
DIALOG FROM THE FIELD

Tailored Teaching: Emerging Themes from the Literature on Teachers' Use of Ongoing Child Assessment to Individualize Instruction

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Ongoing child assessment is increasingly viewed as a tool for informing and individualizing instruction in early childhood, yet little is known about how ongoing child assessment is implemented at the classroom or the programmatic level. This literature review focuses on how teachers use ongoing assessment and adjust instructional practices and content to better meet the individual strengths, needs, and interests of young children. We identified four important issues in the literature in ongoing assessment in early childhood: (1) many teachers do not consistently collect ongoing assessment data, nor do they use it for instruction and individualization; (2) barriers to using data include lack of pedagogical content knowledge and knowledge about how to conduct assessments and interpret data; (3) teachers want more training and professional development in this area; and (4) more needs to be known about how to support the successful implementation of ongoing child assessment.

Keywords: ongoing assessment; individualization; instruction

Over the past two decades, there has been considerable growth in the use of assessments in early childhood education settings (Snow & Van Hemel, 2008). For many years, the most common use of assessment in early childhood was to provide information on children's developmental status and examine how they performed relative to peers or to specified criteria in order to identify and monitor the development of students who had special needs. However, with the heightened emphasis placed on using data to make decisions at all levels of education in the last decade, increased attention has been given to how early childhood teachers use ongoing assessment to adjust instructional practices and content to better meet the individual strengths, needs, and interests of young children (Peisner-Feinberg & Buysse, 2013; Snow & Van Hemel, 2008). Individualization of instruction has been considered a "best practice" in early education programs (National Association for the Education of Young Children, 2005) and is now a requirement in the Head Start Program Performance Standards (Head Start Performance Standards, 2011).

Definition of Ongoing Assessment and Individualization

Ongoing child assessment refers to the process of "continuing observation and documentation teachers complete to determine whether teaching practices need to be adapted to better meet children's needs" (National Center on Quality Teaching and Learning, 2012, p. 1). In other words, teachers use ongoing child assessment to monitor the progress of children over time in order to assure that children meet developmental and educational goals. When used for individualizing, teachers examine each child's progress over time with the intended goal of individualizing instruction to improve the child's progress. In this context, the term individualized is used to refer to instruction that is responsive to each child's unique strengths and challenges through modifications that better meet the child's individual needs. These modifications might include increased opportunities to practice a skill, knowledge, or behavior; changes in curriculum; adaptations of instructional approaches; and environmental or other supports.

Purposes of Ongoing Assessment

Ongoing child assessment has four primary purposes: (1) to inform the teacher's instruction for the entire group; (2) to determine whether current instructional approaches are supporting a child; (3) to determine whether and which additional support or modifications to instruction are needed for the child; and (4) when appropriate, to determine whether the child's rate of growth has changed in response to the support or modification. Overall, in early childhood settings, the goal is to use information from ongoing assessment to track progress and then scaffold children's learning to support school-readiness.

Approaches to Ongoing Assessment

There are two general approaches to ongoing assessment in early childhood education: use of (1) general outcome measures (GOMs) and (2) curriculum-embedded measures tailored to a

particular curriculum. Table 1 presents examples of assessment tools used by teachers in classrooms to obtain information about children's development.

TABLE 1
Ongoing Assessment Tools Used in Early Childhood Education

Name of Tool	Description
General Outcomes Measurement^a	
Individual Growth and Development Indicators (IGDIs) for Infants and Toddlers (Greenwood et al. 2011b; Greenwood et al. 2006; Walker et al. 2008)	Different tasks used to monitor the growth of infants and toddlers across multiple domains. A school-age version (DIBELS) is available. A technology component is also available.
Preschools IGDIs (Missall et al. 2008; Roseth et al. 2012)	Different tasks used to monitor the growth of preschoolers in language and literacy (Get It, Got It, Go). A school-age version (DIBELS) is available. A technology component is also available.
m-CLASS CIRCLE (Amplify Education n.d.)	A web-based system that includes ongoing assessment tools and data linked to approaches for individualizing instruction in the social, emotional, early literacy, and early math domains for 3- to 5-year-olds. A school-age version is available. A web-based system is also available.
Curriculum-Embedded Approaches^{b,c}	
Child Observation Record (COR), COR Advantage (High/Scope Educational Research Foundation 2003, 2013)	A curriculum-based assessment providing systematic observational assessment of young children's knowledge and abilities in multiple domains of development. The Preschool COR is used to assess children from age 2½ to 6 years, and the Infant-Toddler COR is for programs serving children between ages 6 weeks and 3 years. A technology component is available.
Desired Results Developmental Profile (DRDP [®]), DRDP 2015 (California Department of Education and Center for Child and Family Studies at WestEd 2013, 2015)	A criterion-referenced assessment designed to assess multiple developmental domains for children from birth to age 12. The DRDP is aligned with California learning and development foundations. A technology component is available.
Learning Accomplishment Profile (LAP) and Early Learning Accomplishment Profile (E-LAP) (Hardin and Peisner-Feinberg 2001, 2004)	A criterion-referenced observational assessment used to assess development across six domains. The E-LAP assesses children from birth to 36 months old (414 developmental skills arranged hierarchically). The LAP assesses children from 36 to 72 months old (383 developmental skills arranged hierarchically). A technology component is available.

Name of Tool	Description
The Ounce Scale ^(TM) (Meisels et al. 2003)	A criterion-referenced observational assessment used to document the development of children from birth to 42 months. It consists of three interrelated elements: observation records, family albums, and developmental profiles and standards. A technology component is available.
Teaching Strategies: GOLD ^{® d} (Teaching Strategies, Inc. 2011)	A criterion-referenced observation-based assessment system. It is grounded in 38 research-based objectives that include predictors of school success and are aligned with state early learning standards, the Common Core State Standards for kindergarten, and The Head Start Child Development and Early Learning Framework. It can be used with children from birth through kindergarten. A technology component is available.

^aThe GOMs presented in this table are used for illustration purposes. These illustrations are assessments used in the research studies we reviewed. The authors are not recommending particular measures for use.

^bThe curriculum-embedded tools presented in this table are used for illustration purposes. These assessments were reported as the primary assessment by more than 5 percent of teachers in the Head Start Family and Child Experiences Survey (FACES) (Hulsey et al. 2010) and the Early Head Start Family and Child Experiences Study (Baby FACES) (Vogel et al. 2011). The authors are not recommending particular measures for use.

^cSee Halle et al. 2011 for more information on particular curriculum-embedded tools, and for information more generally about how to evaluate an instrument's reliability and validity.

^dEarlier versions for Teaching Strategies GOLD[®] were called Creative Curriculum[®] Developmental Continuum for Ages 3–5 (Teaching Strategies, Inc. 2001) and Creative Curriculum[®] Developmental Continuum for Infants, Toddlers, & Twos (Teaching Strategies, Inc. 2006).

General outcomes measures. In the GOM approach, teachers use a brief measure with strong evidence of reliability and validity to conduct frequent, standard assessments of children's progress toward a long-term goal. Central to this approach is the repeated measurement of a few key skills that represent the entire skill set required to achieve a given goal, rather than measuring the full skill set. A child's increasing proficiency on a GOM is indicated by improved performance on these same skills measured over time.

With GOMs, children's performance may be measured as infrequently as three times per year or as often as once per week (Jenkins et al. 2009). The probes to obtain these performance samples typically range from one to five minutes, depending on the outcome (that is, the knowledge, skill, or behavior) being measured. One common application of GOMs is Response to Intervention (RTI)—an approach to early intervention involving the regular screening of all children throughout the year. Children not progressing as expected receive intensive support as well as frequent assessments to test whether the support is helping (Hamilton et al. 2009; National Association for the Education of Young Children et al. 2012; Buysse and Peisner-Feinberg 2013). GOMs typically do not focus on the full set of child outcome domains. Most GOMs in preschool currently focus on language and literacy, and some focus on mathematics.

Curriculum-embedded approaches. The most commonly used systems for assessing the progress of children in early care and education are curriculum-embedded approaches. These assessments are used to examine children's progress relative to early learning standards and the

skills and knowledge taught via a specific curriculum. Teachers using this approach often collect assessment information as they are teaching their normal curriculum. The assessment tasks are intended to be authentic in context; that is, they should mirror experiences typical to the child's daily life (Pretti-Frontczack et al. 2011). Some curriculum-embedded approaches are developed by the curriculum developers to align closely with the material being taught ("curriculum-based assessments" such as the Teaching Strategies: GOLD assessment used with the Creative Curriculum), whereas other such assessments are derived from national standards and developmental expectations ("curriculum-embedded assessments" such as Galileo and the Work Sampling System).

Teachers typically assess children's performance in relation to criteria on rubrics provided by the assessment system. These rubrics specify different levels of performance based on end-of-year goals, but often provide no guidance regarding children's expected progress throughout the year. In addition, although the tasks being assessed are embedded within daily activities and aligned with curriculum goals, the tasks are not standardized and require teachers to collect assessment data from multiple sources. The assessments may use a variety of data collection methods, such as observation recording forms, worksheets, standardized assessments, and portfolios.

Compared to GOMs, curriculum-embedded approaches are (1) more common in early childhood settings than GOMs; (2) more demanding for a teacher to implement (that is, they require greater teacher skills and knowledge because they are less proscriptive); and (3) more comprehensive, as they traditionally cover several domains of development.

Policies and Evidence Supporting Use of Ongoing Assessment

Policymakers and other federal and state officials are increasingly recognizing the importance of ongoing assessment to individualize instruction during early childhood. For example, in the past five years, the Office of Head Start has elaborated its vision for preschool child and family outcomes, added a stronger focus on program and classroom quality in its monitoring system, and created professional development tools to support ongoing assessment in daily practice. The Head Start Early Learning Outcomes Framework is a blueprint for achieving the child-specific goals of the program through alignment of curricular approaches, assessments, and professional development activities (U.S. Department of Health and Human Services 2015). In 2012, the Secretary of Health and Human Services' Advisory Committee on Head Start Research and Evaluation advocated investment in supporting evidence-based and data-informed practices across all domains of quality teaching and learning (Advisory Committee on Head Start Research and Evaluation, 2012).

Using ongoing child assessment to individualize instruction is considered a best practice in early education programs (National Association for the Education of Young Children, 2005; Sandall, McLean, & Smith, 2000) and is a requirement in the Head Start Program Performance Standards (2011). However, the existing evidence base on the features of high-quality implementation and the effects of ongoing assessment on instructional quality and child outcomes is limited and sometimes restricted to early elementary settings. The small body of literature suggests that teachers who use ongoing assessment to individualize their instruction reduce the school readiness gap for children at risk (Al Otaiba et al., 2011; Landry, Swank, Anthony, & Assel, 2011). Some studies have also shown that these teachers design more

effective instructional programs, and have students who achieve better outcomes, than teachers who do not assess progress. For example, studies have shown that ongoing assessment in reading (sometimes combined with guidance for individualized instruction) raises teachers' awareness of students' current levels of reading proficiency and improves the instructional decisions they make (Connor et al., 2009; Fuchs, Deno, & Mirkin, 1984). The use of ongoing assessment data—often merged with other professional development supports, such as mentoring—has also been linked to growth in literacy outcomes in preschool through first grade (Ball & Gettinger, 2009; Landry, Anthony, Swank, & Monseque-Bailey, 2009; Wasik, Hindman, & Jusczyk, 2009). In one experimental study, infants and toddlers whose home visitors used progress monitoring and received web-based guidance in making data-based intervention decisions demonstrated more growth in their communication skills than those whose home visitors did not use progress monitoring (Buzhardt et al., 2010; Buzhardt, Greenwood, Walker, Anderson, et al., 2011).

It is important to note that most of the available studies that provide evidence linking the use of ongoing assessment to better instructional decision-making and positive child outcomes relate to GOMs rather than curriculum-embedded approaches. These studies typically include supports such as technology-enhanced systems that offer immediate, tailored feedback around using data to tailor instruction, making it infeasible to isolate the effects of ongoing assessment alone. The recommendations provided by the technology-enhanced systems may be a critical factor in fostering improved instructional decision-making and child outcomes.

Knowledge Gaps Remain

Currently, Head Start requires that teachers aggregate and analyze assessment results three times per year in their classrooms (Head Start Performance Standards, 2011). The intent is for Head Start teachers to gather baseline data, make instructional changes based on mid-year analysis, and use year-end data to report progress and inform program improvement. Similar types of assessment are also being implemented in public schools using the Response to Intervention (RTI) model (Gersten et al., 2009; Hamilton et al., 2009). Despite the importance of using assessment to inform instruction and the requirements to do so, information on how teachers actually collect and use assessment data to inform their practice and individualize for children across early education-related disciplines is limited. Little is known about how or how well teachers implement ongoing assessment to adjust instructional or caregiving practices and content and thus better meet the individual strengths, needs, and interests. The current review aims to highlight what is already known in the existing literature on the use of ongoing assessment for individualization of instruction and identify important gaps in our understanding. Specifically, this literature review seeks to answer the following questions:

- What are the steps and activities involved when early childhood education teachers use ongoing assessment to individualize instruction? In other words, what do early childhood education teachers actually do and how are they doing it?
- How do early childhood education teachers perceive ongoing assessment, and what do they know about ongoing assessment practices?
- What barriers do early childhood education teachers face when using ongoing assessment to individualize instruction?

- What supports can assist early childhood education teachers to use ongoing assessment to individualize instruction

LITERATURE SEARCH

The literature search targeted research related to early childhood education (which we defined as including children from birth through third grade) and early childhood special education. The search was limited to references from 2002–2012; search terms are presented in Table 2. Librarians conducted searches in Education Research Complete and the Education Resource Information Center (ERIC) through EBSCOhost; librarians also conducted searches in Sage. In addition, members of an expert consultant group recommended research that fell outside the targeted years for the literature review, including research that was still in press. Together, the literature search and the expert recommendations yielded 1,325 unduplicated references (1,281 references from the literature search and 44 from the expert recommendations). Based on a set of criteria determined by the project team, trained reviewers carefully screened all identified references for relevance. The vast majority of studies were screened out for being off topic; some studies were screened out for not being a relevant document type (for example, a newspaper article) or for not relating to early childhood. Screeners ultimately identified 173 references to include in the review.

TABLE 2
Search Criteria

<i>Search criteria</i>	<i>Parameters</i>
Target populations	Infant* OR toddler* OR preschool* OR “pre-school”* OR “early elementary”
Search terms	Progress Monitoring (descriptor) OR “progress monitoring” OR “response to intervention” OR “instructional effectiveness” OR “multi-tier* systems of support” Differentiated Instruction (descriptor) OR ([differentiated OR personal* OR individualized] AND [assessment OR monitoring]) Curriculum-based Assessment (descriptor) OR “curriculum-based assessment” (Benchmark OR curriculum-embedded OR “curriculum embedded” OR curriculum-referenced OR formative) AND assessment (Data-based OR data-informed OR data-driven) AND (“decision making” OR decision-making)
Years	2002–2012

THEMES FROM THE LITERATURE

Characteristics of the Literature Reviewed

Study designs. Throughout the remainder of this article, a “study” refers to any reference included in the review, including empirical studies, conceptual pieces, best-practice guides, and literature reviews. Of the 173 studies included in the review, almost half (48 percent) were empirical studies, 36 percent were conceptual pieces, 13 percent were guides that provided overviews of best practices or standards, and 2 percent were literature reviews or reviews of measures. The empirical studies included 56 descriptive studies (of which 25 were psychometric), 15 randomized controlled trials (RCTs), 7 quasi-experimental designs (QEDs), and 5 single-case designs (SCDs). Although curriculum-embedded approaches to ongoing assessment are the most commonly used type of assessment in early childhood, most of the empirical studies with more rigorous designs (that is, RCTs, QEDs, and SCDs) focused on GOMs. The GOMs use standard tasks and the research gathered evidence of the reliability and validity of those standard tasks.

Age groups and sample characteristics. Across all 173 studies, 92 discussed the use of ongoing assessment to individualize instruction with students in early elementary school (some studies also included students beyond third grade), 80 with children in preschool, and 35 with infants and toddlers. Of the 173 studies, 34 reported on more than one age group (e.g., preschool and early elementary). Sixty-nine studies included discussions on using ongoing assessment with children with disabilities, and 34 studies included children enrolled in Head Start or Early Head Start programs.

Domain. Across and within all age groups, studies most commonly discussed the use of ongoing child assessment in the domains of language, literacy, or reading (47 percent of all studies). Fewer studies focused on the use of ongoing assessment in the domains of mathematics (16 percent) and social and emotional or behavioral outcomes (16 percent). (Please note that 29 percent of studies did not specify a domain. Science and motor development were covered by 2 percent and 1 percent of studies, respectively.)

Scope. As we discuss next, using ongoing assessment for individualization involves multiple steps: deciding what data to collect and how; conducting the assessment; documenting, organizing, and interpreting information; and making and implementing instructional decisions. Rather than examining the process in its entirety, nearly all empirical studies in the review focused on only one or two steps in the process of using ongoing assessment to tailor teaching. In addition, most studies examined teachers’ use of this process with a particular assessment tool. No studies examined implementation across a range of ongoing assessment tools.

Activities for Individualizing Instruction

To address the question of what teachers actually do when using ongoing assessment for individualization, we report the various implementation activities discussed across the 173 studies. The activities identified in the review include selecting an observation or assessment

target and method, documenting and organizing information on children's progress, and interpreting and applying data to inform instruction and individualization.

Selecting an assessment target and method. Ongoing child assessment begins when the teacher selects an assessment target and method. The assessment target is the knowledge, skill, or behavior that the teacher wants to assess. Examples of assessment targets in preschool include recognizing shapes or colors when they are named, showing an understanding of cause-and-effect relationships, persisting in assembling a puzzle with fewer than 20 pieces, and taking turns with another child when playing a matching game. The assessment method is the way that the teacher gathers information about the skill, knowledge, or behavior of interest. Examples of assessment methods include naturalistic observations; structured tasks, such as asking a child to name pictures, shapes, numbers, or letters using flashcards; and standardized or norm-referenced tests.

The assessment system that the teacher uses (which program managers—rather than teachers—often select) can influence decisions about the target and method. Specifically, GOMs typically define the target and method, while most curriculum-embedded approaches rely on teachers to determine which learning objectives to assess and how to assess them within their curricular activity. The supports available to the teacher within different assessment systems also vary, and some assessment systems link more closely to the curriculum than others.

Literature discussing how teachers select assessment targets was conceptual rather than empirical and consisted of recommendations for practice rather than what teachers actually do. Recommendations included identifying targets that align with the curriculum; measure critical outcomes of the curriculum; are teachable, observable, or measurable; are generalizable in that they can be used and observed across multiple settings and promote skill development across related domains; and are universally designed such that all children can participate, regardless of the extent of any disabilities (Bagnato, McLean, Macy, & Neisworth, 2011; Fuchs & Deno, 1991; Good & Kaminski, 1996; Good, Gruba, & Kaminski, 2001; Hojnoski & Missall, 2007; Hosp & Ardoin, 2008).

No studies focused specifically on teacher-level decision-making related to selecting an assessment method. In early childhood education, researchers have promoted the use of authentic assessments for instructional planning (defined as systematic recording of developmental observations about the naturally occurring behaviors and functional competencies of young children in daily routines by familiar and knowledgeable caregivers in the child's life) over the use of standardized, norm-referenced tests (Bagnato, Neisworth, & Pretti-Frontczak, 2010; Bagnato et al., 2011). Some researchers maintain that authentic assessments are better suited for the early childhood context because they are “developmentally appropriate, representative, accurate, functional, and strengths based, especially for children with disabilities” (Bagnato et al., 2011). Other researchers maintain the importance of looking at the skill in the same way across time so that teachers can more easily attribute any change to differences in the child rather than differences in the task.

Pretti-Frontczak and colleagues (2011) reviewed practice standards for assessment from professional organizations, various committee reports, and legislative policies. They summarized six common themes related to assessment practices for early childhood education, concluding that assessments should be (1) authentic (through the use of tasks “that reflect typical experiences rather than discrete isolated tasks that are irrelevant to the child's daily life”), (2) ongoing, (3) developmentally appropriate, (4) individualized, (5) natural (through the use of

structured observations of children doing typical tasks within their usual routine and setting), and (6) multifaceted (through the use of multiple sources and approaches to assessment). It is important to note that a long-standing tension exists between the use of standardized tasks versus authentic activities for ongoing assessment. Supporters of standardized tasks argue for consistent, reliable measurement that is objective. Alternatively, other researchers argue that children are not good test takers and may not respond to standard tasks and/or may not understand what they are being asked to do in a standard task.

Documenting and organizing information. Once teachers collect ongoing assessment data, they need systems for documenting the information that enable reflection and interpretation (Pretti-Frontczak et al., 2011). The systems should be organized in a way that enables teachers to efficiently and easily access the data. In the literature reviewed, checklists and ratings were the most commonly cited methods for documenting information (mentioned in 13 and 10 studies, respectively), while other types of documentation include anecdotal records, children's work samples (for example, drawings, writing samples, classwork), audio recordings, language samples (transcriptions of child language), and running records of oral reading. This information is then often organized using various systems, including portfolios for compiling data from multiple sources; graphs; and teacher-, school-, district-, or program-developed systems, such as Excel spreadsheets or paper-based systems for recording data on children's progress (see, for example, Jarrett, Browne, & Wallin, 2006; McConnell & Missal, 2008). Prevalent in the literature were studies that discussed web-based or technology-enhanced systems (see, for example, Burke & Vannest, 2008; Fuchs, Fuchs, & Hamlett, 1994; Ysseldyke & Bolt, 2007). These systems include "off-the-shelf" programs for documenting, organizing, and assisting teachers with instructional planning and individualization.

Interpreting and applying data to instruction. Once ongoing assessment data have been collected, documented, and organized, the critical next steps involve interpreting the data and then using the information to individualize instruction. Across the studies, teachers often relied on web-based or technology-enhanced systems, coaches or mentors, or decision points set by schools or districts to help them interpret data (Al Otaiba et al., 2011; Goertz, Nabors Oláh, & Riggan, 2009; Roehrig, Duggar, Moats, Glover, & Mincey, 2008; Wasik et al., 2009). Studies noted that teachers used ongoing assessment data to help them form small groups (DeBaryshe, Gorecki, & Mishima-Young, 2009; Gettinger & Stoiber, 2008, 2012; Wasik et al., 2009); create and implement tiered tasks or lesson plans (Marcon, 2009; Wasik et al., 2009); and identify children in need of one-on-one assistance (Gettinger & Stoiber, 2008, 2012; Goertz et al., 2009).

Several studies looked at the efficacy of web-based or technology-enhanced systems designed to assist teachers in using ongoing assessment data to inform instruction and individualization (Al Otaiba et al., 2011; Bolt, Ysseldyke, & Patterson, 2010; Buzhardt et al., 2010; Buzhardt, Greenwood, Walker, Anderson, et al., 2011; Fuchs, Fuchs, Hamlett, and Stecker, 1991; Fuchs et al., 1994; Landry, Swank, Smith, Assel, & Gunnewig, 2006; Landry et al., 2009; Landry et al., 2011; Ysseldyke & Bolt, 2007). Children whose teachers or home visitors had access to a web- or computer-based system that provided immediate feedback with instructional recommendations had higher levels of achievement than children whose teachers or home visitors did not (Al Otaiba et al., 2011; Buzhardt, Greenwood, Walker, Anderson, et al., 2011; Landry et al., 2009; Ysseldyke & Bolt, 2007). The use of technology to prompt the teacher with recommended instructional strategies based on the data that teachers input into the system

was more prevalent with GOMs. It appeared to be easier to create decisions rules and program technology when the tasks were the same across children.

Despite these promising findings, research also suggests the critical role of implementation integrity—teachers using the technology and recommendations in the intended way—in achieving satisfactory results. For example, in a random assignment study of the effects of a technology-enhanced ongoing assessment and instructional management system—Accelerated Math—on math instruction in elementary schools, Ysseldyke and Bolt (2007) found teachers were using progress monitoring tools with less than half of students, despite a recommendation to implement the program with all students in their classes. When the researchers explored whether teachers chose to implement the program with certain types of students, they found no systematic method teachers were using to exclude students. Teachers also varied in their quality of implementation. In a follow-up study, the researchers noted that the teachers who more successfully implemented ongoing assessment were in general more effective teachers (Bolt et al., 2010). However, it is important to note that more effective teachers in this study may have been more likely to successfully adopt instructional innovations, such as ongoing assessment; the use of ongoing assessment may not have caused teachers to be more effective.

Supporting Teachers

Teachers' knowledge and beliefs and the resources available to support them are critical to the successful implementation of ongoing assessment, but results from this literature review suggest numerous barriers to successful use of ongoing assessment. Although teachers may recognize the value of ongoing assessment and its use is mandated by Head Start, they do not consistently collect ongoing assessment data nor do they use it for instruction and individualization. Teachers face barriers to using data, including a lack of pedagogical content knowledge and knowledge of assessment and interpretation of data. Teachers report a desire for more training and professional development on using ongoing assessment to individualize instruction, but limited research exists to inform the approaches to training with the greatest promise for supporting teachers.

Teachers' perceptions, use, and knowledge of ongoing assessment. Across studies that reported on teachers' perceptions of, experiences with, or knowledge of ongoing assessment and using data to inform instruction, findings suggest that although practitioners may recognize the value of ongoing assessment, they do not consistently collect ongoing assessment data nor do they use it for instruction and individualization (Orosco & Klingner, 2010; Venn & McCollum, 2002).

Barriers to teachers' use of assessment data to inform instruction. The literature pointed to two main barriers to using assessment data to inform instruction: (1) teachers' knowledge of and skill in using assessment results to individualize instruction and (2) the breadth and depth of teacher knowledge of the content area (Keilty, LaRocco, & Casell, 2009; Orosco & Klingner, 2010; Roehrig et al., 2008). Across studies that asked teachers about their experiences using ongoing assessment to inform instruction, teachers consistently cited the need for additional training and support (see, for example, Roehrig et al., 2008; Kashima, Schleich, Spradlin, & Indiana University, 2009). In particular, teachers wanted more professional development and support around how to (1) administer universal screening and progress

monitoring assessments, (2) analyze data to make data-driven instructional decisions, and (3) change the curriculum and instruction to focus on evidence-based practices.

Professional development to support ongoing assessment. Despite the need for additional training and support, only 18 of the 173 studies reviewed described the training and support provided to teachers implementing ongoing assessment (Al Otaiba, 2005; Bagnato, Suen, Brickley, Smith-Jones, & Dettore, 2002; Ball & Trammell, 2011; Buzhardt et al., 2010; Buzhardt, Walker, Greenwood, & Carta, 2011; Buzhardt, Walker, Greenwood, & Heitzman-Powell, 2012; Fuchs et al., 1991; Gajus & Barnett, 2010; Gettinger & Stoiber, 2008, 2012; Greenwood, Buzhardt, Walker, Howard, & Anderson, 2011; Grisham-Brown, Hallam, & Pretti-Frontczak, 2008; Landry et al., 2006; Landry et al., 2009; Landry et al., 2011; Marcon, 2009; Wasik et al., 2009; Zoll & Rosenquest, 2011). Fewer studies examined the approaches to supporting teachers with the most promise for improving their ability to use ongoing assessment for individualization. Of the studies that described the types of assistance offered to teachers to support their use of ongoing assessment and using data to inform instruction, most offered initial trainings, which ranged from online professional development opportunities to multiday workshops, followed by ongoing one-on-one support from mentors or coaches (Gettinger & Stoiber, 2008, 2012; Grisham-Brown et al., 2008; Wasik et al., 2009; Zoll & Rosenquest, 2011).

Although studies suggest that teachers can benefit from professional development on the use of ongoing assessment for individualization, research on the types of professional development that should be offered to teachers is not conclusive (Buzhardt, Greenwood, Walker, Anderson, et al., 2011; Landry et al., 2009; Landry et al., 2011). Only one random-assignment study examined the role of various professional development methods on teaching behavior and children's school-readiness (Landry et al., 2009). The study found that teachers who received online professional development coupled with immediate, detailed feedback and mentoring showed the greatest improvements in their teaching behavior and in children's school-readiness when compared to teachers who had coaching around classroom instructional interactions (not specifically tied to data) and teachers who completed assessments on their own but received no feedback from either live coaches or technology-generated tailored recommendations. However, additional approaches of professional development and support in the use of assessment data to inform instruction remain relatively unexplored in the literature.

DISCUSSION

The use of ongoing assessment in early childhood education has garnered increased attention from educators, administrators, policymakers, and researchers (Buyse & Peisner-Feinberg, 2013; Division for Early Childhood of the Council for Exceptional Children, 2013). This literature review shows that the field is still in the early stages, and research on the implementation and effectiveness of ongoing assessment is still growing.

The literature suggests that although teachers may recognize the value of ongoing assessment and its use is mandated by Head Start, they do not consistently collect ongoing assessment data nor do they use it for instruction and individualization. Studies reported that teachers have indicated that they face a number of barriers that hinder their ability to interpret data and use data for individualizing instruction. In particular, teachers report a greater need for professional development about child development, pedagogical content, assessment practices,

and evidence-based instructional approaches. Teachers also may find the process of conducting ongoing assessment overly burdensome or complicated, especially in the busiest or most under-resourced centers.

Among the few studies that examined the effects of professional development on teaching behaviors, comprehensive professional development seems to be more effective than no professional development, and professional development appears to be more effective when it includes technology-driven support with immediate, detailed feedback (Buzhardt, Greenwood, Walker, Anderson, et al., 2011; Landry et al., 2009; Landry et al., 2011). The literature is clear, however, that many teachers are not successfully implementing ongoing assessment for individualization and instruction without the assistance of a technology-based system that provides immediate feedback and recommends next steps for instruction. This suggests that investing in that type of technology would yield greater benefits for children.

Although current studies provide valuable information on teachers' use of ongoing assessment for individualization, little is known about how critical each step in the process is to high quality use of the data to inform instruction and individualize. In addition, little is known about the key indicators of high quality implementation at each step in the process.

This review suggests we lack solid evidence regarding which ongoing assessment activities best support individualization and enhance child outcomes. Limited information is available about some of the activities involved in the process of using ongoing child assessment data for instruction and individualization. Most studies focus on one or two of the activities, leaving few examples that focus on the process in its entirety. Little is also known about the use of ongoing assessment in domains other than language and literacy and, to a lesser extent, social and emotional development and mathematics. Few causal studies examine the types of ongoing support for teachers, particularly teachers working with children from birth to age 5, which may lead to improvements in teacher knowledge, instructional quality, and child outcomes. A few studies provide evidence of positive effects of ongoing assessment, but these studies typically include technology-enhanced systems that offer immediate, tailored feedback around using data to tailor instruction; therefore, it is not possible to isolate the effects of ongoing assessment alone. These studies also typically examine the use of GOMs, which are not used as commonly in early childhood as curriculum-embedded approaches.

Ultimately, this review points to a number of gaps in the knowledge base about ongoing assessment for individualization that future research should address. In particular, additional research is needed on the use of ongoing assessment with curriculum-embedded assessments and in domains other than literacy and language. Although literacy is an important focus for the early grades, there is increased attention on both social and emotional issues and other content areas in the field of early childhood. It would be important to understand how assessment could be used in a variety of areas to provide information that can be used to modify instruction. Further, studies are needed to help the field better understand whether and how teachers use ongoing child assessment to individualize instruction.

Although ongoing assessment is being used widely throughout Head Start, the current literature suggests that teachers struggle to take the significant step from collecting data to using it in classrooms. Specifically, teachers may lack the knowledge of child development, pedagogical content, assessment practices, and evidence-based instructional approaches that they need to use ongoing assessment to individualize instruction. Additional training and support may be necessary for teachers to successfully implement this process. However, few studies have closely examined all the activities involved in implementation to understand where in the process

teachers experience the greatest challenges. More information is needed about how to best support teachers with training and professional development on using ongoing assessment to individualize instruction. The most promising strategy thus far has been the use of technology that provides immediate feedback and recommendations for teachers. It would be helpful for teachers to understand what specific strategies can be implemented with children if they are having problems in specific areas. Knowing how to identify the problem is important, but teachers also need to understand what the data they collect means and how to try different, research-based instructional approaches to ensure that all children have opportunities to learn. Future research should also study—and explore how to address—other potential barriers to teachers’ use of ongoing assessment, such as feeling overburdened with other work, not understanding the utility of ongoing assessment data to their instruction, and not knowing how to incorporate data into their curriculum and teaching practice in a way that addresses the needs of all children in the classroom. Lastly, more research is needed to determine whether high-quality implementation of ongoing assessment to inform individualization is linked to improved instructional practices and, ultimately, improved child outcomes.

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