A Web-Based Tool to Support Data-Based Early Intervention Decision Making

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Abstract
Progress monitoring and data-based intervention decision making have become key components of providing evidence-based early childhood special education services. Unfortunately, there is a lack of tools to support early childhood service providers’ decision-making efforts. The authors describe a Web-based system that guides service providers through a decision-making process informed by child performance on Infant and Toddler IGDI (Individual Growth and Development Indicators), the provider’s professional judgment, and information from the child’s primary caregiver. Using a case example, the authors describe how a service provider integrates the system into an existing service delivery model. Finally, they describe barriers and potential solutions to implementation within the context of a traditional early childhood service delivery model and implications for policy and practice.

Keywords
progress monitoring, assessment, computers/Internet, early identification, evidence-based practices, problem solving

Early childhood programs and practitioners are increasingly required to use evidence-based practices in the services they provide to young children and their families. These practices include interventions to meet a range of needs and linked measurement systems capable of providing data that help inform screening and progress-monitoring decision making. Additionally, practitioners and programs are accountable for meeting high quality standards in the services they provide and improving results of the children they serve. Key ingredients to improving outcomes for children with developmental disabilities are (a) identifying children at risk for a disability early, (b) choosing evidence-based interventions individualized for each child’s specific needs, (c) monitoring progress of children’s response to the intervention frequently, and (d) using progress-monitoring data to inform data-based intervention decision making so that adjustments can be made for children who are not showing improvement (Barnett, Van DerHeyden, & Witt, 2007; Walker, Carta, Greenwood, & Buzhardt, 2008). Efforts to include these key ingredients combined with increased accountability for early childhood programs have led to increased interest in response-to-intervention (RTI) models as a way to individualize, monitor, and document the effectiveness of evidence-based intervention for infants and toddlers with disabilities (e.g., Greenwood, Carta, Baggett, et al., 2008).

Frequent assessment or progress monitoring of a child’s response to intervention in K–12 special education has been shown to lead to earlier onset of more intensive interventions for individual children, leading to better child outcomes (e.g., Fuchs et al., 2007). In addition to informing intervention decision making, progress-monitoring data can be used for accountability purposes, such as evaluating the effectiveness, availability, and use of early childhood services at the program and state levels (Downs & Strand, 2006; Greenwood, Walker, Hornbeck, Hebbeler, & Spiker, 2007; McConnell, Priest, Davis, & McEvoy, 2002). The need for this level of accountability has increased with the passage of policies such as No Child Left Behind in 2002 and the Office of Special Education Programs State Outcomes policy of 2005, and it continues to grow as publicly funded preschool and early childhood programs compete for limited state and federal resources to support their work (Rous, Lobianco, Moffett, & Lund, 2005). However, a number of challenges exist in the implementation of strategies such as progress monitoring and data-based decision making, including a lack of (a) access to professional development and technical assistance to facilitate progress monitoring within RTI models, (b) financial and human resources to support sustained implementation, and (c) availability of

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infant and toddler progress-monitoring measures to guide individualization of evidence-based early interventions (Greenwood et al., 2007).

Recently, applications of progress monitoring and data-based decision making have shown promise for infants and toddlers (e.g., Greenwood et al., 2008; VanDerHeyden & Snyder, 2006). Unfortunately, limited resources and technical assistance to support early childhood interventionists’ efforts in these areas has led to a significant gap between what research has identified as evidence-based practices and what is actually being used in the field (Odom, 2009). Reducing this gap requires more than a scaling up of traditional in-service and preservice professional development in the implementation of data-based decision making. To apply evidence-based practices in early intervention, service providers also need tools that support and guide their use of frequent progress monitoring for children who are not making expected gains in socially important areas, and they have to adjust intervention strategies based on children’s response to intervention.

The challenges of implementing effective and efficient progress monitoring and data-based decision-making practices are not unique to education. In medicine, where decision making can have life and death implications, computer-based Clinical Decision Support Systems (CDSSs) are used to assist physicians in making critical medical decisions. Based on physician input, CDSSs provide a range of point-of-care clinical recommendations, including prescriptions, diagnostic tests to consider, and drug dosage. The unique advantage of CDSSs is that they make decision making more manageable and reduce errors and delays by linking client information to performance data and treatment history. Such decisions include level of risk and need at screening, selection of interventions most likely to be appropriate and effective with the patient, monitoring of progress, and patient response to intervention, among others. Independent reviews of the CDSS literature (e.g., Garg, et al., 2005), including more than 100 clinical trials, report that CDSSs improve physician decision making and patient outcomes but that effectiveness is mediated by access to critical information and variables such as intuitive user interfaces, ease of integration into existing workflow patterns, and buy-in by staff and key stakeholders (Garg, et al., 2005; Hunt, Haynes, Hanna, & Smith, 1998; Kawamoto & Lobach, 2003).

With the trend toward data-based decision making in early childhood special education (VanDerHeyden & Snyder, 2006; Walker et al., 2008), there is a growing need for CDSSs for early childhood interventionists. Assets needed for early childhood computer-based decision-making systems include: (a) a system of collecting progress-monitoring data for use in screening and response-to-intervention determinations, (b) benchmark criteria for determining level of risk and need for intervention, (c) interventions of known effectiveness, (d) a set of steps explicitly defining the process of service delivery to be completed, (e) measures of implementation fidelity, and (f) approaches to training others (e.g., parents) to implement the intervention.

In this article, we describe the Making Online Decisions (MOD) system, a Web-based CDSS designed to support early childhood service providers’ data-based decision making. The MOD leads early childhood service providers through a data-based decision-making model that considers child performance, the interventionist’s expert judgment, caregiver input, and intervention fidelity of implementation to help service providers make timely, data-based decisions. At the heart of this system is a set of infant and toddler progress-monitoring measures called Infant and Toddler Individual Growth and Development Indicators (IGDIs). Therefore, we begin by providing a brief overview of these measures and how the decision-making system is informed by their use. After describing the MOD and providing a case example of its use, we discuss its implications for early childhood special education service delivery, and potential implementation barriers and solutions.

**Infant and Toddler IGDIs**

IGDIs are brief, easily repeatable, psychometrically sound measurements of child skills that provide a picture of child growth toward an outcome over time (Carta et al., 2002; Parrish & Phillips, 2003; Snow & Van Hemel, 2008). Because IGDIs can be frequently administered and focus on key skill indicators of important general outcomes, a child’s current level and short-term trend in performance provides a critical piece of information for planning and individualizing intervention (Deno, 1997; Walker et al., 2008).

Data summaries obtained by administering IGDIs can quickly detect short-term changes in a child’s performance. This is helpful in the early identification of children who may need intervention, as well as in measuring their subsequent response to an intervention. Five Infant and Toddler IGDIs have been developed and normed across five outcome areas: Early Communication Indicator (ECI: Greenwood, Carta, Walker, Hughes, & Weathers, 2006), Early Social Indicator (ESI: Carta, Greenwood, Luze, Cline, & Kuntz, 2004), Early Movement Indicator (EMI: Greenwood, Luze, Cline, Kuntz, & Leitschuh, 2002), Early Problem Solving Indicator (EPSI: Greenwood, Walker, Carta, & Higgins, 2006), and Indicator of Parent–Child Interaction (IPCI: Baggett & Carta, 2006). Each IGD1 is comprised of a set of behaviors or key skill elements that an observer codes during a six-minute, semistructured, play-based session. After coding a session, the assessor enters the scores into the IGD1 online data system (www.igdi.ku.edu), which calculates a rate per minute for each key skill element, as well as a total rate per minute across all of the measure’s key skill elements. Repeated assessments show an individual child’s growth over time. When plotted against normed values,
interventionists and caregivers can quickly see how a child’s current performance and growth over time compare to expected outcomes at specific age points. Studies of the psychometric properties, administration protocol, and scoring definitions for each IGDI are described elsewhere (e.g., Greenwood, Carta, et al., 2006; also see www.igdi.ku.edu/measures/).

To provide a specific example of an IGDI, we focus here on the ECI, which measures children’s growth in expressive communication through gestures, vocalizations, single-word utterances, and multiple-word utterances. A child’s expression of these four key skill elements are counted during a six-minute session in which the child and a trained play partner engage with a set of preselected toys. IGDI administration protocol is semistructured in that the IGDI’s have standard toy sets, are timed, and although there are no scripted procedures or sequenced steps, the adult play partner must follow general guidelines (e.g., follow the child’s lead, comment about what the child is doing, sustain the child’s engagement, etc.) Assessors have a choice of two toy sets to use during an ECI assessment: a barn or house, each having an appropriate set of figurines and accessories. A certified ECI assessor, counts the child’s key skill elements produced during the session either in vivo or by watching a video of the session.

Training in IGDIs
Assessors must be trained and certified to score and administer each IGDI that they use. Certification for each IGDI requires three steps: (a) learning about the IGDI, how to score it, and how to administer it; (b) coding two online certification videos to at least 85% agreement with master codings; and (c) administering the IGDI, implementing at least 13 out of 16 (81%) of the steps outlined on that IGDI’s administration checklist. Trainees can complete the first two steps online by reviewing material available on the IGDI Web site and entering their coding of the certification videos into the online data system. The data system calculates agreement between the trainee and master coding and reports the results to the trainee through the online data system. Trainees have three opportunities to score 85% agreement on each certification video. After three attempts, they must contact their trainer (a local certified assessor or Juniper Gardens Children’s Project staff), who will review their scoring, provide feedback in specific problem areas, and reset their training account so the trainee can rescore the video(s). Finally, trainees conduct an IGDI assessment as outlined in the IGDI administration checklist for each IGDI to ensure that they administer the IGDI at a high level of fidelity. A certified assessor (local assessor or Juniper Gardens Children’s Project assessor) observes the assessment live or on videotape to check administration fidelity using the administration checklist. The trainee receives feedback from the certified assessor regarding any steps not administered and must conduct another assessment if he or she did not administer at least 13 out of 16 (81%) of the steps from the checklist.

Web-Based Resources to Support IGDI Implementation
After becoming certified on an IGDI, assessors can administer and score their respective IGDI(s), and enter their data into the IGDI online data system using their IGDI account created by a designated member of their staff or a member of the Juniper Gardens IGDI workgroup. The online data system and public Web site support the training, implementation, and maintenance of early childhood service providers’ use of Infant and Toddler IGDI(s) for progress monitoring and intervention individualization. Training materials, scoring forms, administration checklists, and certification videos are available at no charge through the public Web site (www.igdi.ku.edu). In most cases, programs pay $1 per child annually to use the online data system. Registered users login to the password-protected data system from the publicly accessible Web site. Certified program directors can train, certify and monitor the assessment activities of their staff. The director and staff can generate reports of child progress at the individual child, subgroup, and program level. Figure 1 shows an example of the progress-monitoring graphs available within an individual child report for the ECI. These graphs show the child’s communication proficiency relative to normed benchmarks on total score and each key skill element, an indication of when intervention started, and the child’s slope (average increase or decrease) before and after intervention.

Collectively, these Web resources are designed to streamline progress-monitoring activities, and through the use of summative program reports, program administrators can track and report to stakeholders the impact of their services on child proficiency for each IGDI they use (e.g., communication, motor skills, social engagement, problem solving, parent–child interaction). Unfortunately, this level of technical support for intervention decision making has been inadequate in advancing some early childhood service providers with limited time and resources toward the practice of using data to guide and inform intervention decision making (Buzhardt et al., 2008). As a result, we developed and integrated a Web-based decision-making tool into the online data system that guides service providers through the decision-making process and recommends intervention strategies based on a combination of IGDI progress-monitoring data, the expert judgment of the service provider, and input from the child’s caregiver.

The MOD: Making Online Decisions
The Making Online Decisions, or MOD, tool provides a high level of support for implementation of a decision-making
Figure 1. Sample Web-generated progress-monitoring graphs of a child’s total score on the ECI (top graph) and scores on each key skill element (bottom four graphs).
Abbreviation: ECI, Early Communication Indicator.
model developed through prior work with the Early Childhood Research Institute on Measuring Growth and Development (ECRI-MGD, 1998) and is theoretically grounded in Tilly’s (2002) problem-solving model. Similar in scope and purpose to other Web-based K–12 progress-monitoring tools (e.g., AIMSweb), the MOD (Figure 2) is designed to alert service providers to children who may need further intervention, and it guides them through each step of the decision-making process. Text-based guidance informs assessors when a child needs more frequent assessment because of low IGDI performance, recommends when to begin an intervention, and offers online fidelity checklists to monitor intervention fidelity of implementation. Because involvement of a child’s caregivers and social community in intervention implementation are critical to many evidence-based early intervention models (Dunst, Bruder, Trivette, & Hamby, 2006; Odom & Wolery, 2003), the system also prompts and provides a mechanism for interventionists’ documentation of face-to-face collaboration with caregivers regarding their implementation of recommended intervention strategies. Finally, the system provides data-based information regarding intervention effectiveness and recommendations for further intervention steps. A summary of the MOD decision-making model is shown in Figure 2. (Note: The MOD is currently available for only the ECI, so the remaining discussion of the MOD is presented in the context of language delay and language interventions.)

By design, the online data system, including the MOD, does not require special Web technology (e.g., advanced browser plug-ins or novel Web protocols), specialized working knowledge of Web browsers, or even a broadband Internet connection. Instead, it represents an innovative use of well-established open-source Web programming and a reliable and secure relational database. This ensures that the system is usable and accessible to a wide range of nontechnical users who may not have access to the most current Internet resources. It is also important to note that although the MOD is an integrated part of the IGDI online data system, this tool can be turned off for programs or interventionists who want to use the data system without intervention decision-making guidance from the MOD. The following describes how the MOD guides the data-based decision-making process by posing questions to the service provider, recommending intervention strategies, and providing ongoing support based on the child’s response to the intervention.

**MOD Stages**

*Is there a problem?* Each time a service provider who uses the MOD enters a child’s assessment into the secure IGDI online data system, the MOD compares the child’s performance to benchmarked norms. If the child’s performance is at least one standard deviation below benchmark, then the MOD immediately displays the child’s progress-monitoring graph and asks the service provider to indicate if the assessment accurately represents the child’s ability by posing a question to the provider in the format shown in Figure 3. Unusual circumstances unrelated to the child’s actual ability will sometimes result in an invalid assessment. For example, the provider may suspect that the child was ill during the home or program visit, or outside distractions (e.g., sibling interruptions, television or radio noise) during the session may have interfered with the child’s performance. If the provider indicates that the assessment was not valid, then the next MOD screen recommends administering another assessment on the next visit. In most cases however, the provider indicates that the assessment was valid, and the MOD moves on to the next stage to assist the provider with considering potential reasons for the child’s low performance.

*What is causing the problem?* After a problem has been validated, the MOD presents questions designed to initiate the decision-making process. Providers must answer three questions: (a) Does the child have a medical problem that might affect language (for example an ear infection, loss of hearing, sinus problem, redness around the ears, or ear tubes)?; (b) Have there been any recent family changes that might affect the child’s language (for example a new baby, divorce or separation, new spouse or partner, or other type of change with the primary caregiver)?; and (c) Have there been any recent changes in the child’s home or child care environment that might affect his or her language (e.g., moving to a new home or child care, or a new language being spoken in the home)? The provider answers “Yes,” “No,” or “Don’t know” to each question. If the provider answers “Yes” to any question, then the MOD recommends that the frequency of assessment increase to at least monthly, allowing the provider to detect changes (improvements or decrements) in performance more quickly as the child
adjusts to the change. In the case of suspected medical issues, the MOD recommends that the caregiver(s) consult a pediatrician to determine if the child’s performance on the ECI may be the result of hearing loss or some other health problem. If the provider answers “No” or “Don’t know” to all of the questions, then the next MOD screen recommends family-centered language intervention strategies tied to the child’s performance on the ECI.

What intervention should be used? After validating the child’s low performance on the ECI and eliminating medical and temporary environmental disruptions as a cause for the performance, the MOD recommends a set of strategies for implementation by the parents or primary caregiver(s). Because the MOD is a data-based intervention decision-making tool, intervention materials are integrated into it to facilitate intervention implementation and monitoring of implementation fidelity. The current MOD prototype recommends evidence-based caregiver-delivered strategies for promoting infant and toddler communication in the natural environment (home or child care). These recommendations are derived from the Strategies for Promoting Communication and Language of Infants and Toddlers (Walker, Bigelow, Harjusola-Webb, Small, & Kirk, 2004) manual, and the Language Intervention Toolkit (Crowe, 2002). These
recommendations are designed to help caregivers support their child’s language development by suggesting ways to arrange the environment to stimulate language, describing strategies for interacting with their children in ways that promote adult–child communication, and recommending ways to integrate these strategies into daily routines and activities. Recommendations are adapted to the child’s proficiency in each of the ECI’s four key skill elements. So, a child who is using single words but whose proficiency in Multiple Words is below benchmark for his age would receive recommendations for promoting the use of word combinations and sentences, whereas a child who is using gestures and vocalizations but whose use of single words is low would receive recommendations that support the transition from vocalizations to understandable words.

Figure 4 shows a portion of a MOD-recommended strategies screen listing specific strategies as well as daily routines in which the strategies can be used. The page numbers in parentheses refer to the pages within the Language Intervention Toolkit (Crowe, 2003) or the Strategies for Promoting Communication and Language of Infants and Toddlers (Walker et al., 2004) manual where the strategies can be found. Notice that although the MOD recommends strategies based on the child’s performance on the ECI key skill elements, the provider chooses specific strategies and daily routines based on his or her knowledge of the family. After choosing a set of strategies and/or daily routines, the provider clicks a button that generates an easy-to-read text description of each selected strategy in English or Spanish.

On the next home or program visit, the provider and caregiver discuss this information, which provides a justification for each strategy—how to do it, how to incorporate it into daily routines, and examples of how it can be used.

Is the intervention being done? The purpose of this stage of the MOD is twofold: to document how often and to what degree of fidelity caregivers implement the strategies and to sustain ongoing discussion and decision making between the provider and caregiver regarding the strategies and the child’s response to those strategies. This is accomplished through the use of MOD-generated checklists completed on paper during home or program visits by the service provider. After the visit, the provider enters the checklist information into the MOD using an online form similar to that in Figure 5. The checklist asks the provider if he or she reviewed the strategies with the caregiver, if the description of the strategies was left with the caregiver, if the provider worked with the caregiver(s) to identify the best routines in which to use the strategies, and whether the caregiver(s) chose to use the caregiver checklist. The caregiver checklist is a weekly form that asks caregiver(s) to indicate the degree to which they used the strategies with their children each day during the week (often, sometimes, rarely, or not today). On subsequent home or program visits, the provider completes a brief follow-up checklist that asks about the caregiver(s) reported use of the strategies (either by asking the caregiver or by reviewing the caregiver checklist), their comfort level with the strategies, and how they could be improved. We recommend completing checklists three
times a month, and at least monthly. The MOD prompts the provider to enter fidelity checklist data regularly for any child at this stage of the MOD.

Is the intervention working? Following the start of intervention and after three ECI assessments have been entered into the data system, the MOD analyzes the child’s performance and reports on the apparent effectiveness of the intervention. The MOD looks at three criteria to determine a child’s response to intervention: (a) Is the latest ECI higher than one standard deviation below benchmark? (b) Is the calculated slope higher after intervention than it was before intervention? and (c) Based on the current slope and latest ECI score, is performance expected to remain above one standard deviation below benchmark six months from now? If the MOD determines that the answer to all of these questions is “Yes,” then it recommends (a) the caregivers continue using the strategies during daily routines because they appear to be working, (b) that the provider returns to quarterly ECIs, and (c) that the provider discontinues use of the fidelity checklists. If the answer to any or all of these questions is “No,” then the MOD recommends continuing with monthly monitoring, completing the checklists, and considering expanding the strategies to additional routines or activities. For children who remain below benchmark,
the MOD continues to adapt its recommended strategies based on the child’s performance on key skill elements. Also, after each subsequent ECI, the MOD continues to report on the relative effectiveness of the intervention based on the child’s ECI performance.

**Case Example of MOD Use**

Sheila, a Part C Infant–Toddler service provider, administers quarterly ECI assessments with Cameron. At 24 months, Sheila conducts her quarterly assessment, logs into the IGDI data system, and enters Cameron’s ECI score into the data system. Immediately after entering her score, the MOD, which is an integrated part of the IGDI data system, displays Cameron’s updated progress-monitoring graph and explains that her latest score is at least one standard deviation below benchmark. First, the MOD asks Sheila to confirm that this was a valid assessment (e.g., there were no unusual circumstances that may have affected the assessment). After confirming the validity of that specific ECI assessment, the MOD moves to the “What is causing the problem?” stage (see Figure 2), and asks Sheila if there are conditions currently being addressed that may affect Cameron’s language. Sheila indicates that the cause is unknown, so the MOD moves to the “What intervention should be used?” stage by recommending caregiver strategies for optimizing Cameron’s natural language environment. Sheila prints these recommendations along with the fidelity checklists (provider and caregiver) and takes them on her next visit to review with Cameron’s primary caregivers. This prompts a dialogue between Sheila and the caregivers about what strategies they prefer and the daily routines in which they would most likely use the strategies. At this point, Sheila has spent approximately ten minutes responding to MOD questions and generating strategy recommendations since entering Cameron’s ECI.

On each subsequent visit, Sheila takes a paper version of the follow-up checklist similar to that in Figure 5 to document her discussion with the caregivers about their progress in using the strategies, any problems they have encountered, and when they would like to try to expand the strategies across additional routines. Following each home visit, Sheila takes from one to two minutes at the office to enter her checklist responses into the MOD. Also, anytime Sheila enters a new ECI for Cameron, the MOD assumes that Sheila completed another checklist, so it displays a new checklist as a prompt for her to enter this most recent fidelity data. Information from these checklists helps estimate the degree of service provider and caregiver implementation fidelity and dosage.

Now that Cameron’s caregivers are implementing the language intervention strategies and Sheila is monitoring the fidelity of intervention implementation, the next step is to analyze Cameron’s response to these strategies. Once Cameron has had three ECIs after beginning the intervention strategies, the MOD compares her ECI proficiency before and after intervention and reports the findings to Sheila immediately after she enters the third postintervention ECI. The MOD shows Sheila Cameron’s latest ECI progress-monitoring graph and reports that although Cameron’s slope has improved since beginning the intervention, she is still more than one standard deviation below benchmark. So, for now, the MOD recommends continuing the strategies, while maintaining monthly ECI assessments and completing the checklists. The MOD also reminds Sheila to continue checking the MOD’s recommended strategies because they may change as Cameron’s communication skills grow.

**Empirical Evaluation of the MOD**

Currently, a randomized control trial is underway to answer two primary research questions: Does the MOD influence service providers’ decision-making behavior for infants and toddlers performing below expected levels of language performance? and Does this change in service providers’ behavior translate into improved language outcomes for infants and toddlers? Some of the key indicators we are measuring include the frequency with which service providers monitor the progress of low-performing children, and the delay between when a child begins to perform low on the ECI and when an intervention is started. Results of this evaluation will inform modifications to the MOD, how it can be applied across the remaining IGDIs, and the best approach for integrating additional evidence-based intervention materials.

**Potential Barriers to Implementation**

Perhaps the most significant barrier to implementation of the MOD is a familiar one: a lack of time and resources. We know that additional resources expended on early intervention are likely to result in better outcomes later in terms of improved school readiness and less need for special education services (Bailey et al., 2005); in an ideal setting, this would not be a barrier. However, we also know that early childhood service agencies work with limited budgets and expanding caseloads. As stated earlier, the MOD is designed to streamline data-based decision making and progress monitoring by generating graphs and systematically guiding providers through the decision-making process, thereby allowing more time for interventionists to effectively implement evidence-based practices. Another way to reduce this barrier is to ensure that preservice and in-service professional development for early childhood service providers include instruction and practical experience in the use of data-based decision making for early intervention. The ubiquity of the Internet and the advancement of Web technology beyond static Web pages certainly make a tool...
such as the MOD more feasible for people who may not have been able to use it ten years ago. Unfortunately, we have found that a lack of appropriate technology and local technology expertise continued to impede some programs’ efforts to use earlier versions of the IGDI online data system. We sought to address the issue of technology experience through rigorous usability testing of the IGDI online data system with local service providers so that the user interface is intuitive enough for novice technology users. Although this does not guarantee a seamless user experience for everyone, since launching the revised data system in late 2005, we have been able to scale up significantly the use of the online data system with little training for new users (e.g., 9,000 children served by the data system with approximately 27,000 IGDI observations entered into the system by more than 1,000 users in 11 states and multiple countries as of summer 2009). The MOD was introduced in the summer of 2008, and it is currently used only by programs participating in the randomized trial. We expect that the MOD will be available for more wide-scale use in early 2010, following the randomized trial and subsequent revisions.

In its current state, entering data into the data system, interfacing with the MOD, and making the resulting data-based decisions occurs at some point in time removed from the home or program visit (e.g., when the service provider returns to the office). This precludes making MOD-informed point-of-care decisions with real-time input from the caregivers. Instead, providers write information on a paper checklist or data sheet, enter this information into a computer at a later time, view the MOD recommendations and/or respond to additional questions, and bring the results to the caregiver on the next visit, which may be at least a week removed from when the data were collected. This process creates a delay between data collection and decision making, and duplicates data collection efforts (i.e., data recorded on paper, then entered into a computer), which adds to providers’ work load and increases the potential for data entry errors. To address this issue, we are exploring the possibility of using handheld devices (e.g., PDAs) for data collection, which would allow wireless upload of data to the MOD and the return of immediate MOD results, all during a single home or program visit.

Finally, the current MOD prototype includes intervention recommendations only from the Strategies for Promoting Communication and Language of Infants and Toddlers (Walker, et al., 2004) manual and the Language Intervention Toolkit (Crowe, 2002). As described earlier, these interventions are designed for implementation by children’s primary caregivers during daily routines. Within an RTI or multitiered approach, these interventions would be regarded as Tier 1 or 2 interventions. For children who do not respond to these strategies, the MOD currently makes a general recommendation that the child receive more intensive intervention, but it does not make specific recommendations. We are considering ways to allow interventionists either to select from a list of suggested interventions, and/or to add their own intervention. This would also require the use of a more generic fidelity checklist for tracking implementation of these interventions. Related to the issue of children not responding to intervention, providers have reported a desire to be able to set progress goals for children. So, for children who may never have an ECI score above one standard deviation below benchmark, the provider could set quarterly goals for the family or program based on the child’s current performance, slope (average gain), and the provider and family’s judgment. Setting and achieving realistic goals can serve as a powerful reinforcer for caregivers’ implementation of family-focused intervention strategies.

Implications for Practice and Policy

Using progress-monitoring data to make intervention decisions in an RTI framework is a highly technical skill set that may challenge the resources of some programs. Practitioners must first have access to a rich source of progress-monitoring data. They also must know the particulars of that measurement system, including how to interpret scores using benchmark criteria to gauge a child’s progress. Practitioners must also know what evidence-based intervention procedures are available and how to use them and select among components to best address a given child’s particular skills as indicated by the most recent progress-monitoring data. In the case of naturalistic interventions, service providers also need to be able to effectively coach parents and other caregivers how to use the intervention correctly and frequently enough in the home or program where the child receives services. Finally, mechanisms are needed for monitoring intervention fidelity of implementation and frequency of use. The MOD is a system designed specifically to support practitioners in these areas, including their ability to (a) make data-based decisions routinely, (b) measure implementation fidelity of interventions, (c) decide whether an intervention is working, and (d) manage decisions about next steps to promote individual child growth and development. Given these supports, the MOD provides early intervention programs an accessible and usable option to jump-start a program-wide RTI process in service delivery that might otherwise not be possible, given limitations in resources for training, intervention, progress monitoring, and decision making.

The MOD is a support tool for early childhood service providers and direct interventionists. Similar tools for progress monitoring and decision making are available for primary education (e.g., mCLASS, DIBELS, AIMSweb) and medicine (e.g., computer-based clinical decision support systems [see Garg et al., 2005]) designed to help inform and guide
systematic decision making or inform a regimen of care known to lead to desired outcomes. Because the MOD is more like a real-time coach or a guide in the implementation of an RTI process in early intervention, it is not just a source of technical assistance in the usual sense. It merges the data and professional judgment offered by the service provider to simplify what can become a burdensome decision-making process for providers with large and diverse caseloads.

At the program, state, and federal levels, the MOD represents a tool to help publicly funded agencies satisfy accountability requirements. The IGDI online data system maintains a running record of each service provider’s progress monitoring, intervention selection, data-based decision making, and intervention implementation efforts for each child on his or her caseload. Therefore, it helps program directors document and report their work toward meeting higher standards in evidence-based practice with families and report the resulting child outcome data to demonstrate progress toward annual goals (i.e., Annual Yearly Progress) set for improving child results.

In terms of future research, progress-monitoring measures in K–12 special education are considered evidence-based practices because small- and large-scale studies have shown that teachers who use progress monitoring have better student outcomes compared to those who do not use progress monitoring (Fuchs et al., 2007). These outcomes include more frequent changes made to students’ interventions, greater knowledge of what individual students know and need to learn, and improved academic achievement. Because intervention services for infants and toddlers are often provided in-home and parents and primary caregivers play an integral part in intervention implementation (Odom & Wolery, 2003), research and program evaluation of early childhood service providers’ decision-making behavior poses unique challenges not seen in program- or school-based service models. For example, how do we accurately track decision-making behavior that occurs in a family’s home without interfering in home visits that may already be difficult for service providers and intrusive for families? And how do we accurately monitor the dosage of an intervention provided by caregivers at various times in various places during daily routines with their children? Many of these challenges are also relevant to center-based service models. Although not a comprehensive solution to these challenges, decision making and intervention implementation that occurs with guidance from a computer-based system like the MOD creates a permanent product for use in studies of progress-monitoring measurement and decision making that occur in both centers and homes.

As the field of early childhood special education becomes increasingly interested in RTI as a means of differentiating services to meet children’s needs, we foresee the MOD and similar technology-based tools becoming more common because of their potential for supporting early intervention efforts by maintaining fidelity of implementation, reducing costs, improving effectiveness, and supporting program accountability efforts.

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