

Measuring Training and Practice Fidelity in Capacity-Building Scaling-Up Initiatives

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ABSTRACT

This *CELLpaper* includes a framework for assessing three types (implementation, diffusion, and intervention), two elements (training processes and practice adoption), and three dimensions (exposure, adherence, and participant responsiveness) of fidelity in capacity-building scaling-up initiatives of evidence-based practices. The framework is based on descriptions of key components of fidelity found in the literature as well as components specific to efforts to scale-up the adoption and use of evidence-based early literacy learning practices by the *Center for Early Literacy Learning*. Examples of the measures used to assess fidelity are included.

This *CELLpaper* includes a description of a framework for measuring different types of fidelity in scaling-up initiatives that use capacity-building approaches for promoting the adoption and use of evidence-based practices (Dunst, Trivette, Masiello, & McInerney, 2006). The framework was developed specifically for structuring the collection of fidelity information as part of efforts to scale-up the adoption and use of evidence-based early literacy learning practices by staff at the *Center for Early Literacy Learning* (www.earlyliteracylearning.org). The paper was prepared to guide both the development of fidelity indicators and the collection of fidelity data to document the extent to which training methods and targeted practices are used as planned and intended.

Fidelity has been defined in different but compatible ways¹. Dane and Schneider (1998) defined fidelity as “the

degree to which specified procedures are implemented as planned” with intended recipients (p. 23). Dusenbury, Brannigan, Falco, and Hansen (2003) similarly defined fidelity as the “degree to which [practitioners] and other program providers implement programs *as intended by the program developers*” (p. 240). Smith, Daunic, and Taylor (2007) defined treatment fidelity as those “strategies that monitor and enhance the accuracy and consistency of an intervention to ensure it is implemented as planned and that each component [of a program or practice] is delivered in a compatible manner” (p. 121). According to Mowbray, Holter, Teague,

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¹ The terms fidelity, integrity, adherence, and implementation as well as others are often used interchangeably (e.g., Beets, 2007; Gresham, Gansle, Noell, Cohen, & Rosenbaum, 1993; Smith et al., 2007). The terms fidelity and integrity are used interchangeably in this *CELLpaper* to describe the degree to which training and practice methods and procedures are implemented as planned.

and Bybee (2003), “Effectiveness research is now at a point wherein black-box outcome studies are no longer acceptable....Rather, intervention[ist]s are expected to specify the model...explicating the mechanism through which the program will achieve its desired outcomes...[using] valid and reliable criteria for establishing fidelity to the model” (p. 315).

The focus of our descriptions of different types of *fidelity* is specific to efforts to scale up the widespread adoption and use of evidence-based practices. Broadly speaking, there are two approaches to scaling-up the adoption and use of evidence-based practices (Baker, 2006). In the first, program developers or researchers establish the efficacy of an intervention, and they themselves replicate the interventions in different programs or settings (e.g., Golly, Stiller, & Walker, 1998; Olds, Hill, O'Brien, Racine, & Moritz, 2003). In the second, program developers or researchers identify evidence-based practices, and employ methods and procedures designed to promote others' abilities to take the evidence-based practices and teach or train yet other persons to use the practices in settings where neither the researchers nor program developers have face-to-face contacts with end-users (e.g., Bauman, Stein, & Ireys, 1991; Sugai & Horner, 2002; Taylor, 2005). The latter, which we call *capacity-building scaling-up* (Coburn, 2003; Dunst, Trivette, Masiello, & McInerney, 2006; Horner & Sugai, 2006), is the focus of this *CELLpaper*.

The paper is divided into four sections. The first includes a description of a conceptual framework for differentiating between three types, two elements, and three dimensions of fidelity. The second uses the framework described in the first section to operationally define the different kinds of fidelity. The third section includes an overview of the approach to specialized technical assistance being used by *CELL* staff to scale up the use of evidence-based literacy practices. The fourth includes a description of how *CELL* staff are developing fidelity indicators for documenting the adoption and use of evidence-based early literacy learning practices.

FRAMEWORK FOR CONCEPTUALIZING FIDELITY

The degree to which *procedures are implemented as planned with intended recipients* refers to several different aspects of attempts to institutionalize evidence-based practices widely throughout a state, system, or program. This includes the fidelity of the provision of technical assistance and training as planned (*implementation fidelity*) and the fidelity of

the use of evidence-based practices as intended (*intervention fidelity*). Capacity-building scaling-up initiatives include a third type of fidelity that is the extent to which persons who are trained to promote the use of evidence-based practices themselves in turn train others in a manner consistent with the core components and principles of both implementation and intervention (Bauman et al., 1991). We term this third type of fidelity *diffusion fidelity*. It refers to the extent to which technical assistance providers who were trained by *CELL* staff in turn train end-users in the same way as they were trained.

The distinction between implementation and intervention fidelity is similar to the one made by Fixsen et al. (2005) in their review and synthesis of implementation research (see also Gunn, n.d.; Mihalic & Irwin, 2003). The introduction of diffusion fidelity into a discussion of treatment integrity is specifically designed to ensure treatment fidelity is measured at the different levels of technical assistance and training in capacity-building scaling-up initiatives (Rogers, 1995).

The relationship between the three types of fidelity and their influence on the outcomes of targeted evidence-based practices is shown in Figure 1. Implementation fidelity is expected to influence the extent to which persons receiving training in methods and procedures for promoting adoption and use of targeted practices in turn use core training principles so that end-users implement targeted practices in ways consistent with their empirical foundations. Accordingly, *variations* in implementation fidelity should be related to *variations* in diffusion fidelity, *variations* in diffusion fidelity should be related to *variations* in intervention fidelity, and *variations* in intervention fidelity should be related to *variations* in the consequences and benefits of the practices constituting the focus of scaling-up. High degrees of fidelity at each of the three levels, in principle, should result in greater degrees of institutionalization of an evidence-based practice that in turn should result in better outcomes (e.g., Barrett, Boezio, Horner, & Sugai, 2006; Elias, Zins, Graczyk, & Weissberg, 2003; Griffin, Mahadeo, Weinstein, & Botvin, 2006; Kalafat, Illback, & Sanders, 2007; Zvoch, Letourneau, & Parker, 2007).

Elements of Fidelity

The three types of fidelity each include two key elements: the fidelity of training processes and the fidelity of practice adoption. *Training processes* refer to the methods

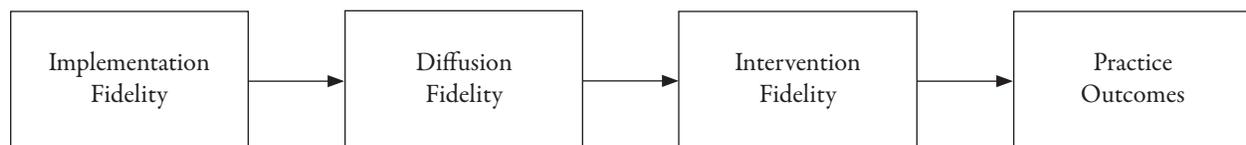


Figure 1. Model for differentiating between different types of fidelity and the relationship between the fidelity measures and desired evidence-based practices outcomes.

and procedures for promoting understanding and use of targeted practices (Fixsen et al., 2005). The extent to which a set of training procedures are used in the intended manner is an example of fidelity of training processes. *Practice adoption* refers to the extent to which targeted practices are described or used in a manner consistent with their evidence base (Dunst, 2007). The extent to which trainers describe and explain the evidence-based characteristics of a targeted practice in sufficient detail to ensure participant understanding is an example of fidelity of practice adoption.

As Fixsen et al. (2005) made clear in their synthesis of implementation research, it is important to be aware of the difference between the practices constituting the focus of training and the training methods used to promote adoption of the practices. Stated differently, processes are *how* we promote the adoption and use of *what* we want implemented by end-users (Mihalic & Irwin, 2003)². Figure 2 shows a framework for showing the combinations of the three types and two elements of fidelity.

Dimensions of Fidelity

Dane and Schneider's (1998) five dimensions of fidelity have been described extensively as core features for measuring treatment integrity (e.g., Beets, 2007; Carroll et al., 2007; Dusenbury et al., 2003; Power et al., 2005). As stated by Beets (2007), the five dimensions "offer information for evaluators to determine what implementers ultimately provided to an audience (i.e., *adherence*), how much (i.e., *exposure*) and how well (i.e., *quality of delivery*) it was provided, what the audience thought of what was provided (i.e., *responsiveness*), and whether similar provisions were taking place [under different] conditions (i.e., *program differentiation*)" (p. 6, emphasis added). A review and integration of different attempts to

operationalize the Dane and Schneider (1998) dimensions (e.g., Beets, 2007; Carroll et al., 2007; Power et al., 2005) indicates that three dimensions capture most if not all of what is generally considered the key features of fidelity: *Exposure*, *adherence*, and *participant responsiveness*³.

Exposure includes both the *quantity* and *quality* of the training and content received by participants (Dusenbury et al., 2003; Power et al., 2005). Exposure is typically measured in terms of dose (e.g., number, duration, and frequency of training sessions [processes]) or number and types of opportunities to learn about the evidence-based characteristics of targeted practices (adoption). Exposure also includes the extent to which the training sessions were interactive, the trainer was well prepared and enthusiastic, and the trainer was perceived as confident and capable as part of his or her attempts to communicate the content of the training. The difference between *quantity* and *quality* is perhaps best understood by recognizing the fact that no training, no matter how often it is provided (*quantity*), is likely to have intended effects if it is not conducted in ways that include the elements known to be key features of adult learning (*quality*) (e.g., Donovan, Bransford, & Pellegrino, 1999; Garet, Porter, Desimone, Birman, & Yoon, 2001; Trotter, 2006).

Adherence includes the extent to which the provision of training and the descriptions of targeted evidence-based practices emphasize those features known as *critical and essential* for an intervention to be effective. This includes, but is not limited to, the degree to which both evidence-based training and intervention practices include those characteristics that research indicates are associated with desired outcomes or benefits. The extent to which variations in adherence are

² Training processes and practice adoption have alternatively been described as *delivery* and *content* respectively (e.g., Gunn, n.d.).

³ In the model proposed in this paper, quality of delivery is considered an element of exposure, and differentiation is considered an element of variation in either or both training processes and practice adoption (see especially Power et al., 2005).

		TYPES OF FIDELITY			
		Implementation Fidelity	Diffusion Fidelity	Intervention Fidelity	Practice Outcomes
ELEMENTS OF FIDELITY	Training Processes (<i>How</i>)				
	Practice Adoption (<i>What</i>)				

Figure 2. Framework for structuring the collection of fidelity information about the training processes used to promote adoption of evidence-based practices.

related to variations in adoption and use of evidence-based technical assistance and practice characteristics is how program or practice differentiation is determined (Dane & Schneider, 1998).

Participant responsiveness includes the degree to which recipients are engaged in the training and whether they view the targeted practices as relevant to their own work (Carroll et al., 2007). This includes, but is not limited to, whether the training and practices are judged as *socially important and acceptable* (Foster & Mash, 1999). No evidence-based training or practice is likely to be adopted or used if participants are not engaged and enthusiastic about both training processes and the targeted practices, and see the relevance of both for their own work.

DEFINITIONS OF TERMS

Table 1 includes an expanded framework that shows the types, elements, and dimensions of fidelity. The definitions of the different types and elements of fidelity described next are drawn primarily from the published literature, and provide one way of bringing practical coherence to rather diverse discussions and descriptions of implementation, diffusion, and intervention fidelity. Operationally, implementation fidelity is used to describe the integrity of training provided by program developers and implementers to technical assistance providers (first generation trainees), diffusion fidelity is used to describe the integrity of training provided by second or third generation trainers to end-users, and intervention fidelity is used to describe the integrity of the use of targeted practices by end-users (i.e., the intended adopters of the practices).

Implementation Fidelity

According to Fixsen et al. (2005) “implementation is defined as a specified set of activities designed to put into practice an activity or program of known dimensions. [Accordingly], implementation processes are purposeful and are

described in sufficient detail such that an independent observer can detect the *presence and strength* of [a] specific set of activities related to implementation. In addition, the activity or program being implemented [needs to be] described in sufficient detail so that independent observers can detect its *presence and strength*” (p. 5, emphasis added). The latter is described by Fixsen et al. (2005) as an intervention-level activity and the former as an implementation-level activity.

Based on the Fixsen et al. (2005) descriptions, *implementation fidelity* is defined as the degree to which training activities of known characteristics are implemented as planned and promote participant understanding of the known characteristics of the evidence-based practices constituting the focus of training. Accordingly, *fidelity of implementation processes* refers specifically to the core components and elements of the training methods and procedures used to present and describe the key features of targeted practices, and *fidelity of implementation adoption* refers specifically to the degree to which knowledge of those characteristics are transmitted to trainees in ways promoting deep understanding of the evidence-based characteristics of the practices.

Diffusion Fidelity

“Diffusion is defined as the process by which an intervention is communicated through channels over time among intended systems, programs, and end-users” (Mihalic & Irwin, 2003, p. 309). According to Griffin, Mahadeo, Weinstein, and Botvin (2006), diffusion of innovations or evidence-based practices “refers to the *processes* by which effective innovations are spread or distributed [and] *adoption* refers to the [degree to which] organizations [and practitioners]...use an innovation” (p. 9). Processes and adoption refer, respectively, to *how* and *what*, where fidelity is assessed in terms of the degree to which both components are implemented as intended.

Based on the Griffin et al. (2006) distinctions, *diffusion fidelity* is defined as the degree to which second and third-generation technical assistance providers use training

Table 1
Expanded Framework for Assessing Different Types, Elements, and Dimensions of Fidelity

Elements	Types of Fidelity		
	Implementation	Diffusion	Intervention
<i>Training Processes</i>	Exposure	Exposure	Exposure
	Adherence	Adherence	Adherence
	Responsiveness	Responsiveness	Responsiveness
<i>Practice Adoption</i>	Exposure	Exposure	Exposure
	Adherence	Adherence	Adherence
	Responsiveness	Responsiveness	Responsiveness

Adapted from frameworks and descriptions by Beets (2007), Carroll et al. (2007), Dane and Schneider (1998), and Dusenbury et al. (2003).

methods and procedures (processes) to promote end-user understanding and use of targeted evidence-based practices (adoption). Thus, *fidelity of diffusion processes* refers to the ability of technical assistance providers to use core components and elements of training methods and procedures to promote end-user knowledge and understanding of targeted practices, and *fidelity of diffusion adoption* refers to end-users' understanding of the characteristics of the targeted evidence-based practices.

Intervention Fidelity

The term intervention means "an activity or set of activities aimed at modifying a process, course of action or sequence of events, in order to change one or several of their [consequences] such as performance or expected outcomes" (World Health Organization, 2001, p. 53). Evidence-based intervention practices are defined as "practices informed by research findings demonstrating a relationship between the characteristics and consequences of a planned or naturally occurring experience or opportunity where the nature of the relationship directly informs what someone can do to produce a desired outcome" (Dunst, Trivette, & Watson, in preparation).

Hogue, Liddle, Singer, and Leckrone (2005) assert that the "most rigorous kind of fidelity research is fidelity process analysis...that investigates how the core, *change-promoting elements* of a given [practice] are delivered" (p. 193, emphasis added). Accordingly, *intervention fidelity* is defined as the extent to which end-users adopt and use instructional methods and procedures (processes) for implementing targeted practices mirroring the evidence-base characteristics of the practices (adoption). Thus, *fidelity of intervention processes* refers to the extent to which end-users employ the core elements of effective teaching methods, and *fidelity of intervention adoption* is the extent to which targeted practices are used by end-users in ways that mirror the evidence-based characteristics of the practices. The extent to which a parent uses the core elements of responsive teaching (processes) to promote a child's active engagement in an interest-based learning activity (adoption) are, respectively, examples of both types of fidelity of intervention.

CENTER FOR EARLY LITERACY LEARNING

The fidelity framework was developed at the *Center for Early Literacy Learning (CELL)* to scale-up (Dunst, Trivette, Masiello, & McInerney, 2006) the use of evidence-based early literacy learning practices (Dunst, Trivette, Masiello, Roper, & Robyak, 2006). The major aims of *CELL* are to: (1) synthesize available research evidence on effective early literacy learning interventions, (2) identify and develop evidence-based practices from this research, (3) implement and evaluate the use of these evidence-based practices, and (4) conduct both general and specialized technical assistance

promoting the adoption and use of evidence-based early literacy learning practices. These aims are being achieved by developing evidence-based early literacy learning practice guides based on the findings of practice-based research syntheses. A practice-based research synthesis involves the analysis and integration of small bodies of evidence where researchers have investigated the manner in which the same or similar intervention variables are related to the same or similar outcomes (Dunst et al., in preparation). The characteristics associated with positive effects and outcomes in turn are used to develop practice guides that *mirror* the research findings (Dunst, 2007).

The widespread adoption and use of evidence-based early literacy learning practices is being accomplished in *CELL* by specialized technical assistance using evidence-based scaling-up methods and procedures (e.g., Menter, Kaaria, Johnson, & Ashby, 2004; Ovin & Miller, 1996) to promote understanding and use of evidence-based early literacy learning practices. *CELL* defines scaling-up as the "adoption of policies [and] practices...that promote widespread, sustained use of evidence-based early literacy learning practices by early childhood intervention programs serving young children, birth to 6 years of age, and their families, to achieve outcomes that are socially and developmentally important and valued" (Dunst, Trivette, Masiello, & McInerney, 2006, p. 2).

State-Level Infrastructure

The scaling-up of evidence-based early literacy learning practices is accomplished by a state leadership (resource) team made up of key personnel with the authority, knowledge, credibility, and technical expertise necessary to scale-up the use of early literacy learning practices (Menter et al., 2004). These teams include, but are not limited to, state lead agency and state education agency representatives, other state-level early childhood program representatives, Part C and Part B(619) coordinators, early childhood intervention technical-assistance program staff (Part C, Part B(619), Early Head Start, Head Start, child care, etc.), early childhood intervention opinion leaders, early childhood practitioners, parent and family organization representatives, and other entrepreneurial leaders (Doig & Hargrove, 1987; Schneider & Teske, 1992). *CELL* works with either an existing or newly established leadership team that creates a state vision for early literacy learning, assesses technical assistance and content needs, provides training to technical assistance providers who will in turn provide training to regional and local technical assistance providers, and conducts self-evaluations of implementation fidelity and effectiveness.

Table 2 shows the core components and key elements of the *CELL* state-level scaling-up plan and approach. A *CELL* capacity-building planning tool is used by state team members to ascertain the status of a State's infrastructure for scaling-up early literacy learning practices and developing and evaluating *CELL* capacity building action plans (see

Table 2
Core Components of the CELL Capacity-Building Scaling-Up Implementation Model

Core Components	Key Elements
Vision	Scaling-up goals, team member roles and responsibilities, dissemination of information about the scaling-up initiative, and timelines for meeting agreed upon goals.
Leadership Team	Team member organization, agreed upon team member roles, designated team member assignments, <i>CELL</i> technical assistance staff roles, and team member meetings and <i>CELL</i> contacts.
Needs Assessment	Identification of early literacy learning practices needs, assessment of existing service delivery program strengths and needs, and the development of a scaling-up implementation plan.
Outreach and Training	Provision of state-level technical assistance and training, regional and local technical assistance and training, end-user technical assistance and training, and ongoing opportunities for follow-up with participants.
Self-Evaluation	Treatment fidelity and integrity data collected at all levels of technical assistance and training, outcome (impact) data collected at all levels of scaling-up, and fidelity data used to make changes in the scaling-up processes.

especially Sugai et al., 2005). The planning tool includes key indicators for the different elements of each core component. The item content of the instrument is based on findings from previous scaling-up initiatives as well as recommendations by implementation researchers (e.g., Baker, 2006; Fixsen et al., 2005; Fullan, 2001; Louis, Rosenblum, & Molitor, 1981; McInerney & Hamilton, 2007; Menter et al., 2004; Simmons & Shiffman, 2006). The planning tool is completed and updated on multiple occasions where indicators that are judged as *present* are used to assess the establishment and status of the state-level capacity-building infrastructure and the action plan. A state-level infrastructure is seen as a necessary, but not sufficient, condition for effective scaling-up.

Technical Assistance Providers

The state resource team includes designated technical assistance staff who are provided *CELL* training to promote use of both evidence-based training processes (Fixsen et al., 2005) and evidence-based early literacy learning practices (Dunst, Trivette, Masiello, Roper et al., 2006). These state level technical assistance providers typically include staff from programs and organizations who already provide or offer training to local program directors, practitioners, and parents.

Scaling-up at the regional and local levels is accomplished by state-level technical assistance providers training regionally or locally constituted groups of technical assistance staff to use *CELL* training methods and procedures (processes) and *CELL* evidence-based practices (practice adoption). These second- and third-generation technical assistance providers spread adoption and use of *CELL* practices through replications of replications of *CELL* training methods and practices with end-users (practitioners and parents). This is accomplished primarily by mapping the scaling-up and training onto existing networks of technical-assistance and early childhood intervention programs since these kinds

of associative strategies can be especially effective in promoting end-user use of targeted practices (CORE, 2005). Figure 3 shows graphically the manner in which *CELL* scaling-up is achieved.

Transfer of Expertise Model

The scaling-up of *CELL* training procedures and targeted practices is best described as a capacity-building, or transfer-of-expertise, model (e.g., Eggbeer, Fenichel, Pawl, Shanok, & Williamson, 1994; Floden, Goertz, & O' Day, 1995; Sayre & Wetterlund, 2002). The transfer-of-expertise model used by *CELL* for scaling-up evidence-based early literacy practices is considered successful to the extent that technical assistance providers receiving *CELL*-specialized technical assistance in

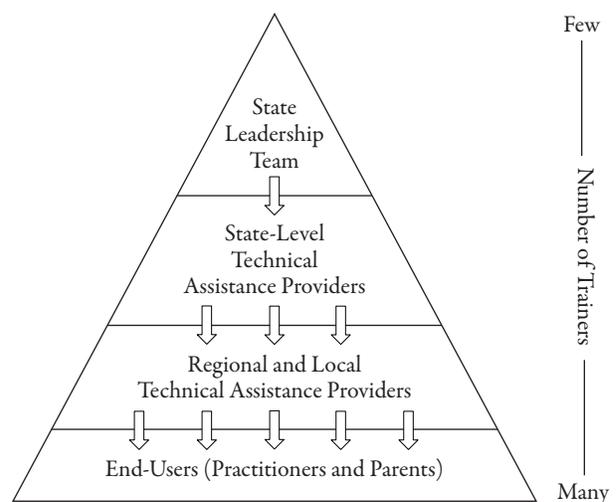


Figure 3. Multi-tiered approach to scaling-up the adoption and sustained use of evidence-based early literacy learning practices.

turn adopt and use the *CELL* model, approach, and practices when they provide training to end-users.

MEASURING FIDELITY OF *CELL* SPECIALIZED TECHNICAL ASSISTANCE

The practices constituting the focus of *CELL* (Dunst, Trivette, Masiello, Roper et al., 2006) and the procedures used to scale-up the adoption and sustained use of the practices (Dunst, Trivette, Masiello, & McInerney, 2006) have led us to identify the *types* (implementation, diffusion, and intervention), *elements* (training processes and practice adoption), and *dimensions* (exposure, adherence, and responsiveness) of fidelity that are measured as part of efforts to promote end-user adoption and use of *CELL* practices. The *CELL* training processes and intervention practices are intentionally straightforward because research indicates that complex programs, interventions, and practices are difficult to implement and often result in poor fidelity (Bauman et al., 1991) whereas “simple interventions [often] require very little in terms of training or guidance to achieve high fidelity” (Carroll et al., 2007, p. 6). Based on a review of available evidence, Carroll et al. (2007) stated that “there is evidence that it is easier to achieve high fidelity of simple [rather] than complex interventions...because there are fewer ‘response barriers’ when the model is simple” (p. 5). Sugai and Horner (2001) described this approach as “doing less but doing it better and longer” (p. 5).

Fidelity of both *CELL* training processes and practice adoption are measured in a number of ways in order to monitor the integrity, effectiveness, and efficiency of both the *delivery* and *content* of targeted evidence-based early literacy learning practices. This is accomplished by gathering different kinds of information about *CELL*-related activities aimed at promoting adoption and sustained use of *CELL* in-

tervention practices. Information gathering is done at state, regional or local, and end-user levels, and parallels the framework outlined in this *CELL* paper.

Fidelity of CELL Training

Fidelity of both implementation and diffusion training is measured by a participant completed training experiences fidelity scale. The scale assesses the degree to which *CELL* training processes and *CELL* targeted practices are conducted and described, respectively, in ways that were of sufficient dose and judged as “well done” (exposure), include clearly described and discernable characteristics of the training processes and intervention practices (adherence), and are viewed by participants as relevant and socially valid (responsiveness). The fidelity scale includes indicators of each dimension and element of fidelity described earlier, and incorporates recommendations by others using self-report instruments for assessing fidelity (e.g., Paulson, Post, Herinckx, & Risser, 2002; Ponti, Zins, & Graden, 1988; Schoenwald & Hoagwood, 2001). Table 3 includes examples of fidelity indicators for assessing *CELL* training.

The training experiences fidelity scale is completed by all participants receiving *CELL* training, including, but not limited to, technical assistance providers, practitioners, and parents. The collection of fidelity data at different levels of training permits an assessment of the degree to which implementation and diffusion training and *CELL* practices are delivered and communicated as intended. A nested framework is used to trace the degree to which both training processes and practice adoption occur as intended (see e.g., Borrelli et al., 2005). The nested structure permits assessment of the degree to which persons trained by *CELL* staff in turn train others as intended, and the extent to which second and third generation trainers train end-users in the use of the *CELL* methods and procedures having intended child outcomes.

Table 3
Examples of Fidelity Indicators Used to Assess Both Training Processes and Practice Adoption

Fidelity	Indicator Examples
<i>Training Processes</i>	
Exposure (Quantity)	The duration of the training was sufficient to cover all the planned topics
Exposure (Quality)	The training was conducted in a well-organized manner
Adherence	The importance of active learner participation in the training process was clearly explained
Responsiveness	The training methods were especially relevant to how I can conduct training with others
<i>Practice Adoption</i>	
Exposure (Quantity)	A sufficient amount of time was devoted to each component of the <i>CELL</i> literacy learning practices model
Exposure (Quality)	It was evident that the trainer(s) really bought into the <i>CELL</i> literacy practices
Adherence	The importance of interest-based child literacy learning was illustrated clearly
Responsiveness	Practitioners and parents would really see the value of using <i>CELL</i> practices

Variations in implementation and diffusion fidelity are related to variations in end-user adoption and use of targeted teaching methods (training processes) and practice adoption to ascertain fidelity.

Fidelity of End-User Interventions

Fidelity of end-user (practitioners or parents, or both) adoption and use of both instructional and literacy learning practices is measured by end-user completed scales of the number and frequency of use of *CELL* practices, the development-enhancing characteristics of the practices, the social validity of the practices, and the child benefits of the practices. The scales are modeled after ones used to promote practitioner and parent adoption and use of evidence-based early childhood intervention practices (Dunst, Pace, & Hamby, 2007; Dunst & Raab, 2007; Trivette & Dunst, 2007; Trivette, Dunst, Hamby, & Pace, 2007). The fidelity scale includes indicators of both the instructional and intervention practices that are the foundations of *CELL* methods and procedures (Dunst, Trivette, Masiello, Roper et al., 2006).

The fidelity scale of end-user adoption and use of *CELL* practices is completed by practitioners or parents, or both, who received *CELL* diffusion training. Fidelity of training processes is measured by the instructional practice indicators used routinely by end-users (e.g., "It was easy for me to be responsive to my child's attempts to communicate with me"). Fidelity of practice adoption is measured in terms of the number and frequency of use of *CELL* practices (e.g., "I was able to do the practices with my child almost every day") and the extent to which the practices were characterized by evidence-based development-enhancing qualities and features (e.g., "My child was especially interested in the learning activities").

Variations in both fidelity of training processes and practice adoption are related to variations in child outcomes using a generally interpretable quasi-experimental research design (Shadish, Cook, & Campbell, 2002). This is accomplished using a post-test only design with two dependent measures, one that the *CELL* practices are expected to affect and one that the *CELL* practices are not be expected to affect. The effectiveness of the *CELL* practices are established by testing for a predicted variations in fidelity by outcome measure interaction (see e.g., Dunst et al., 2007). This type of design has been used widely in a number of fields for ascertaining the effectiveness of interventions in real-world settings (e.g., Mohr & Clemmer, 1989; Nisbett & Kanouse, 1969; Orgel, Milliron, & Frederick, 1992; Seaver, 1973; Simester, Hauser, Wernerfelt, & Rust, 2000).

CONCLUSION

This *CELL* paper included a description of the ways in which treatment fidelity is conceptualized and operationalized as part of efforts to scale-up the adoption and use of

evidence-based early literacy learning practices using capacity-building training methods and procedures. Inasmuch as the *CELL* training processes and intervention practices are intentionally straightforward and easily adapted to existing technical assistance and early childhood intervention program practices, the procedures for measuring fidelity are straightforward as well.

The approach to measuring fidelity is at the same time comprehensive and circumscribed. The approach is comprehensive in the sense that it assesses multiple kinds of fidelity to insure important elements and dimensions of treatment integrity are measured. The approach is circumscribed in the sense that what is measured and how it is measured is easily incorporated into the day-to-day practices of technical assistance providers and end-users.

The approach to conceptualizing and measuring fidelity is also based on the "less is more" principle (Halpern & Hakel, 2003). The indicators used to measure fidelity include only those features and dimensions deemed important and necessary for assessing fidelity, and the indicators themselves are relatively few in number. The latter is the case because the majority of fidelity measures are obtained from participants, and the more succinct the indicators, the greater the likelihood of obtaining reliable and valid information (Babbie, 2004).

The multi-tiered approach to collecting fidelity information (Figure 3) provides a basis for tracking fidelity of both training processes and intervention practices, and for evaluating the extent to which variations in fidelity at different levels are related to variations in end-user adoption and use of targeted practices. As noted by Groark and McCall (2005), "variations in treatment fidelity can be used to assess dose-response and qualitative variations in treatment that then can be associated with qualitative variations in outcomes" (p. 574). Le Menestrel, Tout, McGroder, Zaslow, and Moore (1999) discuss a number of approaches for evaluating variations in different aspects of intervention processes and practices. Durlak and Ferrari (1998) stated that "Future research priorities [should] involve identifying the specific factors that promote implementation [of a program or practice] and determining what levels of implementation are necessary to achieve maximum program impact" (p. 81). The *CELL* approach to measuring and evaluating fidelity permits just this kind of analysis.

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