

**Examining Reading Instruction for Students with Intellectual Disability:
An Early Career Training Program**

This Early Career Development and Mentoring proposal is submitted to NCSER 84.324B

A. SIGNIFICANCE

Overview of Project Focus, Rationale, and Purpose

This proposal, **Examining Reading Instruction for Students with Intellectual Disability: An Early Career Training Program**, is a resubmission to the Research Training Program in Special Education: Early Career Development and Mentoring competition through the National Center of Special Education. Key personnel are the principal investigator (Dr. Esther Lindström) and primary mentor (Dr. Elizabeth Swanson, University of Texas at Austin) and two co-mentors (Dr. Lee Kern, Lehigh University; Dr. Stephanie Al Otaiba, Southern Methodist University [SMU]). I have also identified a consultant (Dr. Jessica Logan, The Ohio State University) committed to advising me throughout the proposed project. None of the designated mentors or consultant were my dissertation committee chair or advisor. The proposal aligns with the Reading, Writing, and Language Development topic area and the Exploration project type, and involves *children with intellectual and developmental disabilities (IDD), defined here as children identified for special education services under the ID label, and their special education teachers*. **The two major goals of this project are to (1) further develop my content, methodological, and management skills as a researcher of reading development for students with IDD and (2) conduct a rigorous examination of content and practices comprising reading instruction for students with IDD, as it relates to student reading growth.** These major goals align closely with the aim of the Institute of Education Sciences to fund integrated research and career development plans for early career investigators involved in special education research.

The purpose of the proposed research project is to conduct a prospective longitudinal evaluation of the relations between reading instruction and reading growth in a sample of students with IDD. Specifically, this project would serve to 1) explore the extent to which effective reading instructional content and practices (as *malleable factors*) are used by special education teachers for elementary students with IDD; 2) Investigate associations between reading instruction and student reading outcomes for this population using curriculum-based measurement and longitudinal analyses; and 3) explore teacher- and student-level covariates potentially related to content and instructional practices occurring during reading for students with IDD. A robust literature examining teachers of typically developing students and students with and at-risk for learning disabilities (LD) suggests that teachers' instructional practices and student growth are related (e.g., Carlisle et al., 2011; Kent et al., 2017; Piasta et al., 2009). Furthermore, research has clearly identified characteristics of effective instruction for students with IDD. Recent intervention studies (e.g., Allor et al., 2018; Allor et al., 2014) indicate positive effects in reading among students with IDD when taught reading with instructional content (e.g., code-based instruction) and practices (e.g., small groups, corrective feedback) adapted from those previously determined to be effective for students with LD. Furthermore, students with IDD, including those with complex communication needs, have demonstrated positive response to intensive, individualized, evidence-based, multicomponent reading instruction (Browder, Ahlgrim-Delzell, Courtade, Gibbs, & Flowers, 2008; Browder, Ahlgrim-Delzell, Flowers, & Baker, 2012; Lemons & Fuchs, 2010). These positive effects have been demonstrated in short- and long-term (e.g., Allor, Mathes, Roberts, Cheatham, & Al Otaiba, 2014) interventions, alike. However, students with IDD have different instructional needs, supports, and goals than their more widely studied peers with LD. Namely, cognitive and behavioral characteristics of students with IDD may manifest in challenges

with processing, transferring information across domains, expressive and/or receptive language, problem solving, and task avoidance (Caffrey & Fuchs, 2007). Research suggests additional benefits for students with IDD when adaptations reflect their needs (e.g., Allor et al., 2009).

Given these recent research developments in reading instruction for students with IDD, it is unknown to what degree they are being taught reading content and practices that align with research. Very little research has examined the relation of special educators' classroom instruction (content, practices, quality) to the reading growth of students with IDD. In particular, teacher knowledge and instruction may interact differently with behavioral and cognitive characteristics of students with IDD to predict reading growth. Although there are studies examining teachers' *self-reported practices* (see Hill & Lemons, 2015) and kindergarten students with IDD (Folsom, 2012), no observation study has been published on students with IDD in grades 1-4, when students strengthen foundational reading skills (learning to read) to prepare for content-based reading in upper elementary grades (reading to learn).

Thus the *primary research aim* of this project is to examine the associations among reading instruction (content and practices), reading growth for students with IDD, and student- and teacher-level covariates. An investigation of the relations among instructional practices and student growth in this population is necessary, to inform the development of effective interventions for teachers and students. *In this proposal, I outline a research project and career development plan to address the following research questions and establish a robust, independent program of research:*

1. What are the teaching practices and reading content covered by teachers in special education classrooms serving students with IDD in grades 1-4?
2. What kind of growth can be expected of students with IDD when receiving business as usual reading instruction? What characteristics (content, practices) of reading instruction are related to greater growth among students with IDD?
3. Are there student- (cognitive, behavioral, linguistic) characteristics that moderate the association between instruction and growth in this sample? How do teacher-level skills, such as knowledge of reading development, moderate this association? Does instruction mediate the relation between student- and teacher-level covariates and student growth?

My current knowledge and skills are primarily in instructional interventions and regression-based analyses. I have organized my proposed career development plan to augment my knowledge and skills specific to the proposed project by strengthening *content knowledge, statistical methodology, grant management, and knowledge of transparent science practices*. These skills are all necessary for successful completion of proposed research activities, and will help me in establishing a successful line of developmental research during my early career and beyond. These studies are necessary for informing the development of interventions aimed at improving the *educational and social outcomes* for these students.

Upon completing the proposed project, my dissemination plan includes manuscripts and presentations describing current instructional practices for teaching reading to elementary students with IDD, reading development among students in this population, special educators' knowledge and beliefs regarding reading instruction for students with IDD, and the relation of these variables to reading growth of students with IDD. Additionally, the project will yield data regarding *cognitive, linguistic, and behavioral profiles* of these students in reading-related domains. This research will guide future intervention development (i.e., a Development and Innovation project) aimed at *improving the educational and social outcomes for students with IDD*.

Rationale

Reading Interventions for Students with IDD

Until recently, reading instruction for students with developmental disabilities has emphasized sight word instruction (Browder et al., 2006; Bruni & Hixson, 2017). But this approach is insufficient, as a growing body of research demonstrates effectiveness of multicomponent, code-based, explicit reading intervention for students with IDD. Evidence from randomized control trials (e.g., Allor et al., 2014; Browder et al., 2012; Browder et al., 2008) and single-case studies (e.g., Ahlgrim-Delzell et al., 2014; Allor et al., 2018; Bradford et al., 2006; Lemons et al., 2012; Lemons et al., 2015) support systematic instruction in phonics and reading foundational skills over sight word based instruction. These findings extend beyond researcher-implemented interventions to studies examining implementation by teachers (see Ahlgrim-Delzell et al., 2014). As findings are replicated across samples and interventions are refined, more research-based tools are available for teachers of students with IDD. However, use of these approaches in special education classrooms is unknown, as is their role in special education teacher preparation.

Examining Classroom Reading Instruction

Few studies have systematically examined research-based reading instruction in special education classrooms serving elementary students with IDD. One method for examining existing instructional practices is through observation research, describing the content (e.g., phonics vs. sight words) and instructional practices (e.g., grouping, feedback) occurring in typical reading instructional lessons. Although there is a substantial literature of observation research pertaining to reading instruction of students with learning disabilities and their typically developing peers (see Swanson et al., 2012; Swanson & Vaughn, 2010), far less research has focused on students with intellectual disability.

Though students with IDD have recently been included in intervention studies, their representation in observation studies is far more scant and often incidental. A recent systematic review and synthesis (Lindström, Gesel, & Lemons, 2018) found students with IDD included in reading observation studies using qualitative methodology (Ruppar, 2014; Ruppar et al., 2015) or in quantitative observation studies but not as the primary population of focus. Ruppar's (2014, 2015) studies revealed low expectations and passive engagement in reading instruction for secondary students with cognitive disabilities, and lack of efficacy and training in academic instruction on the part of the teachers. Teachers spent most of their reading instructional time managing behavior and teaching life skills. A pilot observation study I conducted of 17 students in grades K-3 with IDD and their teachers revealed large portions of instructional time spent on behavior management and transition, and little time spent on foundational reading skills (Lindström & Lemons, under review). The study examined teachers' instructional content and practices, perspectives, and self-efficacy, but did not examine teacher knowledge pertaining to reading instruction or connections to student reading growth. The small sample size limited statistical analysis and generalizability of findings. As previous studies have established a relation among teacher knowledge, observed instruction, and reading growth for students with LD (e.g., Bos et al., 2001; Carlisle, Kelcey, Rowan, & Phelps, 2011; Piasta et al., 2009), research has not yet addressed whether these patterns also hold for elementary students with IDD and their teachers.

It is valuable to investigate whether differing instructional priorities for this age group would be reflected in instructional practices or teacher perspectives. To what degree does instruction mirror individual, varying needs of students with IDD, or the training and views of their teachers? Greater knowledge of instruction occurring in special education classrooms can

inform more precise, effective interventions for this population and serve to improve short- and long-term outcomes.

Considerations for Students with IDD

Examining the association of reading instructional content and practices to students' reading growth could be especially beneficial to advancing intervention research for this diverse population. By pinpointing characteristics of effective instruction for students with IDD, we may better understand mechanisms already occurring in classrooms that are tied to student growth, and which content and practices can be improved through intervention and professional development. To do so, we must use tools reflecting instructional needs and classroom dynamics specific to this population and setting: grouping, pacing, individualized supports, and AAC, to name a few. The potential of findings from rigorous observation research to influence intervention is further strengthened when considered in relation to student characteristics and outcomes. IDD is a heterogeneous designation, attributed to genetic, environmental, and other factors. It is not uncommon for students with IDD to receive special education services for other needs, such as autism spectrum disorder or speech and language impairments. For these reasons, individuals who share the designation of IDD may vary considerably in cognitive abilities, adaptive behavior, communication, social skills, and other characteristics linked with how they respond to reading instruction content and practices. Thus, we may expect to see more individualized instruction to address their particular needs and goals.

Given the heterogeneity of student profiles associated with IDD, and the relation of these factors to learning, it is important to consider the role of such factors in instructional planning, as well as in student outcomes. Specifically, we must consider cognitive, linguistic, reading, and behavioral characteristics beyond the diagnostic criteria of IDD that may be related to classroom instructional decisions and practices, as well as to student development. As needs and characteristics of students with IDD differ, so may effective instruction. Teachers may employ various quantitative and qualitative adaptations (see Lemons, Kearns, & Davidson, 2014) to further individualize best practices for students with IDD, based on their needs. For example, some students with IDD who exhibit escape-oriented behaviors during academic instruction may benefit from shorter sessions or planned breaks during reading instruction (quantitative), whereas their peers with less developed verbal abilities might rely on visual supports and/or AAC to access the content (qualitative). As academic standards for students with IDD have increased, there are questions to be addressed about teacher preparation, reading instruction, and students' short- and long-term reading growth. Finally, given that previous studies (e.g., Wei et al., 2011) have identified slower rates of academic growth among students with IDD, it is necessary to consider both short- and long-term outcomes for this population, and to do so with a large, representative sample to ensure both generalizability and adequate power to detect effects of instruction.

Measuring Reading Growth of Students with IDD

In contrast to studies of reading development among typically developing students or those with learning disabilities, there is far less research on the developmental trajectories of students with IDD. Developmental research can add valuable information to inform more precise, targeted interventions and provide context regarding individual differences, strengths, and weaknesses. As students with IDD demonstrate slower academic growth over time (Wei et al., 2011) and are typically excluded from broader studies of achievement, we need to consider not only how instruction may be related to their short-term growth, but also longer-term development. Whereas students with high-incidence disabilities may demonstrate more immediate growth on academic outcomes, it may take even longer to observe those same patterns of growth in students with IDD, with or without co-occurring conditions.

Teachers of Students with IDD

As increased accountability for academic instruction of students with IDD is fairly recent, there remain many unanswered questions regarding the preparation and instructional practices of special education teachers who work with this population. In particular, there is little research on the content knowledge of teachers of students with IDD and their perspectives on reading instruction for students with IDD. In typically developing classrooms, teachers' content knowledge and perspectives on reading instruction are associated with differential growth (see Piasta et al., 2009), such that students of teachers with less content knowledge who spend more time on foundational skills experience less reading growth than peers whose teachers spend less time on explicit instruction in this area. It is unknown whether this dynamic also holds for self-contained classrooms, where students with IDD are likely to receive some of their reading instruction. Recent studies have found systematic differences among teachers of students with IDD and those with other disabilities or without disabilities on these knowledge and perception variables. Gilmour and Henry (2018) analyzed special education teachers' knowledge of mathematics content and found lower content knowledge among teachers of elementary students with IDD as compared with teachers of students without disabilities. Findings from Ruppert and colleagues' (2015) qualitative study (four teachers, eight students) indicated a range of perspectives and expectations among teachers of secondary students with severe cognitive disabilities, in regards to literacy instruction. Participants varied in the degree to which they individualized instruction, took responsibility for student outcomes, and believed that literacy was an appropriate instructional goal for their students. Those differences were reflected in the instructional time and content, as well as student progress. These findings aligned with those from my pilot study of elementary special education teachers of students with IDD (Lindström & Lemons, under review), in which responses to survey and interview questions revealed similar variability in these areas. Some cases indicated connections between content, perspectives, and teacher preparation, as teachers felt adequately trained to only support behavior or academic goals of their students with IDD, but not both. As standards change for students with IDD, so may the preparation and content knowledge of their teachers, and how reading is taught in the classroom. To evaluate current practices and optimize outcomes for students with IDD, these topics warrant further investigation.

Research Questions

The proposed study aims to address the following research questions:

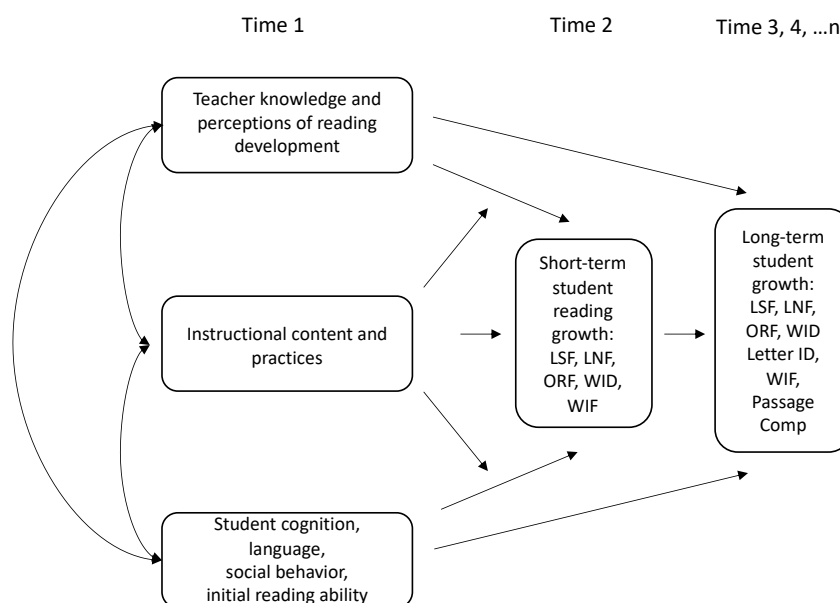
1. What are the teaching practices and reading content covered by teachers in special education classrooms serving students with IDD in grades 1-4?
2. What kind of growth can be expected of students with IDD when receiving business as usual reading instruction (RQ2a)? What characteristics (content, practices) of reading instruction are related to greater growth among students with IDD (RQ2b)?
3. Are there student- (cognitive, behavioral, linguistic) characteristics that moderate the association between instruction and growth in this sample? How do teacher-level skills, such as knowledge of reading development, moderate this association? Does instruction mediate the relation between student- and teacher-level covariates and student growth?

Summary and Purpose

Reading interventions found to be effective for students with LD, when adapted appropriately, have demonstrated promise for students with IDD (Allor et al., 2014; Browder et al., 2012; Browder et al., 2008). As attention to evidence-based reading instruction has developed more

recently for this population than for students with LD, it is to be expected that the training and knowledge of reading instruction available to teachers of students with IDD may be limited. As teacher knowledge and beliefs are linked to instructional practices and student outcomes in the LD literature base (see Carlisle et al., 2011; Kent et al., 2017; Piasta et al., 2009), it is necessary to examine whether these patterns hold for students with IDD and their teachers. In examining student growth outcomes, it is important to investigate the potential role of student- and teacher-level variables in instruction and student growth. Figure 1 presents a logic model of how these variables may be associated. In particular, we must consider the abilities, needs, and supports of students with IDD—cognitive, language, behavior, and reading skills—and how they predict reading growth, as measured by proximal and distal reading assessments. Likewise, we must consider how teachers' knowledge and perceptions of reading development (in general and specific to their students with IDD) are related to their instructional content and practices and the short- and long-term reading growth of their students with IDD. We investigate the role of reading instructional content emphasis and practices as a *malleable factor* potentially linked with student success on the reading measures. Previous studies have examined these associations in other populations, or some of these components in isolation from the rest. Thus, the **purpose of this research project** is to *examine reading development for students with IDD and investigate its relation to classroom instructional content and practices, as well as other student- and teacher-level variables*. See logic model below.

Figure 1. Theory of change.



Current Level of Knowledge and Skills

Currently, I am an Assistant Professor of Special Education in the Department of Education and Human Services at Lehigh University. My research interests include reading instruction and development for elementary students with disabilities. **To establish and maintain this line of inquiry, I will need additional mentorship and training to conduct the project proposed in this application.** This mentorship will assist me in meeting the objectives of my Career Development Plan, which are to (1) establish an independent line of inquiry aimed at understanding reading development among students with IDD and its relation to social, behavioral, and academic outcomes, (2) develop my knowledge and mastery of longitudinal analyses, (3)

enhance my communication and collaboration skills to establish and maintain relationships with area school districts that will allow me to conduct school-based research, and (4) develop my grant writing and grant management skills to position myself for successful future applications and continue my developing line of inquiry.

After beginning my education career as a special education co-teacher in an urban Chicago high school, I pursued my master's and doctoral training at Vanderbilt University. There, I gained valuable research skills and experiences under the supervision of various established researchers in the fields of LD, IDD, and reading development. As a research assistant during my master's program in Dr. Laurie Cutting's Education and Brain Research Lab, I administered and scored assessments (language, reading, cognition), entered and managed data, and trained fellow research assistants on study procedures. Studies included children who were typically developing, with or at-risk for reading disabilities, and with Neurofibromatosis type 1.

Upon entering the doctoral program, I was a research assistant on the First Grade Reading project led by Drs. Doug and Lynn Fuchs. I gained experience in assessment, tutoring, early reading development, curriculum design, and infusing behavior supports into academic intervention for first graders at risk of reading disability. At the same time, I was a research assistant on the Late-Emerging Reading Disability project led by Dr. Donald Compton. My responsibilities included assessing students' cognition, language, behavior, and achievement; scoring; and data entry. From this study, we conducted a profile analysis of students with late-emerging reading difficulties and found differing contributions of knowledge, language, and attention in readers with comprehension difficulties (Compton, Lindström, Steacy, Gilbert, Collins, & Cho, under review).

When I began working under the supervision of Dr. Christopher Lemons (dissertation chair and advisor), we conducted school-based research focused on data-based individualization for students with high-incidence disabilities and academic instruction for students with IDD. For these projects, I transitioned from research assistant (RA) to project coordinator. In this role, I gained considerable experience in training and managing RAs, communicating with schools, coordinating assessments, scheduling interventions, managing scoring procedures, and data entry. The data-based individualization study established best practices for using data to individualize reading instruction for elementary students with intensive academic and/or behavior needs (Lindström et al., 2019). In the academic intervention study for students with IDD, we used single-case design to demonstrate positive effects of an early numeracy curriculum for students with complex communication needs (Wright, Knight, Lemons, Lindström, & Strauss, 2020) who were receiving minimal academic instruction in their special education classrooms.

From these projects, I became interested in (a) what academic instruction looks like for students with IDD, (b) what expectations of progress are reasonable and expected, (c) how teachers make instructional decisions, and (d) similarities and differences in instruction across disability categories. I led a team to conduct a systematic review of reading observation studies to investigate instruction provided to students with disabilities (Lindström et al., 2018). Overall, findings indicated quantitative reading observation studies focused on students with high-incidence disabilities and sensory impairments, often including students with IDD only as a secondary diagnosis. Findings further indicated considerable time spent on non-instruction (e.g., behavior management, transition) and whole group instruction. Of time spent in active reading instruction, most observed activities targeted comprehension, vocabulary, text reading, and phonics/word study. Very little time was spent in phonological awareness and fluency. Some studies included data from teacher interviews or surveys, but few evaluated teaching quality, teachers' knowledge of reading instruction, or student reading achievement.

For my dissertation, I conceptualized, designed, coordinated, and completed a pilot observation study of reading instruction for students with IDD (Lindström & Lemons, under review). This study used data from classroom observations, student IEPs, and teacher surveys and interviews to examine content and practices during reading instruction in self-contained settings, teacher beliefs regarding reading instruction for students with IDD, and teacher perceptions of barriers and facilitating factors to academic instruction for students with IDD. For this project, I adapted the ICE-R observation tool (Edmonds & Briggs, 2003) to reflect characteristics of classrooms with IDD, such as small class sizes and individualized instruction. Results from this pilot study indicated greater time spent on non-instruction than in previous studies of students with reading disabilities. During active reading instruction, more time was allocated to sight words than research-supported phonics. Furthermore, findings from teacher surveys and interviews revealed instructional decisions reflecting previous students or the larger class, rather than individual student needs and IEP goals. Findings also indicated difficulty among teachers in meeting students' academic and behavioral needs simultaneously. This study underscored the need for rigorous observation research pertaining to academic instruction for students with IDD, especially in relation to student growth. Among the many skills I gained from this research experience, one of the most notable was the ability to successfully manage a large research lab (5 Ph.D. and 6 M.Ed. students). To disseminate study findings, I currently have one manuscript under review and have presented findings at two research conferences.

After completing my dissertation, I extended this line of research to examine instructional practices and to refine observational research practices during mathematics instruction. I applied for and was awarded a Faculty Research Grant at Lehigh University to adapt the Math Observation Tool (Bryant & Bryant, 2009) to reflect characteristics of students with IDD during early numeracy and mathematics instruction. Previously used to describe instruction for students with high-incidence disabilities, I adapted the content and format to be developmentally and instructionally appropriate for self-contained settings serving students with IDD. Trained research assistants are currently using the tool to code content, delivery, engagement, and teaching quality. Findings from this study will help to inform knowledge of content and practices inherent to mathematics instruction for students with IDD and further guide systematic observation research practices for this population, as no other studies of this kind have been published at this time.

Mentorship and Advising

I identified the mentors and consultant on this project due to their extensive and complementary expertise in areas pertinent to the proposed project: special education, school-based research, reading development and intervention, students with IDD, teacher training, and behavior. The mentors and consultant bring diverse and convergent perspectives, in addition to strong histories of federal funding, aligned with the research and professional development goals of the proposed project. All have agreed to review manuscripts and provide feedback for dissemination. Their expertise and contributions are briefly presented below.

Elizabeth Swanson, Ph.D. will provide **primary mentorship**. Swanson is a Research Associate Professor at the University of Texas at Austin and Meadows Center for Preventing Educational Risk, an organized research unit in the College of Education. Dr. Swanson's interests and expertise in observation research, reading intervention, and teacher preparation are well matched with the aims of the proposed project. Her guidance on design (e.g., observation research), management (e.g., recruitment, logistics), and establishing relationships with local education agencies will be invaluable to the research and professional development aims of the project.

Dr. Lee Kern would serve as a **co-mentor**. Kern is a Professor of Special Education in the Department of Education and Human Services at Lehigh University and Director of the Center for Promoting Research to Practice and Director of Lehigh Autism Services. She has a successful research program conducting school-based intervention research to support social/emotional and behavioral needs of students with and at-risk for behavioral problems in the greater Lehigh Valley (where the proposed project would take place). IES has supported much of Dr. Kern's intervention research, in addition to support from such agencies as OSEP, NIMH, and USDA.

Dr. Stephanie Al Otaiba will also serve as a **co-mentor**. Dr. Al Otaiba is Patsy and Ray Caldwell Centennial Chair and professor of Teaching & Learning at SMU. She has a strong history of funding from IES and extensive expertise pertaining to reading intervention and development for students with varying abilities, including LD, IDD, and other profiles. Her experience conducting school-based observation research and expertise in reading research with students with IDD provides many potential benefits to both the proposed project and my professional development. Through her work, Al Otaiba has substantial experience with recruitment, data collection, analysis, and publishing of peer reviewed manuscripts in highly-ranked academic journals. She will contribute valuable content-area guidance to the project.

Consultation

Dr. Jessica Logan will serve as a **consultant** on the project. She is an assistant professor at The Ohio State University (OSU) and previously held the position of Senior Researcher in the Crane Center for Early Childhood Research and Policy. Logan has expertise in research related to statistical methodology, language and literacy intervention, and child development. Her content and methodological expertise are well matched to guide the project. She has served as Co-Investigator on several IES-funded research projects related to early literacy development and instruction. Dr. Logan teaches graduate-level courses in statistics and research methods and has served on several federally funded research grants.

Additional Training and Career Development (see p. 17 for full Career Plan)

In addition to the training and career development facilitated by guidance from my mentors and consultant, I will benefit from further training opportunities as I establish this independent line of research. In particular, I will enroll in various carefully selected trainings (e.g., UT Austin Summer Statistics Institute, Inter-university Consortium on Political and Social Research) to gain the methodological skills necessary (e.g., multilevel growth modeling) to address the proposed research questions, as well as future related projects. I will also enroll in courses on sharing and communicating research methods and findings through Open Science practices. Together, these skills will allow me to use the data gathered from the proposed project to develop innovative interventions and supports for students with IDD and their teachers, and make the products of my research accessible beyond the immediate research community. Finally, I will participate in activities sponsored by IES to increase my knowledge of grants application and management.

Summary

In summary, this Early Career Development and Mentoring project is designed to enable me to enhance my existing content- and method-focused research capabilities throughout the project, toward the ultimate goal of establishing a **systematic, productive, and independent research line** focused on *instruction and development of early reading in students with IDD*. The proposed plan, outlined in the following section, would provide the resources and mentorship needed to investigate relations among instructional practices, student growth, and teacher knowledge and

beliefs. This Career Plan is designed to facilitate my preparation to conduct independent research that is rigorous and relevant to *children and youth with disabilities and to the broader field of special education*. This completed project will yield valuable data and insights for developing teacher and student-directed interventions (i.e., Development and Innovation project), to ultimately improve educational and social outcomes for students with disabilities.

B. RESEARCH PLAN

Research Design

The proposed project is a longitudinal exploration of reading development for elementary students with IDD receiving reading instruction in special education classrooms. The project employs a multi-cohort longitudinal design, including student outcomes measured via curriculum-based measures and standardized measures at post-test and follow-up. Given the lower incidence of IDD to LD, the multi-cohort design increases the feasibility of recruiting a sample adequately powered to address the research questions. The longitudinal component of the study facilitates examination of incremental, long-term growth characteristic of students with IDD (see Allor et al., 2014; Wei et al., 2011).

The observational component of the study will yield detailed descriptive data on the nature of reading instruction for students with IDD. Specifically, the ICE-RTI tool will report the number of minutes allocated by content (e.g., phonics, vocabulary) and grouping (e.g., individual, pairs), and use of effective teaching practices (e.g., scaffolding). These data will be reported descriptively. Additionally, they will serve as continuous predictors of student growth in subsequent analyses.

To better understand predictors of reading instruction and student reading growth, I will collect student data on cognition, language, behavior, and initial reading achievement. I will report these data descriptively and test them for possible moderation and mediation effects in the relation between instruction and student reading growth. Likewise, I will collect data on teacher knowledge and perceptions of reading development for students with IDD for the same purposes: descriptive reporting and testing for moderation and mediation effects.

I will use multilevel modeling to conduct analyses examining the relation of instruction to student growth, to account for the nesting of data points within students. The specific details of the modeling procedure will be developed as part of my mentorship plan during year 1. As my career development plan includes a clear plan for training in longitudinal analyses, I will be well prepared to conduct these analyses in Year 4 of the project.

Research Aims

The goal of this Exploration project is to *examine the associations among reading instruction (content and practices), reading growth for students with IDD, and student- and teacher-level covariates* via the following research aims: **AIM 1** is to describe instructional practices during reading instruction for students with IDD. **AIM 2** is to examine connections between teacher variables, instructional practices, and reading growth for students with IDD. **AIM 3** is to examine exploratory moderators and mediators of these developmental trajectories.

Research Timeline

All years include the annual IES PI meeting and a mentor meeting at UT-Austin. Data scoring, entry, and reliability checks are ongoing. To achieve the proposed sample, I will recruit, screen, and assess 100 students over the course of the project.

Year 1. During the summer of Year 1 (2021-2022), I will finalize recruitment materials and begin training RAs on observation coding and data entry. Beginning in the Fall, I will recruit

Cohort 1 ($n_{\text{students}} = 30$) from Bucks County IU, Bethlehem Area School District (BASD), and Parkland School District elementary schools (see Appendix E for letters of support). Following IRB, district, and principal approval, we will recruit special education teachers for participation and deliver consent forms home to students for screening. After receiving parental consent, we will screen students on cognition, language, reading, and behavior measures (see Screening below) and collect IEPs for participating students. At the same time, teachers will complete brief surveys on their knowledge and beliefs on reading instruction for students with IDD. In late fall, we will begin to schedule classroom observation sessions with teachers for their students who meet criteria for participation. Throughout the academic year, we will collect progress monitoring data (five monthly points) from participating students using WIF (Fuchs et al., 2004) and FastBridge (Christ, 2018). Students will receive a small toy or sticker as incentive for completing each progress monitoring session. After completing various stages of data collection, participating teachers will receive compensation for their involvement. In Year 1, I will attend the first of two statistical workshops to build my methodological skills and meet with Dr. Swanson at UT-Austin.

Year 2. In Year 2, I will begin recruiting Cohort 2. Aside from sample size, recruitment and data collection procedures for Cohort 2 ($n_{\text{students}} = 35$) will be identical to Cohort 1. In spring of Year 2, I will also conduct follow up testing on Cohort 1 using timed and untimed measures. During Year 2, I will also complete the 5-week online course on open science practices and meet with Dr. Al Otaiba at Southern Methodist University.

Year 3. In Year 3, I will begin recruiting Cohort 3. Recruitment and data collection procedures for Cohort 3 ($n_{\text{students}} = 35$) will be identical to Cohort 2. In spring of Year 3, I will conduct follow up testing on Cohorts 1 and 2 using timed and untimed measures. During Year 3, I will attend the second workshop (ICSPR, Longitudinal Analysis) to develop my methodological skills and meet again with Dr. Swanson at UT-Austin.

Year 4. By Fall of Year 4, all recruitment, screening, and survey administration will be completed. Data collection in Year 4 will be limited to spring follow-up testing of Cohorts 1-3, for participants enrolled in 2nd-4th grade. Thus, the primary focus of Year 4 will be data cleaning, preparation, and analysis to address research **AIM1**, **AIM2**, and **AIM3**. Exact analytic procedures will be determined with Dr. Logan over the course of the project. During Year 4, I will visit SMU again to meet with Dr. Al Otaiba.

Sample and Setting

Eligibility. Participants in the sample will include students in grades 1-4 with IDD and their special education teachers. Students with IQ scores 40-70 and with adaptive behavior needs will be eligible for inclusion in the study, regardless of primary eligibility category; they may also have a secondary category, though it is not necessary. Students must be receiving reading instruction in their special education classrooms. Students not receiving reading instruction in special education classrooms, those with IQ outside of the 40-70 range, or those unable to complete the assessment battery will be excluded from the sample. Students with visual or hearing impairments and students with low English language proficiency would also be excluded. Students who matriculate beyond fourth grade during the study will be exited from the sample at that time. Finally, general education and special education teachers who teach students with IDD in mainstream classrooms will be excluded from participating. As students with IDD represent approximately 1 out of every 100 students in public schools, collaboration with several large districts and intermediate units will facilitate recruitment of eligible students and teachers.

Recruitment. This project will take place in elementary schools in eastern Pennsylvania. I propose to recruit participants from self-contained classrooms via local districts, including

Bethlehem Area School District (BASD, 16 elementary schools), Parkland School District (PSD, 8 elementary schools), as well as the Pennsylvania Intermediate Unit system, including the Bucks County IU (over 70 elementary schools). Dr. Kern has documented success in engaging with these and other local districts in school-based research. These districts incorporate urban and suburban communities of varying socioeconomic status. Given the low-incidence nature of IDD in the general population, these large districts and intermediate unit will be instrumental in identifying appropriate study participants and supporting ongoing participation throughout the four-year project duration.

I will partner with Bucks IU, BASD, and PSD to identify **schools** from which to recruit special education teacher participants. As IUs oversee special education classrooms across multiple districts, this two-pronged recruitment strategy will help to include students whose needs are being met through various mechanisms and obtain a more representative sample. When schools are contacted, administrators and/or teachers will be asked to identify students who receive reading instruction in special education classrooms who have diagnoses of IDD or an IQ score between 40-70 and adaptive behavior needs. Because the proposed project explores instruction for students with IDD, we will identify eligible students using the KBIT-2 to confirm IQ. Due to the common identification of young students with IDD receiving services under other eligibility categories (e.g., developmental delay, autism spectrum disorders) and variability across districts, I anticipate some discrepancies between school-identified students with IDD and our sample. Thus, I will screen to identify a final sample of 100 students in the present study and take secondary disability categories into consideration during analyses.

Teachers will complete demographic questionnaires for themselves and participating students. Items will address teaching experience, certification, schoolwide systems of support, knowledge of reading development and instruction, and beliefs surrounding reading instruction for students with IDD. Other measures are direct assessments of students' cognition, language, behavior, and achievement, as well as if they receive services for secondary disability categories. The measures are described in the following sections. Figure 2 outlines timing of measures.

Student Measures

Prior to observation, student participants will complete a brief (~45 min) assessment battery, split over two consecutive sessions. In line with previous research (e.g., Allor et al., 2014; Allor et al., 2018), students with IQ scores between 40-70 will be eligible for inclusion in the study. Eligible students will complete additional measures of language, behavior, and reading during the same assessment period and each spring. Finally, we will review individual education programs (IEPs) for data on students' goals, supports, modifications, and related services. Student variables are described below.

Cognition. We will administer the KBIT-2 (Kaufman Brief Intelligence Test, Second Edition; Kaufman & Kaufman, 2004) as a screening measure to confirm IQ. An individually administered intelligence test of verbal and nonverbal abilities, the KBIT-2 comprises three subtests: Verbal Knowledge (select a picture to match a definition), Riddles (select a picture that fits a description of function and/or form), and Matrices (select a picture that thematically aligns with a given item). The emphasis on non-verbal response and brief nature of the measure appropriately accommodate language and behavior characteristics of individuals with IDD. The KBIT-2 reports internal consistency of .93. Scoring and ceiling rules will be applied according to the administration manual.

Language. As students with IDD may be at greater risk for language difficulties, we will assess language abilities using two untimed measures. Language assessments will include the

Word Comprehension (expressive vocabulary) and *Phonological Awareness* subscales of the WRMT-3 (Woodcock, 2011). In the word comprehension task, students provide a synonym or antonym for a stimulus word. The Phonological Awareness task requires students to match words by first sounds, final sounds, identify rhyming words, blend words, and delete sounds from words.

Behavior. Teachers will use the Developmental Behavior Checklist-Teacher, 2nd Edition (DBC2-T, Gray et al., 2018) to rate students' social and behavioral development as they relate to learning. Specifically intended for teachers to evaluate students with intellectual and developmental disabilities, the 92-item online measure includes five subscales: Disruptive, Self-Absorbed, Communication Disturbance, Anxiety, and Social Relating. DBC2-T takes approximately 20 min to complete, and is appropriate for educational or research purposes. Internal consistency for the previous edition of the DBC ranges from 0.61 (Anxiety) to 0.91 (Disruptive) (Dekker et al., 2002).

Reading. We will administer a comprehensive assessment battery in fall and spring to evaluate students' abilities in phonological awareness and reading. We will also administer five monthly progress monitoring probes following observation. Timed and untimed measures used in the project are described in the following sections. We will collect these data directly from students, to ensure consistency and comparability across participants, as not all students with IDD receive progress monitoring, and schools may be using different measures.

Curriculum-based measurement (CBM). CBM assessments were selected to evaluate participants' reading performance, on account of their brevity and intended purpose to inform teaching decisions about instructional content and methods. Raw scores are reported for all CBM measures; except where otherwise noted, raw scores reflect number of correct items provided in one minute. *Onset Sounds* (OSF; Christ, 2018) will be used to measure fluency in PA. Students hear a list of words and are asked to identify the initial sound of each word. *Letter Sounds* (LSF; Christ, 2018) is a phonics measure requiring students to listen to a list of letters and identify the sound for each. *Letter Names* (LNF; Christ, 2018) requires students to identify the names of letters in the alphabet presented in a random order. *Word Identification Fluency* (WIF; Fuchs et al., 2004) is a measure of word reading in which students read a list of words aloud, sampled from the Dolch pre-primer, primer, and first-grade level lists. An *Oral Reading Fluency* task (ORF; Christ, 2018) will be administered to students who identify words on the WIF task. In the ORF task, students read a short passage aloud for one minute. Raw scores reflect the number of words read correctly within one minute. Internal consistency reliability estimates (median values) for FastBridge reading measures are reported at .87 for OSF, .98 for LSF and LNF, and .91 for ORF.

Standardized reading assessments. Reading and listening comprehension tasks were drawn from two untimed subtests of the Woodcock Reading Mastery Test-3rd Edition (*WRMT-III*; Woodcock, 2011). In the *Passage Comprehension* subtest, students read a series of prompts and say the best word to complete each sentence. In the *Listening Comprehension* subtest, students listen to prompts and provide the word that correctly completes the sentence. For both WRMT-III measures, items begin with illustrated supports and increase in difficulty. Raw scores reflect number of items correct. Internal-consistency reliability for both WRMT-III tasks ranges between .87-.91. For all standardized reading assessments, scoring and ceiling rules will be applied according to the administration manual. We will administer WRMT subtests each fall.

Other covariates. Prior to observation, we will collect additional data on students' individual instructional needs that may also be related to their reading achievement. We will review participants' IEPs to report secondary disability categories, goals, adaptations and modifications, and related services. These include students' use of AAC, percent of instructional time spent in general education settings, whether they receive services under a secondary disability

category, and whether other languages are spoken in the home. We will report these descriptively and use them as student-level covariates in our model.

Figure 2. Timing of measures.

		Study Phase					
		Screening/ Pre-Test (Sept-Oct)	Progress monitoring (Nov-Apr)	Post-Test (Apr Y1)	Follow- Up 1 (Apr Y2)	Follow- Up 2 (Apr Y3)	Follow- Up 3 (Apr Y4)
Child Measures	KBIT-2: VK, Riddles, Matrices	X					
	WRMT-III: WID, LID, WA, WC, PA	X		X	X	X	X
	FastBridge LSF, OSF, LNF, ORF		X	X	X	X	X
	WIF		X	X	X	X	X
	DBC2-T	X					
	IEP review	X					
Teacher Measures	Knowledge & Perspectives	X					
	Instructional Practices (self-report)	X					
	ICE-RTI (observation)		X				

Teacher measures

Prior to observation, we will survey teachers on their knowledge and beliefs regarding reading instruction for students with IDD, their self-reported instructional practices during reading instruction for students with IDD, and various demographic variables. The survey should take no more than 30 min to complete on Qualtrics. Lehigh has an institutional membership with Qualtrics and an onsite librarian specialized in Qualtrics that would facilitate survey data collection and analysis. The teacher-level measures are described in the sections ahead.

Teacher knowledge and beliefs. Prior to observation, teachers will complete surveys on their knowledge of research-based reading instruction and behavioral support for students with IDD. We will collect these data using an adapted form of the **Knowledge Assessment for Preservice and Inservice Educators: Structure and Language** questionnaire (Bos et al., 2001). Scores represent number of items correct out of 20. Bos et al. (2001) report internal consistency at $\alpha = 0.60$. Teachers will also respond to questions on their views on explicit (EC, 6 questions,) and implicit code (IC, 6 questions) instruction and their views on the appropriateness of academic goals for students with IDD using a version of the **Teacher Perceptions of Early Reading and Spelling** (DeFord, 1985; adapted by Bos et al., 2001; see Appendix F for the original version of both measures). Bos et al. (2001) report internal consistency reliability (Cronbach's α) of their version at 0.70 (EC subscale) and 0.50 (IC subscale). Dr. Stephanie Al Otaiba will provide mentorship on adapting the measures to reflect characteristics of students with IDD and current best practices (e.g., Foorman et al., 2016). Additional questions will address pre-service and in-service training in reading instruction and behavior management strategies.

Self-reported practices. In the survey, teachers will describe their reading instructional practices, time allocation, and decision-making processes regarding instruction. They will estimate their time allotted to various content and use of evidence-based reading instructional practices, to allow statistical comparison of planned instruction in relation to observed instruction. I developed this questionnaire for use in the pilot study and will work with Dr. Al Otaiba to further adapt it for the proposed project.

Instructional content and emphasis. Students will be observed over three consecutive reading blocks. RAs will code observed instruction using the Instructional Content Emphasis – Response to Intervention (ICE-RTI; Edmonds & Briggs, 2003). The ICE-RTI is an updated version of the ICE-R (Edmonds & Briggs, 2003) used to record and code reading instruction. Data include multidimensional descriptions of curricular content, student grouping structures, instructional materials, student engagement, and instructional quality. We will follow procedures from previous studies using the ICE-R to establish reliable data collection (see Swanson & Vaughn, 2010; Wanzek et al., 2016). That is, RAs will exceed 90% interobserver agreement with the PI on sample videos (i.e., gold standard approach; Gwet, 2001) prior to classroom observations. Trained observers will code reading instructional content along two dimensions: Dimension A describes observed instructional content category (e.g., phonics) and Dimension B identifies more precisely the activity within that category (e.g., blending and segmenting phonemes).

Other dimensions of the ICE-RTI describe instructional grouping structures and materials, engagement, and instructional quality. Student engagement is a Likert-type rating of student on-task behavior during a given instructional activity (1 = *low quality*; 4 = *high quality*). Instructional quality Likert-type ratings are assigned to individual instructional events depending on pre-determined criteria (e.g., explicit instruction). Because we will code instruction at the individual student level, we have adapted the engagement and quality rating metrics to reflect instruction provided to individual students during observed instructional activities, as I did in the pilot study of a similar sample (Lindström, 2017), rather than class-wide ratings. This will allow greater precision in examining these variables in relation to individual and small group differentiated instruction. We will calculate interobserver agreement on at least 25% of sessions selected at random, to ensure reliability of ICE-R findings. See *Procedural Fidelity* for more information about interobserver agreement.

Mediators and moderators. In this study, I am exploring the role of teachers' instructional content emphasis and practices as a potential mediator of the relation between their knowledge and beliefs and student reading growth, as well as a potential mediator of the relation between student pre-test abilities and their reading growth (see Figure 1). Additionally, I am proposing four student-level moderators and two teacher-level moderators of the associations between instruction and reading growth. We will examine student IQ (KBIT-2), social behavior (DBC-2), pre-test reading ability (WRMT-III Word ID), and time spent in general education as covariates in the model of instructional practices. Both teacher-level moderators (i.e., foundational reading knowledge and perceptions of reading instruction) will be based on measures adapted from Bos et al. (2001). All potential moderators and mediators are continuous variables.

Procedural fidelity. With my project coordinator, I will train assessors on all measures and provide feedback prior to assessing any participants, to ensure fidelity of procedures and validity of the constructs in this Exploration project. I will use a procedural fidelity checklist with each assessment to train, evaluate, and monitor the consistency and quality of assessment or observation session. Testers will use the checklist as a guide to practice administering measures; they will be required to achieve at least 90% fidelity before assessing participants. Any discrepancies from the

checklist will be addressed, retrained, and retested. All assessment sessions will be audio recorded. To monitor assessment fidelity, I will randomly select 25% of sessions, and RAs will listen to recordings and conduct independent fidelity checks. If fidelity falls below 90% for an RA, I will provide additional training to meet or exceed 90% fidelity prior to further assessments. In regards to classroom observation fidelity, I will train RAs on observation methods to over 90% fidelity on example videos prior to live observations. Any discrepancies from the fidelity checklist will be addressed, retrained, and retested. All observation sessions will be audio recorded; 25% of observation sessions will be randomly chosen for double coding and scored for interobserver agreement.

Data Collection Procedures

Assessment. For each student participant, we anticipate 45-60 min of assessment per pre-test battery (split across two sessions if needed to reduce fatigue), 5 min per progress monitoring session, and 45 min each per post-testing and follow-up. This is due to the pre-test control measure of intelligence (KBIT-2) and the pre-test achievement assessments (WRMT-3). We are fully prepared for this level of assessment by including in our budget three full-time graduate RAs (20 hours each per week) in Years 1-3, one full and one half-time graduate RA in Year 4 (combined 30 hours per week), and PI research time (32% FTE). Thus, with support from IES, my department, and my research lab, we are well equipped to execute this assessment schedule. Given the RA support proposed in this project and the RA already assigned from my department throughout my pre-tenure period, we have the capacity to assess participants for the proposed study.

Observation. Each student participant will be observed on three consecutive days during their entire reading block (approximately 45-120 min per session), as identified by the special education teacher. As we anticipate students with IDD to experience different pacing of instructional content, as compared with peers, consecutive observations will allow description of typical instruction in a short period of time. Because observed lessons will be audio recorded, only one RA is needed for in vivo student observation sessions. At least 25% of the sessions will be randomly selected for double coding by a second RA, using the audio recording, to limit intrusiveness of the research team to the classroom environment and possible Hawthorne effects. Again, with the support from IES, my department, and my research lab, we are well equipped to execute this observation schedule.

Data Analysis

To address **RQ1**, I will use survey and observation data from teachers. I will report observation findings descriptively, summarizing reading instructional content, grouping, materials, and practices occurring in special education classrooms with students with IDD in grades 1-4. I will also report survey findings descriptively, including self-report of content emphasis.

We will address **RQ2** in two parts. First, I will examine school-year growth following an ANCOVA approach (controlling for beginning of year scores when predicting end of school year gains). ANCOVA is a highly powered approach. Second, I will use multilevel modeling to analyze progress monitoring data under the guidance of consultant Dr. Jessica Logan. To address RQ 2a, Understanding the amount of growth that can be expected for students with IDD, we will fit a multilevel growth model to the monthly progress monitoring data (i.e., Fastbridge). Question 2b will explore what characteristics of reading instruction are related to children's growth, by adding predictors to the multilevel growth model.

To address **RQ3**, I will conduct moderator and mediator analyses to determine the nature of the association between student- and teacher-level covariates, teachers' instructional content and practices, and student growth. As with RQ2, I will conduct these analyses under the guidance of Dr. Logan.

Power analysis

We used a Monte Carlo simulation in Mplus to conduct a power analysis to estimate the minimum effect sizes detectable by our model. The simulation assumed an autoregressive relation of .60 from pre- to initial post-test, and that correlations among the independent variables of (a) teacher knowledge and content, (b) student variables, and (c) instructional content and practices were .20 (an underestimate; larger correlations would likely increase power). Focusing on relations among the student-specific variables, with 100 students, the model is powered $> .90$ to detect an effect of $d = .40$ between predictor variables (a-c) and the outcome, and slightly underpowered (power = .75) to detect an effect of $d = .30$ for those same relations.

Standards for Excellence in Education Research (SEER) Principles

The high-quality design proposed meets the IES SEER principles. We will: (a) pre-register research and analysis activities in a recognized study registry, thus also meeting career development goals related to open science; (b) ensure sample size with adequate statistical power (see above); (c) use intentional sampling procedures to ensure generalizability to the population; (d) document attrition and account for differential attrition in analyses, as necessary; (e) assess fidelity of assessment using technically adequate instruments; (f) use a range of outcome measures that are psychometrically sound; (g) assess student performance before and after observations; adjust for multiple comparisons when estimating effects; and (h) examine moderators and mediators as outlined in Theory of Change (Figure 1).

Plan for Dissemination – See Appendix A

C. CAREER PLAN

Mentors and Meetings. Experienced researchers at UT-Austin, Lehigh University, and Southern Methodist University have agreed to be my mentors for the duration of the project.

Dr. Elizabeth Swanson will provide **primary mentorship** throughout the duration of the project. Dr. Swanson has extensive experience in research related to observation studies, special education, reading intervention, and teacher preparation. She has a strong record of externally funded research and publications in prestigious journals. She has served on several large-scale, IES-funded projects aimed at improving literacy outcomes for students with and without disabilities. As primary mentor on the proposed project, Swanson will provide ongoing guidance on (1) content and methodological decisions pertaining to the study, (2) identifying appropriate outlets for dissemination, (3) using study data to inform development of future intervention research via a Development and Innovation proposal, and (4) general grant management via monthly meetings and a biennial visit.

Dr. Lee Kern will serve as my **onsite co-mentor**. Dr. Kern has served as my faculty mentor since I began in my position at Lehigh. Dr. Kern's mentorship in the proposed project will help me enhance my research methodology skillset, content and measurement knowledge in the area of classroom behavior, familiarity with Lehigh resources to support research, relationship building with local schools, and general management of grant-related responsibilities. Through monthly meetings, her mentorship will support my skill development pertaining to (1) grant management in relation to IES and to Lehigh, (2) content and methodological knowledge in

measuring disruptive classroom behavior and classroom management, (3) project and team management and development, and (4) general professional responsibilities related to the position of an assistant professor at Lehigh University. Kern has agreed to provide support my grant writing goals in preparing a competitive Development and Innovation proposal.

Dr. Stephanie Al Otaiba will also be serving as a **co-mentor**. Dr. Al Otaiba's mentorship will help me develop my skillset on research methodology in reading intervention for students with IDD, longitudinal designs, and general management of grant-related responsibilities. Developing my line of research pertaining to reading instruction for students with IDD will especially benefit from Dr. Al Otaiba's mentorship on this project. Through quarterly meetings and a biennial visit, Dr. Al Otaiba will provide ongoing guidance regarding (1) project content and methodology, (2) adaptation of materials and procedures to reflect the varying instructional needs of students with IDD, (3) transparent research practices, and (4) general grant management. Near the conclusion of this project, Dr. Al Otaiba has also agreed to support me in preparing a competitive Development and Innovation proposal.

I will hold *monthly phone/zoom calls* and in-person visits with Dr. Swanson at UT-Austin in Years 1 and 3. I will hold quarterly phone/zoom calls and in-person visits with Dr. Al Otaiba in Years 2 and 4. Dr. Kern has agreed to meet with me weekly to discuss the project. Weekly and quarterly meetings will include an agenda of project updates, discussion items, and upcoming events. These meetings will allow for mentors to offer guidance on challenges related to the project and feedback on decisions I have made. These meetings are intended to address my goals to improve my grant management skills and establish an independent line of research in this area. After each meeting, I will email meeting notes to all mentors, document progress, and clarify our respective responsibilities. My offsite mentors have agreed to host me at their sites for biennial visits. On these visits, I will meet with Dr. Swanson (Years 1, 3) and Dr. Al Otaiba (Years 2, 4), respectively, to discuss the project and any unexpected challenges. In addition, they will arrange for me to meet with their colleagues who share related research interests and may provide additional perspectives and feedback. These activities will help me to accomplish my goals to enhance my communication and collaboration skills with researchers and districts. Finally, I will seek guidance from Drs. Swanson, Kern, and Al Otaiba on plans for disseminating ongoing findings via manuscripts and conference presentations. All have agreed to read and provide feedback on all manuscripts prior to submission for publication, and to support my preparation of a competitive Development Innovation proposal stemming from the project. See integration of activities for the proposed career development and research plans in Figure 3 below.

Consultant

In addition to the guidance provided by the mentors, **Dr. Jessica Logan** will provide **consultation** to benefit the successful execution of the project and my professional development. Dr. Logan brings strong *methodological and content expertise* to my Career Development Plan. Dr. Logan's research spans the fields of education, child development, research methods, and statistical innovation, with goals to better understand children's learning and inform best practices in statistical methodology. Her expertise in longitudinal data analysis will provide necessary support in research design and analysis for the duration of this project and help me to achieve my professional development goal to enhance my knowledge of these analyses. In addition to sharing minutes from meetings with mentors, I will communicate quarterly with Logan via phone/zoom to evaluate decisions regarding (1) design, (2) data collection, (3) open science practices, and (4) longitudinal analysis. In addition, we will meet at the Society for Research in Child Development biennial meetings. In the fourth year of the project, she will provide support in data cleaning and

analysis. Dr. Logan’s consultation will help ensure the methodological rigor necessary for the proposed work. Via quarterly phone/zoom meetings, I will seek Dr. Logan’s guidance on important decision-making points relative to longitudinal design and analysis with multiple cohorts.

Figure 3. Integration of Career Development and Research Plan

			RESEARCH PLAN											
			Year 1 Train RAs			Year 2 Train RAs			Year 3 Train RAs			Year 4 Train RAs		
			Recruit Cohort 1 Assess Time 1 Observe Assess Time 2			Recruit Cohort 2 Assess Time 1 Observe Assess Time 2 Follow up Cohort 1			Recruit Cohort 3 Assess Time 1 Observe Assess Time 2 Follow up Cohorts 1, 2			Follow up Cohorts 1, 2, 3 Clean final dataset and conduct analyses		
			Fall	Spring	Summer	Fall	Spring	Summer	Fall	Spring	Summer	Fall	Spring	Summer
CAREER DEVELOPMENT PLAN	Mentoring	Meetings with Swanson	X	X	X	X	X	X	X	X	X	X	X	X
		Meetings with Kern	X	X	X	X	X	X	X	X	X	X	X	X
		Meetings with Al Otaiba	X	X	X	X	X	X	X	X	X	X	X	X
	Content	SRCD Biennial Meeting (Logan)					X						X	
		APA Annual Convention			X									
	Methodology	Meetings with Logan	X	X	X	X	X	X	X	X	X	X	X	X
		UT-Austin Summer Stats Institute			X									
		ICPSR Workshop									X			
		Statistical Analyses (Logan)				X			X			X		
	Open Science	Lehigh Open Science Workshops		X						X				
		Open Science MOOC					X							
	IES	Annual PI Meetings		X			X			X			X	
Development & Innovation Proposal												X	X	

Additional Training and Career Development

As I access and learn from project mentors and consultants, I will also seek additional opportunities to build my expertise in school-based developmental research, transparent research practices (i.e., open science), and statistical methods (i.e., longitudinal analysis). I will attend two leading conferences in the area of developmental psychology (American Psychological Association; Society for Research in Child Development). The conferences will facilitate my

understanding of the latest research in reading development and provide ample opportunities for professional networking in a broader setting beyond special education.

To learn more about transparent research practices, I will enroll in *Transparent and Open Social Science Research*, a massive open online course (MOOC) sponsored by University of California – Berkeley Institute for Transparency in the Social Sciences. The course will focus on engaging in open science practices, including preregistration of studies, posting pre-prints of manuscripts, and other methods of sharing findings with broader audiences. These principles are aligned with the IES Standards for Excellence in Education Research (SEER). I will review materials specific to education and developmental research, when possible, including guidelines from the Society of Research on Child Development for improving replicability and transparency (Binion et al., 2019). I look forward to learning more, specifically, about how to engage in open science practices (e.g., data sharing) while protecting the confidentiality of participants in this low-incidence population. I will seek the guidance of the Lehigh Librarian specializing in open science practices, attending regular workshops and scheduling individual meetings as needed.

To develop my methodological abilities, I will attend two intensive methods workshops during Years 1 and 3 of the project. One will be from the UT-Austin Summer Statistics Institute, providing a foundation for the second advanced workshop. The second workshop is offered by Inter-University Consortium for Political and Social Research (ICPSR), focused on longitudinal analysis. This workshop will allow me to build my methodological knowledge to address research questions in the dataset resulting from the proposed project, as well as designing future studies.

Visits to mentors' sites in Years 1-4 will contribute to my professional development goals pertaining to school-based developmental research. On these visits, I will meet with my respective mentors to discuss the project, visit their labs, and meet with colleagues who have related expertise and interests. I will see firsthand various models for managing and executing multiple federally funded studies; these models will then inform my development as a scholar. I will attend the annual PI meetings to meet with other IES grantees and staff, per the requirements of the Early Career Development and Mentoring Request for Applications.

Content and Methodological Expertise

My content expertise in reading instruction for students with IDD will benefit from the support of my mentors, in particular Drs. Swanson and Al Otaiba. Their extensive experience with large-scale school-based reading interventions for struggling readers make them highly qualified to provide the supports needed for me to grow in this area. They both have considerable experience in educational psychology, special education, and teacher preparation. I will actively seek their guidance in issues related to these topics, as they arise in the project, and in establishing my independent line of research more generally. They will be instrumental in identifying appropriate mechanisms for project implementation, as well as research questions to be addressed from the data collected in the project. Dr. Al Otaiba's expertise in reading instruction for students with IDD, including federally funded research projects, provides many advantages to my research and professional development goals, as she will guide me in selecting and adapting materials and making procedural decisions to reflect the developmental and logistical characteristics of reading research with this population.

Grant Activities - IES Development and Innovation Proposal

One goal for the proposed project is to identify malleable factors in the (a) teachers' instructional practices during reading instruction for students with IDD, and the (b) reading development of students with IDD. The observation and student assessment components of the proposed study will enable identification of these malleable factors. With these findings, I plan to develop an

intervention that targets the specific abilities and needs of students with IDD. All of the mentors have extensive grants experience with IES and other federal funding agencies, and they have offered their support in preparing a competitive Development and Innovation proposal during Year 4 of the project.

D. PERSONNEL

Esther Lindström, Ph.D., Principal Investigator (PI; 32% FTE calendar year (12 months); Years 1-4) is Assistant Professor of Special Education and co-director of the Promoting Academic School Success Lab at Lehigh University. She received her doctoral degree from Vanderbilt University (Advisor: Christopher Lemons) in education and human development in August 2017 from the Department of Special Education at Peabody College. Her doctoral program focus centered on reading instruction for students with high-incidence disabilities and IDD. She has received awards and honors such as the Peabody College SEE Award. Dr. Lindström has secured over \$60,000 in research funding, has 1 first-authored and 8 co-authored peer-reviewed journal articles, and 4 articles under review. She has over 30 peer-reviewed conference presentations, is on the Editorial Board of *Assessment for Effective Intervention*, *Learning Disability Quarterly*, and *Intervention in School and Clinic* and reviews ad-hoc for *Learning Disabilities Research & Practice*, *British Journal of Educational Psychology*, *Reading and Writing Quarterly: An Interdisciplinary Journal*, and *Journal of School Psychology*.

Graduate Research Assistants (Three RAs; 100% Years 1-3; 2 @ 100%, 1 @ 50% Year 4). Three graduate research assistants (RAs) will assist with research activities. One RA will primarily be responsible for coordinating research activities. This individual will provide assistance in (a) conducting research observations; (b) preparation of training, assessment, and fidelity materials; (c) recruitment of participants and scheduling of assessments/observations; (d) coordination of training activities; and (e) data entry and management. Two additional RAs will assist with implementation of research activities including data collection, entry, and management. In Year 4, project activities will require less RA support, so one of the RAs will decrease to half-time (i.e., 10 hrs/wk) on the project (see Budget for details).

Primary Mentor. Elizabeth Swanson, Ph.D., (Years 1-4, 5% FTE, contributed \$1500 honorarium) is a Research Associate Professor at UT-Austin, has been PI or Co-PI on several externally funded research and training grants, having secured over \$31 million in education research funding. She is currently PI of an IES funded Efficacy project evaluating a content-specific, distributed professional development model featuring STRIVE, a set of vocabulary and reading comprehension instructional practices designed for use in 4th grade social studies classrooms that include students with disabilities. The large scale RCT was conducted with more than 200 teachers in 80 elementary schools. On this and other large-scale research projects, Swanson has mentored numerous students, postdoctoral fellows, and junior faculty, and they have assumed leadership roles to obtain their own funding. Dr. Swanson's expertise in school-based reading research (intervention, observation, and professional development) will be valuable in supporting the research design, implementation, and data analyses via monthly calls and meetings in Years 1 and 3.

Co-Mentor. Lee Kern, Ph.D., (Years 1-4, 5% FTE, contributed \$1500 honorarium) professor of Special Education at Lehigh and director of the Center for Promoting Research to Practice, has a strong history of federally funded research and training projects, totaling over \$25 million. She is currently PI of a Development and Innovation study focused on Supported College and Career

Readiness (SCCR) for secondary students with emotional and behavioral problems. She is a Co-PI on an IES-funded Efficacy study evaluating efficacy of parent delivered early intervention for young children at-risk for ADHD. Her experience with federally funded grants and expertise in behavioral supports for students with disabilities will greatly benefit the proposed project. She will provide guidance in recruitment, grant management, implementation, and dissemination.

Co-Mentor. Stephanie Al Otaiba, Ph.D. (Years 1-4; 1% FTE; contributed \$1500

honorarium). Dr. Al Otaiba is Patsy and Ray Caldwell Centennial Endowed Chair in Teaching and Learning of Teaching & Learning at Simmons School of Education at Southern Methodist University. She is currently PI on Project FOCUS, an IES Exploration study examining instructional content and practices for students receiving Tier 3 and special education. The project aim is to identify malleable factors related to reading success in Tier 3 and special education, using observation research and other methods. She is also Co-PI on Project Intensity, a replication study of a reading intervention for elementary students with IDD, and an NIH-funded study assessing the efficacy of integrating mindset training into reading intervention for at-risk learners. She has a strong history of external funding from IES and other agencies, totaling over \$60 million. Dr. Al Otaiba will draw on her expertise in reading research (intervention and observation) to support the PI in research design (particularly in relation to instructional needs of students with IDD), adapting materials to reflect the sample and research questions, data analysis, and dissemination.

Mentorship team experience mentoring early career researchers.

All mentors have substantial experience mentoring graduate students and early career scholars through formal and informal mechanisms throughout their careers. All have chaired and/or served on numerous doctoral dissertation committees. Dr. Swanson currently serves as a mentor on an IES-funded postdoctoral training grant. Dr. Kern recently served as a mentor on an IES Early Career project, providing guidance pertaining to content, methodology, and grants management. All have experience co-authoring publications with students and early career researchers. Drs. Al Otaiba and Kern have served as formal mentors for faculty at their institution, providing support on institutional mechanisms and professional development during the pre-tenure period. Finally, Dr. Al Otaiba is an ambassador for POWER, an organization committed to mentorship and support of women in education research. All mentors have agreed to support me in preparing a competitive Development and Innovation proposal at the end of the proposed project.

Consultant. Jessica Logan, Ph.D. (Years 1-4, 1% FTE, contributed \$1600 honorarium). Dr.

Logan is an assistant professor in the Department of Educational Studies at The Ohio State University (OSU). Logan has expertise in research related to statistical methodology, language and literacy intervention, and child development. Her content and methodological expertise are well matched to guide the project. She has served as Co-Investigator on several IES-funded research projects related to early literacy development and instruction, including an IES-funded project titled Efficacy of the BrightStart! Program for promoting the emergent literacy skills of prekindergarten children at risk for reading difficulties. The purpose of this project is to test the efficacy of the Nemours BrightStart! program for prekindergarten children who need additional support in order to enter kindergarten with emergent literacy skills in alignment with their peers. In addition to her own work, she has supported numerous students and early career faculty in their research. Dr. Logan will support the PI in research design, data management, analyses, and open science practices.

Note: For all Personnel, please see attached Biosketch documents for more information on Current/Pending research funding and accomplishments.

E. RESOURCES

I have excellent resources to support the completion of this project from the university, college, department, community, and others. Lehigh is a well-established research institution that contributes to the Lehigh Valley community by partnering with local community centers and schools. The Lehigh College of Education (COE) has a unique partnership with school districts through the Lehigh University School Study Council. I have space for data entry, coding, analysis, and training through the COE and Center for Promoting Research to Practice. My office in the COE has all the necessary office equipment to carry out a research program (phones, copying and printing facilities, computer and network support). Lehigh's COE Research Program Development Office and Finance Office handle all pre- and post-award activity, including monthly budget reports and coordination with the Lehigh Office of Research and Sponsored Programs and federal funding agencies. From the community, I have the confirmed support of Bethlehem Area School District and Bucks County IU, who are interested in supporting this work. Parkland School District also expressed interest in my previous application and would likely be interested in the future. I have direct connections with both districts' administrative offices, and they are committed to improving their students' reading outcomes through collaborating on this research. On my end, I have one committed doctoral student who is a former elementary special education teacher, an RA assigned for 10 hrs/wk through my pre-tenure period, and a motivated team of education and psychology students. Finally, I have a very experienced and knowledgeable team of mentors who are enthusiastic about the proposed project.

Lehigh University. Lehigh University is a comprehensive doctoral university within the high research activity category by the Carnegie Institute rankings. In the past five years the COE has received funding from USDOE, NIMH, and NSF totaling over \$36 million. In addition, the Office of Sponsored Research and Programs within the Vice President for Research's office will also offer ongoing management and oversight support to the project, as well as workshops on pursuing external funding, navigating IRB authorization. The PI has designated office space with computers, relevant hardware and software, printers, telephones and locking filing cabinets. Library and Technology Services (LTS) currently has 545 available computers.

College of Education. The proposed project will be located in the Lehigh COE. Lehigh has the resources associated with a research institution. Lehigh's COE leads the five colleges at Lehigh in securing external funding, and is ranked 56th by US News & World Report (2021) as one of the nation's top graduate programs in education. All faculty members have offices and appropriate technology to conduct their work. The COE track record of securing external funding and providing resources for faculty to successfully complete federally-funded projects provides ideal context and support (e.g., established PIs, Office of Research and Sponsored Programs) for this proposed project. The COE commitment to research support is also facilitated by Dr. George DuPaul, Associate Dean of Research. Resources from Dr. DuPaul's office include guidance on establishing partnerships for multisite research, seeking and securing external funding, and disseminating findings through research- and public-facing outlets.

Center for Promoting Research to Practice. This proposed project will be housed within the Center for Promoting Research to Practice (CPRP), funded by four legislative initiatives from the U.S. Congress. CPRP has successfully competed for \$31 million in funded projects over the past

6 years. Led by proposed project mentor Dr. Lee Kern, the Center focuses on implementation science with an emphasis on bringing school-based research findings into practice. This focus aligns well with the aims and scope of the proposed career development plan and associated research project. Both the COE and CPRP maintain strong collaborative links across school districts in the region and state, and substantial cross-institutional collaborations. Additionally, resources available from within CPRP that are significant and appropriate to the conduct of the work include office space for research assistants, an assessment library, computers, telephones, and other supports for study staff, such as data collectors. CPRP also provides a range of expert colleagues involved in research including potential statistical analysis consultation, as necessary.

Intermediate Units (IUs). The PI will recruit participants primarily through Pennsylvania's Intermediate Unit (IU) network. Regional IUs operate across school districts to provide educational services, including IDEA-mandated special education services, to students with and without disabilities. In some cases (such as partnering organization Bucks County IU), the intermediate unit is the sole provider of special education services. In addition to direct student services, IUs provide training and technical assistance to districts, schools, and educators.

Lehigh University School Study Council (LUSSC). The LUSSC will provide useful resources for additional recruitment, including access to approximately 40 districts in the Lehigh Valley and surrounding area. Communication will occur primarily via monthly meetings at the Lehigh COE.

Center for Community Engagement. Lehigh's Center for Community Engagement (CCE) will provide additional support in recruitment and support of school partners. CCE promotes and publicizes projects that are purposeful in community engagement. CCE will lead workshops for project personnel to engage schools and other stakeholders meaningfully to build mutually beneficial research partnerships. These workshops will benefit the project as it is occurring and directly support the professional development goals of the PI.

Lehigh Promoting Academic and School Success (PASS) Lab. The proposed project will have full access to the resources of the Promoting Academic and School Success Lab within the College of Education. As co-director of this lab, I will have access to affiliated school districts. Through the PASS Lab, I will recruit and supervise research opportunities for graduate students in school psychology and special education. I will recruit high-quality research assistants for the duration of the proposed project. This lab will provide a successful infrastructure to house the proposed research plan and career development activities.

Lehigh Valley Reads (LVR). The PI is active on the higher education subcommittee of the Lehigh Valley Reads campaign, an initiative to promote reading proficiency for all students in the Lehigh Valley by grade 3. LVR brings together various stakeholders, including community members, service providers, researchers, educators, family members, volunteers, and staff from United Way of the Greater Lehigh Valley and PBS39 for the shared mission to improve quality of life for local children through improved literacy. Tracy Smith, Assistant to the Superintendent of Parkland Schools, and Dr. Jack Silva, Assistant Superintendent & Chief Academic Officer for BASD, both serve on the steering committee and have offered their support of the project (Smith in 2019, Silva in 2020; see Appendix E). LVR provides a platform to recruit community and school partners for participation in the proposed project, and to disseminate study findings to the local community.

Bucks County Intermediate Unit (Bucks IU), Bethlehem Area School District (BASD), and Parkland School District (PSD). The research will be conducted in one multi-district intermediate unit and two districts in the Lehigh Valley. Bucks County is home to more than

96,000 public and private school students, in over 270 schools, served by more than 9,000 educators. Bucks IU is the non-competitive, sole source provider of IDEA-mandated special education services to students with disabilities across Bucks County as contracted through the individual school districts. As part of their educational services, Bucks IU operates special education classrooms across districts in Bucks County. The Bucks County community is 86.6% white, 4.4% Latino, 4.1% Asian, and 3.9% Black. PSD serves over 9,000 students in 11 schools. The student body is 65.6% white, 14.3% Hispanic, 12.3% Asian, and 4% black, and 25% of students qualify for free or reduced-priced meals. BASD is the sixth largest school district in the Pennsylvania Commonwealth, with an enrollment of approximately 14,000 students across 22 schools. The student body is 42.6% white, 40.6% Hispanic, 10.8% black, and 3.5% Asian, and 59% of students qualify for free or reduced-priced meals. BASD and Parkland are both active on the Lehigh Valley Reads initiative, committed to reading proficiency for all students by grade 3.

POWER - Providing Opportunities for Women in Education Research. Consultant Dr. Jessica Logan is a founding member and chair of the communication committee, co-mentor Dr. Stephanie Al Otaiba is an ambassador, and Esther Lindström is a member. POWER coordinates virtual and in-person networking opportunities for members, offers resources for professional development, and promotes the professional accomplishments of women in education research.

Open Science. During the course of the project, I plan to develop my knowledge and facility with open science. I will enroll in *Transparent and Open Social Science Research*, a massive open online course (MOOC) focused on engaging in open science practices, including preregistration of studies, posting pre-prints of manuscripts, and other methods of sharing findings with broader audiences. Lehigh University employs a librarian committed to supporting faculty in transparent research practices, leading periodic workshops on the topic. Engaging in these practices will contribute to more meaningful, transformational research as outlined in the IES SEER principles.

Consultation. As outlined in the Project Description, Dr. Jessica Logan is highly qualified to provide necessary guidance to complete the proposed project, complementing the expertise of project mentors. Logan has content expertise in cognitive and literacy development, educational assessment, open science, and advanced educational statistics and research methods. As one area of her methodological expertise is in longitudinal analysis, Logan is well situated to provide support for the proposed project beyond the expertise and guidance of the mentors. Support includes guidance on study design, recruitment, data collection, and analyses.

Resources for Dissemination. The Lehigh Office of Communications and Public Affairs will be a partner in disseminating findings from this research project. The College of Education Director of Marketing and Communications will help to translate research findings into messages appropriate for various target audiences. I will disseminate findings to the general public via the PASS Lab website and twitter account. **Additionally, the following communications methods will be used to reach these target audiences:** (1) the Lehigh College of Education website will feature findings on the Home page, (2) the feature article will be shared via social media, (3) findings will be shared with COE alumni and friends via the COE monthly eNewsletter, and (4) the findings will be shared with researchers at other institutions via Lehigh Research Review, an internationally distributed, annual research newsletter. Relative to broad dissemination, I will submit manuscripts to high-impact peer-reviewed journals and presentations at national conferences. See Appendix A for full dissemination plan.

APPENDIX A. DISSEMINATION PLAN

This section describes my plans to disseminate project findings to various audiences. Proposed publications and communications will reflect the overall purpose of the proposed project: to investigate relations among teacher knowledge and beliefs, their instructional practices, and reading growth of students with IDD. Products and outlets also reflect varying needs, interests, and priorities of the stakeholders. As an Exploration-oriented project, findings will not make claims pertaining to specific interventions, but rather highlight developmental findings, as well as potential areas for further attention in teacher training that may be addressed in future research. The table below summarizes this dissemination plan:

Stakeholders	Products	Potential outlets (examples)
Special education teachers and paraeducators	Summary of project findings	<ul style="list-style-type: none"> • Presentations to Bethlehem Area School District, Parkland School District, Bucks Intermediate Unit teaching staff • Individual consultation with participating educators upon request, following data collection
	Peer-reviewed articles in practitioner-oriented journals	<ul style="list-style-type: none"> • <i>Teaching Exceptional Children</i>; • <i>Education and Training in Autism and Developmental Disabilities</i>
	Presentations at practitioner-focused conferences	<ul style="list-style-type: none"> • Pennsylvania Council for Exceptional Children; • CEC Teacher Education Division; • CEC Division on Autism and Developmental Disabilities
	Informational sessions for Pennsylvania special ed teachers	<ul style="list-style-type: none"> • PaTTAN – Pennsylvania Training and Technical Assistance Network • Intermediate Units
Education researchers	Peer-reviewed research journal articles;	<ul style="list-style-type: none"> • <i>Exceptional Children</i>; • <i>Journal of Special Education</i>; • <i>Child Development</i>; • <i>Scientific Studies of Reading</i>; • <i>Remedial and Special Education</i>; • <i>Teacher Education Special Education</i>
	Presentations at research conferences	<ul style="list-style-type: none"> • Council for Exceptional Children; • Pacific Coast Research Conference; • CEC Division for Autism and Developmental Disorders; • Society for Research in Child Development • American Association on Intellectual and Developmental Disabilities • APA Division 7: Intellectual and Developmental Disabilities / Autism Spectrum Disorder
	Institutional briefs	<ul style="list-style-type: none"> • Institutional social media accounts (twitter, facebook, Instagram) • <i>Lehigh Today</i> newsletter

Families of students	Summary reports of student assessment data	<ul style="list-style-type: none"> • Letter sent to home • Optional meetings with parents to clarify study findings • Focus groups to understand parent perspectives on reading instruction
School administrators	Summary of project findings	<ul style="list-style-type: none"> • Presentations to Bethlehem Area School District, Parkland School District, Bucks Intermediate Unit leadership, Lehigh University School Study Council • Written summary briefs
General public	Press release, summary of project findings	<ul style="list-style-type: none"> • <i>Lehigh Research Review</i> annual publication • Lehigh Communications Office: <i>Lehigh Today</i> electronic newsletter, press releases
	Preregister on open science platforms	<ul style="list-style-type: none"> • Post open-source materials throughout process • <i>OSF</i>, <i>EdArXiv</i>
	Presentations to advocacy groups	<ul style="list-style-type: none"> • American Association on Intellectual and Developmental Disabilities • The Arc (Advocacy organization for individuals with intellectual and developmental disabilities)
	Digital outreach and science communication	<ul style="list-style-type: none"> • Lehigh, College of Education, and PASS Lab social media accounts (twitter, facebook, Instagram) • Summaries posted on Center for Promoting Research to Practice website
	Open Access	<ul style="list-style-type: none"> • Post published manuscripts on <i>Preserve</i>, Lehigh's institutional open-access depository

Summary

This research is intended to inform the scientific community about mechanisms in reading instruction for students with IDD, and by describing the profiles of students who are more and less responsive to intervention. I will seek mentor and advisor guidance regarding appropriate fit with high-impact to ensure that all manuscripts I submit for publication are matched with appropriate, high-impact journals. I will also seek their guidance on appropriate conferences to present both interim findings and final project results (e.g., American Educational Research Association, American Association on Intellectual and Developmental Disabilities, Council for Exceptional Children, Society for Research in Child Development, Society for Research on Educational Effectiveness). Throughout the dissemination process, I will integrate SEER principles with my training on open science to ensure appropriate and transparent practices in the dissemination process and seek guidance from the Lehigh Social Science/Scholarly Communication Librarian, who has expertise in open science.

For participating schools, I will provide teachers and administrators with a practitioner-oriented summary of results. Because I will solicit permission for data sharing with teachers during the consent process, I can generate focused reports based on the results of the assessments and provide teachers descriptive information on their students' literacy skills and strategies to help support reading instruction in the self-contained classroom.

Comments on Proposal Resubmission

This proposal was first submitted to the FY20 competition and received valuable feedback from reviewers that have helped to strengthen the proposal. With the support of my mentor team, I have incorporated feedback from the three reviewers in this resubmission; comments are outlined below (*italicized text*), followed by description of relevant changes. The proposal is responsive to other changes in the FY21 RFA, including an increase of total budget to \$700,000.

A. Significance

I appreciate the reviewers' feedback on the strengths of this proposal, including the critical need to conduct research exploring reading instruction for students with IDD and the connection of the proposed project to the trajectory of my program of research. Reviewers highlighted some items requiring clarification and specification. Reviewer A noted, "While the case is made that there is little in this direct area, there could be greater detail included on related work" and requested explanatory text for the theory of change. Additionally, Reviewer C requested greater clarity and rationale in sampling methods relating to students with below-average IQ and IDD and "unique instructional needs of students with complex communication and support needs."

- In response to Reviewer A's suggestion for more connections to related literature (e.g., students without ID, non-observation studies), I have revised the significance section to provide stronger rationale and context for the proposed project (p. 3-5). Specifically, I have highlighted studies focused on reading growth for students with IDD and their teachers and described their contributions, as well as still unanswered questions. Therefore, in this revised proposal, connections to related studies are now clearer, and the case is stronger for observational research exploring instructional factors that impact the reading performance of students with IDD from a longitudinal perspective.
- In response to a suggestion from Reviewer A, I clarified connections among the theory of change, literature review, and research plan. Explanatory text for the theory of change is now integrated throughout the research plan (p. 6). The theory of change for this project highlights instructional content and practices as *malleable factors* that have potential to impact the reading performance of students with IDD, further delineating theoretical and empirical support for the inclusion of potential mediating and moderating factors (p. 3-5).
- Reviewer C noted concerns related to sample identification. The current proposal focuses on a more cohesive student sample: students with intellectual and developmental disabilities (IDD). This is addressed in the significance (p. 1) and detailed in the research plan (p. 11). Specifically, I have added information about reading instructional practices and development for students with IDD to address the unique characteristics and practices that may be observed in the proposed study. I also distinguish characteristics of students with IDD from peers with more widely-studied disability categories, such as LD (p. 4). The proposed study has the potential to contribute valuable knowledge about current instructional practices for students with IDD. With this in mind, I have provided greater context to my rationale regarding instructional elements related to supporting the specific and varied needs of students with IDD, especially as they manifest in classroom settings.

B. Research Plan

Reviewer A noted that the Research Plan was "quite strong, overall," and Reviewer C noted cohesion between the Research design, research aims, and career development plan. I appreciated this feedback and recognition of various strengths in this section, including project feasibility, clarity of research questions, and use of participant incentives (Reviewer A). All three

reviewers noted the clarity of validated measures. Reviewers B and C agreed that the specificity and purpose for the student measures were clear, and that the dissemination plan was thorough. To strengthen the proposal, Reviewer A requested explicit rationale for the research design. Reviewer B requested details regarding data analysis, exclusionary criteria, and information on ICE-RTI reliability. Reviewer C requested greater consideration of the sample, specifically regarding general education settings, relevance to special education, and group instruction.

- Reviewer B requested more explicit linking of measures and research questions. I have more cohesively integrated the research questions with the rationale, data collection, and analyses proposed. Data analyses are now directly specified and linked to research questions (see p. 16).
- *Sample and design:* I have revised the research plan to provide a clearer and stronger rationale and description for the multicohort, longitudinal design of the study (see p. 10). As Reviewer A inferred, this was a planned part of the study design intended to address two central issues: recruitment and rate of growth. Building a multicohort design allows for recruitment in waves during Years 1-3, whereas the longitudinal element allows for examination of long-term growth, when more immediate measures may not be sufficiently sensitive. This design also allows for a more robust and adequately powered sample (p. 17).
- *Sample:* I have also provided greater detail regarding inclusionary and exclusionary criteria of teachers and students (p. 11). As noted above, I modified the specific eligibility criteria to focus on students with IDD (p. 1, 11), thus excluding “garden variety” struggling readers previously included on account of below-average IQ (Reviewer C). Students who receive all reading instruction in general education will be excluded from the study, as will those who “age out” past 4th grade, and those with hearing or visual impairments or low English proficiency. Teachers who primarily teach in mainstream classrooms will also be excluded. Specifically, I adjusted inclusionary criteria to IQ between 40-70 (previously 80) and adaptive behavior needs and/or receiving special education services under ID, to align with diagnostic criteria and current practices in identifying individuals with IDD (IDEA, 2004). Together, these criteria will allow for greater specificity in interpreting study findings and clearer implications for special education, and increased generalizability to the larger elementary IDD population and their teachers. I also added detail about student characteristics and instructional needs into pre-observation data collection (p.12-13), as I expect to identify associations among complex communication and support needs and instructional content and practices, which may be further moderated by student- and teacher-level covariates.
- *Data collection:* I have clarified methods for ensuring reliable use of the ICE-RTI tool (p. 15) and a clear plan for data analysis (p. 16), as requested by Reviewer B. I plan to train observers to exceed 90% IOA on the adapted ICE-RTI prior to classroom observation, in line with previous studies using the tool (e.g., Wanzek et al., 2016; Swanson & Vaughn, 2010). Data analyses reflects research questions and will involve multilevel growth modeling and analysis of mediators and moderators; in addition to working with a consultant (Logan), I will continue to build expertise in these methods, as outlined in my career development plan (p. 17).
- *SEER:* Reviewer C noted the need for the proposal to explicitly address IES SEER principles. I have added clarification on how my study meets the SEER principles directly in my research plan (p. 17) and how I will use these principles to guide and strengthen the proposed study through research design, replicability, meaningfulness of findings, and

generalizability.

- *Variables*: I have provided more information about the roles of mediators, moderators, and other covariates (including issues specific to students with IDD, as noted by Reviewer C) in my theoretical framework and analyses, to further clarify the study methods and better reflect the complex instructional needs and development of students with IDD (p. 12-13). I will include student-level covariates such as use of AAC, eligibility under a secondary disability category, and time spent in general education as covariates in the model. These data are integral in examining the instruction of students with IDD, and consideration of them in data collection and analysis will strengthen the proposed study and its implications for students with IDD and their teachers.

C. Career Development Plan

I appreciate the reviewers' positive feedback regarding the Career Development portion of the proposal, especially as it complements the core elements of the proposed research project. This component of the proposal was found to be cohesive with the goals of the proposed research plan, as well as in establishing a strong line of research in this area. Reviewers A and C requested additional information about "the mentors' experience specific to the research plan"

- At the request of Reviewers A and C, I added detail to the description of mentor expertise "to specifically facilitate and improve the research plan." I have explicitly addressed each mentor's role in supporting research activities: design, data collection, and analyses (p. 17-18, 21). Dr. Swanson will support content, methods (observation research, use of the ICE-RTI), grant implementation. Dr. Kern will support study implementation, questions on behavior and school-based research, recruitment in the geographical area, and establishing a strong program of funded research. Dr. Al Otaiba's substantial expertise in reading research with students with IDD will benefit content and methods of the proposed project (e.g., further adapting ICE-RTI, identifying instructional practices reflective of IDD).

D. Personnel and Resources

I appreciate the recognition by reviewers that my mentorship team and I are well suited to the project content and scope. I also appreciate the reviewers' positive feedback on the Resources section, noting especially the capacity of Lehigh to support my proposed research and career development, and the strength of my proposed dissemination plan to share findings with various stakeholders through "a wide range of venues" (Reviewer C). Reviewer A requested more detail about mentors' "total grant funding accrued over the years." Reviewers A and B noted that previous letters of support from mentors "note the time commitment but do not note the amount of the honorarium, which does not appear to be in line with salary/consultation rates."

- In response to Reviewer A's request for more detail on mentors' previous grant funding, I added mentors' respective totals of externally funded research (see p. 21). Their success in securing numerous large-scale federal grants will be beneficial in mentoring my grant activities and supporting my future Development and Innovation proposal.
- Revised letters of support from mentors acknowledge the annual honorarium (three mentors at \$1500 each), which adheres to RFA guidelines ("Up to \$5,000 per year for mentors. If there are co-mentors, this maximum allowable sum must be divided among all the mentors," p. 14). Mentors are generously donating their time in support of my project.
- Though Reviewer A noted my previous and ongoing work in this area as a strength, I provided further clarification in the summary on doctoral research pertaining to students with IDD (p. 20) to address concerns raised by Reviewer C on this topic.
- I made minimal substantive changes to the Resources section.

Appendix C: Summary of Research

PI: Esther Lindström (Lehigh University)

Ongoing and Recently Completed Special Education Research

Title of Project	Role	Description of Project	Funding (source & amount)	Duration
Effects of Dual Licensure on Student Mathematics Achievement (Ongoing)	PI	We are examining the relation between special education teacher licensure and math achievement of students with and without disabilities using national achievement data. Co-PI: Dr. Jihyun Kim (Lehigh University).	AERA and NSF research grant #1749275 \$25,000	9/20-8/21
Genes to Behavior: Unlocking the Code for Early Detection of Reading Disorder (Ongoing: No-cost extension)	Co-I	We are investigating potential connections between behavioral and genetic evidence of reading difficulties among elementary (K-2) students. PI: Dr. Lisa Gabel (Lafayette College), Co-I: Jeffrey Pfaffman (Lafayette College), Jeffrey Gruen (Yale University Medical School), Evelyn Johnson (Boise State University).	NIH 1R15HD087937-01A1 Total award: \$374,137; Lehigh subaward: \$25,000	Award: 9/17-8/20 Subaward: 2019-present
Special Education Licensure and Student Achievement Outcomes (Ongoing: No-cost extension)	Co-PI	We are examining the relation between special education teacher licensure and math, reading achievement of students with and without disabilities using state-level data. PI: Dr. Jihyun Kim (Lehigh University).	Pennsylvania Department of Education \$3000	8/19-9/21
Observing Early Numeracy Instruction for Students with Intellectual Disability (Ongoing: No-cost extension)	PI	We are adapting the Math Observation Tool and investigating instructional content and effective teaching practices during early numeracy/mathematics instruction for students with ID in grades K-3, using the adapted tool. Collaboration with Dr. Diane Bryant (UT Austin).	Lehigh Faculty Research Grant \$6,000	11/17-12/20

Teacher Knowledge and Student Reading Outcomes (Ongoing)	PI	We are using publicly available national student data sets to examine the relation between state licensure tests of teacher reading knowledge with student reading achievement outcomes. Collaboration with Dr. Allison Gilmour (Temple University).	Unfunded	2019-present
Observing Reading Instruction for Students with Intellectual Disability (Recently completed)	PI	Pilot study examining content and instructional practices during reading instruction for students with ID and low IQ. Collaboration with Dr. Chris Lemons (Vanderbilt University). Manuscript under review.	Vanderbilt University Peabody Dean's Fellowship \$5000	2016-2019
A Synthesis of Reading Observation Studies for Students with Disabilities (Ongoing)	PI	Synthesize observation studies of reading instruction including students across disability categories, specifically examining time use across reading content areas. Collaboration with Dr. Samantha Gesel (UNC Charlotte), Dr. Chris Lemons (Vanderbilt University).	Unfunded	2016-present

Mentor: Elizabeth Swanson (University of Texas, Austin)
 Ongoing and Recently Completed Special Education Research

Title of Project	Role	Description of Project	Funding (source & amount)	Duration
Developing an Instructional Leader Adaptive Intervention Model (AIM) for Supporting Teachers as They Integrate Evidence-Based Adolescent Literacy Practices School-Wide (Ongoing)	Co-PI	The purpose of this project is to develop an adaptive intervention model (AIM) used by instructional leaders to provide ongoing professional development (PD) to content-area middle school teachers as they implement Tier 1 evidence-based literacy practices.	IES Grant # R324A200012 \$1,399,999	7/20-6/24
Evaluation of PACT: Replication in a Train-the-Trainers Context (Ongoing)	Subaward PI	The purpose of this project is to test the effectiveness of a variation of the Promoting Accelerated Reading Comprehension of Text (PACT) intervention. Previous research on PACT has shown positive effects for specific social studies content knowledge and more generalized social studies reading comprehension among eighth graders. PACT-L will use a train-the-trainers (TTT) approach that relies on local coaches to train and coach classroom teachers to implement the intervention.	IES Grant # R305R200002 \$3,999,942	7/20-6/25
Multi-Tiered Systems of Support and Methodological Skill Development (Ongoing)	Mentor	The postdoctoral research program will provide postdoctoral fellows with extensive research training in multi-tiered systems of support (MTSS), including the development and evaluation of interventions for students with disabilities and innovative and robust methodology, such as a sequential, multiple assignment, randomized trials. The overarching goal of this program is to prepare four fellows (with 2 years of training each) to conduct rigorous intervention research focused on students with disabilities.	IES Grant # R324B200012 \$753,806	8/20-7/25

Examining the Efficacy of Differential Levels of Professional Development for Teaching Content Area Reading Strategies (Ongoing)	PI	The major goal of this project is to evaluate the efficacy of a content-specific, distributed professional development model featuring STRIVE, a set of vocabulary and reading comprehension instructional practices designed for use in 4 th grade social studies classrooms that include students with disabilities.	IES Grant # R305A150407, \$3,500,000	7/15-6/21
Building RTI Capacity (Recently Completed)	PI	This project focuses on disseminating products based on research evidence designed to support the implementation of RTI in Texas public schools. All products are focused on either preventing academic or behavioral difficulty or addressing the needs of students who struggle in school, including those with disabilities.	Texas Education Agency, \$708,758	6/18-8/19
Adolescent Literacy Model for Students with Disabilities: Improving Instruction and Intervention to Enhance Reading (Recently Completed)	Co-PI	The goal of this project was to implement a school wide model for improving reading outcomes for middle school students with disabilities.	OSEP Grant # H326M15001, \$1,600,000	10/15-6/19
Understanding Malleable Cognitive Processes and Integrated Comprehension Interventions for Grades 7-12 (Recently Completed)	Co-PI	The aims are to (a) examine cognitive processes that underlie reading for understanding to identify intervention targets, (b) investigate role of engagement, motivation in enhancing reading comprehension outcomes, and (c) integrate, apply findings from these studies to develop, test the efficacy of interventions for students with reading comprehension difficulties in Grades 7-12.	IES Grant # R305F100013, \$20,000,000	6/10-5/16

Mentor: Lee Kern (Lehigh University)
 Ongoing and Recently Completed Education Research

Title of Project	Role	Description of Project	Funding (source & amount)	Duration
Early Intervention for Young Children At-Risk for ADHD: Evaluating Efficacy and Delivery Format for Behavioral Parent Education (Ongoing)	Co-PI	The primary aim of the initial efficacy study is to examine the effects of face-to-face and online behavioral parent education, using the intervention <i>Promoting Engagement for ADHD Pre-Kindergartners (PEAK)</i> , on parent knowledge of and fidelity with intervention strategies, parent treatment acceptability, child and parent behavior, and child early academic skills for families of young children at risk for ADHD.	IES Grant # R324A200010 \$3,292,105	9/20-8/25
Supported College and Career Readiness (SCCR) for Secondary Students with Emotional and Behavioral Problems (Ongoing)	PI	The purpose of this project is to develop and pilot test a multi-component program that augments typical school-based college and career readiness (CCR) activities. The current project aims to develop and evaluate the <i>Supported College and Career Readiness (SCCR)</i> program. SCCR will adapt and supplement components of currently existing CCR programs.	IES Grant # R324A200097 \$1,374,356	9/20-8/23
Adapting Tier 2 Interventions to Address Non-Responsiveness in Elementary Schools (Ongoing: no-cost extension)	PI	The purpose of this project is to develop an Adaptive Intervention Framework (AIF) that will facilitate the systematic identification and modification of Tier 2 interventions within the context of a multi-tiered system of behavior support. Co-PI Dr. Joseph Wehby (Vanderbilt University)	IES Grant # R324A160096, \$1,499,599	9/16-8/20
Immersive Virtual Reality to Support Effective Intervention for Individuals with Disabilities: Promoting Maintenance and Generalization (Recently Completed)	Co-PI	An interdisciplinary research team will develop and evaluate the enhanced effectiveness of a parent education intervention previously developed by our team when combined with optimistic parenting and immersive virtual reality. Participants will be parents of young children (age 3-5) with or at-risk for ADHD.	Lehigh University (\$70,000)	5/19-5/20

<p>Pathway 360°: Improving Secondary Students’ College and Career Readiness (Ongoing)</p>	<p>PI</p>	<p>College and career readiness program for high school students that (a) regularly assesses student career preferences; (b) suggests high school courses linked to career choices; (c) advisory course with career preparation activities; (d) opportunities for field-based leveled career exploration; and (e) senior presentation related to college and career readiness. This project supports training to replicate the program in schools throughout the US. Co-PI Kyle Longacre.</p>	<p>US Department of Agriculture \$150,000; Lehigh University Faculty Innovation Grant, \$27,400</p>	<p>9/16-8/19</p>
<p>Developing Functional Behavior Assessment Maps for Students with Persistent Challenging Behavior: A Guiding Framework for Practitioners (Ongoing)</p>	<p>Men- tor</p>	<p>The Principal Investigator (PI) will conduct a program of research designed to improve the quality of functional behavior assessments (FBA) for elementary-age students with or at risk for disabilities with persistent challenging behavior, as well as participate in career development activities aligned with this program of research to expand relevant knowledge and methodological skills.</p>	<p>IES Grant # R324B160010, \$399,846</p>	<p>7/16-6/20</p>

Mentor: Stephanie Al Otaiba (Southern Methodist University)
 Ongoing and Recently Completed Education Research

Title of Project	Role	Description of Project	Funding (source & amount)	Duration
Project Intensity (Ongoing)	Co-PI	The goal of this grant is a randomized control trial (RCT) to evaluate the efficacy of a literacy intervention, <i>Friends on the Block</i> , designed to enhance reading and language outcomes for elementary students with intellectual and developmental disability (IDD).	IES Grant # R324A200151 \$3,299,942	7/20-6/25
Evaluating Mindset as a Pathway to Enhance Students' Response to Reading Intervention (Ongoing)	Co-PI	The major goal of this project is to assess the efficacy of integrating mindset training into reading intervention for at-risk learners.	NIH Grant # R01 HD091232-01A1, \$2,874,579	7/17-6/21
Project FOCUS: Exploring Response to Intervention implementation with a focus on students receiving tier 3 and special education (Ongoing: No-cost extension)	PI	The goal of this exploration grant is to learn more about malleable factors related to reading success in Tier 3 and special education.	IES Grant # R324A160132, \$1,600,000	7/16-6/21
National Center on Leadership in Intensive Intervention (NCLII) (Ongoing: No-cost extension)	Co-PI	The goal of this grant is to train doctoral students to lead research in intensive interventions.	OSEP Grant # H325H140001, \$7,500,000	7/15-12/19

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August 18, 2020

Dear Esther,

I am very pleased to serve as your primary mentor in your Early Career Development IES project, “Examining Reading Instruction for Students with Intellectual Disability.” My interests and expertise in reading intervention, observation research, and teacher preparation align well with your previous work and future research goals. I look forward to collaborating with you and mentoring you throughout the four-year project timeline.

The project will be valuable in reporting information on content and practices during reading instruction in special education classrooms serving students with intellectual disability. There is currently little research in this area for this population. The project is a logical extension of work that I and others have done in this area, and it meets two needs in the field of reading research to examine the 1) reading development and 2) type and quality of reading instruction provided to students with ID. Specifically, it will contribute new knowledge on how reading is taught to students with ID, its relation to students’ reading development, and potential connections to teacher and student variables. The results from this project will yield valuable research to inform more precise, effective interventions for students in this population and their teachers.

I have the expertise necessary to mentor you in this project to achieve your research and professional development goals. In this process, I also look forward to guiding you toward new projects in this line of research. I have substantial experience in mentoring early-career researchers and graduate students who have joined me in a series of IES-funded projects. During their time on my projects, we meet frequently to discuss project needs and study plans in an effort for support knowledge development of conducting studies that meet the WWC standards. I have also mentored graduate students in co-authoring more than a dozen articles published in high impact peer-reviewed journals. Additionally, as PI and Co-PI on several externally funded awards (e.g., Co-PI: Reading for Understanding [IES]; PI: STRIVE [IES]; Co-PI: PACT Plus [OSEP]; PI: Building RTI Capacity [Texas Education Agency]), I have extensive experience with designing, coordinating, and executing large-scale school-based research projects, all focused on improving students’ reading outcomes. Over the course of these projects, I have remained engaged in conducting and publishing observation studies that focus on reading instruction provided to elementary, middle, and high school students.

Throughout the project’s duration, I will support your professional development goals to strengthen your knowledge of research methodology (e.g., observation research) and implementation. To help support your

content-oriented goals, I will also contribute my expertise in reading intervention and teacher training. I agree to monthly phone or zoom calls, as well as to hosting you on visits to my lab at UT-Austin during Years 1 and 3. In Year 1, the visit will align with your attendance at the UT Austin Summer Statistics Institute. In our monthly calls, you will provide an update on the project status, and we will discuss any unexpected challenges that may arise during recruitment, data collection, or other project activities. To stay informed of decisions made throughout the project, I understand that you will be sending me minutes from your meetings with your other mentors. I agree to review your manuscripts and provide guidance on appropriate outlets for dissemination, including journals and conferences. On your visits to UT, I will arrange opportunities for you to meet with some of my colleagues who also share expertise in areas related to your project and can lend additional perspectives and feedback. In Year 4, I will support you with preparing a competitive Development and Innovation proposal.

I look forward to mentoring you as you implement these proposed studies and to supporting your career development goals. During the four years of the project, I agree to allocate 5% effort to the mentoring activities outlined above and any other related activities to facilitate successful completion of your research. I understand that I will receive an annual honorarium of \$1500 in recognition of my mentorship activities.

Sincerely,

A handwritten signature in cursive script that reads "Elizabeth Swanson".

Elizabeth Swanson, Ph.D.
Research Associate Professor
The University of Texas at Austin
Meadows Center for Preventing Educational Risk



August 18, 2020

Esther Lindström, Ph.D.
Lehigh University College of Education
111 Research Dr., A-319
Bethlehem, PA 18015

Dear Esther,

I am delighted to have the opportunity to serve as your mentor on your proposed research project entitled, “Examining Reading Instruction for Students with Intellectual Disability.” As we have discussed, I have extensive background in classroom-based interventions, challenging behavior, partnering with schools, and leading large-scale IES grants. Your work is extremely important, and I look forward to the opportunity to work with you.

I understand that my role as your mentor includes participating in formal meetings at Lehigh on a weekly basis. During these meetings, you will update me on project activities completed since our previous meeting, communicate guidance from other mentors, identify unanticipated challenges specific to a particular study or general project management to generate solutions, and plan activities for the upcoming month (including discussing questions or concerns related to future project activities). At least once per semester, we will discuss plans to disseminate project results via conference presentations and manuscript submissions. I am happy to review manuscripts, presentations, and grant proposals and offer feedback. I also understand that as primary onsite mentor, I will be responsible for working with you to navigate Lehigh’s resources to support research and facilitate relationships with local districts, to foster your professional development. I agree to allocate 5% effort yearly to the aforementioned mentoring activities and any other related activities that will facilitate completion of your research. In recognition of my mentorship activities, I will receive a \$1500 annual honorarium. I have experience serving as a mentor for an IES Early Career Grant and fully understand the responsibilities required.

Your proposed research is extremely valuable and has the potential to advance the way we approach reading instruction for students with ID. Examining relations between instruction and students’ reading development will help researchers and practitioners to better understand developmental trajectories for this population and inform more effective interventions. I have no doubt you will be able to complete this project and produce important findings, and I look forward to working with you. I wish you the best of luck with your proposal.

Sincerely,

Lee Kern, Ph.D.
Professor and Director, Center for Promoting Research to Practice



SMU

ANNETTE CALDWELL SIMMONS
SCHOOL OF EDUCATION
& HUMAN DEVELOPMENT

August 11, 2020

Dear Esther,

I am looking forward to mentoring you in your Early Career Development IES project, “Examining Reading Instruction for Students with Intellectual Disability.” We share a commitment to improving reading instructional outcomes for students with intellectual disabilities (ID). Your work aligns with my research interests and expertise related to reading development, intervention research, and observational research. I look forward to collaborating with you and mentoring you through the duration of your four-year project, which feels like a logical progression from my role on your dissertation committee.

Your proposed project is important, providing necessary information on the instructional practices in special education classrooms serving students previously overlooked in academics. In addition, the project will also produce valuable developmental data pertaining to the typical reading growth of students in this population; this will meet a need in the fields of special education and reading research. The project will assist researchers in understanding how reading is being taught to students with ID, and its relation to students’ reading development, while considering potential relations with theoretically supported teacher and student covariates. The findings from this project would build a strong foundation to further advance reading intervention research for this population.

I have the expertise necessary to provide methodological and content-oriented guidance for your proposed project, as well as to mentor you in moving forward toward new projects in this line of research. I have substantial experience in mentoring early-career researchers and graduate students. Since 2000, I have collaborated as a PI, Co-PI, or Co-I on 16 research projects funded by OSEP, NIH, and IES that have used a variety of research designs (i.e., randomized control trials, single case designs, correlational designs and qualitative studies). I have extensive experience with designing, coordinating, and executing large-scale school-based research projects. I believe I can also support you with your dissemination efforts.

Throughout this project, I will support your professional development goals of improving your methodological knowledge regarding research design and implementation, and I will contribute my expertise in reading instruction for students with ID to help support your content-focused goals. I will mentor you by meeting by zoom on a quarterly basis and hosting you on visits to my lab at SMU during Years 2 and 4. In our zoom meetings, you will update me on the project’s progress, and we will discuss and troubleshoot any unexpected challenges in recruitment, data collection, or other project activities. I understand that you will be sending me minutes from your meetings with your other mentors so that I can stay informed of the decisions you are making during the project. It is important that you disseminate your findings to researchers and to educators. I agree to look over your manuscripts and offer

Department of Teaching & Learning

Southern Methodist University PO Box 750455 Dallas, TX 75275-0455

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SMU.

**ANNETTE CALDWELL SIMMONS
SCHOOL OF EDUCATION
& HUMAN DEVELOPMENT**

guidance on appropriate journals and conferences for dissemination. As we have discussed, on your visits to SMU, I will arrange for you to meet with several of my colleagues who also have expertise in areas related to your project and can provide additional perspectives and/or feedback. In Year 4, I will work with you to prepare an appropriate Development and Innovation proposal.

I look forward to supporting you in implementing your proposed studies and in furthering your career development. I agree to allocate 1% effort throughout the four years to the aforementioned mentoring activities and any other related activities that will facilitate completion of your research, and I understand that I will receive an annual honorarium in the amount of \$1500 in recognition of my support.

Sincerely,

Dr. Stephanie Al Otaiba, Professor, and Simmons Endowed Centennial Chair



William Gaudelli
Dean and Professor

College of Education
Iacocca Hall, A-325
111 Research Drive
Bethlehem, PA 18015-4794
Tel: (610) 758-3221 | **Fax:** (610) 758-6223
Email: wig318@lehigh.edu
Web: <http://ed.lehigh.edu>

August 12, 2020

Dear National Center for Special Education Research,

I enthusiastically support Dr. Esther Lindström's application for a Research training grant in Special Education (CFDA#:84.324B) under the topic of Early Career Development and Mentoring. Dr. Lindström began her position as Assistant Professor of Special Education in 2017 after graduating with her PhD from Peabody College of Vanderbilt University. Dr. Lindström has developed a strong proposal with an extraordinary team to assist her in achieving her research and professional development goals.

Dr. Lindström has quickly established herself as a highly valued member of our College of Education faculty. She conducts cutting edge research that advances knowledge and practice regarding academic instruction for students with disabilities. She has been a productive early career scholar with publications in highly respected peer-reviewed journals with a viable pipeline of manuscripts under review and in preparation. During her first semester on our faculty, she secured a competitive internal grant to support her research agenda. It should be noted that Dr. Lindström is among a handful of researchers in our college who are focused on academic intervention and, thus, she provides skills and experiences that are critically important to our research and teaching missions. Furthermore, she has launched her research program in the midst of doing an exemplary job with respect to teaching/advising and service to the college and profession. In short, she is doing all the right things that an early career scholar in special education should be doing. Receipt of this grant award would allow Dr. Lindström to maximize the growth of her research skills and investigative program.

Dr. Lindström's project, titled *Examining Reading Instruction for Students with Intellectual Disability*, has the potential to provide highly valuable information to the fields of reading development, special education, and teacher preparation. Dr. Lindström is well suited to do this work as a former teacher to struggling readers and researcher of reading difficulties experienced by students with various disabilities. The proposed project will be essential to better understanding the development and instruction of students who have been historically excluded from academic learning. The onsite mentorship of Dr. Lee Kern will further serve to strengthen her program of research and professional development.

The College of Education is highly supportive of research and will provide support for Dr. Lindström's research activities through various mechanisms. Our Office of Research and Business offices will assist with budgeting, hiring, and general grants management.

Research assistants working on the project would have adequate space and facilities needed to do so successfully. The College of Education has provided Dr. Lindström with an ample start-up package that she may use for grant activities to supplement or extend those in the proposal, including attending additional trainings, purchasing equipment as needed, and other needs that may arise. Further, she will continue to be provided with a 10 hour per week graduate assistant throughout her pre-tenure period. All of these supports are in addition to the ones offered to new faculty by the university, such as a faculty mentoring program, grant writing groups through our Office of Sponsored Research, and university-wide manuscript writing groups. As the Dean of the College of Education, I will ensure that these and other resources are provided to Dr. Lindström, as necessary. Our goal, both within the College of Education and at the university level, is to provide faculty with the resources and supports necessary to conduct high-quality research to support their professional goals.

To support the research and professional development outlined in this proposal, the College of Education will provide Dr. Lindström course reductions commensurate with the funding levels, including at least two course reductions per year. In addition, we will work with Dr. Lindström to secure any technology support she needs for conducting this research, including software for collecting and analyzing data and a secure electronic space for data storage. Additionally, we will support Dr. Lindström's dissemination efforts by communicating the results of her research to relevant stakeholders through our extensive list serv, social media accounts, and newsletters.

In closing, my colleagues and I strongly and enthusiastically support Dr. Lindström's application for an Early Career Development grant, as the work supported by this funding would provide a solid foundation for her important research in designing, implementing, and evaluating academic intervention for students with disabilities. Her investigative program is in an area of critical need for our college as well as the field of special education given the potential to positively impact school-based practice and improve outcomes for students with disabilities. Please do not hesitate to contact me if you need additional information.

DocuSigned by:

William Gaudelli

D96FED030DC0496...

William Gaudelli, Ed.D.

Dean and Professor

College of Education, Lehigh University



705 N. Shady Retreat Rd.
Doylestown, PA 18901
Tel: 215-348-2940
www.BucksIU.org

August 10, 2020

Esther R. Lindström, PhD
Lehigh University
Department of Education and Human Services
111 Research Dr., A-319
Bethlehem, PA 18015

Dear Dr. Lindström,

The Bucks County Intermediate Unit (Bucks IU) is pleased to express support for your research project examining reading instruction provided to students with intellectual disability or below-average IQ (ID). We recognize that your project will explore techniques used by special education teachers in Bucks IU during reading instruction for students in this population.

This project has implications for improving reading instruction for students with disabilities. Bucks IU educates students with a variety of academic needs across thirteen school districts and three charter schools. We are encouraged that your research project would provide useful information to schools like ours in PA, and more broadly, for improving reading instruction. We look forward to learning more about reading instruction currently being provided by our teachers and how responsive students with disabilities are to these practices.

We recognize the following project activities to support the goals of your project and to assist you in obtaining the necessary teacher and student sample. Initially, we would collaborate to recruit teachers from our elementary schools who teach reading to students with ID. Participation would also include observing teachers during reading instruction, collecting surveys from teachers to understand factors that influence their instruction, and administering assessments to students with ID (after parent consent and student assent is obtained) to consider how observed instruction relates to their performance. Campus representatives would assist with facilitating this process.

We are excited that you going to be studying reading instruction, how it relates to student achievement, and the unique role of special education teachers. Thank you for the opportunity to collaborate on this important project.

Sincerely,

Lenny Greaney, Ed.D CCC-SLP
Director of Special Education



August 13, 2020

Dear Dr. Lindström:

The Bethlehem Area School District (BASD) offers our enthusiastic support for your research project that focuses on reading instruction for elementary students with intellectual disability (ID). This project will benefit BASD, as it would provide information about the reading instruction of teachers who support students with ID. We also support the value of this project to the field of education, given the need to learn about factors that contribute to improving reading instruction and student outcomes in this population.

Our support of this project is an opportunity to build a collaborative partnership with Lehigh University in an area of critical need. Improving academic outcomes for all of our students is a district priority. In fact, we have made a public commitment for all of our students to read on grade level by grade 3. As the Assistant Superintendent for Education and Chief Academic Officer, I understand the need to improve our understanding of how special educators are instructing students with disabilities.

We understand that our participation would include several activities. These include classroom observations of special educators to systematically document present reading instructional practices, administration of surveys to these teachers to acquire additional information about their instruction, and administration of assessments to students to learn how different types of instruction influence the reading performance of students with disabilities. We would assist the research team in identifying a liaison at each of our affiliated schools to facilitate these logistics.

In BASD, we serve students with a variety of backgrounds and academic needs across sixteen elementary schools. In summary, we would be eager to support your research group as you work to improve the knowledge base on reading instruction for students with ID and make a difference in our schools, and we would potentially be interested in participating. Thank you for the opportunity to be involved.

Sincerely,

A handwritten signature in black ink, appearing to read 'Jack P. Silva', written in a cursive style.

Dr. Jack P. Silva

Assistant Superintendent/Chief Academic Officer



8/15/2020

Dear Esther,

I am looking forward to serving as a consultant on your Early Career Development IES project, “Examining Reading Instruction for Students with Intellectual Disability”. My interest and expertise in reading development, early literacy, and advanced longitudinal data analyses align with your proposed project and longer-term professional goals. I am very excited about your project, and I am looking forward to supporting you in completing this project in its four-year duration.

I am certain that your proposed project will yield valuable observational and developmental data pertaining to students with intellectual disability that will advance current knowledge in the fields of reading research and special education. The project will assist researchers in understanding how reading is being taught to students with ID, and its relation to students’ reading development, while investigating potential relations with theoretically supported teacher and student covariates. Combining proximal measures of progress monitoring with more distal post-test and follow up measures, the findings from this project would build a robust database that will be very helpful for understanding how reading typically develops for students with ID, who often exhibit more gradual academic growth than their peers. Together, these data would be instrumental to developing innovative, targeted reading interventions for this population and establishing a strong line of research in this area.

I look forward to helping you conceptualize the methodological and statistical scope of the project, and providing you with mentorship during its’ execution. I have the expertise necessary to provide methodological and content-oriented guidance for your proposed project, as well as to assist you in moving forward toward new projects in this line of research. As a founding member of Providing Opportunities for Women in Education Research, I take mentorship very seriously and see it as one of the fundamental tenets of my work. Additionally, I bring a clear record of externally funded awards (e.g., *Language Gains in Early Childhood*, *Developing Talkers*, *Early Learning Network: Critical Contributions of Classroom Ecology to Children's Learning*, *Efficacy of the BrightStart! Program for Promoting the Emergent Literacy Skills of Prekindergarten Children at Risk for Reading Difficulties*). On these projects, I have considerable experience with designing, coordinating, and executing large-scale research studies.

As part of my consulting role on this project, I will provide expertise to support both your project implementation and your goals related to developing your knowledge of longitudinal analysis, reading development, and open science practices. I agree to



meet by zoom on a quarterly basis to discuss data collection and analysis, as well as at the biennial meetings of the Society for Research in Child Development (should it meet). In our meetings, you will provide updates on the project, and we will discuss and troubleshoot any unexpected challenges in data collection, organization, or other project activities. You will be sending me minutes from your meetings with your mentors to keep me informed of the content-oriented decisions you are making during the project. I agree to look over your manuscripts and provide feedback on appropriate journals and conferences for dissemination. In Year 4, I will work with you to clean and analyze your data to address your proposed research questions.

I look forward to supporting you in the implementation and analysis of your proposed studies and in furthering your career development. I agree to allocate consultation effort equal to about 1% of my time throughout the four years to the aforementioned consultation activities and other related activities to support successful completion of the proposed project.

Sincerely,

Jessica Logan, PhD

Assistant Professor
Quantitative Research, Evaluation, and Measurement
College of Education and Human Ecology
29 W Woodruff Ave | 211A Ramseyer Hall
Columbus, Oh 43210
Logan.251@osu.edu

APPENDIX F.
MATERIALS TO SUPPORT TRAINING PROGRAM NARRATIVE

1. Observation tool: ICE-RTI coding form (Edmonds & Briggs, 2003)

Time	Summary of activity	Grouping	Materials	Student engagement
9:15	Teacher (T) takes attendance and makes a few announcements.	Whole class		NA
9:20	T tells students to think of a word that rhymes with <i>clam</i> . Students (SS) take turns completing the sentence "The ship is loaded with < >" with a word that rhymes with clams. It is the next student's turn when the previous student rolls the basketball to him/her. Each student (S) identifies a rhyming word and then says the complete sentence. T tells 1 S to sit down. SS arguing about who has had a turn. T tells 1 S to let the other S have his turn.	Whole class	Oral language, basketball	High
9:30	<QUICK TRANSITION> T takes the ball. SS go back to original spot on carpet. T tells SS to stand where they are.	Whole class		NA
9:30	She takes them through a "movement" activity – touch your head, touch your shoulders, touch your knees, touch your toes. Then she alters the order. SS are to listen to her instruction and touch the appropriate body part.	Whole	Oral language	High
9:31	T tells SS they are going to practice their sounds. SS groan. T tells SS that since some SS don't know all their sounds yet, they need to practice. "This is to help them." T points to letter cards on the wall. For each letter, SS identify the letter, say the sound, and do the accompanying hand motion. For the vowels, SS say both the short and long sound. T redirects SS to repeat "g," too much /uh/ at the end. All SS but 1 are engaged. They do the entire alphabet.	Whole class	Visuals with print, hand motions	High
9:35	T hands out copies of a small decodable text to each student.	Whole class	Decodable text	NA
9:38	T previews book. They look at the pictures. T asks Q about the pictures. The book has rebus sentences in it. About 4 SS are off-task; 1 S lies on the floor.	Whole class	Decodable text	Low

2. Sample ICE-R data entry

	A	B	C	D	E	F	G	H	I	J	K	L
	session_id	total_min	instr_event	event_min	start	stop	diff	brief_summ	dim_a	dim_b	dim_c	dim_d1
1	006_103_r1	109	6	4	25:42:00	29:48:00	4:06	DTT - telling time	12	1	999	999
8	006_103_r1	109	999	0	29:06:00	29:48:00	0:42	Transition	13	1	999	999
9	006_103_r1	109	7	6	29:49:00	35:42:00	5:53	Writing mom's cell phone numi	12	1	999	999
10	006_103_r1	109	999	2	35:43:00	36:05:00	0:22	Transition	13	1	999	999
11	006_103_r1	109	8	5	36:06:00	40:49:00	4:43	Counting money	12	1	999	999
12	006_103_r1	109	9	7	40:50:00	48:07:00	7:17	Transition, reinforcement, tran:	13	1	999	999
13	006_103_r1	109	10	2	48:08:00	50:37:00	2:29	PCI - reading list of words	4	4	5	12
14	006_103_r1	109	999	0	50:11:00	50:37:00	0:26	Transition	13	1	999	999
15	006_103_r1	109	11	7	50:38:00	57:35:00	6:57	Reading leveled text	8	1	5	4
16	006_103_r1	109	12	2	57:36:00	59:21:00	1:45	Answering comprehension que	9	3	5	4
17	006_103_r1	109	13		59:22:00	2:01:00	2:15	Transition (0:14 + 2:01)	13	1	999	999
18	006_103_r1	109	14	3	2:02	4:47	2:45	Letter sounds (digraphs, diphth	4	1	2	19

3. Adapted ICE-RTI Engagement Rating Scale

Student Indicators of Low, Medium, or High Engagement During Instruction:

	Getting started	Task persistence	Response to teacher prompt *	Mood/demeanor
1 Low	Student exhibits one or both of the following behaviors: <ul style="list-style-type: none"> • Tantrum • Elopement (wandering or running away from a task) 	<ul style="list-style-type: none"> • Looks away from task, wanders, elopes, throws materials • Most of instructional event is spent focused on external stimuli or appears to be daydreaming 	<ul style="list-style-type: none"> • Does not respond to teacher prompt, or responds with aggression, tantrum, elopement, etc. 	Appears upset, angry, frustrated, dazed, overly playful (“goofing off”)
2 Medium	<ul style="list-style-type: none"> • May provide some pushback/resistance/delay when presented with a task, then turns attention to task • Forgets needed materials at first, then gets started 	<ul style="list-style-type: none"> • Delayed start on a task then works steadily • Attempts assigned task, but sometimes distracted by peers or external stimuli • Fiddles with materials somewhat • Attention wanders when task is too difficult 	<ul style="list-style-type: none"> • Delays responding to teacher prompt, then participates (some “dilly-dallying”) • Easily redirected if veers off-task/off-topic 	Appears to have a neutral mood, minimally frustrated
3 High	<ul style="list-style-type: none"> • Is prepared to begin when teacher signals 	<ul style="list-style-type: none"> • Asks for help when needed • Focuses on task at hand, rather than external stimuli • Reads/writes/listens when appropriate 	<ul style="list-style-type: none"> • Responds to teacher prompt verbally or through actions • (Requires minimal prompting) 	Appears to be pleasant, eager, uses minimal call-outs, enthusiastic

* Note: Engagement ratings should reflect student behaviors, rather than those of the teacher. Try to distinguish student engagement from what may be teachers’ perceptions of their engagement.

Adapted from ICE-RTI (Edmonds & Briggs, 2003)

4. Measure of Teacher Knowledge of Reading

Knowledge Assessment for Preservice and Inservice Educators

(Bos, Mather, Dickson, Podhajski, & Chard, 2001)

- 1) Which word contains a short vowel sound?
(a) treat (b) start (c) slip (d) cold (e) point
- 2) A phoneme refers to:
(a) a single letter (b) a single speech sound (c) a single unit of meaning (d) a grapheme
- 3) A pronounceable group of letters containing a vowel sound is a:
(a) phoneme (b) grapheme (c) syllable (d) morpheme
- 4) If *tife* were a word, the letter *i* would probably sound like the *i* in:
(a) if (b) beautiful (c) find (d) ceiling (e) sing
- 5) A combination of two or three consonants pronounced so that each letter keeps its own identity is called a:
(a) silent consonant (b) consonant digraph (c) diphthong (d) consonant blend
- 6) Example of a voiced and unvoiced consonant pair would be:
(a) b-d (b) p-b (c) t-f (d) g-j (e) c-s
- 7) Two combined letters that represent one single speech sound are a:
(a) schwa (b) consonant blend (c) phonetic (d) digraph (e) diphthong
- 8) How many speech sounds are in the word "eight"?
(a) two (b) three (c) four (d) five
- 9) How many speech sounds are in the word "box"?
(a) one (b) two (c) three (d) four
- 10) How many speech sounds are in the word "grass"?
(a) two (b) three (c) four (d) five
- 11) What type of task would this be? Say the word "cat." Now say cat without the/c/sound.
(a) blending (b) rhyming (c) segmentation (d) deletion
- 12) What type of task would this be? "I am going to say some sounds that will make one word when you put them together. What does/sh//oe/say?"
(a) blending (b) rhyming (c) segmentation (d) manipulation
- 13) Mark the statement that is false:
(a) Phonological awareness is a precursor to phonics; (b) Phonological awareness is an oral language activity; (c) Phonological awareness is a method of reading instruction that begins with individual letters and sounds; (d) Many children acquire phonological awareness from language activities and reading.
- 14) What is the second sound in the word "queen"?
(a) u (b) long e (c) k (d) w
- 15) A reading method that focuses on teaching the application of speech sounds to letters is called:
(a) phonics (b) phonemics (c) orthography (d) phonetics (e) either a or d
- 16) A soft c is in the word:
(a) Chicago (b) cat (c) chair (d) city (e) none of the above
- 17) Identify the pair of words that begins with the same sound,
(a) joke - goat (b) chef - shoe (c) quiet - giant (d) chip = chemist
- 18) If you say the word, and then reverse the order of the sounds, "ice" would be:
(a) easy (b) sea (c) size (d) sigh
- 19) If you say the word, and then reverse the order of the sounds, "enough" would be:
(a) fun (b) phone (c) funny (d) one
- 20) All of the following nonsense words have silent letters, except:
(a) bamb (b) wrin (c) shipe (d) knam (e) phop

5. Measure of Teacher Perspectives

Teacher Perceptions About Early Reading and Spelling

(Bos et al., 2001, adapted from DeFord, 1985)

Directions: For each of the following items, please choose the option that most aligns with your views on early reading and spelling.

Explicit Code Instruction

K-2 teachers should know how to assess and teach phonological awareness (i.e., knowing that spoken language can be broken down into smaller units: words, syllables, phonemes).

Strongly disagree – Disagree – Mildly disagree – Mildly agree – Agree – Strongly agree

Controlling text through consistent spelling patterns (*The fat cat sat on a hat.*) is an effective method for children who struggle to learn to identify words.

Strongly disagree – Disagree – Mildly disagree – Mildly agree – Agree – Strongly agree

Poor phonemic awareness (awareness of the individual sounds in words) contributes to early reading failure.

Strongly disagree – Disagree – Mildly disagree – Mildly agree – Agree – Strongly agree

K-2 teachers should know how to teach phonics (letter/sound correspondences).

Strongly disagree – Disagree – Mildly disagree – Mildly agree – Agree – Strongly agree

It is important for teachers to demonstrate to struggling readers how to segment words into phonemes when reading and spelling.

Strongly disagree – Disagree – Mildly disagree – Mildly agree – Agree – Strongly agree

Phonics instruction is beneficial for children who are struggling to learn to read.

Strongly disagree – Disagree – Mildly disagree – Mildly agree – Agree – Strongly agree

Implicit Code Instruction

Time spent reading contributes directly to reading improvement.

Strongly disagree – Disagree – Mildly disagree – Mildly agree – Agree – Strongly agree

Learning to use context clues (syntax and semantics) is more important than learning to use grapho-phonetic cues (letters and sounds) when learning to read.

Strongly disagree – Disagree – Mildly disagree – Mildly agree – Agree – Strongly agree

If a beginning reader reads "house" for the written word "home," the response should not be corrected.

Strongly disagree – Disagree – Mildly disagree – Mildly agree – Agree – Strongly agree

Picture cues can help children identify words in the early stages of reading.

Strongly disagree – Disagree – Mildly disagree – Mildly agree – Agree – Strongly agree

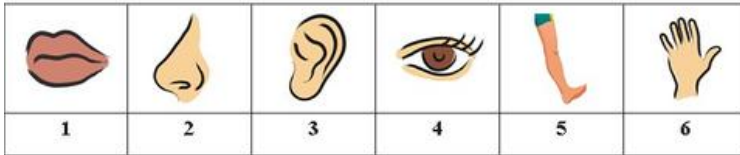
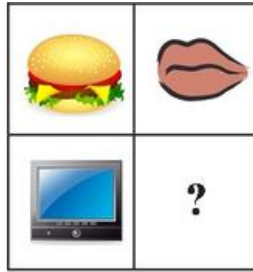
Adult-child shared book reading enhances language and literacy growth.

Strongly disagree – Disagree – Mildly disagree – Mildly agree – Agree – Strongly agree

All children can learn to read using literature-based, authentic texts.

Strongly disagree – Disagree – Mildly disagree – Mildly agree – Agree – Strongly agree

6. Student Measure: KBIT-2 (Example of Matrices item)



7. Student measure: FastBridge earlyReading CBM (Christ, 2018)

fast

Page 1

m t s b f d y h
N P Z Qu R K W M
l x qu r p z w n
S T F B L D X Y
m a v qu t x j r
L Z V Y Qu P H J
l h f z d w b k n t
T B D M K N S R F B


o e u g c i
U I G O A E C

veta vago fumá narto pida
pide paca tuba ifra beca
nido rojo mica sano solo.

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fast

Reading Form 1



Jan and her dog woke up from a nap. Her dog began to run around the house. Jan ran fast after the dog. She could not keep up!

Page 2

Fast

Antes estaba muy tranquila cuando que se hizo muy ruidoso en su casa. Tanta gente que gritaba y cantaba y había muchos colores. Tanto que pasó a un punto enorme en la parte de atrás. Una hora más y empezó a correr en el primer piso. Dio una vuelta rápida, pero ahora y la hermana escucharon su otro lado. Un día después jugaban en el jardín cuando alguien llamó al móvil. Un hombre estaba hablando la casa no estaba cerca de ella porque. Pensaron que el ruido era del primer piso y corrieron a la par. Mejor una puerta blanca que estaba medio abierta. De la ventana solo una luz con la sombra del día. En primer la la puerta era verde, pero nadie contestó. Entonces las miraron, con mucha miedo. Decidieron entrar.

Con mucho ruido comenzó la puerta a moverse. Luego alguien estaba hablando y una persona con una bicicleta. Había tres en las montañas y miraba jugando en los árboles. También dos personas jugando con sus amigos en el agua. En el medio todo se volvió la señora más asustada en una hora.

Ello se paró de ver a la niña y la niña o ampa. Entonces corrió que era la casa de este lugar rápido. Los días que en la casa y sus amigos oyeron para cuidar a los animales. Ahora y también se miraron corriendo y le dijeron que lo habían escuchado.

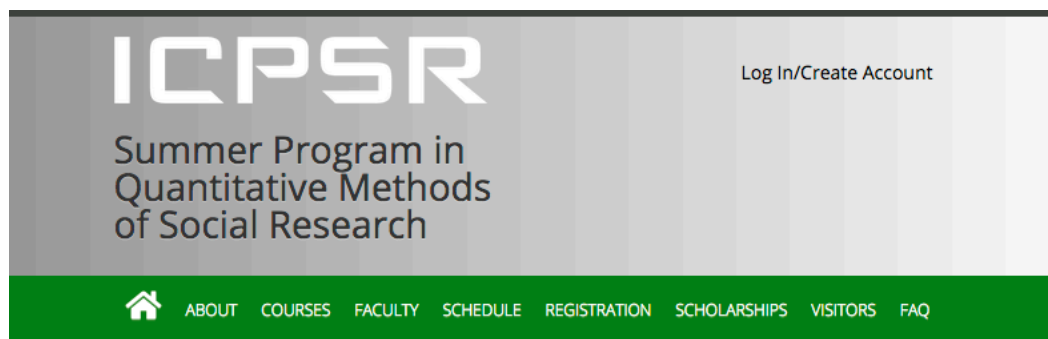
Todos los días después de la escuela los niños vuelven temprano a casa, incluso a la noche en su casa rápida. Los días como a los animales y juegan con ellos. Ahora ya no pensar... en la casa nunca es un lugar tranquilo. Si la casa más tranquila y especial en todo el mundo.

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8. Professional Development: Previous course offerings from [UT Summer Statistics Institute](#).

SOFTWARE AND DATABASE	<ul style="list-style-type: none"> • Introduction to Data Analysis and Graphics Using R 	<ul style="list-style-type: none"> • Introduction to GIS • Introduction to SQL and Relational Database Design
STATISTICAL METHODS	<ul style="list-style-type: none"> • Structural Equation Modeling • Statistical Methods for Categorical Data - Logistic Regression and Beyond 	<ul style="list-style-type: none"> • Introduction to Applied Bayesian Statistics • Time Series Analytics
DESIGN AND APPLICATION	<ul style="list-style-type: none"> • Applied Hierarchical Linear Modeling 	<ul style="list-style-type: none"> • Non-Parametric Statistical Methods for Small Datasets • Questionnaire Design and Survey Analysis

9. Professional Development: ICPSR Workshop on Longitudinal Analysis



Level, Change, and Acceleration: Modeling Correlated Change in Longitudinal Data and Intensive Repeated Measures Design (Salt Lake City, UT)

Instructor(s):

- Pascal Deboeck, University of Utah

An ever-increasing number of models are available for the modeling of repeated observations on the same individuals, families, and groups. While theories often express ideas about correlated changes between constructs, matching theories about growth and change to statistical models can be challenging. This workshop will introduce derivatives -- level, change, and acceleration. This framework will provide a basis for articulating theories of change, as well as a framework for understanding a wide variety of change models. A variety of foundational models for longitudinal data will be discussed using this framework. These more common models will then be used to build models for intensive repeated measures designs (e.g., diary data, ecological momentary assessments). This course will provide a conceptual understanding of topics using lecture, reference code through demonstrations, and hands-on practice with sample data.