long-term educational achievements and public understanding of science.

2.4. Relevance to the PD's Career Development and Research Trajectory

This project deepens the PD's research on social reception of books across multiple stakeholders. Furthering her dissertation research, the PD has published refereed journal articles (Hu, LeBlanc, et al., 2023; Hu, Diesner, et al., 2025; Hu, Underwood, et al., 2025), an award-winning conference paper (Hu, Layne-Worthey, et al., 2023), and participated in multiple panels examining how different digital infrastructures and sociotechnical factors shape the visibility of books and their readerships. Specifically, the PD's most recent research on social reviewing of children's books serves as a preliminary investigation for this proposed research (Hu & Ling, 2025).

Methodologically, the PD has demonstrated expertise in mixed-method research, including computational analysis of large-scale text corpora (Hu, Jiang, et al., 2020; Jiang et al., 2021), semi-structured interviews (Zhou et al., 2018), and qualitative content analysis (Hu et al., 2022; Hu, Ocepek, et al., 2020). This project builds directly on these competencies, integrating online book discourse analysis with stakeholder interviews and focus groups.

In support of this research, the PD has convened an advisory board of scholars, librarians, and early childhood education professionals and initiated collaborations with both the Early Childhood Center and the Center for Survey Research at Indiana University. This collaboration reinforces Dr. Hu's long-term goal of bridging critical data analysis with contemporary book culture studies to inform best practices in libraries and relevant cultural institutions.

3. Project Work Plan

3.1 Research Questions

This project examines how advanced-topic early childhood STEM books are discovered, circulated, framed, used, and evaluated by caregivers, librarians, early childhood professionals, education scholars, and STEM domain experts. By investigating this emerging category of children's literature, the study seeks to generate evidence-based guidance to inform early STEM reading practices and library programming. The study is organized around four primary research questions:

- RQ1 Promotion and Circulation: How are advanced-topic early childhood STEM books circulated and framed across digital marketplaces, social media platforms, and professional recommendation channels (e.g., libraries)?
- RQ2 Reading and Use: How do caregivers and other readers engage with advanced-topic STEM books in real-world contexts, such as co-reading at home or storytelling in library settings?
- RQ3 Discussion and Evaluation: How do different stakeholders—including caregivers, librarians, early childhood professionals, and STEM experts—evaluate these books (e.g., social media visibility, entertainment value, scientific integrity, pedagogical soundness)?
- RQ4 Reflection and Implication: Under what conditions do advanced-topic early childhood STEM books foster meaningful, developmentally grounded engagement with science, and how can these insights inform reading practices and library programming?

3.2 Workplan Overview

This project comprises six phases of work over three years (September 1, 2026–August 31, 2029). The research team includes the PD, a doctoral student, graduate research assistants, and advisory board members (please see the next subsection for personnel details). The figure below visualizes the personnel, data collection sources, key deliverables, evaluation methods, and timeline across the six research phases. More details about each phase are provided in the following paragraphs.

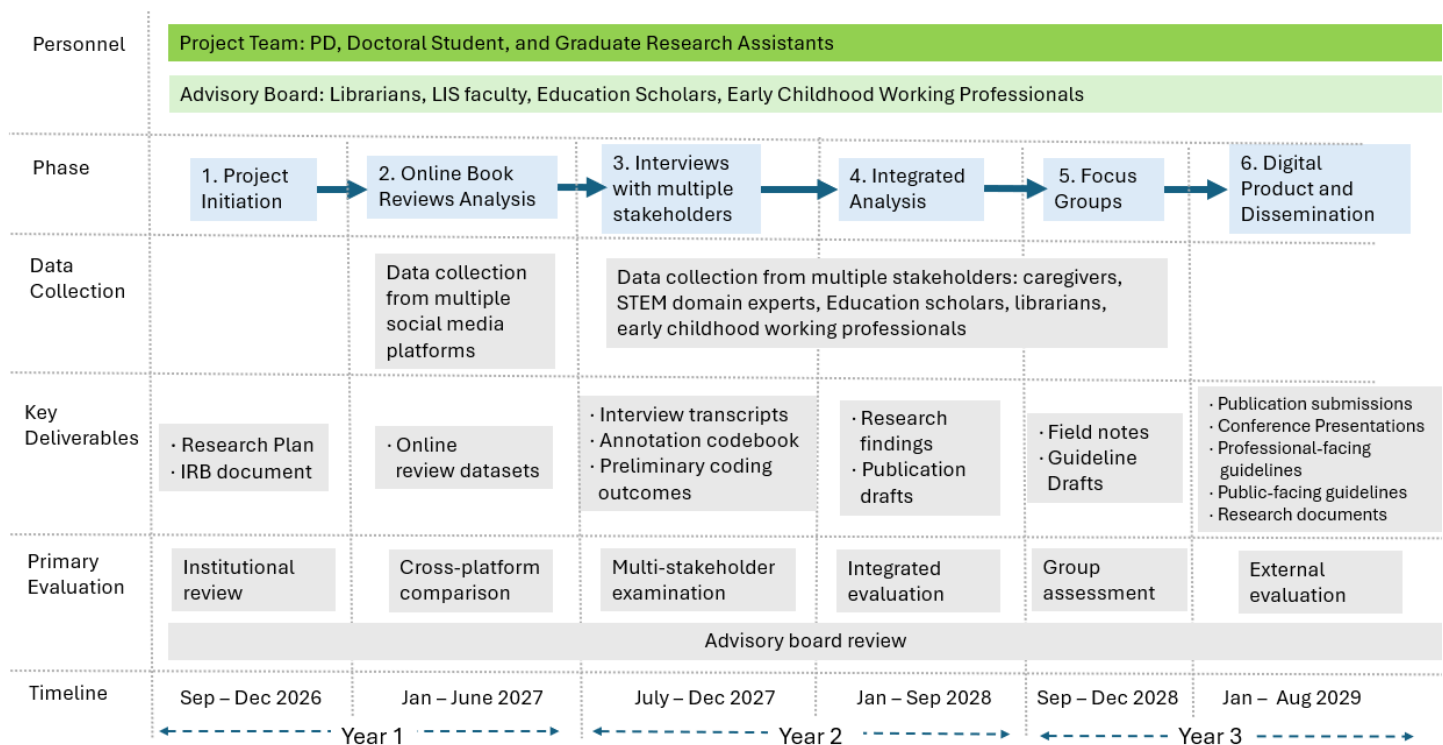


Figure 1. The overall project work plan.

Phase 1: Project Initiation and Research Design | 4 months | September – December 2026

Phase 1 will establish the intellectual, methodological, and administrative foundation for the project. During this phase, the PD will finalize team members and obtain Institutional Review Board (IRB) approval for all human subjects research. The advisory board will convene to review and refine the research plan. The PD and the doctoral student will also establish data management pipelines and documentation procedures (e.g., Qualtrics for recruitment forms, Zoom for conducting interviews, Dedoose for qualitative coding, and Python for computational data processing).

Phase 2: Online Book Review Data Collection and Preliminary Analysis | 6 months | January – June 2027

The PD and the doctoral student will sample about 50 early childhood STEM books featuring advanced topics (e.g., AI, quantum physics, and neuroscience), drawing from bestsellers, highly rated books, award-winning, and media-featured titles. Then they will collect online book reviews (e.g., publicly accessible reviews, ratings, and marketing descriptions) and metadata for the selected 50 titles from multiple sources, including (1) digital book marketplaces like Amazon, and (2) social media platforms like Goodreads, LibraryThing, Fable, StoryGraph, TikTok, and YouTube. When Application Programming Interface (APIs) are available, data will be collected programmatically; when scraping is restricted by platform policies, the team will analyze publicly visible data and supplement it with structured manual annotation, with help from master students in library and information science recruited as research assistants (GRA).

Using Dedoose and NVivo, the PD will conduct discourse analysis and qualitative content coding on the data collected and annotations created by the GRAs. The qualitative analysis will look into mentions of educational effectiveness, children's engagement, representations of STEM knowledge, among other evaluative languages and personal opinions, to provide a broad overview of the circulation and reception of this type of book. Python will also be used to assist with the analysis of the social media corpora, such as using word embeddings to describe the higher-level divergence/convergence of topics in online book discourse. Findings from this phase will also inform the design of interview protocols in Phase 3. The advisory board will meet at the conclusion of this phase to review preliminary findings and provide feedback on interview design.

Phase 3: Interviews with Caregivers, Education Scholars, and STEM Experts | 6 months | July – December 2027

Phase 3 will focus on qualitative data collection through semi-structured interviews online. The team will recruit three groups of interviewees, including (1) 20 caregivers (i.e., parents and legal guardians) of children aged 0–6; (2) five pre-school education scholars; and (3) five domain experts in STEM areas (with PhD degrees in relevant fields). The interviews with different stakeholders seek to gain a more comprehensive view of the reception and use of early childhood STEM books.

All participants will be adults; no children will be directly involved in the study. Interviews will be conducted via Zoom, audio-recorded with informed consent, and transcribed for data analysis. Each participant will receive \$50 compensation for an approximately 60-minute interview. The interviews will be conducted in English, and the interviewees must be able to communicate in English. Interview participants will retain ownership of any book mailed to them for evaluation.

Caregivers will be recruited through snowball sampling, with help from both the Early Childhood Center (ECC) and the Center for Survey Research at Indiana University. Advisory board members will convene prior to recruitment to review interview protocols and refine questions. A brief screening form administered via Qualtrics will verify their eligibility and collect information about their prior experiences with early childhood STEM books. To ensure broader participation, caregivers with different levels of engagement with the books are eligible, including (1) caregivers who have previously acquired and read early childhood STEM books with children aged 0–6, and (2) those who are interested in acquiring and co-reading such books but have not yet done so.

For the second group, one book, selected from the 50 titles sampled in Phase 2, will be provided. Book assignments will be based on participants' topic preferences while maintaining balance across STEM areas to avoid overconcentration on a small subset of titles. The research team will conduct a short online meeting (5 minutes) with the participants before the full interview, to introduce the workflow and ask about their book preferences. Books on the topics specified by participants will be mailed to them directly through Amazon using a secure purchasing link to protect participant privacy; the link will be provided to participants during the meeting. Participants will be asked to read the book and schedule the interview within two weeks after the delivery. They may choose whether to read the book independently or share it with a child; if they decide the book is not appropriate for co-reading with children, they are not required to share the book and can still participate in the interview to share their own evaluation of the book content. Participants who do not complete the reading will retain the book but will not proceed to the interview or receive compensation. Interviews with caregivers will explore discovery pathways, motivations for acquiring STEM books, reading, and sharing practices, evaluative criteria, and perceived concerns or tensions. Caregivers may decline to answer any question and opt out during the process.

Education scholars and STEM experts will be recruited through institutional networks (e.g., the School of Education and the Luddy School of Informatics, Computing, and Engineering at IU) for their professional evaluation. Interviews with the education scholars will focus on the evaluative criteria and developmental appropriateness; interviews with the STEM experts will examine the selection, accuracy, and accessibility of scientific content. Additionally, both groups will be invited to comment on selected book reviews identified in Phase 2's online review analysis.

Upon the completion of all interviews, the team will review recruitment outcomes, preliminary themes, and the emerging coding framework to assess whether additional data collection adjustments are needed. Additional interviews might be conducted according to the review outcomes.

Phase 4: Integrated Data Analysis | 9 months | January – September 2028

Phase 4 focuses on systematic and comparative data analysis. First, based on grounded theory and qualitative analysis of content, the PD, a doctoral student, and GRA students will conduct in-depth qualitative analysis of the interview transcripts using Dedoose and NVivo. Preliminary coding (developed in Phase 3) will be refined into focused thematic categories, including evaluative criteria, perceptions of developmental appropriateness, mediation strategies, and perceived benefits or concerns. Analytic memos will document emerging patterns, contradictions, and stakeholder-specific perspectives.

Second, the team will extend and deepen the analysis of online book reviews collected in Phase 2 to identify common evaluative logics (e.g., popularity and content novelty), recurring tensions, and controversies across platforms. Particular attention will be paid to descriptions of children's engagement and claims of early advantage.

Third, the project will conduct a comparative analysis of online discourse and interview findings. This synthesis will examine areas of convergence and divergence across stakeholder groups and data sources. For example, the team will assess whether online enthusiasm appears disproportionately positive relative to caregiver and professional reflections, and whether concerns raised in interviews (e.g., comprehension challenges or mediation difficulty) are underrepresented in public review discourse. The analysis will also examine if similar evaluative dimensions—such as age appropriateness—are articulated differently in online versus interview contexts.

Findings from this integrated analysis will be summarized in a comprehensive analytic report. The advisory board will convene at the conclusion of this phase to review synthesized results, provide interpretive feedback, and help identify focal themes to guide the focus group discussions in Phase 5.

Phase 5: Focus Groups for Guideline Development | 3 months | September 2028 – December 2028

Phase 5 translates the integrated findings from Phase 4 into actionable guidance through two structured focus groups. The two half-day hybrid focus groups (6–8 participants each) will be convened to engage librarians and early childhood professionals in structured evaluation and synthesis. Each participant will receive \$200 compensation. Additionally, each focus group will include at least one prior interview participant (e.g., caregiver or STEM/Education scholar) to introduce cross-stakeholder perspectives into professional deliberation. Both focus groups will be documented through detailed field notes. A synthesized summary of key themes, tensions, and recommendations will be circulated to participants for member review and clarification.

Focus Group 1 tests and refines evaluative criteria derived from Phase 4 in applied professional and practical contexts. More specifically, this session will assess the feasibility, clarity, and professional relevance of the evaluative criteria identified in Phase 4. Composed primarily of librarians and early childhood professionals, participants will each evaluate a rotating subset of books that have been studied in Phase 2 and Phase 4. The participants will then discuss their suggestions and reflections on the evaluation in a group, particularly challenges they encountered or can perceive in the process, and concerns they have about the books.

Building on the applied evaluation conducted in Focus Group 1, the second focus group will focus on synthesizing research findings and feedback from the first group into practical guidance for both library professionals and the public. This group will include librarians, early childhood professionals, and advisory board members. The PD will begin by presenting a structured synthesis of Phase 2–4 findings and any remaining questions that emerge from the research process. The participants will respond to the findings and questions collectively and co-develop practical guidance. The resulting guidance is intended to support stakeholders in making informed, grounded, and critical decisions about engaging with early childhood STEM books. The guidance developed in Focus Group 2 will be further refined in Phase 6 before public dissemination.

Phase 6: Digital Product Development and Dissemination | 8 months | January 2029 – August 2029

Phase 6 will focus on final reporting, scholarly writing, and dissemination of research findings.

Phase 6 will focus on writing grant reports and finalizing digital products for the dissemination of research findings (e.g., research articles and conference presentations). The team will finalize and submit peer-reviewed manuscripts and deliver conference presentations. The guidance developed in Phase 5 will also be refined and then shared through webinars (during the award period and, where appropriate, continued post-award), conference presentations, and professional channels. Codebooks, data-processing scripts, and other deliverables designated for public release will be prepared for deposits in accordance with the Public Access Plan. The advisory board will convene for a final meeting to review outcomes and discuss future research directions.

3.3. Research Personnel and Collaboration

The core project team consists of the PD, Dr. Yuerong Hu, and a doctoral student in the Library and Information Science (LIS) program to be recruited upon award. The PD will oversee the research design, analytic framework, and overall coordination of the project, and will lead cross-phase integration and scholarly dissemination. The doctoral student will serve as a core research collaborator throughout the three years. Under the PD's mentorship, the student will receive structured training in mixed-method research. Hourly master's students in the LIS program will assist with data collection, annotation, and documentation under the supervision of the doctoral student and PD.

The project team will consult with an Advisory Board (AB), which comprises 7 members, including faculty members in library and information science and education, domain experts and practitioners in early childhood development, and a children's librarian. Below is their detailed information, in alphabetical order of their last names:

- Angelica Candelaria (MLIS): Ms. Candelaria serves as Children's Services Manager at the Monroe County Public Library in Indiana, where she leads youth-focused programming, collection development, and community engagement initiatives. She brings frontline expertise in reader's advisory, youth programming design, and public library service delivery. Her frontline experience in reader's advisory, youth programming, and collection development ensures that the project's evaluation of STEM books remains grounded in real-world library practice.
- Kahyun Choi (PhD): Dr. Choi is an assistant professor at the School of Information Sciences, University of Illinois Urbana-Champaign. Dr. Choi, who offers expertise in ethical AI workflows for librarianship as well as experiences with IMLS-funded projects, will guide the project's computational analysis, ethical data management practices, and the translation of findings into tools that are relevant and useful for libraries.
- Katie Herron (PhD): Dr. Herron is the Director of the Early Childhood Center at the Indiana Institute on Disability and Community at Indiana University. Dr. Herron provides critical expertise in early childhood development, family-centered practices, and system-level professional development within early intervention and preschool contexts. Her expertise ensures that the project's evaluation of STEM books remains developmentally grounded and aligned with evidence-based early childhood practice.
- Cici (Chen) Ling (PhD): Dr. Ling is an assistant professor at the Informatics Department at Indiana University Bloomington. Dr. Ling brings expertise in computational social science and social media analysis, essential for examining how advanced-topic STEM books circulate across digital platforms. Dr. Ling and the PD have collaborated on multiple projects and publications on children's literature and their social review.
- Erin Rich (PhD): Dr. Rich is a Postdoctoral Researcher in the Department of Curriculum and Instruction, School of Education at Indiana University Bloomington, specializing in elementary STEM education and instructional strategies. Dr. Rich's expertise in elementary mathematics education and the intersection of children's literature and STEM informs the project's assessment of pedagogical design and instructional scaffolding.
- Kaiwen Sun (PhD): Dr. Sun is an assistant professor at the Informatics Department at Indiana University Bloomington. Dr. Sun contributes years of experience in conducting interdisciplinary research at the intersection of children's behavior, family-centered design, and emerging technologies. Her expertise informs the project's methodological design, particularly in understanding family-centered engagement with emerging technologies.
- Yandi Xia (M.S.Ed, BCBA, LBA): Ms. Xia is a Board Certified Behavior Analyst with frontline expertise in applied behavior analysis, with years of experience in directly working with children ages 2–6. Her applied expertise in behavior analysis informs the project's evaluation of how STEM books function in different early learning contexts.

Together, the advisory board provides complementary expertise that ensures the project is methodologically rigorous, developmentally informed, and directly connected to library and educational practice. Their guidance strengthens the project's capacity to produce findings that are both theoretically robust and practically actionable.

3.4. Prior Work

Institutional Review Board (IRB) Experience

This project will require Institutional Review Board (IRB) approval for interviews and focus groups involving adult participants. Upon award, the PD will submit a protocol to Indiana University's IRB and anticipates Exempt or Expedited review, as the study involves minimal-risk interviews with adults and does not directly involve children as research subjects.

The PD has previously secured and maintained IRB approval from IU for two ongoing projects employing surveys, interviews, and focus groups. One approved study focuses on multiple stakeholders' perspectives on social book reviewing; the other involves interviewing caregivers and adolescents about co-reading children's books reviewed on social media. These two projects demonstrate the PD's experience with IRB approval for qualitative studies on social reviewing and reading children's literature in family contexts. Both projects involve institutional standards for informed consent, encrypted data storage, transcript de-identification, secure retention of consent documentation, and ethical conduct of research with readers. This prior experience ensures procedural readiness and compliance for the proposed research.

Domain Expertise and Prior Research on Relevant Topics

The proposed project builds directly on the PD's most recent research on social reception of children's books within digital and sociotechnical ecosystems. For instance, as the first and leading author, the PD has published a peer-reviewed conference paper, "*Towards nuanced and critical data analysis: An exploratory investigation into complexities of Goodreads reviews for children's books*" in 2025. That study curated and analyzed a dataset of 37,408 Goodreads reviews on children's books, and demonstrated methodological feasibility for Phase 2.

The PD has also collaborated with Dr. Cici Ling and Dr. Kaiwen Sun—both are advisory board members on this project—on research examining children's engagement with emerging technologies and family navigation of online book review ecosystems. The ongoing collaboration has produced (1) a manuscript currently under review that investigates how families interpret divergent online book opinions through co-reading; and (2) a conference workshop on "Designing Safe and Transparent AI for Children and Families."

Early Feedback from Advisory Board and Institutional Partners

In preparation for this proposal, the PD has conducted one-on-one consultations with all advisory board members and domain experts from the two institutional partners (Both the Early Childhood Center and the Center for Survey Research at IU) to examine and refine this project's theoretical foundations, potential challenges, and overall research design.

Together, these prior publications, collaborations, and methodological experiences provide a solid foundation for the successful execution of this mixed-method study among multiple stakeholders.

3.5 Evaluation of Research

This research adopts a phased and iterative evaluation framework. Findings are continuously cross-examined, refined, and evaluated through stakeholder engagement, advisory board review, and external feedback.

First, across all phases, the advisory board provides review and feedback on the design and implementation of this research.

Second, Evaluation is embedded throughout all phases of the project and functions as both a methodological safeguard and a mechanism for strengthening impact. More specifically:

- In **Phase 1**, the IRB and institutional partners will review the research plan to ensure ethical compliance, scholarly rigor, and feasibility.

- In **Phase 2**, evaluation is embedded in the cross-platform comparison of online book discourse to identify recurring patterns, inconsistencies, and potential amplification effects. This ensures that analysis is not dependent on a single platform's dynamics.
- In **Phase 3**, preliminary Phase 2 findings will be shared with interviewees for their reflection and critique, so as to examine whether online discourse aligns with lived reading practices and professional perspectives. Comparing perspectives across stakeholder groups is another intentional analytic design feature.
- In **Phase 4**, integrated evaluation occurs through structured cross-examination of online and interview data. Convergences and divergences will be explicitly analyzed to strengthen internal validation.
- In **Phase 5**, focus groups with librarians and early childhood professionals will collectively assess the clarity, feasibility, and relevance of evaluative criteria derived from earlier phases.

Starting from **Phase 6**, evaluation extends externally. Scholarly manuscripts will undergo peer review, conference presentations will invite disciplinary feedback, and the professional-facing and public-facing guidance frameworks will be circulated for practitioner comment prior to broader dissemination. Materials designated for public release will be reviewed for usability and accessibility in alignment with the Public Access Plan. This iterative evaluation structure positions the project to generate methodologically robust scholarship and professionally actionable guidance.

4. Project Results

4.1. Research Outcomes and Deliverables

First, the project will generate new empirical knowledge about the circulation, reception, and evaluation of advanced-topic early childhood STEM books. Through online book review analysis, stakeholder interviews, and focus groups, the research will clarify how these books are framed, interpreted, and mediated across digital, institutional, and family-based contexts. The resulting peer-reviewed publications and conference presentations will contribute to scholarship in library and information science, children's literature, and contemporary book culture, illuminating emerging book genres and advancing understanding of early STEM reading practices.

Second, the project will produce both professional-facing and public-facing guidelines. The professional-facing guidelines are designed to support librarians and early childhood professionals in evaluating and integrating advanced-topic STEM books into collection development, reader advisory, and family-friendly programming. This guidance will provide developmentally grounded evaluative criteria and practical recommendations for designing STEM-themed programming in public libraries.

The public-facing guidelines will support caregivers in engaging with early childhood STEM books at home. This resource will synthesize research findings into accessible recommendations that help families critically interpret promotional claims, scaffold complex content, and foster meaningful science engagement through shared reading.

Additional deliverables include qualitative codebooks, interview protocols, and data-processing scripts designated for public release, consistent with the Digital Products and Public Access Plans. Together, these results address the identified need for multi-stakeholder, evidence-based evaluation of this emerging sub-genre of children's books and provide actionable tools for both scholarly and professional communities.

4.2. Adaptability and Generalizability

The project is designed to ensure that its findings and outputs are adaptable across institutions and communities. The evaluative criteria and guidance frameworks will be developed to apply broadly across U.S. public libraries and early childhood education settings, while remaining flexible enough to accommodate different community contexts and levels of STEM familiarity.

Because the study examines multiple advanced STEM topics rather than a single subject area, the resulting framework will be transferable across emerging domains such as artificial intelligence, quantum physics, or other emerging STEM

themes. By grounding the guidance in developmental research and stakeholder perspectives rather than topic-specific content, the project ensures that its recommendations can be adapted to diverse collections and programming models. This public-facing guidance is likewise designed to be used by families with varied levels of prior engagement with STEM. By focusing on principles of mediation, scaffolding, and critical evaluation rather than domain knowledge, the outputs will support early STEM literacy for families of interest, despite their differences in experiences and familiarity with emerging STEM topics.

4.3. Dissemination

Project findings will be disseminated through scholarly and professional venues in library and information science. Peer-reviewed manuscripts will be submitted to leading LIS and related interdisciplinary journals, and findings will be presented at relevant conferences. In addition, the professional-facing and public-facing guidelines will be shared through library-focused dissemination channels, through professional and institutional networks, as well as digital distribution platforms. These materials will support family-friendly programming and provide librarians with tools to introduce emerging STEM topics—including artificial intelligence and related fields—in developmentally appropriate ways. By reaching both academic and practitioner audiences, the dissemination strategy ensures that research findings engage with ongoing conversations in librarianship, children’s literature, and early STEM education.

4.4. Sustainability and Future Work

This research and its contributions should extend beyond the award period in several ways. First, the research findings and professional-facing guidelines will be designed for integration into LIS teaching and continuing education initiatives, supporting librarians in responding to emerging community interests in advanced STEM topics. Incorporating these materials into LIS curricula and professional development programming will help prepare future and current librarians to navigate evolving STEM-related collection and programming needs.

Second, collaboration with the advisory board and institutional partners will continue beyond the period of performance, providing opportunities to refine guidance and explore future research directions. For instance, the collaboration will extend to other sub-genres of STEM books for children and young adults, such as those that involve hands-on experiments. The scholarly findings and publicly released research instruments will also serve as a foundation for future external funding proposals that expand the investigation into additional STEM topics, age groups, or institutional contexts.

Overall, this project advances applied and scholarly knowledge while strengthening the capacity of libraries and families to engage with advanced-topic early childhood STEM books. By producing empirically grounded guidance and integrating findings into professional education and practice, the project contributes to sustainable, developmentally informed early STEM literacy efforts.

Activity												
Year 2 of 3	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12
Stakeholder interviews (caregivers and STEM experts)												
Transcription and qualitative coding of interviews												
Advisory board consultation on preliminary interview analysis findings												
Integrated analysis of online discourse and interview data												
Advisory board review of integrated findings												

[illegible]