Using Implementation Science to Improve Adoption of Curriculum-Based Assessments Among Early Childhood Teachers

A Dissertation

SUBMITTED TO THE FACULTY OF THE UNIVERSITY OF MINNESOTA

BY

Tehout Selameab

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY

Dr. Stuart Yeh, Advisor

June 2023

Acknowledgments

I wish to extend my deepest gratitude to my advisor Dr. Stuart Yeh for always encouraging my intellectual pursuits with great patience and confidence in my abilities. I wish for every student to experience such steadfast support.

I want to thank my wonderful committee – Dr. Peter Demerath, Dr. LeAnne Johnson, and Dr. David Johnson - for their willingness to join one more committee, despite being pulled in multiple directions.

I owe a deep debt of gratitude to the Head Start team. Head Start staff generously and kindly allowed me into their work with trust and curiosity about what we could learn together. I cannot overstate the importance of the Head Start program as one of the most important federal efforts to support children and families. Thank you for the tireless work you do every single day.

Finally, I want to thank my co-workers, clients, friends, and family for tolerating my absence, absent-mindedness, and crabbiness during parts of this journey.

I dedicate this work to the memory of my beloved aunt, Haregewoien Shimelis (February 12, 1960- March 30, 2023), who lost her life suddenly as I finished my work.

Abstract

Despite the importance of child assessment data in early childhood education, teachers struggle with its use in their work. This study uses an implementation science approach to explore facilitators and barriers to teacher use of child assessment practices in three Head Start centers and tests a specific strategy to improve teacher practice. This study explores two research questions:

(1) How do teachers perceive their current assessment practices in terms of use and level of difficulty? What do teachers believe about child assessment practices? How do teachers perceive their use of child assessment data for individualizing instruction? What do organizational leaders believe are the individual and organizational level facilitators and barriers related to child assessment practices?

(2) What is the impact of employing one specific implementation strategy identified by teacher/center leaders on the quality of teacher-child assessment practices?

Data was generated from 43 teacher surveys, 7 interviews with center leaders, and an audit of child assessment data entered by 16 teachers in the study sites. The study found that teachers report they are skilled in completing child observations, collecting observation data, entering data into an assessment database, and using data for lesson planning. Teachers are less confident in choosing a developmental level for each child. Most teachers in the study trust their judgment of student progress more than assessment, but many also consider assessment practices part of their professional responsibility. Teachers were less likely to agree that assessment practices benefit their students, make their jobs easier or were supported by their coworkers. Head Start leaders revealed several organizational-level facilitators of teacher assessment

practices, including policies requiring assessment and mandated organizational support, such as financial resources for ongoing professional development, technology solutions, and compliance practices that keep assessment practices in place. Individual-level facilitators that support teacher assessment practices include an educated workforce with long tenures and commitment to the classroom. Barriers to teacher adoption of child assessment practices reported by leaders include English language comprehension of complex child development concepts, insufficiently protected time, a high volume of required observation data, and teaching team incompatibility. A few leaders felt assessment practices were inconsistent with this local Head Start's organizational culture around relationships.

Teachers and leaders in this study hypothesized that a lower data volume would help improve teacher assessment practices. This feedback inspired a small-scale study where the required data was halved for three months. An audit process of child observation records assessed four data quality elements of child assessment data completed by teachers before and after the reduction in required data. Teachers completed the first three elements in both pre-and post-intervention periods, with similar average scores. The individualization of observation notes showed modest improvement between pre-and post-intervention periods. The overall average score for all data quality elements increased slightly from 30.0 (pre-intervention) to 32.7 (post-intervention). This study provides Head Start leadership with targeted data for decision-making.

This study demonstrates how implementation science frameworks and evaluative thinking can be used to tackle practical problems in complex settings. Following a systematic assessment of known implementation facilitators and barriers, this study piloted a specific implementation strategy for improving teacher practice and generated targeted data for improving teacher practice. Replicating the approach used in this study –the use of targeted

studies of specific implementation strategies – will improve teacher use of child assessment practices.

Table of Contents

List of Tables

List of Figures

Chapter 1: Introduction

Early childhood is a critical time of development in children and has been linked to health, educational and societal outcomes later in life (US Health & Human Services, 2010). Preschool and childcare settings provide formative experiences for healthy brain development, building various functional and cognitive capacities needed to live a healthy life.

The size and demographic profile of children in the United States is changing. The population of children will increase from 73.6 million (in 2016) to 76.3 million by 2030 (Federal Interagency Forum on Child and Family Statistics, 2017). By 2050, 32% of all children are projected to be Hispanic and 39% White, non-Hispanic (Federal Interagency Forum on Child and Family Statistics, 2017). One in every five American children live in poverty, 18% are classified as "food insecure," and 39% live in substandard housing conditions (Federal Interagency Forum on Child and Family Statistics, 2017).

There is a need to provide high quality early childhood experiences for low-income and/or diverse families to address disadvantages early in life (Organisation for Economic Co-operation and Development, 2018; Peisner-Feinberg et al., 2016; Workman & Ullrich, 2017). A 2016 meta-analysis of high-quality studies of publicly funded center-based preschool programs serving 3- and 4-year-old children from low-income and racially and ethnically diverse communities found quality early childhood education programs across all types – state, district, Head Start – significantly improved children's performance on standardized assessments and their ability to emotionally self-regulate (Hahn et al., 2016). Additional positive nonsignificant findings of early childhood programs include improvement in children's grade retention, identification and assignment to special education, emotional development, and reduction in future criminal behavior and teen pregnancy (Hahn et al., 2016).

The Early Childhood Education and Care Landscape in the United States

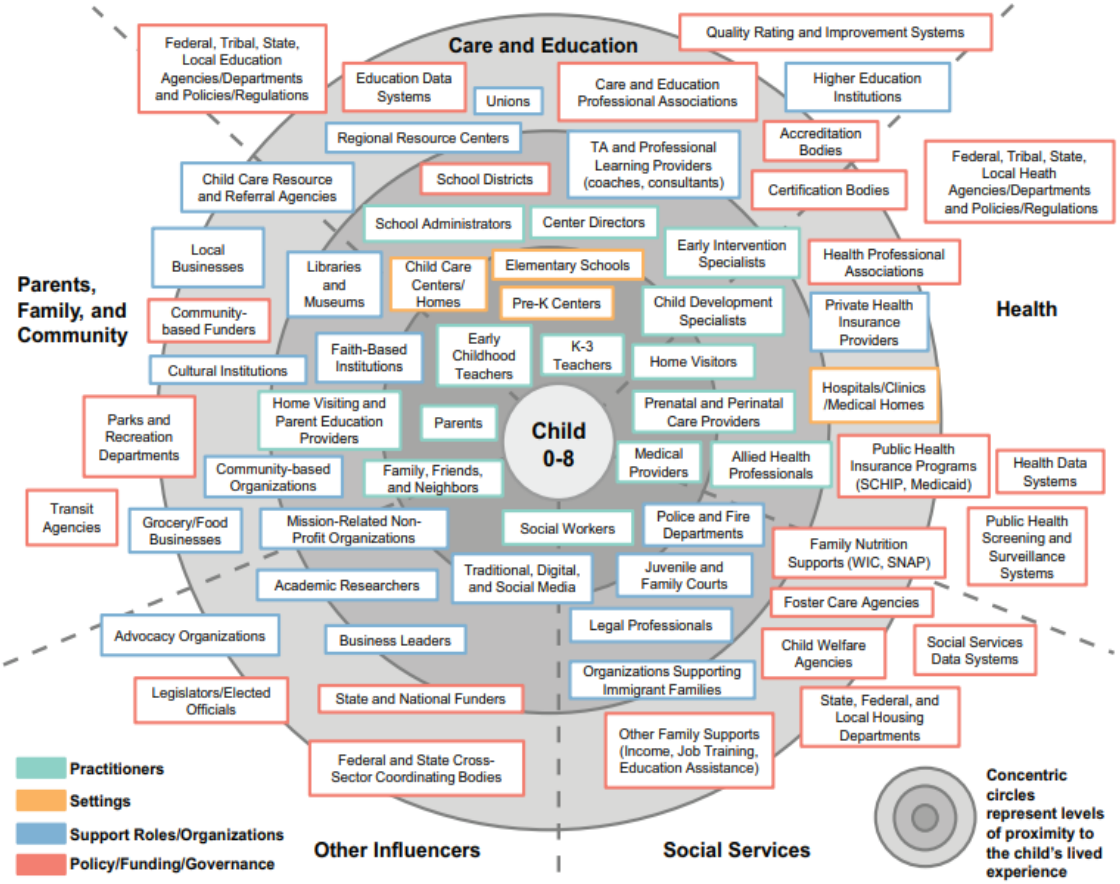
In the United States, while there is broad consensus about the need for quality early childhood programs, the delivery of quality early childhood programs is complex, involving an array of state, federal educational, health, and social service systems, researchers, and families (Figure 1). Two factors contributing to the complexity of the delivery system are local variation in a.) childcare settings, and b.) how the system is financed.

Early childhood care and education in the US are provided in two settings: licensed center-based or family-based and unlicensed informal care provided by relatives or nonrelatives. In 2011, 61% of all US children under age 5 were in some sort of childcare arrangement (Laughlin, n.d.). Of those in care, 32% of children were in nonrelative care, which includes licensed centers and family-based settings (Laughlin, n.d.). Within the types of nonrelative care, childcare centers were the most common arrangement, with 23.5% of children found in those settings (Laughlin, n.d.). Interestingly, the most significant type of childcare provider group were nonrelative providers, which included family members, friends, and neighbors, who cared for 42% of children under age 5 (Laughlin, n.d.). This combination of individuals providing care – those working within licensed and unlicensed settings – has created a diverse array of childcare providers reflecting a range of educational backgrounds, motivations, philosophies, and capacities in childcare settings (Institute of Medicine, 2012).

Figure 1

The Complex Landscape Affecting Children Ages 0-8. Reprinted from Transforming the Workforce for Children Birth Through Age 8: A Unifying Foundation (pg.25), Institute of Medicine (IOM) and National Research Council (NRC). (2015). The National Academies Press. https://doi.org/10.17226/19401.

Local variation in the financing of early childhood education, plus lack of a comprehensive, coordinated financing system, magnifies variation in the quality of childcare. In the US, early childhood is financed through a fragmented mix of subsidies for families living at the poverty level, tax-based subsidies, and in some states, quality-based incentive structures



(National Academies of Sciences, Engineering, 2018). One estimate indicates families pay for 52% of the cost of early childhood education; 46% is paid for by federal, state, and local government financing, and 2% by the private sector (National Academies of Sciences, Engineering, 2018). In the current stream of subsidies, childcare assistance programs support low-income families, and tax subsidies support middle-class families, which some argue further exacerbates access inequality and economic segregation within early childhood settings (National Academies of Sciences, Engineering, 2018).

In sum, the delivery of quality early childhood programs involves a complex system, involving interactive effects of state, federal educational, health, and social service systems, researchers, and families. The combination of the various settings delivering early childhood care and how it is financed has created a system with gaps in quality and access.

Understanding the Childcare Problem in Minnesota: Gaps in Quality and Access

In Minnesota and throughout the nation, the convergence of rising costs for childcare providers and the increased financial burden on families has resulted in geographic areas with an insufficient supply of childcare, known as child-care deserts. One study showed that 26% of Minnesota families live in a child-care desert (Malik et al., 2016). Of families living in child-care deserts, a more significant proportion is African-American (35%), Hispanic/Latino (30%), or low-income families (36%) compared to Whites (25%) and high-income families (28%) (Malik et al., 2016). Child-care deserts vary by geography, with the highest need in rural areas like the northeastern corner of Minnesota. Between 2006 and 2015, northeastern Minnesota experienced a net loss of 15,377 childcare slots, whereas their metro region counterparts experienced a net increase of 3,284 slots (Werner, 2016). Inadequate access to childcare has significant economic impacts on families as it interferes with parents' ability to work, further exacerbating the

financial challenges of families living in poverty (National Academies of Sciences, Engineering, 2018).

Along with access, the availability of high-quality childcare programs is an equally important dimension of the childcare problem. Research has shown a link between the quality of childcare settings and later development in low-income children (Adams et al., 2007). In Minnesota, as in many other states, quality in childcare settings is defined by a Quality Rating and Improvement System (QRIS) called Parent Aware. Parent Aware contains a set of quality childcare and early education program practices related to health and wellbeing, relationships with families, teaching and relationships, individualized assessment and planning, and professionalism (Minnesota Department of Human Services, 2016).

As of October 2019, 20% of licensed childcare programs were Parent Aware rated statewide, an increase from 14% in 2015 (Minnesota Department of Human Services, 2019). Of those rated programs, 13% were rated higher (3 or 4 stars out of 4 possible), and 7% were rated lower (1 or 2 stars out of 4 possible) (Minnesota Department of Human Services, 2019). The distribution of rated programs varies by geography. The state's west, central, and southern parts have fewer rated programs than the northern or metro areas (Minnesota Department of Human Services, 2019).

As the requirements for quality childcare evolve and increase, so has the cost to providers and families, shaping supply and demand. The availability of childcare options, or the supply-side of the childcare market, is shaped by local factors such as:

- The cost of meeting regulatory requirements
- Hiring, training, and maintaining qualified staff

- Supply costs such as curricula, food, and equipment
- Securing and purchasing space
- The cost of ancillary staff for managing a center (e.g., Center Director)

One report estimated that the startup cost of a center with capacity for 99 seats in Greater Minnesota ranged from $400,000 - $600,000, in addition to acquiring property (First Children's Finance of Minnesota, 2016). The same report estimated the annual cost of operating a family childcare business in Minnesota as $26,372, with 41% of expenses related to mortgage or rent, utilities, and maintenance (First Children's Finance of Minnesota, 2016). Minnesota providers described the operating costs for childcare businesses as harder today than five or 10 years ago, given increasing educational requirements for staff and evolving rules and regulations (Center for Rural Policy and Development, 2019a).

Costs are also high for families seeking childcare. One study estimated Minnesota families pay an annual cost of $16,120 for infant care in childcare centers and $8,476 in family-based care, with a family's burden increasing with each additional child in care and household income (e.g., single vs. double-income households) (*Price of Childcare in Minnesota 2019*, n.d.). Compared to household income, infant care in Minnesota takes up 52% of a single parent's income, compared to 15% of the income of a two-income family (*Price of Childcare in Minnesota 2019*, n.d.). Some evidence suggests low-income families utilize paid childcare options like center-based programs less often than higher-income families, as the cost of childcare consumes a higher proportion of their household income (Institute of Medicine, 2012). A 2019 survey of 400 rural and urban providers in Minnesota found more than half of providers reported parents' lack of ability to pay was compromising the sustainability of their business (Center for Rural Policy and Development, 2019b).

In sum, there is consensus that the cost to supply quality early childhood education depends on local factors and evolving rules and regulations. The same cost factors shape demand for early childhood education. Parents are the biggest financers of the early childhood system, followed by the government. Given its regulatory and financing role, government agencies have set the standard for what quality early childhood education settings and providers need to embody and deliver. These factors shape the nature and quality of the early childhood education workforce and the quality of early childcare programs.

The Early Childhood Workforce

The childcare workforce in the United States, predominantly consisting of female and White providers, faces significant challenges such as low wages, high turnover rates, and inadequate access to benefits, which can negatively impact the quality of early childhood environments and the developmental outcomes of children under their care. An early childhood worker may be defined as a person who is paid for caring for, or educating, children from birth to age 5 while not being a Kindergarten teacher (Burton et al., 2002). Based on this definition, the size of the workforce is estimated to be 2.2 million paid early childhood workers, with an additional 3.2 unpaid childcare providers in the US (Institute of Medicine, 2012). Half of the workforce (51%) works in center settings, 12% work in family childcare settings, 27% are paid relatives, and 11% are paid non-relatives (Institute of Medicine, 2012).

The same national study estimated in 2009-2010, the US childcare workforce was nearly all female, with a median age range of 34 - 43 years old and predominantly White (70.5-78.6%) across provider types, including childcare workers, preschool and Kindergarten teachers, and family childcare providers (Institute of Medicine, 2012). Additional estimates of the racial/ethnicity makeup of the workforce suggest Hispanic females/Latina females are the largest

racial/ethnic group of providers across provider type, making up an estimated 16.2-19.2% of childcare workers and 35.5-39.5% of family childcare workers in the US (Institute of Medicine, 2012).

Federal occupational data show childcare workers earned a median hourly wage of $11.17 for an annual median salary of $23,240 in 2018 (Bureau of Labor and Statistics, 2018). Along with low compensation, job turnover is high among childcare workers, with estimated annual job turnover rates ranging from 43% to 29%, depending on the setting and age group of children served (Institute of Medicine, 2012). In Minnesota, quarterly employment data show childcare workers of color consistently have higher turnover rates than their white counterparts In the first quarter of 2021, White childcare workers had a turnover rate of 13%, while Black (17%), American Indian (16%), Asian (17%), Native Hawaiian or Other Pacific Islander (17%) and Two or more Races (19%) had higher rates during the same period (U.S. Census Bureau, n.d.).

In Minnesota, one study estimated the size of the childcare workforce as 43,000 workers, with 14,000 providers working in family-based centers and 29,000 in center-based settings (Valorose & Chase, 2012). The same study used childcare licensing data to estimate the rate of business turnover among family-based providers was 11% in 2011 (Valorose & Chase, 2012). Consistent with the national profile of childcare workers, most licensed Minnesota providers were female, White, and, on average, 44 years old (Valorose & Chase, 2012). An estimated 23% of licensed Minnesota providers had a bachelor's degree or higher in early childhood, and 40% had a high school diploma or GED (Valorose & Chase, 2012). Wages for Minnesota childcare workers mirror the national rate, with a median hourly wage of $11.61 and an annual median salary of $24,150 (Bureau of Labor and Statistics, 2018). According to the Minnesota

Department of Employment and Economic Development, the childcare workforce pipeline is experiencing significant gaps because of the sector's low wages, long hours, and lack of health care benefits (Casale et al., 2020). In sum, improvements in working conditions are needed to attract skilled workers with the capacity to create quality early childhood environments capable of helping children achieve key developmental outcomes.

Defining Quality in Early Childhood Environments

Research has linked various conceptualizations of quality early childhood settings and child development outcomes, particularly for children from diverse and/or less-advantaged backgrounds (Peisner-Feinberg et al., 2016). Quality components in early childhood settings are often described as a set of interrelated components that include (1) *structural quality factors* such as child-staff ratios and provider characteristics, and (2) *process quality factors,* including child learning opportunities, teacher-child and peer-to-peer interactions (Manning et al., 2015).

Structural quality elements such as child-staff ratios and classroom size are often monitored through state and local regulations, while provider characteristics are commonly addressed through voluntary accreditation and/or participation in QRIS and/or center-level hiring policies (Workman & Ullrich, 2017). Evidence suggests lower ratios and classroom sizes are associated with more significant progress in a child's academic and social developmental outcomes (Manning et al., 2019). Strong evidence associates higher teacher educational or training levels with improved scores on achievement tests and cooperation among the children they teach (Hahn et al., 2016; Manning et al., 2015).

Process quality elements include classroom dynamics, peer-to-peer, teacher-child and teacher-parent interactions, which have been found to be more predictive of child outcomes than structural quality elements, suggesting the relational aspects of early childhood settings may

provide stronger points of leverage for reaching child development outcomes (Manning et al., 2015; Peisner-Feinberg et al., 2016). Process quality has been measured in the field in several ways, including observation-based assessments of individual-level interactions and a review of the broader learning environment. The Environment Ratings Scale (ERS) is a global measure that includes both process and structural elements, making it the most common measure of quality in the field (Manning et al., 2015; Tout et al., 2009). A large body of evidence shows that the quality of an environment as measured by ERS has been associated with learning and developmental outcomes for children (Manning et al., 2019).

Preparing the Early Childhood Workforce to Create Quality Environments

Expectations for the early childhood workforce are high, but there is less clarity in the field about how to prepare teachers to meet those expectations. Authors of a 2015 Institute of Medicine *Transforming the Workforce for Children Birth Through Age 8: A Unifying Foundation (2005)* report write:

> Having a role in the early learning of a child is a complex responsibility that requires a sophisticated understanding of the child's cognitive and social emotional development; knowledge of a broad range of subject-matter content areas; and skills for developing high-quality interactions and relationships with children, their families, and other professionals. The importance and value of these skills is often underestimated. (Institute of Medicine (IOM) and National Research Council (NRC), 2015, p. 339)

This standard raises a deeper challenge of identifying the combination of educational, training, or credentialing experiences teachers need to meet the increasingly complex demands they face. A large body of evidence suggests a bachelor's degree with a specialization in early childhood education is the strongest predictor of quality environments. However, a few studies

show teachers can achieve similar outcomes with an associate's degree or bachelor's without specialization (Manning et al., 2019; Whitebook, 2003). One recent meta-analysis of 49 comparison and/or correlational studies of the association between teacher qualifications and quality environments (as measured by ERS) found a correlation between all ERS subscales and teacher educational attainment, with space and furnishing and personal care routines being the least correlated (Manning et al., 2019). Interestingly, the study found no association between teacher educational attainment and quality in settings where most children were Asian, Native American or Latino. The authors hypothesize that teachers with lower educational attainment in those settings drew on other strengths for creating quality environments that more educated teachers from outside those cultural groups would be unable to replicate (Manning et al., 2019).

Despite this evidence, requiring early childhood workers to obtain bachelor's degrees with specialized training in early childhood development is not without controversy. Some have argued that expecting low-wage earning teachers and/or teachers from culturally or linguistically diverse communities to meet such an educational standard is problematic (Whitebook, 2003). A survey of rural and urban Minnesota providers found the increasing educational requirements have made it difficult for centers to hire and retain staff, complicating their ability to compete with school districts and other employers that can pay higher wages (Center for Rural Policy and Development, 2019a).

While the focus in the field has been on a bachelor's degree with specialized early education knowledge, there is no consensus in the field on the educational pathway early childhood workers should follow to master a broad range of complex skills, subject matter expertise on multiple domains of child development, and skills for assessment and instructional design (Institute of Medicine (IOM) and National Research Council (NRC), 2015). Generally,

formal coursework covers three topic areas, including foundational theories of child development, subject matter content, and pedagogy, all of which can culminate into an associate's, bachelor's, master's or Child Development Associate credential (CDA) (Institute of Medicine (IOM) and National Research Council (NRC), 2015). Scholars caution that while most early childhood programs offer various courses, the content is not presented in a manner that helps students develop a deep understanding of or formulate strategies for linking the content with application in practice (Institute of Medicine (IOM) and National Research Council (NRC), 2015).

Recent expert consensus highlighted several competencies needed by today's early childhood professionals working with children 0 to 8, including:

(1) A core knowledge base of developmental science, child development in multiple areas including cognitive development, social emotional development, general learning competencies, physical development and health; subject-matter knowledge (e.g., mathematics, science, etc.) to support development in multiple domains; how environmental and biological factors influence child development; and knowledge of how to assess children's growth in a manner that is developmentally and culturally appropriate, valid and reliable.

(2) Practices to help children learn by establishing nurturing relationships with children and their families by using positive language, creating effective learning environments, using materials, routines and schedules, various instructional, curricula and caregiving practices, setting appropriate individual goals based in individual learning trajectories based on assessment.

(3) Working with diverse populations by understanding how to teach children from various family structures, socioeconomic status, race, ethnicity, language, cultural backgrounds and disabilities or learning challenges.

(4) Developing and using partnerships with families that are respectful, reciprocal, and set goals to enhance children's learning; provide families with needed resources for addressing behavioral, health, social services referrals and partnerships.

(5) Engage in continuous improvement of quality practice through professional development and self-care.

(Institute of Medicine (IOM) and National Research Council (NRC), 2015)

In sum, expectations for the early childhood workforce are high, yet there is a lack of clarity regarding the best way to prepare teachers for this important role. A bachelor's degree with a specialization in early childhood education is often considered a strong predictor of quality learning environments, though some studies suggest similar outcomes can be achieved with alternative qualifications. The complex skills needed to succeed in early childhood education include a deep understanding of child development, subject-matter knowledge, pedagogy, and relationship-building abilities. However, requiring a specialized degree has sparked controversy, as it can create challenges for low-wage teachers and those from culturally or linguistically diverse communities. The field is seeking consensus regarding suitable education pathways, but recent expert recommendations emphasize core knowledge in child development, effective teaching practices, working with diverse populations, and ongoing professional development for early childhood professionals.

Closing the Gap Between What is Needed and What is Delivered in Early Childhood Settings

Early childhood specialists have focused on development and testing of the efficacy of evidence-based interventions (e.g., literacy or numeracy interventions), monitoring implementation fidelity, and tracking child outcomes. Less attention has been paid to addressing the broader environmental conditions under which those evidence-based strategies can succeed (Martinez-Beck, 2013). As one early childhood education and care scholar argues, "careful consideration is needed so that implementers of evidence-based models will be able to understand the conditions necessary to implement effective interventions on the ground, under different conditions, and in diverse contexts" (Martinez-Beck, 2013, pg.xxi). The field of implementation science offers methods for developing a more refined understanding of *what else* is needed to achieve child developmental outcomes.

The current study investigates one evidence-based teacher practice, involving early childhood education assessments, and connects its adoption to implementation science frameworks to better understand conditions that facilitate or hinder its use. Such conditions include organizational and individual-level factors associated with implementation quality. The study aims to answer research questions related to teacher perceptions, organizational leaders' beliefs, and the impact of specific implementation strategies on teacher-child assessment practices. The study seeks to strengthen the implementation of evidence-based interventions in diverse early childhood education settings. The study investigates the following research questions:

RQ1. How do teachers perceive their current assessment practices in terms of use and level of difficulty? What do teachers believe about child assessment practices?

How do teachers perceive their use of child assessment data for individualizing instruction? What do organizational leaders believe are the individual and organizational level facilitators and barriers related to child assessment practices? What suggestions do study teachers, leaders, and local field experts have for strengthening teacher assessment practices?

RQ2. What is the impact of employing one specific implementation strategy identified by teacher/center leaders on the quality of teacher-child assessment practices?

Chapter Two: Literature Review

This study draws on implementation science literature to describe environmental factors that shape teacher practice. Implementation Science is a discipline motivated to reduce the "know-do" gap; the distance between what is *known* regarding evidence-based strategies, curricula, policies or practices for addressing a problem and what is *delivered* in real-world settings (Aarons, Horowitz, & Ehrhart, 2012, Brownson et al., 2017, Domitrovich et al., 2008). While research has established the link between quality of implementation and program outcomes, there is little research focused on implementation factors in the field of early childhood (Franks, R., Schroeder, 2013). A few early childhood studies have moved beyond solely measuring program outcomes or fidelity to the intervention and included measures of contextual factors to better understand optimal conditions under which an intervention can deliver its promised outcomes (Martinez-Beck, 2013).

In evaluation literature, the role of implementation is often discussed in two ways: program design (e.g., theory of change) and fidelity to design. The implementation science literature extends beyond the concern with fidelity by providing frameworks and constructs that

consider additional implementation outcomes (as opposed to program outcomes), including program stakeholder behaviors (e.g., adoption of an intervention), stakeholder attitudes (e.g., perceived value and acceptability of an intervention), cost, the feasibility of an intervention, penetration of an intervention in a context, and sustainability of an intervention. In the case of the early childhood workforce, tension exists between teachers taking a 'business as usual' approach and/or adopting evidence-based strategies, as evidenced by the varying levels of quality across early childhood settings in the state (Minnesota Department of Human Services, 2019).

Implementation Determinants and Strategies Related to Teacher Adoption of Evidence-Based Practices

The implementation science literature argues that factors, or determinants, operate at the individual, organizational, policy, and intervention levels that enable or obstruct the adoption of new practices. These factors influence the degree to which teachers adopt evidence-based child assessment practices and the degree to which such practices are incorporated into early childhood education. *Implementation strategies* are actions for addressing determinants to support achieving *implementation outcomes*. The current study describes the organizational and individual-level determinants, strategies and outcomes related to teacher uptake of evidence-based practices. The study combines two frameworks for organizing and describing the salient determinants, including the Consolidated Framework for Implementation Research (CFIR) and The Supportive Environmental Quality Underlying Adult Learning (SEQUAL) (Center for the Study of Child Care Employment, n.d.; Damschroder et al., 2009).

Organizational-Level Determinants and Strategies Related to Teacher Adoption of Evidence-Based Practices: The Supportive Environmental Quality Underlying Adult Learning (SEQUAL)

While teachers are the focal point for policy, coaching, and accountability efforts, their ability to implement evidence-based practices is mediated by their work environments. Understanding the aspects of work environments that matter in supporting or hindering teacher adoption of evidence-based practices is therefore key to understanding how, specifically, to support teachers. SEQUAL is a tool developed by the Center for the Study of Childcare Employment at the University of Berkeley for assessing organizational factors linked to quality environments (Whitebook et al., 2016). SEQUAL assesses five areas (Figure 2) including teaching supports, learning opportunities, policies and practices that support staff initiative and collaboration, adult well-being and interactions between supervisors and staff (Whitebook et al., 2016). A 2018 SEQUAL assessment of 143 teachers working in 47 Minnesota early childhood centers (17 highly rated centers, 16 lower-rated centers, 14 unrated centers) provides teacher ratings on each of these organizational-level implementation determinants in early childhood settings.

Figure 2

Organizational-Level Determinants and Strategies Related to Reacher Adoption of Evidence-Based Practices. Reprinted from Center for the Study of Childcare Employment, U. of C. (n.d.). Supportive Environmental Quality Underlying Adult Learning (SEQUAL): A Tool For Program Improvement Five SEQUAL Domains.

Teaching supports include the availability of curriculum; training related to child assessment and observation, supports for children and families and professional responsibilities; and access to needed materials and equipment (Whitebook et al., 2018). In the Minnesota SEQUAL study, 36% of teachers stated their environments provided insufficient curriculum-related training supports (Whitebook et al., 2018). Most teachers in the Minnesota SEQUAL study reported having an assessment process, 62% reported they have been trained on how to report findings to families, and 62% indicated receiving guidance using assessment findings to inform their teaching (Whitebook et al., 2018). Implementation strategies that support teachers, particularly those with lower readiness for adoption, include dynamic and engaging training experiences, raising awareness, addressing teacher attitudes and beliefs, and protected time for reflection and planning (Powell et al., 2015).

A *Learning Community* is defined as the availability of professional development opportunities and space to practice new skills and openness to trying new things in the work environment (Whitebook et al., 2018). Minnesota teachers in the SEQUAL study expressed a need for financial support for engaging in professional development opportunities, as well as increased flexibility in their work schedule to participate (Whitebook et al., 2018). Additionally, only 32% of teachers described having time to discuss work-related issues with other teachers (Whitebook et al., 2018). Teachers having protected time for applying learned skills individually or as a team is an implementation strategy that cultivates learning (Powell et al., 2015).

Whitebook and colleagues describe *job crafting* as workplace practices and policies that support teaching staff decision-making about how their classrooms operate, creative problem-solving and innovation through quality improvement efforts (Whitebook et al., 2018). In Minnesota, most of the teachers in the study reported having the ability to choose classroom materials and planned activities; however, less than half reported having a choice on when observations were made in their classroom (Whitebook et al., 2018). Regarding organizational decision-making, only 53% of teachers felt their input into policies was taken seriously (Whitebook et al., 2018). Providing facilitation is an implementation strategy that helps nurture shared group decision-making and ownership in implementation efforts (Powell et al., 2015).

Adult Well-Being includes teachers' economic well-being, wellness supports, and quality of their work life (Whitebook et al., 2018). 39% of Minnesota teachers in the study worried about covering their housing costs, 55% worried about covering monthly bills, and 24% worried about having enough money for food for their families (Whitebook et al., 2016). Concerning wellness supports and the quality of their work environments, 58% disagreed or somewhat agreed their work place provides facility maintenance and cleaning support from someone other than teaching staff, 43% disagreed or somewhat agreed there are comfortable places for adults to sit and be with children, and 26% disagreed or somewhat agreed that bullying other adults is not tolerated in their work place (Whitebook et al., 2018). Providing teachers with recognition, comfortable spaces and time for breaks, and financial incentives are some implementation strategies that may broaden their capacity for adopting new practices (Powell et al., 2015; Whitebook et al., 2018).

Program Leadership includes supervision and oversight of a childcare setting's daily operations, leaders with expertise in child development and pedagogy, and the ability to create a

positive climate that boosts healthy staff morale and innovation (Whitebook et al., 2018). Only 38% of Minnesota teachers in the study felt their supervisors knew their teaching well and understood the challenges they face in the classroom (Whitebook et al., 2018). At the same time, the majority of teaching staff reported their leadership knew their setting well and encouraged teachers to take the initiative to solve problems (Whitebook et al., 2018). Leader behaviors that support the uptake of innovation in organizations include articulating the benefits of innovation, problem-solving during implementation, rewarding staff on implementation progress, managing staff distress around change, allocating resources, 'managerial patience,' and ongoing monitoring of implementation efforts (Aarons et al., 2012; Damschroder et al., 2009; Domitrovich et al., 2008). Bertram and colleagues argue the leadership style most effective in navigating the complexities of implementation efforts is adaptive leadership – a form of leadership better suited for situations with high uncertainty (Bertram et al., 2015). Effective leadership in early childhood settings includes a mix of technical expertise (e.g., pedagogical acumen), coaching and staff development know-how and the 'managerial patience' to help teachers integrate new ways of doing their work.

In sum, SEQUAL may be used to assess key factors influencing the quality of early childhood education, including teaching supports, learning opportunities, policies supporting staff initiative and collaboration, adult well-being, and interactions between supervisors and staff. The available evidence suggests that these factors may be addressed via dynamic training experiences, addressing attitudes and beliefs, and provision of protected time for reflection and planning. Having a learning community and encouraging shared group decision-making can also foster improvements. Additionally, providing teachers with recognition, comfortable spaces, and financial incentives may support their growth. Lastly, effective leadership in early childhood

settings should include technical expertise, coaching, staff development know-how, and the patience to help teachers integrate new methods into their work.

Individual-Level Implementation Determinants and Strategies Related to Teacher Adoption of Evidence-Based Practices

In addition to organizational factors, individual level factors influence adoption of evidence-based practices. The CFIR framework provides the following individual-level implementation determinants (Figure 3): knowledge and beliefs about the evidence-based practice, stage of change or readiness, identification with their organization (or profession), self-efficacy and other personal resources (Damschroder et al., 2009).

Figure 3

Individual-Level Implementation Determinants and Strategies Related to Teacher Adoption of Evidence-Based Practices

Knowledge and beliefs about an intervention include tactical knowledge on how to use an intervention and understanding the underlying rationale for the existence of the intervention, both of which facilitate the uptake of interventions by individuals (Damschroder et al., 2009). In his seminal work, Rogers argues successful adoption requires compatibility between a new practice or innovation and an individual's previously held sociocultural values and beliefs (Rogers, 1995). In their conceptual framework for schools, Domitrovich and colleagues argue psychological characteristics (e.g., enthusiasm, confidence) influence implementation success, as

well as a perception that the evidence-based practice is better than current practice (Domitrovich et al., 2008). A common belief among early childhood teachers is that children "construct their own knowledge through self-directed discovery and that the teacher's responsibility and role is one of supporting that discovery. This explicit belief system often is at odds with professional development that encourages teachers to provide explicit information about vocabulary, number concepts, and letters in a more intentional approach (Bereiter, 1972)." (Landry et al., 2009, pg.449). Strategies for improving teacher implementation of assessment include tending to teachers' philosophies and beliefs about teaching and creating experiences that help teachers understand evidence-based strategies (Landry et al., 2009; Peterson, 2013).

Individual *readiness or Stage of Change* refers to stages of change an individual moves through as they change their behavior (Prochaska et al., 2005). Peterson (2013) argues readiness among early childhood professionals is influenced by several factors, including cultural beliefs and attitudes, social systems and relationships, current and persistent stressors, and enduring personal characteristics (Peterson, 2013). Evidence-based practices resonate less with many cultural communities as they are typically developed from middle-class cultural norms (Peterson, 2013). Some implementation strategies for increasing readiness for change include identifying and preparing champions, offering dynamic training sessions and educational outreach events, creating learning collaboratives, and assessing readiness (Powell et al., 2015).

Individual identification with the organization or profession is another individual-level determinant linked to implementation success. Damschroder and colleagues found an individual's perception or attachment to their organization mediated their willingness to adopt new practices (Damschroder et al., 2009). Given the low pay, demanding work, and fragmented nature of early childhood systems, high teacher turnover rates suggest low attachment to the

profession. Organizational development scholars argue that resistance to change forms in small groups within organizations and that a small-group intervention is more effective for increasing adoption (Glisson et al., 2006).

Self-efficacy and personal resources refer to a teacher's belief that they can do what is required. A high sense of self-efficacy increases an individual's willingness to adopt a new practice and persist in the face of challenges (Damschroder et al., 2009). For early childhood workers, access to emotional resources for meeting the demands of their work is a critical aspect of implementation success. Burnout or emotional exhaustion has been associated with negative student interactions and is a real problem faced by the early childhood workforce (Domitrovich et al., 2009). Whitebook and colleagues provide strategies for increasing the well-being of early childhood staff, including environmental adjustments (e.g., spaces for teachers, ergonomic adjustments) and reinforcing social resources in the work environment by strengthening staff relationships and creating a supportive climate (Whitebook et al., 2018). Given the high demands placed on early childhood teachers, supporting their emotional wellbeing contributes to their ability to adopt the evidence-based practices expected from them.

In sum, successful adoption of evidence-based practices in early childhood education is influenced by individual-level factors such as knowledge and beliefs about the intervention, stage of change or readiness, identification with the organization or profession, self-efficacy, and personal resources. Compatibility between new practices and an individual's sociocultural values is crucial, while psychological characteristics and perception of the practice's effectiveness also play a role. Implementation strategies may include addressing cultural beliefs, improving teacher philosophies, and offering diverse training opportunities. Additionally, fostering a strong sense

of identification with the organization, enhancing self-efficacy, and providing support for emotional well-being positively influence implementation success.

An Early Childhood Care and Education Evidence-Based Practice: Child Assessments

The use of child assessment data to monitor child outcomes is an evidence-based practice supported by research and regulatory agencies. Head Start, a federal program that serves the nation's low income children, has codified the use of assessment data via regulation (*Head Start Program Peformance Standards*, n.d.). Assessment of children in early childhood is a foundational practice for monitoring child progress on developmental milestones, tailoring instructional activities, and identifying children in need of interventions or extra support (Institute of Medicine (IOM) and National Research Council (NRC), 2015).

Early childhood assessments take two forms: curriculum-embedded or general. General outcome assessments (GOM) assess a limited set of skills (e.g., literacy) thought to be representative of a broad set of needed skills, whereas curriculum-embedded approaches assess a wide array of developmental domains and are often linked to curriculum (Atkins-Burnett et al., 2014). GOM approaches are generally easier for teachers to implement as they require less teacher expertise and decision-making and provide explicit implementation protocols (Atkins-Burnett et al., 2014). Curriculum-embedded assessments are associated with increased demands for teacher knowledge and expertise regarding child development, pedagogy, data interpretation and translation into instructional design solutions (Atkins-Burnett et al., 2014).

In Minnesota, there are four child assessment tools early childhood sites can use in their programs, one of which is a curriculum-embedded approach called *Teaching Strategies Gold (TSG)* (Minnesota Department of Education, 2019). TSG is an evidence-based assessment system that reliably measures a child's progress along developmental outcomes accurately and

objectively (Lambert, Kim, & Burts, 2015). Paired with the TSG's Creative Curriculum, or any developmentally appropriate curriculum, a teacher can provide appropriate educational experiences based on TSG assessment findings. According to TSG developers, the assessment system will help teachers:

- Assess child performance using tasks shown by research to be predictive of school success
- Conduct less intrusive, classroom-based observations that align with a child's everyday classroom activities
- Use the same assessment process for children with developmental delays, advanced learners and dual language
- Support teacher planning efforts based on timely and robust child-level and/or classroom-level assessment findings
- Increase a teacher's understanding of each student's developmental trajectory
- Improve a teacher's relationship with parents and their ability to communicate a student's progress in the classroom

(Lambert et al., 2015; Teaching Strategies Gold, n.d.)

The potential benefits of curriculum-based assessment systems such as Teaching Strategies Gold (TSG) have led to increased adoption in early childhood settings. However, implementation remains challenging for teachers (Atkins-Burnett et al., 2014).

The use of child assessment data is an important evidence-based practice in early childhood education, helping teachers monitor progress, tailor instruction, and identify students needing additional support. Two forms of assessments exist: general outcome assessments

(GOM), which focus on a limited set of skills and are easier for teachers to implement, and curriculum-embedded assessments, which assess a wide array of developmental domains but require more teacher knowledge and expertise. In Minnesota, TSG is a popular curriculum-embedded, evidence-based assessment system that measures a child's progress along developmental outcomes. However, implementing such curriculum-based assessment systems can be challenging for educators due to increased demands for knowledge and expertise. The current study examined factors that support or hinder teacher use of ongoing curriculum-based assessments for individualizing instruction through the lens of one implementation determinant: teacher beliefs and self-efficacy with the practice.

Implementation Challenges of Child Assessments

Despite the growing awareness of assessments in early childhood settings, there is a lack of concrete evidence on how teachers effectively utilize assessment data to individualize instruction or strategies to support teachers with this important task (Atkins-Burnett et al., 2014). A 2014 literature review found little rigorous evidence regarding the kinds of implementation activities and supports that facilitate early childhood teachers' successful use of assessments (Atkins-Burnett et al., 2014). The same review found an absence of a research base demonstrating how teachers link assessment efforts to instructional design decisions or individualization (Atkins-Burnett et al., 2014). In 2012, the Minnesota Head Start Association (MHSA) sought to explore the data quality of teacher assessments using a 'fidelity checklist' created by the University of Minnesota's Center for Early Education and Development. The tool was piloted on data from 88 teachers and found "the quality and completeness of teachers' data were lower than expected (receiving an average score of 9 out of 15 possible points)" (*Learning Community Around Data*, n.d.). A recent study (Bailey) of Head Start teachers in Minnesota

found time, competing priorities and the lack of knowledge of the state's early learning and K-12 standards were the main barriers to implementing child assessments (Bailey, 2017). In sum, evidence suggests that early childhood teachers struggle when using child assessment data to individualize their instruction. Some evidence suggests a combination of factors including time management and technical knowledge contribute to this problem.

Defining High Quality Teacher Assessment Practices

The discrete tasks required of teachers using curriculum-based assessment have been defined and widely disseminated in the field. Standards for assessing the quality of those tasks, however, are less widely known and are a critical missing piece needed for driving improvement efforts. In an effort to close this gap in the literature, in 2012, the Office of Planning, Research and Evaluation at the Administration for Children and Families (ACF) took up the challenge of defining quality measures for teacher assessment tasks. The result was a comprehensive, multi-method, research-informed tool called the Examining Data Informing Teaching (EDIT) (S. Monahan et al., 2016). EDIT was piloted in 18 classrooms in 2012; revisions were made based on the pilot, and the authors recommended further testing of the tool in additional settings with varying assessment practices, teacher skill levels and assessment systems (S. Monahan et al., 2016). Additional testing and refinement of the EDIT process has not been conducted since its development in 2012 (S. Monahan, personal communication, February 6, 2023). This study uses EDIT as a guide for measuring the quality of core teacher assessment tasks. Table 1 displays the four major teacher assessment tasks identified by the EDIT project (and the literature more broadly), the EDIT quality measures, and the indicators of quality used in this study.

The first assessment task involves the teacher selecting a point of focus – a child's behavior, skill, or knowledge – they wish to assess. Authentic assessment approaches (such as

the one used in Head Start) give teachers the freedom to pick a focus point, rather than being told what to assess. Strategies for selecting what child behavior a teacher assesses are driven by the program's curriculum, what is observable, and modifiable (Akers et al., 2016). A 2016 literature review of 173 studies found no studies on teachers' decision-making about what to assess. The literature review identified several guidelines offered by professional organizations, legislative policies, and committee reports, including that assessments should be: (1) authentic and natural rather than performative, (2) ongoing, (3) developmentally appropriate, (4) individualized, and, (5) use multiple sources (Akers et al., 2016). At the study sites, assessment targets need to span ten learning domains including social, emotional, physical, language, cognitive, literacy, math, science and technology, social studies, arts, and English language acquisition (*Birth Through Kindergarten Minimum # of Items / Dimensions Required Gold Area Total # of Dimensions Minimum # of Items / Dimensions Required*, n.d.). Teachers are expected to select assessment targets that cover these areas over the three-month assessment period. Therefore, a quality measure used in this study is whether each observation includes at least three learning and development objectives.

The second major assessment task includes teachers' abilities to collect and manage assessment data on an ongoing basis. In many cases, this involves teachers creating systems to remember to make an observation, capture documentation related to the observation, and enter the information into a system that organizes high-volume and detailed data. Some studies have found that web-based or technology-based systems help teachers with this step (Akers et al., 2016). Teachers use *Teaching Strategies Gold*, a web-based assessment database in the study sites to enter and manage their data. Teachers are expected to collect two daily observations for each child in the study sites. Additionally, for each observation, teachers are expected to provide

a rating of the assessment target using a scale of 'Not yet' to 9 and include documentation that provides contextual information that is individualized and not generic.

The third major assessment task, arguably the most difficult for teachers, involves making sense of assessment data and using it to individualize instruction (deMonsabert et al., 2022). Part of the issue is rooted in how early childhood teachers are trained, which often does not include a data literacy component (Love et al., 2019). One author defined data literacy as teachers' ability to: "(a) define a problem of practice and contextually frame the data question or goal on which data are being collected, (b) collect and use a variety of data, (c) transform data into useful information, (d) transform information into instructional decisions, and (e) evaluate instructional outcomes" (Love et al., 2019, pg. 299). The literature points to factors that may help teachers improve data utilization, including data visualization, data literacy professional development, leadership support, collaborative support, and policy requirements (deMonsabert et al., 2022). Knowledge about teachers' data literacy is not well understood. However studies have shown teachers primarily view data use as an accountability exercise rather than a tool to inform instruction (Brawley & Stormont, 2014; deMonsabert et al., 2022). The EDIT quality measures of this task include data interpretations that are evidence-based, context-based and consider alternative hypotheses (Shannon Monahan et al., 2016). Measuring this task was beyond the scope of this study.

The fourth major assessment task is teachers making data-informed instructional decisions and evaluating the effectiveness of those strategies. Quality measures for this task include the presence of differential evidence-based instructional strategies (i.e., not a one-size-fits-all approach) that build on the strengths and interests of each child (Shannon Monahan et al., 2016). Studies have shown that web-based assessment management programs, coaches, policies,

or decision points set by educational organizations help teachers interpret assessment data in practice (Akers et al., 2016). Some evidence suggests that technology-based systems that provide teachers with immediate recommendations on instructional strategies based on assessment data lead to a higher level of achievement for children (Akers et al., 2016). The current study utilized teachers' self-reported behaviors related to the use of data to individualize instruction. Teachers were asked to rate themselves on how much they rely on assessment data to plan specific activities for groups or individual students, complete lesson planning, and engage parents.

Table 1.

Teacher Assessment Tasks, EDIT Quality Measures, and Study Quality Indicators and Method

Assessment Task (Shannon Monahan et al., 2016)	EDIT Quality Measures (Shannon Monahan et al., 2016)	Study Indicators
(1) Select an assessment target (i.e., a skill, behavior, or knowledge) and assessment method	• Targets are meaningful, observable, responsive to instruction and modifiable	• Teachers select 3-5 learning & development objectives (out of the 38 total objectives) that span across at least 3 different domains (out of a total of 10 domains) *Method: Data Audit*
(2) Implement ongoing assessment of child progress	• Teacher documentation is objective, complete, efficient, and consistent.	• For each observation, teachers select a rating of the child's level on each selected objective and documentation for the rating in the form of an individualized note. *Method: Data Audit*
(3) Interpret data and formulate instructional decisions	• Teachers make data interpretations that based on context, evidence-based and include alternative hypotheses.	• *Not included in the study*
(4) Apply instructional decisions and evaluate progress	• Teacher uses evidence-based strategies, and a variety of instructional approaches to build on children's strengths and interests. • Teacher engages parents on their child's progress using assessment data.	Teacher self-rating of their use of assessment data for individualizing instruction and engaging parents. *Method: Teacher self-report*
	• Teachers evaluate the success of instructional strategies.	• *Not included in the study*

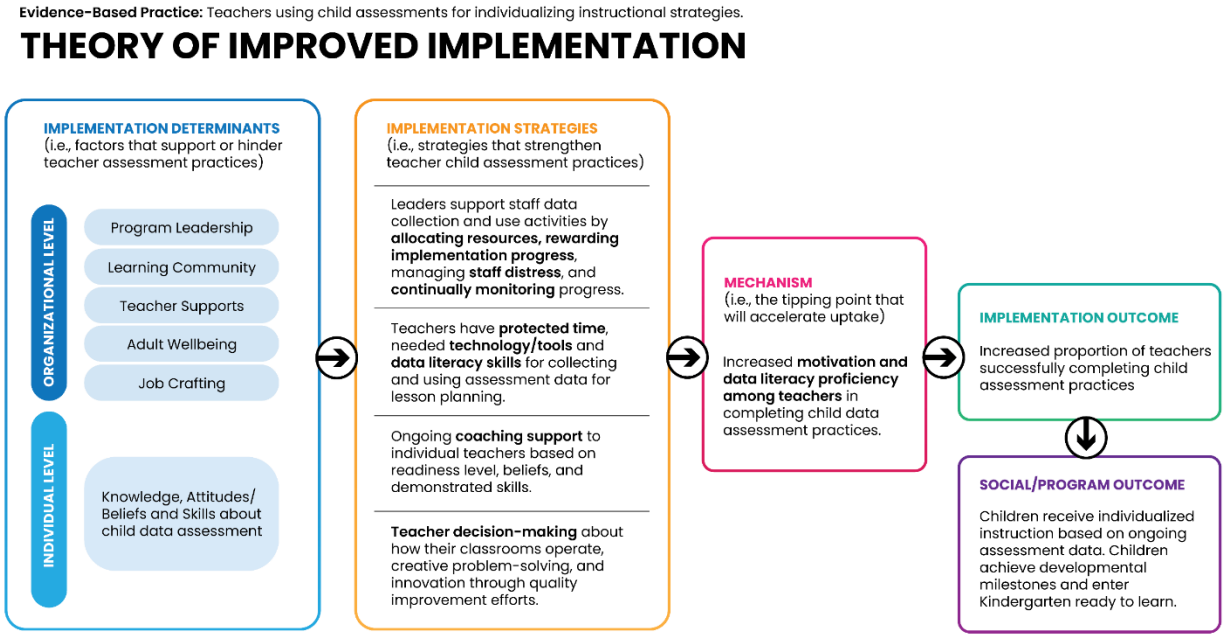
The current study focused on *implementation*, rather than program outcomes, and sought to contribute to a body of knowledge concerned with the delivery of evidence-based programs and practices. A critique of implementation science has been its inability to move beyond inventories of implementation factors (one study found 601 determinants) and strategies (one study found 73 strategies) to providing testable theories that guide practitioners and scholars on how to improve program delivery (Krause et al., 2014; Lewis et al., 2018; Powell et al., 2015). Lewis and colleagues argue what the field needs are "…testable theories that describe the causal pathways through which implementation strategies function" (Lewis et al., 2018, pg.2). As such, a key feature of the current study is to move beyond lists of factors and test a discrete implementation intervention (based on the literature and an assessment of local factors in the study sites) for advancing the understanding of what may help improve teacher use of child assessment to individualize instruction. Figure 4 depicts the current study's theoretical framework, based on the SEQUAL tool previously described. The framework displays several organizational and individual factors at play; however, the current study narrowly focuses on testing an implementation strategy based on *job crafting*, defined as engaging teachers in how they do their work.

The discrete tasks required of teachers using curriculum-based assessment have been defined but lack quality measures, representing a gap in the field. The Office of Planning, Research, and Evaluation at the Administration for Children and Families (ACF) developed a comprehensive research-based tool [Examining Data Informing Teaching (EDIT)] to address this gap. Assessment tasks involve the teacher selecting a child's behavior, skill, or knowledge as the point of focus, collecting, and managing data on an ongoing basis, analyzing assessment data and using it to individualize instruction, making data-informed instructional decisions, and evaluating

the effectiveness of those decisions. The current study sought to advance understanding of strategies to strengthen teacher use of assessment data by testing an intervention to engage teachers in the practice of assessment.

Figure 4

Conceptual Framework



Chapter 3: Research Design and Methodology

The case study reported here examined a subset of factors influencing teacher use of child assessment data in three Head Start centers with linguistically, racially, and ethnically diverse students and teaching staff. The researcher selected a case study design given the bounded nature of the study context and the in-depth exploration of a real-world issue (Merriam & Tisdell, 2016). This study uses a practical action research approach and is "a small-scale research project, [that] narrowly focuses on a specific problem or issue and is undertaken by individual practitioners or teams within a practice setting…" (Plano & Creswell, 2015, pg. 433). Based on a review of the literature, this study asks the following research questions:

RQ1. How do teachers perceive their current assessment practices in terms of use and level of difficulty? What do teachers believe about child assessment practices? How do teachers perceive their use of child assessment data for individualizing instruction? What do organizational leaders believe are the individual and organizational level facilitators and barriers related to child assessment practices? What suggestions do study teachers, leaders, and local field experts have for strengthening teacher assessment practices?

RQ2. What is the impact of employing a specific implementation strategy identified by teacher/center leaders on the quality of teacher-child assessment practices?

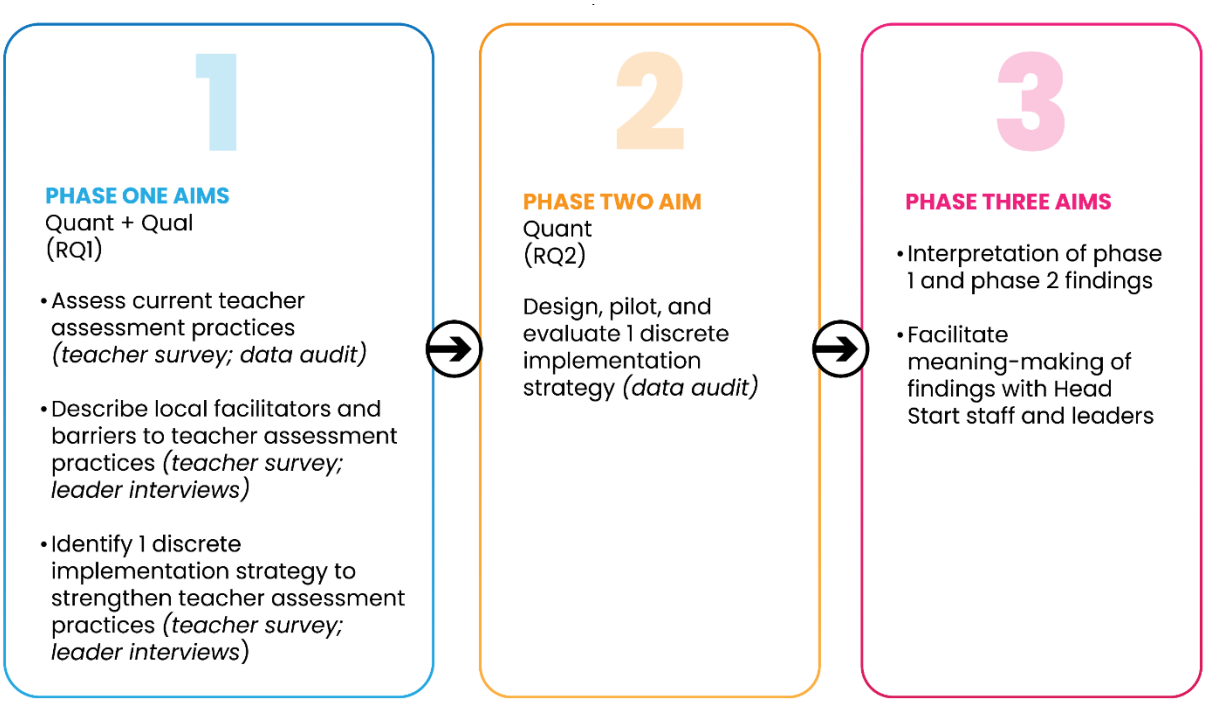
This case study is organized as follows (see Figure 5):

Phase 1 (RQ1): Needs assessment to document teachers' current assessment practices and the local factors driving practices using a teacher

	survey, interviews with center directors, Head Start leaders, and local field experts.
Phase 2 (RQ2):	Identify and pilot a discrete implementation strategy for strengthening teacher assessment practices in the three study centers.
Phase 3 (Interpretation)	Interpret and discuss findings with Head Start. Document learnings about local factors and tested implementation strategy.

Figure 5

Study Phases and Aims



This study defines the 'outcome' using four dimensions, as previously described:

(1) Select an assessment target (i.e., a skill, behavior, or knowledge) and assessment method,

(2) Implement ongoing assessment of child progress,

(3) Interpret data and formulate instructional decisions, and,

(4) Apply instructional decisions and evaluate progress.

Study Setting

The study employs a purposive sample (Merriam & Tisdell, 2016) of three publicly funded Head Start centers in the Twin Cities metropolitan chosen because of their diverse student and staff population. Most of the children attending two out of the three sites came from homes that spoke languages other than English (Table 2). Among the nearly all-female teaching staff in this study, 55% are teachers of color (Table 3). Most of the teachers were born outside the United States and had lived here for an average of 20 years. Teachers in this sample had on average been in early childhood teaching roles for 10 years. About half the sample of teachers held a high school degree or a Child Development Associate certificate. Over half (56%) of the teachers in the current study were former Head Start Parents.

In Minnesota, 295 Head Start programs serve low-income families with high-quality early childhood programs throughout the state and tribal communities (US Department of Health & Human Services, Administration of Children & Families, n.d.). Since 2007, Head Start programs have been mandated to use assessment practices for monitoring child outcomes and individualizing instruction (*Head Start Program Peformance Standards*, n.d.). The history of assessment and the presence of a highly resourced and regulated infrastructure for supporting assessment practices make Head Start an ideal setting for studying teacher assessment practices.

The study team included the principal investigator, an early childhood assessment practice trainer with over 36 years of experience working with early childhood teachers in the study community, center administrators, and teachers at study sites. The principal investigator and early childhood trainer met regularly throughout the study period to reflect on observations

and determine the next line of inquiry for the study. Center directors and the administrator were briefed at key junctures and approved study decisions. The current study engaged 43 lead and assistant preschool teachers through a teacher survey and interviewed seven site leaders. The Head Start trainer audited child assessment records generated by 16 teachers.

Table 2

2022 Number and Home Language of Enrolled Children and Teachers in Study Sites

	Site 1	Site 2	Site 3
	172	161	139
Number of full-day and half-day children enrolled by home language	39% Latino 30% Somali 29% English 1% Oromo	25% Somali 13% Spanish 5% Oromo 1% Other	76% English 8% Oromo 6% Other 3% Somali 3% Spanish <1% Swahili
Number of lead and assistant teachers in each study site	15 Lead 18 Assistant	10 Lead 11 Assistant	10 Lead 1 Assistant
Number of lead and assistant teacher survey respondents by race and ethnicity	6 Lead 7 Assistant	8 Lead 7 Assistant	2 Lead 7 Assistant

Table 3

Teacher Survey Participants' Demographics

		n	*%*
Race/Ethnicity	Asian or Asian American	6	14%
	Black or African American	10	23%
	Multi-racial	7	16%
	Native Hawaiian or other Pacific Islander	1	2%
	White or Caucasian	6	14%
	Missing	13	30%
	Total	43	100%
Gender	Female	36	84%
	Male	1	2%
	Missing	6	14%
	Total	43	100%
Education	Associate's degree	6	14%
	Bachelor's Degree	13	14%
	Child Development Associate	11	30%
	High school diploma or GED	7	26%
	Missing	6	14%
	Total	43	100%
Birthplace	In the United States	11	26%
	Outside the United States	26	60%
	Missing	6	14%
	Total	43	100%
Former Head Start Parent	Yes	24	56%
	No	12	28%
	Missing	7	16%
	Total	43	100%

Data Collection and Analysis

Given the study's focus on understanding the current state of teacher assessment practices, and the nuances that drove those practices, the principal investigator chose a mixed-

method case study methodology (Bartlett & Vavrus, 2016). Choice of methods was based on the information sought and, in part, guidance from implementation literature on strategies for improving the uptake of a practice.

Teacher Survey. The team developed a 26-item teacher survey asking teachers to rate themselves on their current practices, beliefs, and use of assessment to individualize instruction. Implementation science experts highlight assessing facilitators and barriers as a discrete strategy for improving implementation efforts (Powell et al., 2015). Teachers were asked to rate themselves on frequency (using rating scales *always, usually, sometimes, rarely, never, or other* or *daily, weekly, monthly, once per season, or other)* and ease (*easy, somewhat easy, somewhat difficult, difficult, and I don't know)* with completing widely-accepted child assessment tasks including (1) identifying an observation that demonstrates a child's progress on a developmental milestone, (2) providing a rating based on the observation, (3) collecting and entering documentation supporting the observation and rating, and (4) using the assessment data to individualize instruction for the observed child (Atkins-Burnett et al., 2014). The survey also asked teachers about agreement (*agree, somewhat agree, somewhat disagree, disagree)* with beliefs statements related to assessment, including the following:

- Whether they are a better judge of a child's progress than data.
- Their need for assessment data to ascertain student progress.
- Whether the assessment is a part of their professional responsibility.
- Who benefits from their assessment efforts.
- Perceptions about peers and supervisor attitudes about assessment.
- Whether assessment makes their work easier.

Items were based on previous research on early childhood teacher beliefs about the child assessment (Brawley & Stormont, 2014). Finally, the survey asked teachers about using assessment data, including clarity on how to access the data, use data to assess each child's strengths and areas of growth, identify specific activities to support students' growth, use data for lesson planning, and communicate with parents. The research team developed these items based on site-specific interests.

The survey was pilot tested with two early childhood teachers working in a neighboring but unrelated early childhood center using a think-aloud procedure (Willis, 2005). The author used the teachers' feedback on item wording and missing response options to improve the readability of survey items. A professional translation firm translated surveys into Spanish and Somali. Teachers from the three study sites were invited to participate in an online survey; an incentive of $25 was provided. The survey included consent elements at the beginning. Forty-five surveys were received, of which 40 were complete.

Survey data were analyzed using descriptive statistics to describe teacher assessment practices, local implementation facilitators and barriers, and beliefs about assessment. Quantitative data were analyzed using SPSS. Qualitative survey responses were analyzed for themes and ideas for implementation strategies to pilot in phase two of the study.

Audit Tool. The research team developed an audit tool to measure teacher practice. This tool was based on a previous audit study by the Minnesota Head Start Association (MHSA). The study team modified the original tool per quality indicators specific to the study. Head Start operates on seasonal assessment periods (e.g., fall, winter, spring) that are 12 weeks long and uses the *Teaching Strategies Gold (TSG)* system to store, analyze and produce their child assessment data. Head Start teachers are required to enter data for each child in their classroom

during each assessment period that meets discrete quality milestones before the system finalizes data for the period. The team developed a protocol for how to select child assessment records to ensure selections were random and covered three time periods (beginning, middle and end) throughout the assessment period. The team evaluated observations for the presence of four assessment tasks including (1) inclusion of three to five learning and developmental objectives, (2) presence of a rating scale for selected objectives, (3) documentation supporting the ratings used, and (4) individualized observation note. For each element, the early childhood trainer indicated whether the observation included the element by marking 'yes' (1) or 'no' (0).

The Head Start early childhood trainer piloted the audit tool on a small subset of child assessment records for usefulness in discerning varying levels of data quality. The team discussed and then made modifications to the audit tool. A standardized tool was necessary because the study team wanted to apply the same quality measures across all child data records. Before the start of the audit, participating teachers received a virtual orientation about the audit process.

Complete records were obtained and audited for 16 out of the 17 teachers. One teacher was removed due to medical leave. The trainers' audit notes were reviewed and discussed by the study team. The team made modifications to audit scores based on joint decision rules. Data generated by the audit tool was analyzed using descriptive statistics and evaluated for change using inferential statistics.

Semi-structured Interviews. Seven semi-structured interviews were conducted with Head Start center directors and leaders to learn more about the study centers, Head Start's experience with teacher assessment practices, organizational support for teacher assessment practices, and implementation challenges. The principal investigator interviewed individuals with

responsibilities related to teacher adoption of assessment practices, including three Center Directors, one Director and team member of the Early Intervention Services, one Screening and Assessment Specialist, and one Director of Education. Semi-structured interviews allowed questions about specific issues but allowed for flexibility and responsiveness to information as it was shared (Merriam & Tisdell, 2016).

Before and at the start of each interview, interviewees were briefed about the aims of the study, the interview time requested (45 minutes), the voluntary nature of participation, procedures to preserve their anonymity, and the provision of a small incentive for participation ($50 digital gift card). The principal investigator obtained verbal consent at the start of the interview. Virtual interviews lasted an average of 42 minutes. Interviews were transcribed and analyzed for themes using a constant comparative approach and managed using NVivo (Release 1.7). The principal investigator first reviewed recordings of each interview, along with the transcript, and made notes of impressions and insights offered by interviewees. Interviews were then coded using a deductive approach based on organizational and individual-level implementation determinants defined by the SEQUAL model previously described.

Local field experts, including two state-level administrators charged with overseeing state-level assessment efforts, and a Minnesota Head Start Association leader were also interviewed using unstructured interviews to understand the state teacher assessment landscape. Interviews lasted an average of one hour each. The principal investigator took notes during these conversations and collected key documents from interviewees.

Strengthening Study Validity and Credibility

The current study utilized several strategies to strengthen the credibility of the findings. First, the study relies on a mixed-method approach that triangulates findings using various data

methods (by employing the survey, interviews and data auditing) and sources including teachers, leaders, and document review (Patton, 1999). Secondly, the principal investigator developed study measures based upon a significant body of research related to teacher perceptions of assessment practices and beliefs. Third, the co-lead on the project, the early childhood trainer with 36 years of experience, conducted and interpreted the audit data using her expertise with the assessment system and extensive experience with teacher behaviors to rate the quality of the records reviewed. Fourth, the principal investigator ensured the accuracy of their interpretation by pausing and rephrasing their understanding back to each interviewee to verify they understood what interviewees shared. Finally, as a practical action research study, findings and data collection efforts were shared with leaders and staff at the study site throughout the study to ensure the study's direction aligned with the needs and interests of staff and leaders.

Study Limitations

A key limitation of this study is its sample size drawn from three centers or 21% of sites within the Head Start system. Within those sites, 65% of teachers completed surveys, and the team audited child assessment records for 25% of teachers within the three centers. Findings from this study shed light on the sample participants and not all teachers in this Head Start system.

Another limitation of this study is the narrow scope of the child assessment records audit, which only measured basic adherence to broadly defined assessment practices. Other important quality elements, such as teachers' ability to select the developmentally appropriate ratings for each child, match documentation to the selected objective, and individualization documentation, were not systematically measured.

Chapter 4: Results

The current study aimed to answer two research questions related to teacher-child assessment practices in three Head Start settings, including understanding barriers to, and facilitators of, teacher assessment practices and testing of a discrete implementation intervention suggested by study participants. Study findings were organized by research question.

Research Question 1

RQ1. How do teachers perceive their current assessment practices and their level of difficulty? What do teachers believe about child assessment practices? What do organizational leaders believe are the individual and organizational level facilitators and barriers related to child assessment practices? The principal investigator explored RQ1 using a teacher survey and semi-structured interviews with Head Start leaders and field experts.

Teacher Current Assessment Practices, Ease/Difficulty of Completing Assessment Practices and Beliefs About Assessment.

Most teachers reported completing the four assessment practices: (1) daily observations (75%), (2) collecting documentation to support their observations (73%), (3) entering documentation into a database (81%), and (4) using assessment data for lesson planning (95%) (Figure 6). Similarly, most teachers report using assessment data for understanding student needs, interests, and areas of growth (95%), identifying areas of progress and specific activities for individual children (92%) as well as entire classrooms (89%) (Figure 7).

Figure 6

Teacher Self-Rating of Use of Child Assessment Practices. Percentage of Respondents that Responded "Always or Usually" Completed Assessment Tasks (n=35-40)

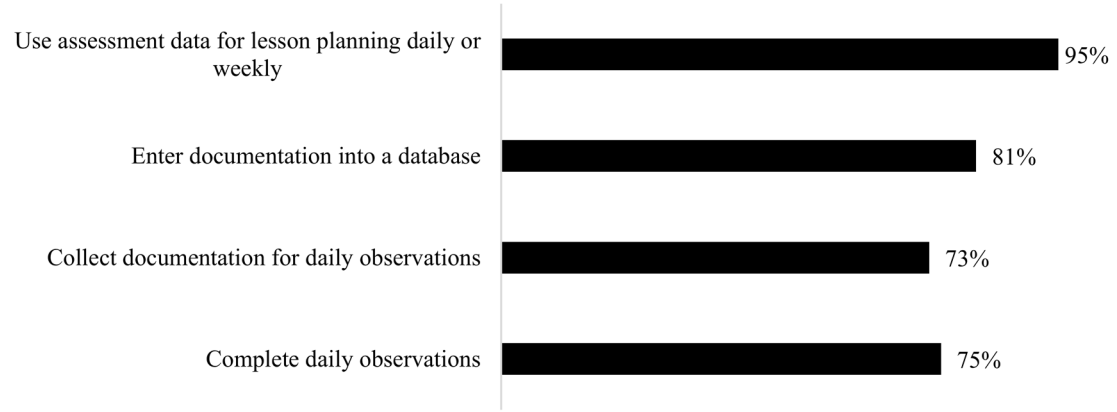
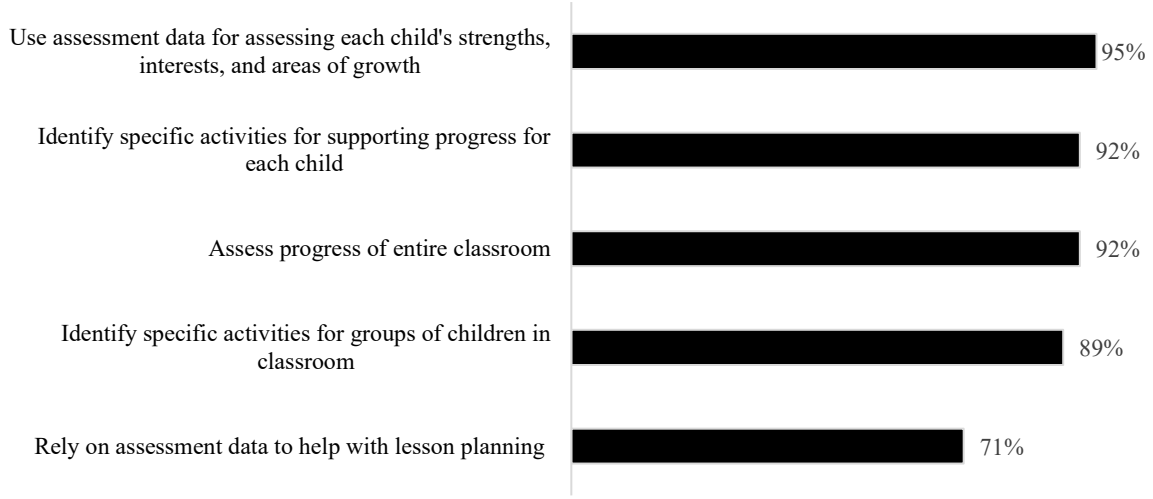


Figure 7

Teacher Self-Rating of Use of Child Assessment Practices for Lesson Planning Percentage of Respondents that Responded "Agree or Somewhat Agree" (n=38)



When asked about the difficulty or ease of completing assessment tasks, most teachers rated creating an observation (80%) and entering documentation (83%) as “easy or somewhat easy.” Fewer teachers (67%) rated choosing the developmental level for a child as 'easy or somewhat easy (Figure 8).

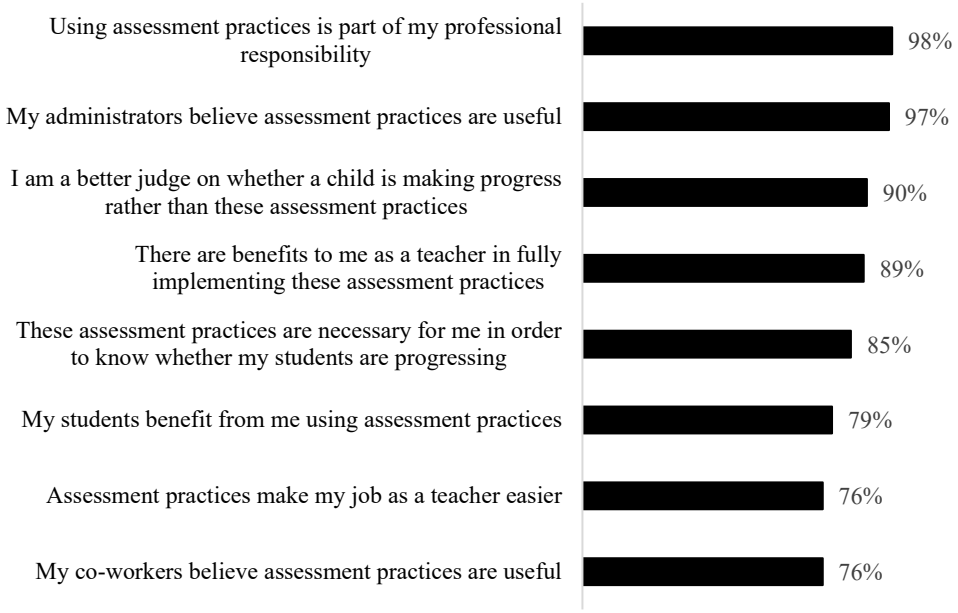
Figure 8

Teacher Self-Rating of Difficulty of Child Assessment Practices. Percentage of Respondents that Responded "Easy or Somewhat Easy" (n=38-40)

Interestingly, when asked about their beliefs about assessment, most teachers (90%) said they are a better judge of their students' progress rather than assessment data; however, a similar proportion (85%) said assessment practices are needed to know whether students are progressing (Figure 9). Teachers had stronger agreement with the statements that assessment was a part of their professional responsibility (98%) and that administrators believed in its usefulness (97%) (Figure 9). Teachers had lower agreement with statements that assessment benefited their students (79%), made their jobs easier (76%), or that their coworkers believed in the usefulness of assessment (76%) (Figure 9).

Figure 9

Teacher Self-Rating of Beliefs About Child Assessment Practices for Lesson Planning. Percentage of Respondents That Responded "Agree or Somewhat Agree" (n=38)



Teacher Barriers and Suggestions for Improvement. Teachers were asked to name one thing that would make completing assessment practices easier. Most comments referred to having to collect fewer daily observations for each child. The current policy at the three Head Start study sites requires teachers to collect two daily observations per child. Other comments described teachers' difficulty completing child assessment observations in a timely manner (e.g., daily). A few teachers noted knowing their students well helped them ascertain developmentally appropriate activities. A few teachers commented that having more time and examples of observations would help complete assessment tasks. When asked how equipped teachers feel for completing assessment practices, most comments indicated they feel equipped. Example comments include:

- "The two [daily observations] a day is overkill. One detailed one for each child a week would be better."
- “Que fueran menos de escribir lo que se observa, debido a la cantidad de niños en el aula y tener que escribir muchas observaciones por niño semanal no hay tiempo. (Less to write what is observed, due to the number of children in the classroom and having to write many observations per child per week, there is no time.)”
- “Tengo lo necesario. (I have what it takes.)”

Teacher Survey Summary. Most teachers report completing the four assessment practices of (1) select an assessment target (i.e., a skill, behavior, or knowledge) for a child (75%), (2) collecting documentation for the observation (73%), (3) entering assessment documentation into the database (81%), and (4) using assessment data for lesson planning (95%). Most teachers rated creating an observation and entering documentation as 'easy or somewhat easy,' but fewer teachers rated choosing the developmental level for a child similarly. 90% of teachers believed they were better judges of their students' progress than assessment data, yet 85% still recognized the importance of assessment practices to gauge their students' progress. Teachers generally accepted assessment as part of their professional responsibility, with 98% agreeing. Administrators also had faith in its usefulness at 97%. However, teachers had lower agreement that assessment benefited their students (79%), made their jobs easier (76%), or was supported by their coworkers (76%).

Head Start and Field Leader Interviews

The author used a semi-structured interview process to ask Head Start leaders to describe what they believed were the organizational-level barriers and facilitators related to teacher assessment practices. Interviewees held leadership within centers and cross-agency roles.

Individuals held long tenures with Head Start, with an average tenure of 18 years. Each leader had deep experience working with teachers; some were former teachers, parents, or Head Start students. The author also interviewed two individuals from the State of Minnesota's Department of Education for the historical context of assessment work in Minnesota. Table 4 displays the primary facilitators and barriers that emerged from the interviews.

Table 4

Head Start and Field Level Interview Themes

Facilitators	Policy Level Supports
	- Federal performance standards that require:
	  - Use of a research-based curriculum and assessment to individualize instruction
	  - Provision of monthly learning communities for teachers
	  - Regular reporting and auditing of program data
	  - Teacher educational qualification requirements
	  - Provision of resources for teacher professional development
	- State of Minnesota expansion of kindergarten readiness model to include authentic assessment systems
	
	Organizational Level Supports
	- Provision of professional development resources (e.g., one-on-one coaching, group trainings, monthly learning communities)
	- Technology and customized tools for individualizing instruction
	- Protected time for completing assessment tasks
	
	Individual Level Supports
	• Teacher assessment knowledge, skills and commitment
	• Teaching Teams (e.g, lead and assistant teaching teams)
	• Adult well-being and support

Barriers

Teacher Level

- Absence of content on assessment in training/education programs
- Incomplete teacher knowledge of child development theory
- Language comprehension of English Language Learner (ELL) teachers
- Teaching Team incompatibility

Assessment Process

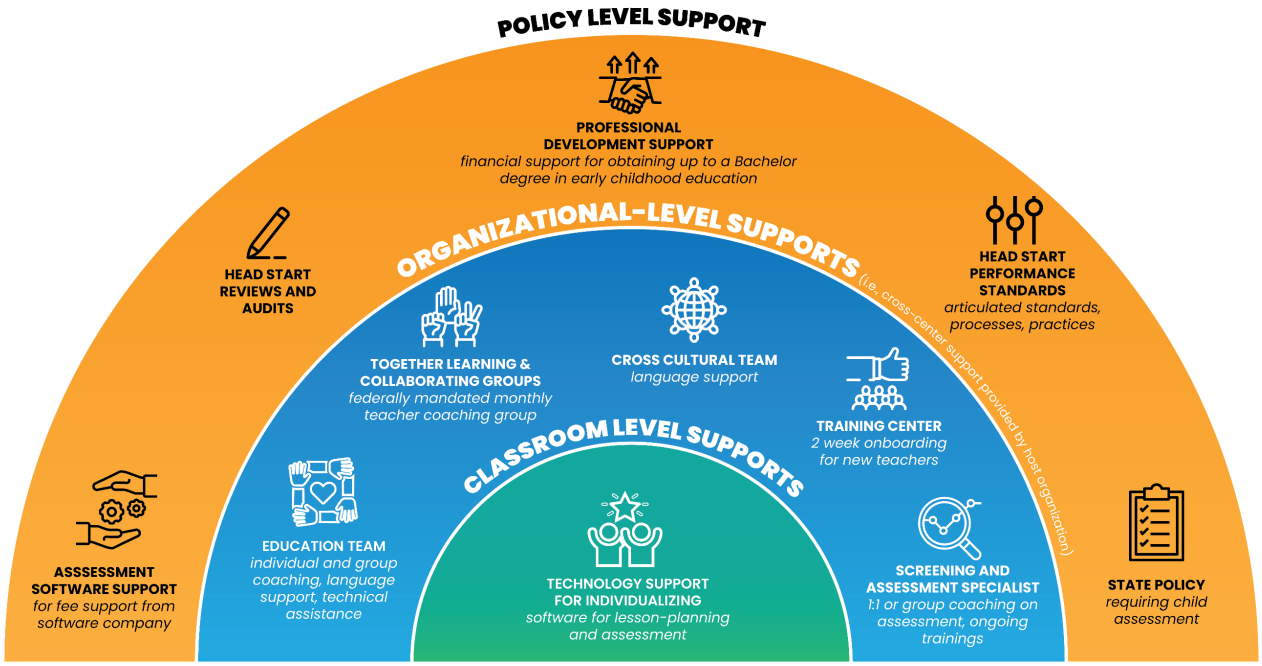
- Complexity of the assessment system
- Volume of required assessment data

Organizational Culture

- Clash of historical culture of relationally based teaching and new requirements

Figure 10

Policy, Organizational, and Individual Level Facilitators



Facilitators. Interviewees described a variety of policy, organizational, and individual level supports for facilitating teacher assessment practices displayed in Figure 10.

Policy Level Facilitators. Interviewees described the Head Start performance standard (i.e., federal policy) that triggered the use of child assessment data in the study sites. As a federal program, Head Start is heavily regulated by performance standards that define every work aspect. A performance standard requiring a research-based standardized assessment system was adopted in 2007. Around the same time, the Minnesota Department of Education expanded its kindergarten readiness measurement model to include authentic assessments, such as *Teaching Strategies Gold*. At that time, this local Head Start researched assessment systems and piloted their chosen system with a subset of seasoned teachers. One leader recalled how assessment introduced new language into teaching but that the pilot teachers had a strong command of child development theory and could integrate it into their teaching practice.

> So the language changed. And, it wasn't that difficult because of the education of the teachers, the years that they had been there…they were kind of that group of teachers that provided intentional teaching and understood the next levels of where they wanted their children to be. They understood that child development piece, which has to be strong too.

Another important change introduced at that time was the connection between assessment and lesson planning, which was a new concept. The same leader recalled how it took a long time for Head Start teachers and leadership to understand how to connect assessment data to the curriculum.

> I had to make sure myself and the Director of Education at that time were familiar with assessment and curriculum and what that looks like when they are connected. What are teachers doing with that information once we capture it, once we gather that? So, like I said, it took some, it took a long time to really work into it and figure it all out… it took us three to five years to really wrap our heads around this whole thing with assessment. And then it was changing. I mean, it wasn't just staying the same, it was changing, you know, But it was, it was changing for the better.

Along with introducing assessment into teachers' work, federal performance standards also require Head Start centers to provide teachers with various supports, including monthly learning communities and other professional development resources.

Organizational Level Facilitators

All interviewees described some aspects of organizational-level resources to help with teacher adherence to assessment practices. Core support is the provision of professional development. Upon initial hire, if teachers do not meet the minimum qualification, Head Start will pay for teachers to obtain their Child Development Associate (CDA) certificate (i.e., a 120-hour training program) while they are on the job and pay up to a bachelor's degree if the teacher wishes to pursue more education. One leader explained, "when they come into getting hired, [they get trained] right away for the first two weeks. And then…[our assessment staff] train[s] them on TS Gold…and us coaches follow up with them after they do the training." Head Start also requires yearly teacher training as a part of its performance standards and licensing requirements. One leader commented, "[with] professional development, if you don't take advantage of it is because you're choosing not to… there's room to grow around here."

Beyond training resources, teachers are also provided monthly learning communities called Together Learning and Collaborating (TLC), consultation and coaching from cross-agency subject matter experts such as screening, special education, cross-cultural team (that provides language and cultural brokering support), and behavioral specialists. When asked about how teachers are supported by cross-agency coaches on the topic of using assessment to individualize instruction, one coach shared,

> [A]fter [assessment data is] sent out… and this is fairly new for me…[I] sit down with the team and ask… how can we arrange your small group? how can we arrange your activities? how can we rearrange some of the lessons in order to help support these kids? But the teacher really has to know where the kids are struggling at in order for them to make a difference in looking at the data and making those changes in activity.

Another coach saw her role as a conceptual translator, particularly for ELL teachers, in helping teachers use assessment data for individualizing instruction. She said,

> I kind of look at what my role as a coach and how I can support the teachers is that I'm taking this education jargon and translating it to something that's understandable to someone who's looking at kids every day. And then of course we have different layers where people are still learning English. People are still learning how to write English, even though they understand it...I understand why [assessment content is] phrased in certain ways…I do think it makes things a little bit more difficult in a little less accessible...so that's where I kind of see what I'm trying to do is like translate this because they do know it. We just have to get the words to match if that makes sense.

Technology support is another resource mentioned by interviewees that is in place to help teachers to complete assessment tasks. The Head Start that oversaw the three study sites developed software that helps teachers manage and plan how to individualize instruction based on assessment data. One leader explained the need for the software by saying,

> [T]he reason why we created the database was because…so when I first came I would print off these blank lesson plans. It was a teacher's responsibility to write in the activities what they were gonna do. We didn't care where they got [activities], they can resource it...they can Google it, get it out of a book… we didn't care where they got this from, all I had to do was print out the lesson plans, hand it over to them. Everybody had to have a lesson plan in their classrooms on what they were doing. [Half of the teachers] just couldn't do it. They couldn't do it. There was struggling with age-appropriate activities, whether it was for Early Head Start or Head Start babies or preschool. They were struggling with individualization. They had all the kids working on the same thing. That's not individualizing. And one thing about our performance standards, when this is all broken down, it says you have to individualize everything.

The software holds the curriculum in a dynamic format which allows teachers to mix and match activities as they answer questions about how those activities are responsive to an individual child's recent assessment findings. The system will prompt the teacher to answer the following questions for each child:

1. What skills will you be working on with this child? (Refer to assessments, Developmental Learning Report, and observation notes)
2. What part of your daily routine will the skill be worked on?
3. Which teacher will be working with this child?

Additionally, the Head Start leaders can monitor teacher lesson plans by accessing them through the database. One leader felt this database and planning process prompts teachers to consider individualization. She said,

> I think it would be a higher percentage of teachers that would not know how to individualize for a child without doing these assessments. The way [we] set up with a lesson plan individualization is included.... so then they're also getting another message to know how to individualize for children. I think [if] we didn't have [assessment] that the percentage would go down… I think [without assessment] [teachers] would just do activities based on their theme of selection, but not be mindful of what activities to tie into [assessment].

Finally, another important facilitator mentioned by interviewees is teachers' protected time for working with their assessment data and planning for how they will individualize instruction. Teachers have two hours for planning at the beginning and end of the day. These hours have been reduced in recent years due to staff shortages and teachers needing to cover bus duty. While leaders acknowledge teachers have protected time, one leader attributed the lack of time and energy as one reason teachers cannot individualize instruction. She said,

> I think that's our biggest struggle [individualizing instruction]. I think that's like understanding what the data means, but I also think we ask so much of our teachers, that it's really about time. Teachers just don't have time to be able to dig into the data… they're with our kids from nine to six ...And then they're either riding the bus or catching up on documentation. I feel like it's not for a lack of interest or understanding. I do think it's for a lack of time, energy.

Individual Level Facilitators

Interviewees mentioned individual-level facilitators that support teacher use of assessment, including teacher knowledge, skills and tenure, teacher compliance with assessment policy requirements, and teaching teams.

Given Head Start's educational requirements and robust professional development resources, leaders felt most teachers could make child observations (task 1) and collect documentation (task 2). A few interviewees felt some teachers struggled with entering assessment data into the data system (task 3) and using data for lesson planning (task 4). Still, they felt it was a smaller proportion of teachers.

Leaders indicated teachers' long tenure at Head Start provides a stable workforce with deepening expertise and strong relationships with families. As it relates to teachers' knowledge of their students to complete assessments, one leader commented, *"...[when it comes to] making child observation, our teachers know our kids so well, I mean next to the parents, they spend the most time with our kids, especially how a Head Start is set up."* Leaders felt teachers demonstrate a strong commitment to the profession and Head Start specifically. One leader reflected,

> [Teachers]…love working with the children. You know, they really do love working with the children...it is a heavy workload…Head Start requires a lot of paperwork…we do…expect a lot because we just wanna provide quality. So with quality, you have to be intentional; otherwise, it's just gonna not be worth anything. And that's anything with quality. You gotta put the time and the effort into it.

Teacher adherence to assessment requirements was another facilitator mentioned by leaders. Regardless of how teachers feel about assessment practices, they understand it is

required. When asked what motivates teachers to complete assessment tasks, one leader said, *"...cause that's a requirement of [Head Start]. You'll get a small percentage of teachers who will probably say 'to see where the child is at and where they need to go,' but I really many of them are gonna say it's because that's required by [Head Start] or performance standards."*

Teaching teams (i.e., Lead and Assistant Teacher teams in each classroom) are another facilitator of teacher assessment practices mentioned by leaders. Teachers can share assignments of children in their classroom as their "primary" and complete assessments over time for those children. This provides a lower workload for each teacher and allows them to focus on particular children. Teaching teams also provide a learning and coaching space for the assistant teacher, who typically has less experience with assessment than the lead teacher.

The last facilitator mentioned by interviewees was mindfulness toward teacher well-being and efforts to encourage and recognize teachers. Each site recognizes teachers differently with activities like lunches, mindfulness spaces, and training, sunshine carts with treats throughout the day. Each director described how they work with teachers who consistently struggle to meet assessment requirements by offering role modeling, providing extra training resources, and working intensively with each teacher to determine whether the issue is technical, language or content comprehension, or capability.

Barriers. Interviewees felt most teachers were completing required assessment tasks but described a sizable proportion of teachers that continue to have trouble. One leader estimated that about 30-40% of teachers struggle to complete assessment tasks. Interviewees identified barriers related to teacher knowledge, the assessment process itself, and perceived misalignment between assessment and the historical culture of this local Head Start.

Teacher Level Barriers.

A few interviewees felt some teachers did not have sufficient training in child development theory, despite having completed educational or certification programs. This is seen in some teachers' inability to identify developmentally appropriate activities related to assessment findings. When probed why this was happening, that some CDA-trained teachers did not have a strong grasp of child development theory, one leader commented,

> While they were going to college for their degrees, what we realized is that there was nothing in the college about assessment. There was some stuff about developmental stages and what happens next with children, but there was nothing regarding assessment and there's nothing regarding a curriculum…so there wasn't [any] connection.

Another barrier mentioned by leaders was English language comprehension among ELL teachers. Linguistic and cultural diversity in Head Start is viewed as an asset, and supporting children to preserve their home language is a performance standard. However, it poses significant challenges. A leader said,

> I'm gonna tell you there isn't a day that goes by where the blessing of working at [Head Start] is the diversity and the challenge of working at [Head Start] is the diversity…a normal, everyday exchange is challenging, and that's just a normal exchange of information that people need to do their jobs. And there is much different comprehension from person to person on a daily basis.

For ELL teachers, gaining a command of child development theory can be a significant challenge. Interviewees also mentioned the need to work through different cultural

understandings or philosophies around early childhood education that may not include a structured and formal assessment. One leader commented,

> Our English language learners are particularly challenged by the format the current assessment system that we have. I think it is heavily laid in with language that is specific to child development, and it's not just comprehension of child development concepts. It really [is] cumbersome with being able to have the comprehension of an English language learner jump right in, be able to do those observations, and now tackle a system that is incredibly complex and becoming increasingly more so with the volume of documentation that's required for each individual child.

For some teachers, another barrier to teacher adoption of child assessment practices is incompatible teaching teams. A few leaders commented on the importance of teaching teams working effectively to manage teacher assessment tasks. When asked what gets in the way of teachers completing assessment tasks, one leader reflected,

> Sometimes it can even be teaching teams don't mesh well together, and sometimes when they don't mesh well together, it shows in the work. I think when it's a good rapport and a good match personality-wise, I mean, let's be real, we're human. We're not meant to get along with everyone. But can you be respectful and get the work done? And sometimes, that is a struggle, or one person might try to put all the workload on another person, which isn't fair. But I notice when teams have really good scores, they really get along well together, this real seamless in what they're doing and teaching in the classroom.

Another leader shared,

> We're all strong in different areas. …what I like to see is that they may use their assistant teacher or their lead teacher to help balance them out...learn from one another. But they have to keep moving in the right direction. Like, you can't be the one that's really good at observing children and not want to get there like your other co-teacher. You wanna kind of build off one another and be strong together. That's kind of what I would like to see happen…so there are some team teachers that do that well, and then there's some struggles.

Assessment Process Barriers. This local Head Start requires teachers to collect two daily observations for each child and ensure teachers assess the required number of observations in all ten developmental areas (e.g., physical development, cognitive, etc.). Interviewees lacked clarity or understanding of why this daily threshold was set. Some thought it related to a technical requirement of the current system. The required volume of data elicited the strongest critique from interviewees. Most leaders felt the requirement was excessive and burdened teachers with little benefit to their work. One leader said,

> Now we're doing [two] observations per child per day. And that's just the observation. That's not coding that observation and then taking that information and being able to utilize it, analyze it, look at it, and individualize for each child. I think it's heavily loaded on the quantity of documentation required to feed the system.

Other leaders felt the data interpretation offered by the current system was too vague and gave teachers little useful information. A leader said,

> What does "meeting expectations" even mean? Is there a number… sometimes when we think about [a] test and I know assessments aren't testing, but you think about a number

like a child should be able to count to five or they should be able to count to 20…and so is that what that is saying? That 15% of my kids can count to 15 or 20 or whatever. And so, I think teachers kind of struggle with that. Like give me an exact thing, give me something that I can look and say, okay, my child needs to be able to count or be able to hold their pencil.

Another leader disagreed with the approach entirely and felt teachers intuitively knew what their students needed next and found the assessment process required significant work for little useable information in return. The leader said,

> [Teachers have an] intuitive way of looking at children and figuring out what they need to go, the next steps for growth, bless them for that. And so that is what drives their work daily. And I feel like the tool is cumbersome and adds more than the value it has… I believe that all work should be driven by the path of least resistance. Like you should have a tool that adds value instead of adds work.

When probed about how confident this leader felt about teachers' ability to get children ready for learning without this assessment process, the leader responded,

> I don't think we would [miss the mark in getting kids ready for school]. I think there's enough mother-wise in our building to teach like it's a village. And I think that what we need to be able to do is [to] make a system to assess both where our English language learner teachers are and where our children are because they can't teach what they don't know. So I feel like we can get a system that really looks at and not a system that we have to pay per child and pay for weeks and weeks and weeks of onboarding and then

> continual training, because we're, we're missing the mark. I feel like [our current] system [is] set up to feed itself.

Organizational Culture Barrier

A few interviewees described a conflict between their local Head Start philosophy, which had a historically prioritized relationship and social and emotional development, and the culture brought in by the assessment performance standard requirement. Leaders felt how assessment is defined and measured comes at the cost of a more relational and intuitive approach. One leader commented,

> It is very interesting because the first thing about Head Start is based off of relationships, building that relationship that's social. So, you know, that's the whole history behind Head Start is social-emotional development. They didn't care about anything else. They just wanted kids to hang out and play and hang with other kids. That's all they wanted. Then we got into the academics and all these developmental areas and blah, blah. [We have] teachers that have not yet made that connection, they just know their kids. [For example, the teacher knows the child] doesn't wanna play with other children. She wants to play by herself. So [how is the teacher] gonna change this behavior? Is [the teacher] getting that from [assessment]? Or is she getting that because she knows her kids in her classroom.

Another leader felt the system is at odds with the ethos of Head Start and the role of preschool, which is to help children develop curiosity and social and emotional skills. That leader said,

> I feel like it shouldn't take a Ph.D. to understand how to score a kid, to get them ready for. We have preschoolers…how are we taking all the different approaches to child development that we know come our multicultural parents who may not see eye-to-eye about what's appropriate in a classroom? How do we take all of that and take all of our knowledge and say this is us, this is who we are….
>
> The basic premise of what preschool needs to do [is that we]…give [children] opportunities, and we teach them that curiosity is how they're gonna learn. And that books open doors and that science and math are gonna be something that is gonna help them understand their world. And that social and emotional connections with their peers are gonna be able to what keeps the world here, in this universe.
>
> I think that those are the things that our staff know how to do…how do we measure that every day? How do we measure that week to week? How do we say this child isn't typically developing? …we have so many challenges to getting kids what they need that having a challenge of how to code it and analyze it is not value added.

Leader Interview Summary

Interviewees named several facilitators and barriers for teacher assessment practices at policy, organizational and individual levels. Federal and state policies introduced assessment practices into Head Start settings. They mandated organizational support, including financial resources for ongoing professional development, technology solutions, and policies that keep assessment practices in place. This has resulted in individual-level facilitators such as an educated workforce with long tenures and commitment to the classroom. Overall, leaders report that most teachers in the study sites successfully implement assessment practices; however,

many teachers continue to face difficulties. Barriers reported by leaders include English language comprehension of complex child development concepts, insufficiently protected time, a high volume of required observation data, and teaching team incompatibility. A few leaders felt assessment practices were inconsistent with this local Head Start's organizational culture around relationships.

Research Question 2

RQ2. What is the impact of employing one discrete implementation strategy identified by teacher/center leaders on the quality of teacher-child assessment practices?

The most common barrier mentioned by teachers and leaders was the required number of observation notes. Participants strongly suggested reducing the daily requirement of observation notes from two to one to improve teacher adoption of assessment practices. Head Start agreed to test this strategy for three months in the three study sites. Participation was voluntary. A total of 16 teachers participated across the three study sites.

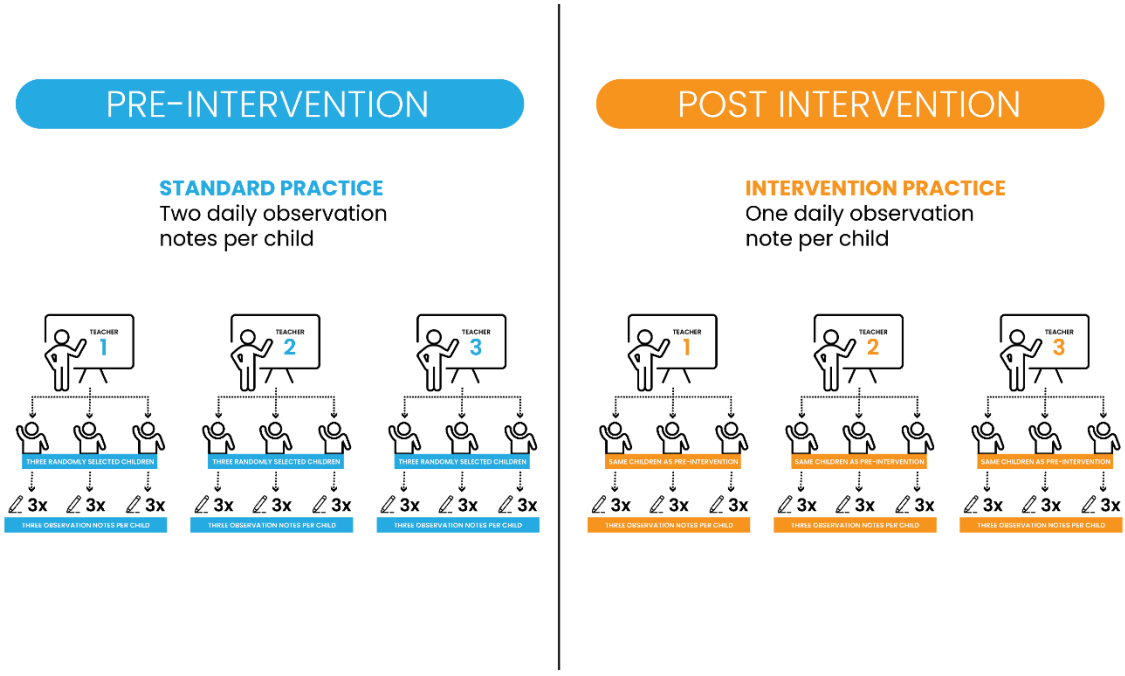
Observation notes entered by teachers were reviewed by an early childhood assessment practice trainer using a standardized tool. The trainer randomly selected three children per teacher and reviewed three observation notes per child for a total of nine observation notes per teacher (Figure 11). The quality of the observation note was evaluated for the presence of:

1. Three to five learning and developmental objectives.
2. A rating for selected objectives.
3. Documentation supporting the ratings used.
4. Whether the note was individualized.

For each element, the early childhood trainer indicated the presence of the quality element by marking 'yes' (coded as 1) or 'no' (coded as 0). If a teacher fulfilled all the required elements for all three randomly selected children for each individual quality indicator, they would achieve a maximum score of nine points. If a teacher fulfilled all four data quality elements for all three randomly selected children, they would achieve a maximum score of 36. Descriptive statistics (i.e., mean, and standard deviation) were calculated for each of the four quality indicators at pretest, and at posttest (see figure 13).

Figure 112

Audit Design

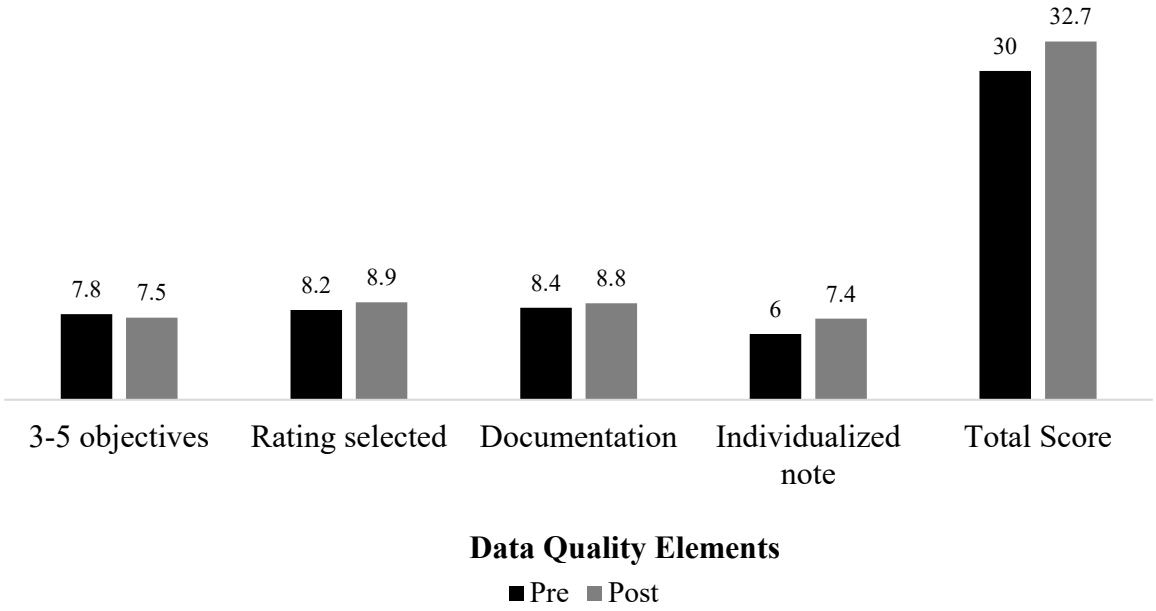


The audit revealed teachers successfully completed three out of the four elements: (1) 3-5 objectives (pre $\overline{x}$ = 7.8, sd=1.68; post $\overline{x}$ = 7.5 post, sd=2.10), (2) a developmental rating (i.e., level) (pre $\overline{x}$ = 8.2, sd=1.53; post $\overline{x}$ = 8.9, sd=.25) and (3) supporting documentation (pre $\overline{x}$ = 8.4, sd=1.75; post $\overline{x}$ = 8.8, sd=.50) in both the pre and post periods, yielding similar average scores. Ratings of individualizing observation notes to specific children and behaviors yielded

lower ratings (pre $\overline{x}$ =6, post $\overline{x}$ =7.4), however there was a modest improvement between pre and post periods. The overall average score, including all four elements, improved slightly from pre $\overline{x}$ = 30 to post $\overline{x}$ = 32.7. Pre and post total scores were compared using a paired t-test. There was an increase of 2.25 points from pre to post total scores, however, the difference was not statistically significant, $t(15) = 1.469$, $p = 0.1625$, 95% CI = (-1.01, 5.51).

Figure 12

Average Pre- and Post-Intervention Child Observation Audit Score (N=16 Teachers)



Audit Data Summary

Four data quality elements were rated for quality using an audit process of child observation records. Teachers completed three elements (objectives, developmental rating, and supporting documentation) in both pre- and post-intervention periods, with similar average scores. The fourth element, individualization of observation notes, had lower ratings but showed a modest improvement between the pre- and post-intervention periods. The overall average score

for all four data quality elements improved slightly from 30 (pre-intervention) to 32.7 (post-intervention). Due to the small sample size (n=16), statistical tests were not used to test for significant differences between pre- and post-intervention scores.

Summary of Findings

Most Head Start teachers reported completing the four assessment practices the study focused on, including creating observations, collecting documentation, entering documentation into databases, and using data for lesson planning. While most teachers found creating observations and entering documentation "easy or somewhat easy," fewer rated choosing a child's developmental level similarly. Despite this, 90% of teachers believe they judge their students' progress better than assessment data alone. However, 85% still recognize the importance of assessment practices to gauge student progress.

Federal and state policies introduced assessment practices into Head Start settings and mandated organizational support. These supports included financial resources for professional development, technology solutions, and policies to keep assessment practices in place. Interviewees named several facilitators and barriers to teacher assessment practices at policy, organizational, and individual levels. Some barriers identified include English language comprehension of complex child development concepts, insufficient protected time for planning, a high volume of required observation data, teaching team incompatibility, and incongruity with an organizational culture that values relationships.

An audit process of child observation records assessed four data quality elements: objectives, developmental rating, supporting documentation, and individualization of observation notes. Teachers completed the first three elements in both pre-and post-intervention periods, with similar average scores. The individualization of observation notes showed modest improvement

between pre- and post-intervention periods. The overall average score for all data quality elements increased slightly from 30 (pre-intervention) to 32.7 (post-intervention).

Chapter 5: Discussion and Implications

Despite the widely held expectation that early childhood teachers use child assessment data to individualize instruction, teachers' use of assessment remains low. This study used an implementation science framework to (1) better understand the facilitators and barriers to teacher adoption of child assessment practice in three Head Start sites and (2) test a discrete implementation strategy to improve teacher practice. The study generated data from 43 completed teacher surveys, interviews with 7 Head Start leaders and an audit of the child assessment records created by 16 teachers.

This study identified several facilitators of teacher assessment practices, including policies and regulations, organizational support, and an educated and committed workforce. Table 5 summarizes the study's main findings. A discussion of each major finding follows.

Table 5

Summary of Main Findings

RQ1: How do teachers perceive their current assessment practices and their level of difficulty? What do teachers believe about child assessment practices?	Current Practice: • Teachers report completing various assessment practices: creating observations (75%), collecting documentation (73%), entering documentation into databases (81%), and using data for lesson planning (95%). • Teachers find creating observations and entering documentation easy; however, choosing a developmental level for a child is more challenging. Teacher Beliefs: • 90% of teachers trust their judgment on students' progress more than assessment data, yet 85% still consider assessment practices crucial for measuring students' progress. • Teachers (98%) and administrators (97%) accept assessment as part of their professional responsibility. • Lower agreement among teachers on assessment benefiting students (79%), making their jobs easier (76%), and being supported by coworkers (76%).
RQ1: What do organizational leaders believe are the individual and organizational level facilitators and barriers related to child assessment practices?	Facilitators for teacher assessment practices: • Federal and state policies • Organizational supports, such as financial resources, professional development, and technology solutions) • An educated and committed workforce. Barriers to teacher assessment practices: • English language comprehension • Insufficiently protected time • High volume of observation data • Teaching team incompatibility • Inconsistency with Head Start's organizational culture

RQ2: What is the impact of employing one discrete implementation strategy identified by teacher/center leaders on the quality of teacher-child assessment practices?	• The presence of four data quality elements was evaluated: (1) Three to five learning and developmental objectives. (2) A rating for selected objectives. (3) Documentation supporting the ratings used. (4) Whether the note was individualized. • Teachers completed three elements with similar average scores in pre- and post-intervention periods. • The fourth element, individualization of observation notes, had lower ratings but showed modest improvement between periods. • Overall average score improved slightly from 30 to 32.7.

Organizational Supports

The current study found robust support for teacher use of child assessment practices in Head Start sites, including customized technology, training, individualized and group coaching, peer support, and leadership support. Professional development through trainings, learning communities, and coaching are recognized strategies for improving teacher use of assessment practices (Akers et al., 2016). Some participants credited Head Start's custom-built lesson planning software as a key support in helping teachers individualize instruction. Some studies have shown providing teachers with technology-based tools for documenting, organizing, and individualizing instruction leads to greater child outcome gains than teachers working without technology-based support (Akers et al., 2016).

Barriers to teacher use of assessment practices identified in this study include English language comprehension, insufficient amounts of protected time, the high volume of required data, teaching team incompatibility, and misalignment of assessment practices with the organizational culture. There is evidence of the early childhood workforce's growing cultural and linguistic diversity (Park et al., 2015). Using 2011-2013 census data, one study found 38% of preschool teachers and 48% of assistant teachers had Limited English Proficiency (LEP) (Park et al., 2015). Head Start leaders in this study viewed their cultural and linguistic diversity as a

tremendous strength but admitted the need for finding strategies that facilitate shared meaning. Teachers' access to protected time was raised as both a barrier and facilitator in the study sites. Some interviewees argued teachers could not complete some assessment practices due to a lack of protected time. Other interviewees, however, mentioned teachers have several hours for planning at the start and close of each day. Studies have affirmed the importance of protected time, particularly for teachers with lower readiness for implementing a practice (Powell et al., 2015).

The most common barrier mentioned by study participants was the volume of required data. While teachers and leaders in the study indicated too much data was required and some questioned its utility, there was high adherence to policy requirements. An ethnographic study of early childhood teachers in the United Kingdom described a similarly antagonistic relationship between teachers and required assessment data as that of "cynical compliance" in which they met the demands of a performative culture by meeting the minimum standards (Bradbury, 2012).

Teacher Knowledge, Skill, Beliefs and Commitment

Studies have shown the skills and knowledge of teachers are important implementation facilitators (Damschroder et al., 2022; Whitebook, 2003). Teachers reported being skilled in completing the four assessment practices measured by this study and felt most were "easy" or "somewhat easy." An audit of child assessment observations entered by teachers showed an overall command of the assessment practices. Overall pre- and post-audit ratings of child observation notes were strong and improved from 30 (pre) to 32.7 (post) out of a total possible of 36. Fewer teachers rated choosing a child's developmental level rating as "easy," indicating this task may be particularly challenging for them. The audit reviewer noted some teachers rated a child's developmental level as higher than warranted or used the same rating for all objectives.

Teachers may struggle with this task because ascertaining a child's developmental level without prescriptive guidance requires greater teacher knowledge and mastery of child development theory (Akers et al., 2016). In a 2016 review of 173 studies, authors concluded the depth and breadth of teachers' content knowledge (i.e., child development domains, milestones, etc.) is a barrier to teacher use of assessment data (Akers et al., 2016).

Most teachers believe assessment is important but feel they are a better judge of a child's developmental trajectory. Most teachers (95%) indicate they use assessment data for individualizing instruction, but fewer (71%) indicate they rely on assessment data for lesson planning. Most teachers use assessment practices because it is a job requirement. However, fewer teachers (76%) felt implementing these practices made their jobs easier. Studies have also found teachers recognize the expectation of using child assessment practices, even though reliance on the data for shaping their teaching practice is lacking (Akers et al., 2016). Some teachers and leaders described an incongruence between Head Start's historical organizational culture and mandated assessment practices. This may be a source of dissonance towards assessment practices among some teachers and leaders. Policies and regulations are indeed a powerful implementation strategy (Damschroder et al., 2022). However, they may be insufficient for overcoming organizational cultural opposition.

Implications for early childhood care and education

This study highlighted factors influencing teacher adoption of child assessment practices. This study found high levels of adherence to recommended teacher child assessment practices among teaching staff with no bachelor's degree in early childhood care and education. This study suggests a strong supportive infrastructure can help non-degreed teachers to meet recommended quality child assessment practices. Given the enormous economic and human capital required to

obtain higher education, and the ongoing childcare workforce crisis, this study raises the question of whether professionalization of the field vis-à-vis a bachelor's degree the best use of limited resources is. It is significant that a qualitative study of 32 Head Start teachers found the promise of professionalization (i.e., a bachelor's degree) in raising the wages and status of teachers was not met, leaving teachers resentful of the sector's rising expectations with no corresponding improvement to their compensation or professional status (Boyd, 2013). While compensation remains a perennial issue that needs to be resolved, this study suggests quality early childhood education could be delivered by a coordinated team of non-degreed teachers supported by in-house staff.

This study suggests that the 'audit culture' that dominates early childhood education may erode teacher confidence and autonomy. This study found high teacher compliance and sense of responsibility with completing child assessment practices, but lower proportions of teachers who agreed that these practices were beneficial to the children in their care. Michael Power, a professor in accounting and philosophy (Shore & Wright, 2015), argued that audits, performance metrics, and monitoring schemes were often spearheaded by conservative governments and neoliberal-leaning countries and celebrated as value-neutral accountability and efficiency schemes (Shore & Wright, 2015). These systems, Power argued, promoted mistrust of professional judgment, and favored formal systems of inspection (Shore & Wright, 2015). Power argued that 'audit culture' promoted loss of organizational trust, a culture of compliance, defensiveness and blame among employees, deprofessionalization and reduced employee morale, narrow focus on measures rather than substantive work and undermined meaningful activities that are difficult to measure (Shore & Wright, 2015). Others argue that the use of audits and quantitative information is simply a different way to render information and that the more

important questions to ask are "…*what* is accounted for, *how* it is accounted for, and on *whose terms."* (Shore & Wright, 2015, pg. 433). Rather than eliminating the use of audits and other quantitative systems for monitoring program goals, federal regulators and funders could incorporate more of elements teachers and center leaders value as quality indicators thereby using audits to build accountability around staff and funder priorities. Another way to ease the burden of 'audit culture' may be to use software designed to seamlessly collect student performance data using interactive formats such as games, puzzles, or video data, and analyze and report student performance data in a manner that informs teacher instructional decision-making.

Testing a Discrete Implementation Strategy

Program evaluation is often categorized into two broad streams of work: process evaluation, which concerns itself with documenting the extent to which programs are delivered as planned, and outcome evaluation, which focuses on program results. Implementation science research is distinct from process and outcome evaluation in its focus on the mechanisms that support or hinder program delivery. Along with process and outcome evaluation, implementation science research is guided by theory and frameworks that help explain or determine successful program delivery. Implementation science evaluative studies offer evaluators an additional approach for investigating strategies to improve program delivery.

This study tested job crafting, i.e., the practice of soliciting feedback from teachers on how their job should be done, as a strategy to improve the implementation of quality environments for children and the child education workforce (Whitebook et al., 2016). As such, the current study sought feedback from teachers and leaders on what would make teacher completion of child assessment tasks easier. Teachers and leaders in this study hypothesized a

lower data volume would help improve teacher assessment practices. This feedback was turned into a small-scale study where the required data was reduced by half of the normal requirement for three months. A seasoned assessment Head Start trainer evaluated the quality of entered child observation notes using a standardized form. Pre and post scores showed modest improvement. No statistically significant differences were found. This study provides Head Start leadership with data for decision-making. If increased data is not leading to a significant improvement, perhaps its reduction is an opportunity to help teachers experience less overwhelmed with assessment practices.

Conclusion

This study raises several important implications for the field of implementation science and early childhood. Implementation science is often criticized for the impracticality of its ideas and tools. This study demonstrates how implementation science frameworks and evaluative thinking can be used to tackle practical problems in complex settings. Following a systematic assessment of known implementation facilitators and barriers, this study focused its efforts on a discrete factor for further research and action. The findings of this study provide program leaders and teachers with information for action. Implementation research is time-consuming and can be expensive. However, as this study demonstrated, large systems often have the needed data and human capital to study implementation challenges in small and practical ways. Similar small-scale studies should continue to address implementation challenges in a focused manner.

The field of early childhood is highly regulated. This has made the work of teachers increasingly complex and in some cases, competes with the reason why many teachers enter the profession: to be with children. Additionally, the workforce is rapidly evolving with the arrival of immigrant and refugee teachers, further enriching and complicating the field. Head Start is an

exemplary institution that has invested significant resources in delivering quality early childhood education to communities most in need. The ongoing investment has led to a relatively successful introduction and implementation of teacher-child assessment practices in the study settings. Most teachers are engaged in assessment practices; however, many teachers struggle to implement them because of language and philosophical differences. Head Start provides holistic support to families and recruits its workforce from within the communities it serves. This should be supported and celebrated. At the same time, Head Start needs to continue building an infrastructure that can support a multi-lingual, multicultural workforce through efforts like software improvements (e.g., databases in multiple languages) and psychometrically sound, simplified assessment approaches.

This study highlights the significance of implementation science in early childhood education, showcasing practical applications in complex settings. By systematically analyzing implementation facilitators and barriers, the research offers valuable insights for program leaders and teachers. Despite the time-consuming and costly nature of implementation research, large systems can benefit by utilizing available data and human capital to address challenges in a focused manner. Early childhood education, especially in regulated environments such as Head Start, has become increasingly complex due to the evolving workforce and diverse needs of immigrant and refugee teachers. To ensure success in implementing teacher-child assessment practices, it is crucial to support a multi-lingual, multicultural workforce through infrastructure improvements like multilingual software and simplified assessment approaches.

References

Aarons, G. A., Horowitz, J. D., & Ehrhart, M. G. (2012). *The Role of Organizational Processes in Dissemination and Implementation Research* (R. C. Brownson, G. A. Colditz, & E. K. Proctor (Eds.); Issue April 2019, pp. 1–35). https://doi.org/10.1093/acprof

Adams, G., Tout, K., & Zaslow, M. (2007). *Patterns of Use , Quality , and Potential Policy Implications Early Care and Education for Children in Low-Income Families*. *May*.

Akers, L., Del Grosso, P., Snell, E., Atkins-Burnett, S., Wasik, B. A., Carta, J., Boller, K., & Monahan, S. (2016). Tailored Teaching: Emerging Themes from the Literature on Teachers' Use of Ongoing Child Assessment to Individualize Instruction. *NHSA Dialog*, *18*(4), 133. http://ezphost.dur.ac.uk/login?url=https://search.proquest.com/docview/1810069368?accountid=14533%0Ahttp://palimpsest.dur.ac.uk/openurl/?genre=article&issn=15240754&title=NHSA+Dialog&volume=18&issue=4&date=2015-10-01&atitle=Tailored+Teaching%3A+Emerging+T

Atkins-Burnett, S., Monahan, S., Akers, L., Carta, J., Wasik, B. A., & Boller, K. (2014). Tailored teaching: teachers' use of ongoing child assessment to individualize instruction - Volume I: Conceptual framework and measurement plan. *Ongoing Assessment for Tailored Teaching in Early Childhood: Conceptual Framework and Measurement Development*, *I*(June), 1–93.

Bailey, A. (2017). *Building Quality Early Childhood Assessment: What Really Matters?*

Bartlett, L., & Vavrus, F. (2016). *Rethinking Case Study Research: A Comprative Approach*. Routledge.

Birth Through Kindergarten Minimum # of items / Dimensions Required Gold Area Total # of

Dimensions Minimum # of items / Dimensions Required (p. 70). (n.d.).

Boyd, M. (2013). "I love my work but..." The professionalization of early childhood education. *Qualitative Report*, *18*(36), 1–20. https://doi.org/10.46743/2160-3715/2013.1470

Bradbury, A. (2012). *' I feel absolutely incompetent ': professionalism , policy and early childhood teachers*. *13*(3), 175–186. https://doi.org/10.2304/ciec.2012.13.3.175

Brawley, S., & Stormont, M. A. (2014). Investigating Reported Data Practices in Early Childhood: An Exploratory Study. *Journal of Positive Behavior Interventions*, *16*(2), 102–111. https://doi.org/10.1177/1098300713480838

Bureau of Labor and Statistics. (2017a). Occupational Employment and Wages, May 2017: 23-2032. *Occupational Employment Statistics*, *May 2017*, 9. https://www.bls.gov/oes/current/oes291051.htm

Bureau of Labor and Statistics. (2017b). Occupational Employment and Wages, May 2017: 23-2032. *Occupational Employment Statistics*, *May 2017*, 9.

Burton, A., Brandon, R. N., Maher, E., Whitebook, M., Young, M., Bellm, D., & Wayne, C. (2002). *Estimating the size and components of the U.S. child care workforce and caregiving population*.

Casale, O., Noel, Z., & Pearl, Z. (2020). *Early Care and Education: Profile of an Industry in Crisis*. https://mn.gov/deed/newscenter/publications/trends/september-2020/early-care-education.jsp

Center for Rural Policy and Development. (2019a). *Results of a statewide survey of child care providers* (Vol. 3185, Issue April).

Center for Rural Policy and Development. (2019b). *Results of a statewide survey of child care providers* (Vol. 3185, Issue April). www.ruralmn.org

Center for the Study of Child Care Employment, U. of C. (n.d.). *Supportive Environmental Quality Underlying Adult Learning (SEQUAL): A Tool For Program Improvement Five SEQUAL Domains*.

Damschroder, L. J., Aron, D. C., Keith, R. E., Kirsh, S. R., Alexander, J. A., & Lowery, J. C. (2009). Fostering implementation of health services research findings into practice: A consolidated framework for advancing implementation science. *Implementation Science*, *4*(1), 1–15. https://doi.org/10.1186/1748-5908-4-50

Damschroder, L. J., Reardon, C. M., Widerquist, M. A. O., & Lowery, J. (2022). The updated Consolidated Framework for Implementation Research based on user feedback. *Implementation Science*, *17*(1), 1–16. https://doi.org/10.1186/s13012-022-01245-0

deMonsabert, J., Brookes, S., Coffey, M. M., & Thornburg, K. (2022). Data Use for Continuous Instructional Improvement in Early Childhood Education Settings. *Early Childhood Education Journal*, *50*(3), 493–502. https://doi.org/10.1007/s10643-021-01168-3

Domitrovich, C. E., Bradshaw, C. P., Poduska, J. M., Buckley, J. A., Olin, S., Romanelli, L. H., Leaf, P. J., Greenberg, M. T., & Ialongo, N. S. (2008). Maximizing the Implementation Quality of Evidence-Based Preventive Interventions in schools: A Conceptual Framework. *Adv Sch Ment Health Promot.*, *1*(3), 6–28.

Domitrovich, C. E., Gest, S. D., Gill, S., Jones, D., & Sanford, R. (2009). Individual Factors Associated with Professional Development Training Outcomes of the Head Start REDI Program. *Early Education Development*, *20*(3), 401–430.

https://doi.org/10.1080/10409280802680854.Individual

Federal Interagency Forum on Child and Family Statistics. (2017). *America's Children: Key National Indicators of Well-Being, 2017*. U.S. Government Printing Office. https://doi.org/10.1016/j.annepidem.2009.07.040

First Children's Finance of Minnesota. (2016). *Business Practices of Family Child Care : Expanding What We Know*.

Franks, R., Schroeder, J. (2013). Implementation Science: What Do We Know and Where Do We Go from Here? In I. Halle, T, Metz, A., Martinez-Beck (Ed.), *Applying Implementation Science in Early Childhood Programs and Systems* (pp. 5–19). Paul H Brookes Publishing Co.

Glisson, C., Dukes, D., & Green, P. (2006). The effects of the ARC organizational intervention on caseworker turnover, climate, and culture in children's service systems. *Child Abuse and Neglect*, *30*(8), 855–880. https://doi.org/10.1016/j.chiabu.2005.12.010

Hahn, R. A., Barnett, W. S., Knopf, J. A., Truman, B. I., Johnson, R. L., Fielding, J. E., Muntaner, C., Jones, C. P., Fullilove, M. T., & Hunt, P. C. (2016). Early childhood education to promote health equity: A community guide systematic review. In *Journal of Public Health Management and Practice* (Vol. 22, Issue 5, pp. E1–E8). Lippincott Williams and Wilkins. https://doi.org/10.1097/PHH.0000000000000378

Head Start Program Peformance Standards (pp. 1–9). (n.d.). https://eclkc.ohs.acf.hhs.gov/policy/45-cfr-chap-xiii/1302-33-child-screenings-assessments

Institute of Medicine. (2012). The Early Childhood Care and Education Workforce. *The Early*

Childhood Care and Education Workforce: Challenges and Opportunities: A Workshop Report. https://doi.org/10.17226/13238

Institute of Medicine (IOM) and National Research Council (NRC). (2015). Transforming the Workforce for Children Birth Through Age 8: A Unifying Foundation. In *Transforming the Workforce for Children Birth Through Age 8: A Unifying Foundation*. The National Academies Press. https://doi.org/10.17226/19401

Krause, J., Van Lieshout, J., Klomp, R., Huntink, E., Aakhus, E., Flottorp, S., Jaeger, C., Steinhaeuser, J., Godycki-Cwirko, M., Kowalczyk, A., Agarwal, S., Wensing, M., & Baker, R. (2014). Identifying determinants of care for tailoring implementation in chronic diseases: An evaluation of different methods. *Implementation Science*, *9*(1), 1–12. https://doi.org/10.1186/s13012-014-0102-3

Landry, S. H., Anthony, J. L., Swank, P. R., & Monseque-bailey, P. (2009). *Effectiveness of Comprehensive Professional Development for Teachers of At-Risk Preschoolers*. *101*(2), 448–465. https://doi.org/10.1037/a0013842

Laughlin, L. (n.d.). *Who's Minding the Kids? Child Care Arrangements: Spring 2011*. www.census.gov/hhes/socdemo/children/data

Learning Community Around Data. (n.d.).

Lewis, C. C., Klasnja, P., Powell, B. J., Lyon, A. R., Tuzzio, L., Jones, S., Walsh-Bailey, C., & Weiner, B. (2018). From Classification to Causality: Advancing Understanding of Mechanisms of Change in Implementation Science. *Frontiers in Public Health*, *6*(May). https://doi.org/10.3389/fpubh.2018.00136

Love, H. R., Horn, E., & An, Z. (2019). Teaching Observational Data Collection to Early Childhood Preservice Educators. *Teacher Education and Special Education*, *42*(4), 297–319. https://doi.org/10.1177/0888406419836147

Malik, R., Hamm, K., Adamu, M., & Morrissey, T. (2016). *Child Care Deserts An Analysis of Child Care Centers by ZIP Code in 8 States*. *October*, 1–47. https://www.americanprogress.org/issues/early-childhood/reports/2016/10/27/225703/child-care-deserts/

Manning, M., Garvis, S., Fleming, C., & Wong, G. T. W. (2015). The Relationship between Teacher Qualification and the Quality of the Early Childhood Care and Learning Environment: A Systematic Review. *Campbell Systematic Reviews*, *11*(1), 1–37. https://doi.org/10.1002/cl2.149

Manning, M., Wong, G. T. W., Fleming, C. M., & Garvis, S. (2019). Is Teacher Qualification Associated With the Quality of the Early Childhood Education and Care Environment? A Meta-Analytic Review. *Review of Educational Research*, *89*(3), 370–415. https://doi.org/10.3102/0034654319837540

Martinez-Beck, I. (2013). Where Is the New Frontier of Implementation Science in Early Care and Education Research and Practice? In I. Halle, T, Metz, A, Martinez-Beck (Ed.), *Applying Implementation Science in Early Childhood Programs and Systems*. Paul H Brookes Publishing Co.

Merriam, S. B., & Tisdell, E. J. (2016). *Qualitative Research : A Guide to Design and Implementation: Vol. Fourth edi*. Jossey-Bass. http://login.ezproxy.lib.umn.edu/login?url=https://search.ebscohost.com/login.aspx?direct=t

rue&AuthType=ip,uid&db=nlebk&AN=1022562&site=ehost-live

Minnesota Department of Education. (2019). *Comparison of KEP-Approved Assessments for SY 2019-20*. *400*(1), 6339.

Minnesota Department of Human Services. (2016). *Parent Aware Quality Rating and Improvement System: Standards and Indicators 2016* (Issue October).

Minnesota Department of Human Services. (2019). *Parent Aware Rated child care programs across Minnesota* (Issue October).

Monahan, S., Atkins-Burnett, S., Wasik, B. A., Akers, L., Hurwitz, F., & Carta, J. (2016). *Developing a Tool to Examine Teachers ' Use of Ongoing Child Assessment to Individualize Instruction* (Issue November).

Monahan, Shannon, Atkins-Burnett, S., Wasik, B. A., Akers, L., Hurwitz, F., & Carta, J. (2016). *Developing a Tool to Examine Teachers' Use of Ongoing Child Assessment to Individualize Instruction*. *November*. http://www.acf.hhs.gov/opre/research/project/early-childhood-teachers-use-of-progress-monitoring-

National Academies of Sciences, Engineering, and M. (2018). Transforming the Financing of Early Care and Education. In *Transforming the Financing of Early Care and Education*. The National Academies Press. https://doi.org/10.17226/24984

Organisation for Economic Co-operation and Development. (2018). *Engaging young children : lessons from research about quality in early childhood education and care*. OECD Publishing.

Park, M., McHugh, M., Zong, J., & Batalova, J. (2015). Immigrant and Refugee Workers in the

Early Childhood Field: Taking a Closer Look. *Migration Policy Institute*, 40.

Patton, M. Q. (1999). Enhancing the quality and credibility of qualitative analysis. *Health Services Research*, *34*(5 Pt 2), 1189–1208. http://www.ncbi.nlm.nih.gov/pubmed/10591279%0Ahttp://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=PMC1089059

Peisner-Feinberg, A. E. S., Burchinal, M. R., Clifford, R. M., Mary, L., Peisner-feinberg, E. S., Burchinal, M. R., Clifford, R. M., Culkin, M. L., Howes, C., Kagan, S. L., & Yazejian, N. (2016). *The Relation of Preschool Child-Care Quality to Children ' s Cognitive and Social Developmental Trajectories through Second Grade Culkin , Carollee Howes , Sharon Lynn Kagan and Noreen Yazejian Published by : Wiley on behalf of the Society for Research in*. *72*(5), 1534–1553.

Peterson, S. M. (2013). Readiness to Change: Effective Implementation Processes for Meeting People Where They Are. In T. Halle, A. Metz, & I. Martinez-Beck (Eds.), *Applying Implementation Science in Early Childhood Programs and Systems* (pp. 43–64).

Plano, V., & Creswell, J. W. (2015). *Understanding Research A Consumer's Guide* (2nd ed.). Pearson.

Powell, B. J., Waltz, T. J., Chinman, M. J., Damschroder, L. J., Smith, J. L., Matthieu, M. M., Proctor, E. K., & Kirchner, J. A. E. (2015). A refined compilation of implementation strategies: Results from the Expert Recommendations for Implementing Change (ERIC) project. *Implementation Science*, *10*(1), 1–14. https://doi.org/10.1186/s13012-015-0209-1

Price of Child Care in Minnesota 2019. (n.d.). https://www.childcareaware.org/our-issues/research/the-us-and-the-high-price-of-child-care-2019/

Prochaska, J. O., Redding, C. A., & Evers, K. E. (2005). The Transtheoretical Model and Stages of Change. In G. Karen, B. Rime, & K. Viswanath (Eds.), *Health education research: Theory & practice* (4th ed., Issue 2, pp. 244–258). Jossey-Bass.

Rogers, E. M. (1995). *Diffusion of Innovations* (4th ed.). The Free Press.

Shore, C., & Wright, S. (2015). Audit culture revisited: Rankings, ratings, and the reassembling of society. *Current Anthropology*, *56*(3), 421–444. https://doi.org/10.1086/681534

Tout, K., Zaslow, M., Halle, T., & Forry, N. (2009). Issues for the next decade of quality rating and improvement systems. *Washington, DC: Child Trends*, 10.

U.S. Census Bureau. (n.d.). *Quarterly Workforce Indicators (1990-2022)*. Longitudinal-Employer Household Dynamics Program. https://qwiexplorer.ces.census.gov

US Department of Health & Human Services, Administration of CHildren & Families, H. S. E. C. L. & K. C. (n.d.). *No Title*. https://eclkc.ohs.acf.hhs.gov/center-locator?latitude=46.730&longitude=-94.686&state=MN

Valorose, J., & Chase, R. (2012). *Child Care Workforce in Minnesota: 2011 Statewide Study of Demographics, Training and Professional Development* (Issue August, pp. 1–107). Wilder Research.

Werner, M. (2016). *A Quiet Crisis: Minnesota Child Care Crisis*. https://www.ruralmn.org/a-quiet-crisis-minnesotas-child-care-shortage/

Whitebook, M. (2003). *Early Education Quality: Higher Teacher Qualifications for Better Learning Enviornments - A Review of the Literature*.

Whitebook, M., King, E., Philipp, G., & Sakai, L. (2016). Teachers' Voices: Work Environment

Conditions That Impact Teacher Practice and Program Quality. *Center for the Study of Child Care Employment, University of California at Berkeley*, 1–63. https://www.lib.uwo.ca/cgi-bin/ezpauthn.cgi?url=http://search.proquest.com/docview/1913349132?accountid=15115%0Ahttp://vr2pk9sx9w.search.serialssolutions.com?ctx_ver=Z39.88-2004&ctx_enc=info:ofi/enc:UTF-8&rfr_id=info:sid/ERIC&rft_val_fmt=info:ofi/fmt:kev:

Whitebook, M., Schlieber, M., Hankey, A., Austin, L. J. E., & Philipp, G. (2018). *Teachers ' Voices: Work Environment Conditions That Impact Teacher Practice and Program Quality - Minnesota*.

Willis, G. (2005). *Cognitive Interviewing*. https://doi.org/10.4135/9781412983655

Workman, S., & Ullrich, R. (2017). *Quality 101: Identifying the Core Components of a High-Quality Early Childhood Program*. 1–16. https://cdn.americanprogress.org/content/uploads/2017/02/10063958/QualityEarlyChildhood101-brief.pdf