Am J Community Psychol (2012) 50:445–459
DOI 10.1007/s10464-012-9509-7

ORIGINAL PAPER

Toward an Evidence-Based System for Innovation Support for Implementing Innovations with Quality: Tools, Training, Technical Assistance, and Quality Assurance/Quality Improvement

Abraham Wandersman · Victoria H. Chien · Jason Katz

Published online: 27 April 2012

Abstract An individual or organization that sets out to implement an innovation (e.g., a new technology, program, or policy) generally requires support. In the Interactive Systems Framework for Dissemination and Implementation, a *Support System* should work with *Delivery Systems* (national, state and/or local entities such as health and human service organizations, community-based organizations, schools) to enhance their capacity for quality implementation of innovations. The literature on the Support ystem has been under-researched and under-developed. This article begins to conceptualize theory, research, and action for an evidence-based system for innovation support (EBSIS). EBSIS describes key priorities for strengthening the science and practice of support. The major goal of EBSIS is to enhance the research and practice of support in order to build capacity in the Delivery System for implementing innovations with quality, and thereby, help the Delivery System achieve outcomes. EBSIS is guided by a logic model that includes four key support components: *tools, training, technical assistance, and quality assurance/quality improvement*. EBSIS uses the Getting To Outcomes approach to accountability to aid the identification and synthesis of concepts, tools, and evidence for support. We conclude with some discussion of the current status of EBSIS and possible next steps, including the development of collaborative researcher-practitioner-funder-consumer partnerships to accelerate accumulation of knowledge on the Support System.

Keywords Training · Technical assistance · Quality assurance/quality improvement · Implementation · Capacity building · Interactive systems framework

A. Wandersman (✉) · V. H. Chien · J. Katz
University of South Carolina, Columbia, SC, USA
e-mail: Wandersman@sc.edu

Introduction

If we are to achieve better outcomes in public health, education, human services and other social programs, we need to implement appropriate innovations (e.g., evidence-based programs, policies, processes) with quality. In collaboration with Divisions[1] at the Centers for Disease Control and Prevention (CDC), the Interactive Systems Framework for Dissemination and Implementation (ISF) was developed to coordinate contributions that funders, researchers, evaluators, and practitioners can make to bring evidence-based innovations into practice to promote outcomes (Wandersman et al. 2008a). The ISF has three systems: (1) *synthesis and translation* of innovations, (2) *support* for building capacity for implementation of the innovation, and (3) *delivery* (implementation) of the innovation (See Table 1 for terms and definitions used throughout the manuscript).

As pointed out in the original ISF special issue (Wandersman et al. 2008b), major gaps exist in knowledge about connecting the three systems (the bidirectional arrows that link the systems), and the Support System has been under-researched and under-developed. In this article, we address these gaps by a conceptualization of theory, research, and action for an evidence-based system for innovation support (EBSIS). We conceptualize EBSIS as a bridge between the ISF Support System and the ISF Delivery System that has four support components: tools, training, technical assistance, and quality assurance/quality improvement. We strengthen the approach to support by emphasizing the importance of an evidence-based approach to the support components (similar to the importance of evidence-based programs and policies). In Fig. 1, we present the original ISF figure in solid lines;

[1] Division of Violence Prevention; Division of Reproductive Health.

Table 1 Terms and definitions

Term	Definition
Best/promising practice	An innovation that has an actual or emerging empirical link to important or relevant desired outcomes
Capacity	Ability to achieve a performance standard; includes human, fiscal, and technical capacities
General capacity	Capacity related to the infrastructure, skills, and motivation of a community or organization (e.g., policy), or to the skills and motivation of an individual that is not specific to the use of a particular innovation (e.g., leadership)
Informatics	A discipline pertaining to the study of the processing, management, and retrieval of information
Information quality	A multi-dimensional construct that broadly refers to the value of information to a user
Innovation	Something that is new to an individual, organization, or community (e.g., technology, program, policy)
Innovation-specific capacity	Capacity related to the use of a specific innovation (e.g., skills and knowledge for carrying out an innovation)
Performance	The implementation of tasks and activities that are considered important for achieving desired outcomes
Quality	A state of meeting the standards necessary to achieve desired outcomes
Standards	Benchmarks for capacity or performance

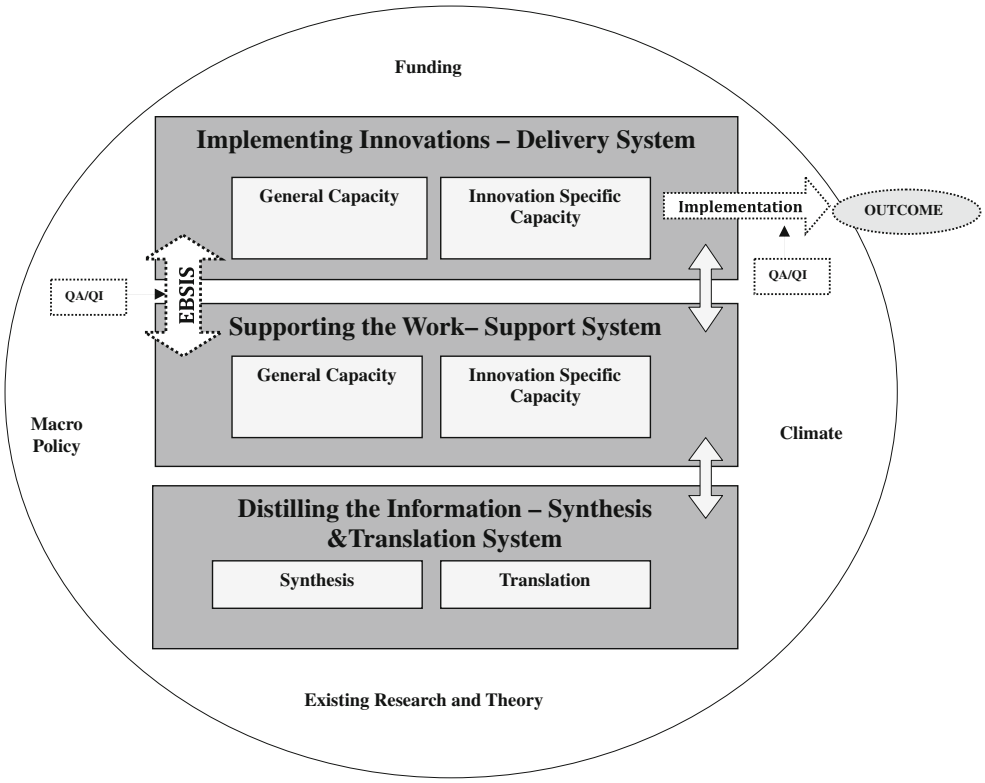

Fig. 1 Relationship between the EBSIS and the ISF. *Solid lines* indicate the original ISF (2008) figure and *dashed lines* indicate additions by our EBSIS approach. QA/QI are emphasized in two places: the provision of support to the Delivery System *and* the implementation of innovations (programs, policies, etc.)

additions described in this article are represented with dashed lines.

An Overview of the Evidence-Based System for Innovation Support (EBSIS) Logic Model

In the ISF, the EBSIS logic model can be applied to support many types of innovations (e.g., programs, policies, processes). The EBSIS logic model begins with the identification of an entity's desired outcomes to be achieved, followed by an assessment of the entity's current capacity for achieving the desired outcomes (See Fig. 2). Entities differ in their current levels of capacity to implement an innovation (Flaspohler et al. 2008). Therefore, collecting data about capacity allows the Support System to accommodate the entity's needs and resources. (A detailed discussion of capacity is beyond the scope of this article; the

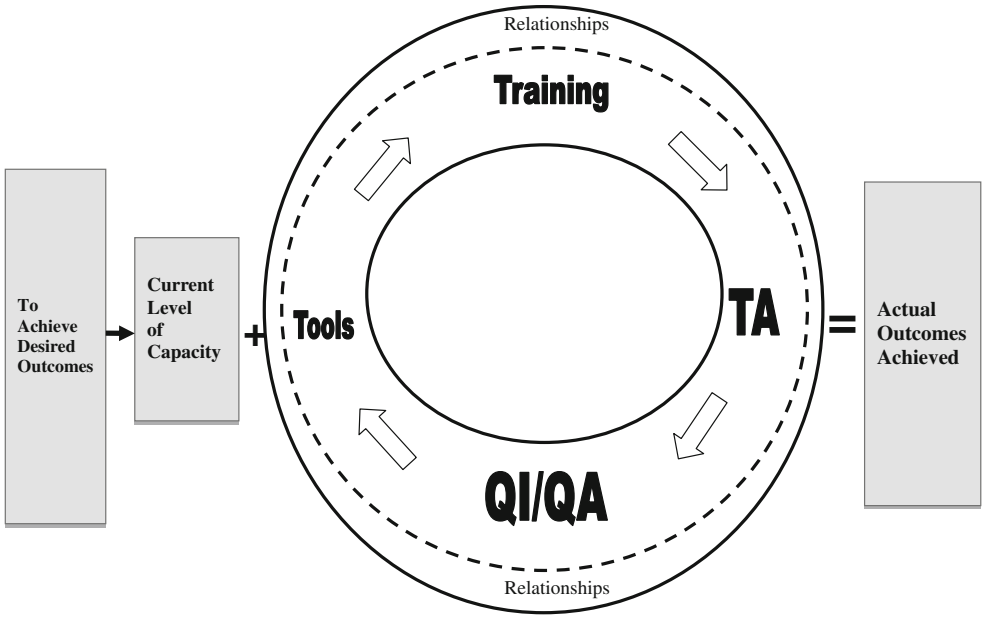

Fig. 2 Evidence-Based System for Innovation Support (EBSIS) Logic Model. Tools, training, TA, and QA/QI are depicted as a sequential series of support components. The four components operate upon an entity's current capacity in an iterative cycle until outcomes are achieved. The components are additive, which is reflected in the progressive enlargement of the font size for a component in moving from tools to QA/QI. Hence, training does not replace tools but enhances tools; TA then enhances both tools and training; and QA/QI embeds each of the other components. A *dashed circle* represents an outer "membrane" that promotes import of human relationships into EBSIS components

reader is directed to Flaspohler et al. 2008.) The logic model proceeds with four components of support: tools, training, technical assistance (TA), and quality assurance/quality improvement (QA/QI). Each of the components is intended to be used iteratively until the desired outcomes are achieved.

Although a detailed discussion of the role of relationships across the four components is beyond the scope of this article, we believe that the issue of relationships (e.g. trust and mutual respect) is vital in the four support components. The importance of relationships, including communication about values and building of trust, is most obvious within TA systems (Butterfoss 2004; Mitchell et al. 2002). We propose that support relationships are important in using tools, and are essential for conducting training, technical assistance, and quality assurance/quality improvement, as indicated by picturing relationships surrounding the four components (illustrated by the dashed lines in Fig. 2).

Connections among the Four EBSIS Support Components (Tools, Training, TA, QA/QI)

Each of the four support components has its own literature and has often been used independently. However, researchers have discussed the importance of linking support components (e.g., training and technical assistance; Fixsen et al. 2009; Kelly et al. 2000). We agree that an integration of the support components lends itself to a stronger Support System. Beginning with tools, we suggest that each component should incorporate the preceding component. *Tools* are necessary, but not sufficient (Kelly et al., 2000). The effectiveness of tools can be enhanced by providing *training* around the use and interpretation of the tools. Training is often cost-efficient but not sufficient for obtaining utilization (Fixsen et al. 2009; Joyce and Showers 2002). Training can be enhanced with individualized coaching and *technical assistance* (TA). *Quality assurance/quality improvement* (QA/QI) reinforces the proper use of the tools, training, and TA for quality performance (this is suggested graphically by the growing size of the components in Fig. 2). In sum, we propose that the four support components work in concert to overcome limitations that may arise when a component is used independently.

Structuring the Evidence Base for Tools, Training, TA, and QA/QI: Using the Getting To Outcomes Approach to Accountability

We think it is important for EBSIS to have a structure that is consistent across the four components and that promotes the importance of theory, evidence, practice, and

Table 2 Ten steps of the Getting To Outcomes (GTO) framework

GTO Step	Purpose
1. Conduct needs/resources assessment	To identify existing needs and resources
2. Establish goals/desired outcomes	To establish goals and desired outcomes (objectives) based on the needs/resource assessment
3. Consider best/promising practices	To review existing best/promising practices for achieving the established goals/objectives and to select a best/promising practice
4. Assess fit	To ensure that the best/promising practice selected aligns with the needs of the stakeholders
5. Address capacity issues	To identify existing capacities (e.g., human, financial, technical, intellectual) and address any capacity gaps
6. Develop a plan	To develop a plan for meeting the goals/objectives set forth in GTO step 2
7. Implement plan and conduct process evaluation	To implement and monitor implementation of the plan
8. Conduct outcome evaluation	To assess the effectiveness of the innovation
9. Engage in continuous quality improvement	To make short-term (mid-course) and long-term (strategic) corrections across the stages of a program/innovation
10. Address sustainability issues	To develop and implement plans for sustaining the program/innovation

accountability. Therefore, we use the Getting To Outcomes®[2] (GTO®) framework to organize each of the four support components. GTO is a 10-step results-based approach to accountability that includes planning, implementation, evaluation, and sustainability (Wandersman et al. 2000; see Table 2 for the 10 steps of GTO). Using GTO promotes a systematic accumulation of knowledge for each support component in a way that is accessible to researchers and practitioners. In the following sections, we offer a *frame* to be filled with present and future evidence-based practice and practice-based evidence on how to perform each of the four component's ten GTO steps with quality. The frame is structured in a matrix table with one column for each support component and ten rows for each GTO step (see Table 3).

Tools

The modern workforce is largely comprised of individuals who work primarily with information (Drucker 2008). It is estimated that the proportion of "information workers" to "manual workers" (e.g., agricultural, industrial) is four to one in the U.S. (Haag et al. 2006). The shift toward information-centered work has spawned a flurry of new tools. The *tools* component in EBSIS refers to informational resources designed to organize, summarize, and/or communicate knowledge. Tools include, but are not limited to, books, journals, manuals, guides, pamphlets, worksheets, templates, spreadsheets, and checklists. The open-access nature of the internet allows for the dissemination of many informational tools. Tools that are based on research literature are a major product of the synthesis and translation system in the ISF.

Importance of Quality Informational Tools

Quality of information influences all aspects of an entity's performance, including decision making and implementation of innovations. Use of quality informational tools can enhance cost-efficiency and effectiveness (Lee et al. 2002; Mizzaro 2003), whereas inadequate tools can result in undesirable short- and long-term consequences (e.g., temporal and financial waste, decreased organizational morale).

Tools are more likely to contribute to desired outcomes when they are current, well-organized, understandable, and accurate. *Mis*information—an aspect of poor quality in a tool—can have serious ramifications (e.g., sickness or death resulting from misinformation in a drug interaction checker tool) (Eysenbach and Jadad 2001). Conversely, the use of quality tools (e.g., well-written and evidence-based clinical practice guidelines) can advance excellence (McLaughlin et al. 1996; Grimshaw and Russell 1993; Thomas et al. 2000).

A common problem is that many tools are designed with minimal input from the users (Trivedi et al. 2002). However, user input may not be sufficient for quality tool development (Squires and Preece 1996). It is also important for a tool to be informed by educational, cognitive, and informatics research. Thus, the design and development of a quality tool involves a systematic process that is both evidence-based and user-centered. GTO incorporates research and practice perspectives and can be a fitting heuristic for either development or adoption of a tool. Table 4 begins to illustrate the development of an evidence base for tools using the GTO steps. The steps in Table 4

[2] Getting To Outcomes and GTO are trademarks registered by the University of South Carolina and RAND Corp.

Table 3 GTO frame for the accumulation of evidence across the four support components of EBSIS

GTO Step	Tools[a]	Training[b]	TA[c]	QA/QI[d]
Conduct a Needs/Resource Assessment (GTO Step 1)				
Establish Goals and Desired Outcomes (GTO Step 2)				
Identify Best/Promising Practices (GTO Step 3)				
Address Issues of Fit (GTO Step 4)				
Consider Capacity Issues (GTO Step 5)				
Develop a Plan (GTO Step 6)				
Implementation & Process Evaluation (GTO Step 7)				
Conduct an Outcome Evaluation (GTO Step 8)				
Engage in Continuous Quality Improvement (GTO Step 9)				
Address Sustainability Issues (GTO Step 10)				

[a] See Table 4 for details relating to tools

[b] See Table 5 for details relating to training

[c] See Table 6 for details relating to TA

[d] See Table 7 for details relating to QA/QI

offer a systematic way to begin building the evidence base we seek for quality (evidence-based) tools.

Training

In EBSIS, we define *training* as a planned, instructional activity intended to facilitate the acquisition of knowledge, skills, and attitudes in order to enhance learner performance. Training is often performed in group settings. *Training effectiveness* refers to the extent to which the training objectives are achieved. Over the last half-century, models for training have become increasingly more comprehensive as they have moved from focusing strictly on training outcomes (Kirkpatrick 1959) to encompassing individual, contextual and programmatic factors that influence training outcomes (Cannon-Bowers et al. 1995; DeMatteo et al. 1997; Rowold 2007; Scaduto et al. 2008; Tai 2006). Despite significant strides, the field continues to lack a model that fully captures a central characteristic of quality training, namely its *process.* Bartholomew et al. (2007) expressed the need for a new model that accounted for the full training process, including planning and evaluating training effectiveness. In brief, the training literature suggests the need for a comprehensive model that captures key features of the training process—extending from needs assessment to evaluation of organizational impact and sustainability. Table 5 begins to illustrate the development of an evidence base for training using the GTO steps. The steps in Table 5 offer a systematic way to begin building the evidence base we seek for quality (evidence-based) training.

Technical Assistance

Technical assistance (*TA*) is an individualized, hands-on approach to building an entity's capacity for quality implementation of innovations, usually following training (Chinman et al. 2005; Keener 2007). TA can improve an entity's capacity by assisting the entity in the selection of the optimal innovation, informing adaptations of the innovation to enhance fit, and building skills for implementation and evaluation of the innovation (Flaspohler et al. 2008). Although this article focuses on innovation-specific capacities in the ISF, TA may also be delivered to build general organizational capacities, e.g., leadership development, funding/resource development, access to resources, practitioner empowerment, competence, and capacity for future efforts (Butterfoss 2004; Fawcett et al. 1995; Flaspohler et al. 2008; Gibbs et al. 2002; Stevenson et al. 2002). Knowledge of best/promising TA practices is at an early stage, but there is a growing evidence-base for four dimensions of TA in particular: dosage, mode of delivery, collaborative design, and proactive design. Each of these dimensions is briefly described below.

Dosage

There are benefits to the provision of ongoing TA in contrast to temporary or circumstance-limited TA (Spoth et al. 2007). Chinman et al. (2008) found that more TA hours are correlated with improvements in the implementation of prevention programming (e.g., capacity building, development of outcome evaluations). However, two studies found no significant improvements with variations in TA

Table 4 Towards an evidence-based approach to tools using GTO

GTO step	Current evidence
Conduct a needs/resource assessment (GTO step 1)	Conducting a needs assessment for tools involves examining the current availability of tools in the workplace to identify possible gaps between existing and needed instruments. A needs and resource assessment clarifies the specific task-related needs associated with the tool and the resources available for acquiring or developing a needed tool. The availability of resources informs the extent of investment that can be devoted to tool development or acquisition. Taking time to survey an organization's access to existing tools contributes to cost-savings by reducing the likelihood that unnecessary investments are made in new tools
Establish goals and desired outcomes (GTO step 2)	A determination of the broad purpose of a tool and its specific desired outcomes should be informed by the needs and resource assessment and completed collaboratively with end-users (Ho and Antunes 1999). The goals and desired outcomes in this step inform the content, format, and function of the tool
Identify best/promising practices (GTO step 3)	Whether the decision is made to develop a new tool or to acquire/adapt a pre-existing tool, it is important that the instrument captures the features of a quality tool. Literature on information quality identifies a number of dimensions of quality information, including accessibility, appropriateness in amount of information, believability, completeness, conciseness and consistency in representation, interpretability, objectivity, relevancy, timeliness, and understandability (Groi et al. 1998; Kahn et al. 2002; Lee et al. 2002; Stvilia et al. 2005). These attributes are examples of best/promising practices for the development or selection of a quality information tool
Address issues of fit (GTO step 4)	Studies pertaining to issues of fit for tools have examined: (1) fit with task-needs; (2) fit with end-user (e.g., reading level, cultural sensitivity, format, level of detail); (3) fit with organizational practices and infrastructure (e.g., adequate technological supports and policies/procedures to support use of tool) (Hiruma and Kaiho 1991). These issues are important to take into consideration when addressing fit of the informational tool. Research shows that designers and users can differ substantially in what is considered a quality tool (Hiruma and Kaiho 1991). Thus, engaging the end-user in the tool development process can improve alignment between the purpose of the tool and the needs of the end-user
Consider capacity issues (GTO step 5)	Addressing capacity issues for using an existing informational tool involves identifying the human, fiscal, technological, evaluation and material capacities necessary for obtaining the tool, learning how to use it, and adapting the tool as required. Similar capacity considerations should be made in decisions to develop a new tool (Clement et al. 2002). Although developing a new informational tool may be resource intensive and costly (McConnon et al. 2007), it can be a sensible alternative when existing tools do not meet the needs of the innovation
Develop a plan (GTO step 6)	A clear plan is needed to guide the development of a new tool or the adoption of a pre-existing tool. This involves anticipating and addressing barriers associated with access to information. Informatics researchers Eysenbach and Jadad (2001) suggest addressing how consumers can access information *when* and *where* they need it, and in the amount and format in which they need it during the planning phase. To ameliorate the array of challenges associated with information access and use, a plan for tool implementation should be developed using a collaboration including end-user input. If a new tool is being developed, detailed plans for development should be shared with end-users and other stakeholders (e.g., top management, partnering agencies, patient population)
Implementation and process evaluation (GTO step 7)	While developers often do not have time to test a tool before release, it is common for them to have to take time to respond to errors and inaccuracies after product release (Parnas and Lawford 2003). Piloting the tool prior to full release is important for quality assurance and consumer satisfaction, and should be viewed as part of the implementation phase. During process evaluation, it is important to use a systematic approach that involves several reviewers (Parnas and Lawford 2003). Product monitoring is an on-going activity that should continue into the product launch phase to ensure that the tool achieves its desired outcomes. Careful documentation of changes made to the tool should be kept for communication and record-keeping purposes. The need for greater information quality control has produced a variety of tools for information quality assurance (see Lee et al. 2002; Kitchenham et al. 1995, Mizzaro 2003; Whiting et al. 2003)
Conduct an outcome evaluation (GTO step 8)	This step involves assessing the extent to which the desired outcomes of the tool (established in GTO step 2) are achieved after full implementation. Evaluation of outcomes should take contextual factors into consideration, including the characteristics of the user and workplace (Mumtaz 2000). Metrics for evaluating outcomes are available in best/promising practice literatures (e.g., information quality dimensions; Kahn et al. 2002). Using a multi-method, multi-informant approach increases validity of data (Kraemer et al. 2003)

Table 4 continued

GTO step	Current evidence
Engage in continuous quality improvement (GTO step 9)	Keeping a tool useful may require routine updates. Suggestions for revisions should be driven by end-users, evidence of utility, changes in the workplace (e.g., staffing, funding) macroeconomic factors (e.g., political and economic factors) (Ayusawa et al. 2005), and a review of the answers to the previous eight GTO steps. Prior to formal changes, intended revisions should be reviewed by end-users to ensure that changes are useful. If substantial CQI revisions are made, it may be necessary to provide additional training on how to use the tool. When redistributing to veteran users, the dissemination of revised tools should include a summary of changes
Address sustainability issues (GTO step 10)	Sustaining a new tool involves ensuring ongoing capacity to produce, disseminate, and support the tool. It also involves making on-going revisions as well as engaging in marketing activities for tool dissemination. A tool is more likely to be sustained if it is well-translated. Translation activities can involve language (e.g., English to Spanish), format (e.g., non-virtual to virtual), design (e.g., text to video), or content (e.g., length: full to abridged version, versions for different ages)

dose (Keener 2007; Mihalic and Irwin 2003). There may be variables that moderate the relationship between TA dosage and observed outcomes, and therefore, account for variability in these findings. For example, TA dosage is more likely to predict improvements in programs that have been recently implemented, and less likely to predict improvements in programs that have been in place for a longer period of time (Feinberg et al. 2008).

Mode of Delivery

The provision of TA can occur on-site, or via telephone calls, interactive web sites, and electronic mail (Keener 2007). Compared to telephone- or email-based TA, on-site TA is more likely to afford opportunities for experiential learning and the demonstration of relevant skills (Becker et al. 2008; Feinberg et al. 2008). For example, higher doses of on-site TA predicted improvements in the functioning of youth development programs (Feinberg et al. 2008). However, off-site TA can help to contain travel costs, particularly in a multi-state or national TA project (Feinberg et al. 2008; Young et al. 2006).

Collaboration

It is important to balance TA expertise in substantive areas with interpersonal and group facilitation skills (Wesley and Buysse 1996). Studies have reported benefits to collaboration between multiple stakeholders in planning for TA (Spoth et al. 2007). This may include collaboration with consumers and their families, practitioners, administrators, researchers and funders (Salyers et al. 2007).

Proactive TA

Proactive TA is a strategic approach to bringing specific knowledge and skills to recipients, and then helping recipients to adopt and use the information and skills effectively. Proactive TA is both anticipatory and responsive to recipients' needs. In an anticipatory role, TA providers catalyze the TA process rather than wait for TA requests to arrive (Collins et al. 2006), which is important because potential TA recipients with lower capacity levels are less likely to make TA requests (Kegeles et al. 2005). TA providers then continue to be proactive subsequent to the first contact in helping recipients to use the information and skills with quality.

Proactive TA providers are also responsive to recipients. They customize TA so that it starts with and builds upon recipients' current capacities and moves towards an ideal level of capacity to use specific information and skills with quality. There is a growing literature supporting the benefits of proactive TA in building capacity and improving implementation in Delivery Systems (Fagan et al. 2008; Kelly et al. 2000; Mihalic and Irwin 2003; Mitchell et al. 2004; Quinby et al. 2008). See Ray et al. (2012) for a brief review of proactive TA.

Similar to ideas presented in the training component, *quality TA* involves best/promising TA practices and comprehensive TA processes for planning, implementation, and evaluation. Comprehensive TA programming can be thorough when the ten GTO steps are applied to it. Table 6 begins to illustrate the development of an evidence base for TA using the GTO steps. The steps in Table 6 offer a systematic way to begin building the evidence base we seek for quality (evidence-based) TA.

Quality Assurance/Quality Improvement

Evidence is needed for how innovations can be adopted and used in ways that improve quality and advance outcomes in practice settings (Shojania and Grimshaw 2005). Here we briefly describe a preliminary framework that was developed to guide the development of evidence-based quality assurance/quality improvement systems. Quality

Table 5 Towards an evidence-based approach to training using GTO

GTO step	Current evidence
Conduct a needs/resource assessment (GTO step 1)	The training needs and resource assessment aims to clarify the specific training needs, increase knowledge about the trainees and organization of interest, ensure adequate training value, and survey the availability of existing training resources. The training literature has discussed several training needs assessment tools including organizational, task, person, and value analyses
	An *organizational analysis* is completed to collect information about the target entity (McGehee and Thayer 1961). A *task analysis* identifies the specific knowledge, skills, and attitudes that the trainers seek to cultivate (Carnevale et al. 1990). A *person analysis* identifies the characteristics of the trainees (Noe 2010). A *value analysis* is completed to ensure that the benefits of training outweigh the costs (Bramley and Kitson 1994)
Establish goals and desired outcomes (GTO step 2)	The specific aims of training are determined based on needs and resource assessment data. Defining training goals in collaboration with stakeholders can increase buy-in and promote alignment of goals with an entity's culture (Bramley 1991). Linking training goals to an entity's programming goals facilitates evaluation of impacts of training (Mahapatra and Lai 2005). The goals and desired outcomes established in GTO step 2 are revisited in the *Output/Outcome* Phase (GTO step 8: Outcome Evaluation) to inform training effectiveness
Identify best/promising practices (GTO step 3)	It is common for trainers to base decisions about training methods on convenience and habit rather than on the goals and characteristics of the trainees. However, devoting additional time to strategically identifying training methods can enhance training efficiency and effectiveness. Identifying best/promising practices for training involves reviewing training literature for evidence-based strategies that best address training goals. Adult learning principles (e.g., use of learning situations that are problem-centered and practical, capitalize on experience, encourage choice and self-direction, and demonstrate respect for the individual learner) are an example of a best/promising practice area in the literature for training (Knowles 1970)
Address issues of fit (GTO step 4)	When identifying a set of best/promising training practices, it is important to evaluate each best/promising practice in relation to the training goals and trainee population. This step is important because the effectiveness of the training program is directly linked to how well the training approach and curriculum both satisfies the goals/desired outcomes of the training and complements the characteristics of the trainees. It ensures that the training is relevant for the trainees and that the target entity sees a positive return on its training investment
Consider capacity issues (GTO step 5)	The aim of GTO step 5 is to address the capacity needs of a training program. This begins with determining the capacities needed for the training (i.e., human, instructional, technical, evaluation, and physical capacities), and proceeds with distinguishing capacities that are available from those that need to be obtained. A concrete plan for capacity acquisition should be developed during this step. Although it is well-recognized that capacities are critical for successful training outcomes (Bartholomew et al. 2007), there is a surprising dearth of empirical literature on the relationship between the availability of capacities that organizations have for training and training outcomes
Develop a plan (GTO step 6)	A training plan serves as a roadmap for implementation. It describes the tasks, roles, schedules, and methods of the training. It can be used for progress monitoring, and as a tool for accountability. Planning a training program involves: (a) developing a training design, addressing training logistics, and addressing anticipated implementation barriers, (b) determining what processes will be used to facilitate the transfer of training materials into the workplace, and (c) ensuring that employees and leaders are fully informed about the training. Engaging members of the organization in the planning process is important for achieving program outcomes (Alliger et al. 1997). A well-developed plan improves the probability of implementation quality and contributes to results
Implementation and process evaluation (GTO step 7)	A process evaluation provides information about the extent to which the training is going as planned, and allows for the identification of implementation issues as they arise. Organizing a process evaluation involves developing a plan for monitoring the quality of the training program and associated post-training activities. It also entails creating or adapting process evaluation instruments
Conduct an outcome evaluation (GTO step 8)	The purpose of an outcome evaluation is to determine training effectiveness—i.e., the extent to which training goals were met. Outcome evaluations for training are generally measured at the individual and organizational levels. At the individual level, training outcomes can assess affective reactions and perceptions of utility, different levels of learning (e.g., immediate recall, long-term retention, behavioral demonstration), and transfer of information and/or skills. At the organizational level, common measures for training outcomes include return on investment and customer satisfaction
Engage in continuous quality improvement (GTO step 9)	Conducting a CQI process is critical for making improvements to future trainings. This step is designed to clarify which activities were successful and which require improvement. Engaging in continuous quality improvement involves a collective review of all the previous training steps, including the review of process and outcome data

Table 5 continued

GTO step	Current evidence
Address Sustainability issues (GTO step 10)	When a training program achieves its desired outcomes, there is value to sustaining them. Addressing sustainability for training includes preserving the core components of a training program, ensuring sufficient capacity and infrastructure for program continuation, establishing a repertoire of effective training strategies and best/promising practices, routinizing training activities, and ensuring that trainings have beneficial outcomes

Assurance (QA) involves the use of tools and logic to assess quality performance. Quality Improvement (QI) is the use of methods to enhance quality performance. Quality assurance/quality improvement (QA/QI) is an integrative process for identifying current levels of quality and for improving quality performance.

We propose that QA/QI plays an important role in at least two areas of the ISF. First, as discussed by Meyers et al. (2012), QA/QI is used to monitor and improve the implementation of an innovation in the Delivery System (see QA/QI near the "Implementation" arrow in Fig. 1). Second, QA/QI is applied in the interaction between the Support System and the Delivery System to monitor and improve the quality of support (e.g., tools, training, and TA). The QA/QI section in this article emphasizes the former application of QA/QI in the ISF.

Industry-derived continuous quality improvement (CQI) approaches (e.g., Lean, Six Sigma, and Plan Do Study Act) are increasingly being used for QA/QI in healthcare settings and are gradually being adopted in other sectors (Ammerman et al. 2009; Beard 2008; Furman and Caplan 2007, King et al. 2006). QA strategies (e.g., statistical process control strategies) can be used to track and interpret performance over time (Ammerman et al. 2009; Anjard 1995). Promising QA strategies have been documented in other (non-industry) literatures. For example, *innovation configuration* (*IC*) *maps* have been used by consultants in educational settings to track variations in the quality use of an innovation and to monitor performance over time (Hall and Hord 2006). QI strategies (e.g., checklists, kitting, visual management strategies, and work cells) are used to move performance to a higher level of quality (Wandersman et al. 2008a). Table 7 begins to illustrate a framework for accumulating evidence-based approaches to QA/QI using the GTO steps. The steps in Table 7 offer a systematic way to begin building the evidence base we seek for quality (evidence-based) QA/QI.

Discussion

Each year, billions of dollars are spent on tools, training, technical assistance, and quality assurance/quality improvement activities with questionable outcomes. We suggested that there is a critical need to enhance: (1) the science and practice of support, and (2) the connections among the support components in order to build adequate capacity in the Delivery System for achieving targeted outcomes. To be effective, efficient, and accountable, we propose that having an EBSIS is as essential as having evidence-based health care, therapy, or educational programs.

EBSIS is in an early stage of development-similar to the stage of development that characterized the original ISF article in 2008 (i.e., it was a generative, heuristic framework which outlined the basis for and components of the ISF in order to be enhanced by future contributors). And akin to the ISF, many years will be required for the development of a robust EBSIS. Moreover, it will be an ongoing process that advances with the evidence base and the needs of the implementation field. A full description of the past, present, and future status of an EBSIS would require a book-length manuscript. Therefore, in this article, we were deliberately brief and illustrative in our description of each GTO step across the four components.

Some Strengths of the Current State of EBSIS

1. In the original ISF article and special issue, the editors predicted that the real action for bridging research and practice would be in the arrows connecting the systems. EBSIS illustrates how these connections can take place in an evidence-based way to promote quality implementation.
2. EBSIS promotes a culture of evidence and brings accountability into support components to enhance the capacity of practitioners, organizations, and/or communities to implement innovations with quality.
3. EBSIS is intended to be iterative. Iterative revisions to the components should be anticipated in response to changes within and beyond EBSIS, and with the accumulation of new evidence about what works and what does not.
4. EBSIS is a flexible approach for addressing a common challenge to the provision of effective intervention: working in a customized yet evidence-based way with practitioners, organizations, and/or communities that vary in their current levels of capacity. We expect

Table 6 towards an evidence-based approach to TA using GTO

GTO step	Current evidence
Conduct a needs/resource assessment (GTO step 1)	A needs and resource assessment provides a basis for determining the extent to which a Delivery System requires TA for strengthening capacity. The Marguerite Casey Foundation (2007) has a multi-dimensional organizational capacity assessment, with sub-scales for quantifying the capacity dimensions of leadership, adaptive management, and operational capacity. Minimal psychometric information is available for existing capacity assessment tools (Sobeck and Agius 2007), although Florin et al. (1993) provide an alpha coefficient for a capacity assessment tool used as part of a coalition-building project
Establish goals and desired outcomes (GTO step 2)	TA goals and desired outcomes are developed based upon information obtained from the needs and resource assessment. Desired TA outcomes can be defined by benchmarks that are based upon available evidence (Salyers et al. 2007). Letts et al. (1999) describe several types of desired TA outcomes, including outcomes related to improved implementation capacity in the Delivery System
Identify best/promising practices (GTO step 3)	An evidence-based TA system incorporates a menu of best/promising TA practices (e.g., a certain dosage of TA, benefits of on-site TA relative to off-site TA, proactive TA). The selection of best/promising TA practices is strategic
Address issues of fit (GTO step 4)	It is important for TA providers to approach the selection of best/promising TA practices strategically, in part by ensuring a sufficient level of commensurability between TA practices, and the values and cultures of TA recipients. TA is more likely to have a positive impact when a TA provider uses practices that fit with the entity being supported (O'Donnell et al. 2000)
Consider capacity issues (GTO step 5)	Sufficient capacities—including human, fiscal, and technical capacities—are needed to ensure the quality implementation of TA strategies. Many TA strategies require substantial human capacities (Florin et al. 1993), including internal staffing and linkages with content experts and researchers. Other capacities include funds for travel (Salyers et al. 2007), computer equipment and software for electronic communications (Cowley and Good 2010), and capacities for analyzing and using data (Cowley and Good 2010)
Develop a plan (GTO step 6)	TA planning addresses the *"who*, *what*, *where*, *when*, and *how"* of conducting TA. It essentially serves as a roadmap for TA implementation. An important component of a TA plan is documentation of tasks and responsibilities for both TA providers and recipients (Feinberg et al. 2004). Unfortunately, TA plans are often developed and used in a climate of limited evidence about how TA plans should be structured and used. As an example of a promising approach to TA planning, the South Carolina Campaign to Prevent Teen Pregnancy developed a *Proactive TA Plan* that includes action steps for TA, target end dates, individuals responsible for action steps, and indicators for determining the accomplishment of action steps (Duffy et al. 2012)
Implementation and process evaluation (GTO step 7)	TA providers implement the plan that was developed in step 6 and conduct a process evaluation. Process evaluation provides feedback about the extent to which delivery of best/promising TA practices is on target and identifies areas requiring mid-course corrections (Nemec et al. 1991). A database can be used to monitor implementation metrics such as dosage of TA (e.g., number of hours) and fidelity to the TA plan (Durlak and DuPre 2008)
Conduct an outcome evaluation (GTO step 8)	An outcome evaluation provides information about the extent to which the goals and desired outcomes (established in GTO step 2) have been met. Although specifics will vary by TA project, the general TA outcome evaluation question will be the same, namely, "were the Delivery System's capacities enhanced as a result of TA?" TA outcome evaluations can be useful for accountability if they are conducted with quality. However, a review article by Blumenthal (2003) concluded that evaluation designs for TA are often "black box" evaluations that are inadequate for making inferences about the effectiveness of TA in building capacity
Engage in continuous quality improvement (GTO step 9)	CQI activities are used to improve performance gaps in TA and to build upon excellence. When data from an outcome evaluation suggest room for improvement (e.g., the Delivery System's capacity did not improve at the rate expected), performance can be improved by a strategic review of the previous GTO steps (e.g., the initial needs and resources assessment may have missed something important, or the goals and desired outcomes may have been overly ambitious). While there is only minimal literature on CQI in TA, the use of frequent needs assessments and skill-based capacity-building strategies are important for improvement (Butterfoss 2004)
Address sustainability issues (GTO step 10)	Once goals and desired outcomes are accomplished, the benefits are targeted for sustainability through ongoing evaluation, and provision of TA as needed. The capacity built by TA providers in Delivery Systems may be more likely to be sustained when the TA provider-recipient relationship allows for openness in communication, shared-decision-making, and general agreement on key programming and evaluation strategies (Butterfoss 2007). In addition, members of the organization should gradually absorb the training and TA functions previously provided by the Support System (e.g., to support new staff hires)

Table 7 Towards an evidence-based approach to QA/QI using GTO

GTO step	Current evidence
Conduct a needs/resource assessment (GTO step 1)	Assessment data collected in step 1 are used to identify gaps in quality performance (Speroff and O'Connnor 2004). Practitioner skills and knowledge testing, client satisfaction surveys, and chart reviews are examples of data sources for determining performance quality (Grol et al. 1997). For example, Chinman et al. (2003) developed and validated a tool for assessing competencies among providers treating individuals with serious mental illness
Establish goals and desired outcomes (GTO step 2)	QA/QI goals and desired outcomes are projected improvements in performance. *Benchmarking*—which entails drawing upon a competitor or leader in the field as a criterion for quality performance—is a strategy for selecting specific performance improvement outcomes (Yasin and Zimmer 1996). Methods and tools that can be used to facilitate setting of goals and desired outcomes include *kaizen events* and *future state maps*. Kaizen events are workshops that are held over five business days to pinpoint goals for improvement (Powell et al. 2009). A future state map is a blueprint that depicts the ideal state of quality, which can help focus a QA/QI initiative and define its target (Lovelle 2001)
Identify best/promising practices (GTO step 3)	The QA/QI literature is used to select strategies to meet the goals and desired outcomes identified in GTO step 2. Quality improvement strategies may be connected to a particular content area (e.g., coronary bypass surgery) or may be generic. Promising QA/QI strategies include the use of checklists (Gawande 2009), and industry-based approaches for enhancing workflow
Address issues of fit (GTO step 4)	It is important to ensure an appropriate level of fit between QA/QI methods and the surrounding organizational context. For example, QA/QI is more likely to be congruent with organizations that emphasize learning and accountability (Donabedian 1996). Factors to be considered in this step include the relevance of QA/QI to an organization's mission, consideration of a funder's requirements, and level of fit with preexisting data systems (Sieber 2008)
Consider capacity issues (GTO step 5)	Sufficient capacities (e.g., human, fiscal, technical) need to be in place in order to implement QA/QI, including committed facilitators, organizational or administrative support, sufficient training and preparation, and team cohesiveness (Harvey and Kitson 1996). An important human resource issue involves recruitment of QA/QI team members at multiple levels of an organization, including high-level managers, supervisors, and service staff (Lammers et al. 1996)
Develop a plan (GTO step 6)	A QA/QI plan specifies tasks and responsibilities connected to data collection, monitoring, and reporting (Knatterud et al. 1998). A *charter* or opportunity statement provides a description of the scope and objectives of quality improvement activities, a timeline, and documentation of the key players (Varkey et al. 2007). An additional part of planning addresses the selection of validated or established performance indicators as well as methods for monitoring and evaluating implementation of QA/QI strategies
Implementation and process evaluation (GTO step 7)	Process evaluation monitors implementation of the QA/QI plan (developed in GTO step 6) and can identify potential points of slippage from the QA/QI plan as a basis for initiating mid-course improvements. Monitoring methods include use of decision support data systems (Fixsen et al. 2009) or measurement feedback systems (Bickman 2008)
Conduct an outcome evaluation (GTO step 8)	An outcome evaluation is conducted to determine the extent to which QA/QI desired outcomes have been attained. Although the specifics will vary by project, QA/QI outcome evaluations will generally involve determining whether performance has moved into acceptable limits. Outcome indicators should be routinely tracked to assess that a change was connected to implementation of the QA/QI plan rather than extraneous factors (Speroff and O'Connnor 2004)
Engage in continuous quality improvement (GTO step 9)	Staff and other stakeholders review progress achieved, and take stock of lessons learned via application of all of the previous GTO steps. Evaluation data and lessons learned from the previous eight steps are used to inform decision-making about specific refinements and/or use of new strategies to enhance QA/QI programming, including planning, implementation, and evaluation
Address sustainability issues (GTO step 10)	Current QA/QI programming should be sustained once it has been successful in reaching desired outcomes for performance improvement. Silimperi et al. (2002) developed a framework for sustaining a QA/QI system, which highlights the importance of an *internal enabling environment* (including policies, leadership, values, and resources), as well as management functions (e.g., QA/QI oversight and coordination) and support functions (e.g., training, communication and information, and rewarding quality)

EBSIS to resonate with the day-to-day work of practitioners and support providers.

5. EBSIS provides an agenda for collaboration between funders, practitioners, researcher/evaluators, and consumers to make useful contributions to the science and practice of support. Local organizations and communities, in collaboration with their support providers, can make important contributions to the science and practice of support through participatory action research (Marrow 1969), use-inspired community research (Chinman et al. 2005), and services research paradigms (Salzer and Bickman 1997). We encourage funders, researchers, and evaluators to work collaboratively with practitioners, support providers, and

consumers to advance and accelerate the research on support. For example, when funding agencies fund training and TA (or develop centers for training and TA), they should do so in a way that uses evidence-based support to promote evidence-based practice and practice-based evidence.

Some Limitations and Next Steps

There are many limitations in the current status of EBSIS including:

1. Opportunities to apply EBSIS in practice are currently constrained by limitations in the availability of evidence within each of the four EBSIS components. For example, the evidence-base for filling in the EBSIS frame (Table 3) is often either non-existent or weak, particularly for TA. There is a need for further conceptualization and evidence in each of the 40 cells of the frame. Although promising evidence exists for several of the ten GTO steps per component (as briefly mentioned in Tables 4, 5, 6, 7), more sophisticated research and methodologies (e.g., studies that include a control or comparison group) are needed to strengthen the evidence-base. The role and the importance of partnerships among key stakeholders in developing EBSIS needs clearer articulation, including how to bring funders, researchers/evaluators, practitioners, and consumers together for effective research and practice and how to use peer–peer learning and communities of practice to build an EBSIS.
2. We believe that human relationships (e.g., trust and mutual respect) are vital in the use of the four support components. Relationships influence the quality of a Support System. A comprehensive evidence-based approach to relationships must be undertaken.
3. Leadership is recognized as a key factor in the adoption and implementation of an innovation. The role of leadership in multiple systems of the ISF needs to be more fully investigated in relation to EBSIS.
4. Accountability and quality implementation are major priorities in the ISF that span across each of the interacting systems. This article focuses primarily on one segment in the ISF: the link between the Support System and the Delivery System. A future step will be to additionally illuminate the interaction between the Support System and the Synthesis and Translation System (for example, the development of quality tools may entail mutual contributions by the Support System and the Synthesis and Translation System (Lewis et al. 2012)).
5. The EBSIS logic model places great importance on initial and ongoing capacity at the individual and organizational levels, yet the assessment of capacity status was not systematically discussed in this article. A systematic approach to the initial capacity assessment is needed.
6. In the ISF, there are two kinds of capacity: innovation-specific capacity and general capacity. In this article, we emphasize development and use of evidence-based Support Systems for building innovation-specific capacity. EBSIS would benefit from an extension that includes strategic, accountable approaches for general capacity building.
7. A fundamental concept in EBSIS is that each of the four components is necessary but not sufficient to build capacity in the Delivery System, and that an integration of the four components is most likely to produce capacity outcomes. The science and practice of best practices for integrating the use of all four components must be built to obtain excellence in the Support System of the ISF. As we move forward, we expect there to be many interactions between the 40 EBSIS cells.

A Concluding Comment

The development of the Interactive Systems Framework for Dissemination and Implementation was stimulated by the gap between science and practice. Support for innovations is required to bridge research and practice and to achieve quality outcomes. Developing an evidence- based system for supporting innovation is a journey that was begun years ago with many piecemeal studies and frameworks in *each* of the four components of support (tools, training, TA, and QA/QI). A robust EBSIS can help advance the science and practice of the ISF Support System because it would provide (1) an evidence-based approach that will integrate the four components to increase the effectiveness and efficiency of support, and (2) an accountability structure for both existing and new theory and research on support. Quality implementation of evidence-based practices requires mutual accountability among funders, researchers, practitioners, and consumers. A robust EBSIS would provide funders, researchers/evaluators, practitioners, and consumers with a more articulated accountability system for achieving the quality outcomes desired.

References

Alliger, G. M., Tannenbaum, S. I., Bennet, W., Traver, H., & Shotland, A. (1997). A meta-analysis of the relations among training criteria. *Personnel Psychology, 50*, 341–358.

Ammerman, R. T., Putnam, F. W., Margolis, P. A., & Van Ginkel, J. B. (2009). Quality improvement in child abuse prevention programs. In K. A. Dodge & D. L. Coleman (Eds.), *Preventing child maltreatment: Community approaches* (pp. 63–86). New York: The Guilford Press.

Anjard, R. P. (1995). SPC chart selection process. *Microelectronics and Reliability, 35*(11), 1445–1447.

Ayusawa, M., Sonobe, T., Uemura, S., Ogawa, S., Nakamura, Y., Kiyosawa, N., et al. (2005). Revision of diagnostic guidelines for Kawasaki disease. *Pediatrics International, 47*(2), 232–234.

Bartholomew, N. G., Joe, G. W., Rowan-Szal, G. A., & Simpson, D. D. (2007). Counselor assessments of training and adoption barriers. *Journal of Substance Abuse Treatment, 33*, 193–199.

Beard, G. (2008). Improving clinical interventions through successful outreach using Six Sigma quality improvement. *Journal of Healthcare Quality, 30*(1), 38–43.

Becker, D. R., Lynde, D., & Swanson, S. J. (2008). Strategies for state-wide implementation of supported employment: The Johnson & Johnson—Dartmouth Community Mental Health Program. *Psychiatric Rehabilitation Journal, 31*(4), 296–299.

Bickman, L. (2008). A measurement feedback system (MFS) is necessary to improve mental health outcomes. *Journal of the American Academy of Child and Adolescent Psychiatry, 47*(10), 1114–1119.

Blumenthal, B. (2003). *Investing in capacity building: A guide to high-impact approaches*. New York: The foundation Center.

Bramley, P. (1991). *Evaluating training effectiveness.* New York, NY, and Maidenhead: McGraw-Hill Book.

Bramley, P., & Kitson, B. (1994). Evaluating training against business criteria. *Journal of European Industrial Training, 18*(1), 10–14.

Butterfoss, F. (2004). The coalition technical assistance and training framework: Helping community coalitions help themselves. *Health Promotion Practice, 5*(2), 118–126.

Butterfoss, F. D. (2007). *Coalitions and partnerships in community health*. San Francisco, CA: Jossey-Bass.

Cannon-Bowers, J. A., Salas, E., Tannenbaum, S. I., & Matthieu, J. E. (1995). Toward theoretically-based principles of trainee effectiveness: A model and initial empirical investigation. *Military Psychology, 7*, 141–164.

Carnevale, A. P., Gainer, L. E., & Meltzer, A. S. (1990). *Work- place basics: The essential skills employers want*. San Fran- cisco, CA: Jossey-Bass Publishers.

Chinman, M., Young, A. S., Rowe, M., Forquer, S., Knight, E., & Miller, A. (2003). An instrument to assess competencies of providers treating severe mental illness. *Mental Health Services Research, 5*, 97–108.

Chinman, M., Hannah, G., Wandersman, A., Ebener, P., Hunter, S. M., Imm, P., et al. (2005). Developing a community science research agenda for building community capacity for effective prevention interventions. *American Journal of Community Psychology, 35*(3–4), 143–157.

Chinman, M., Hunter, S. B., Ebener, P., Paddock, S. M., Stillman, L., Imm, P., et al. (2008). The getting to outcomes demonstration and evaluation: An illustration of the prevention Support System. *American Journal of Community Psychology, 41*(3–4), 206–224.

Clement, W. A., Wilson, S., & Bingham, B. J. (2002). A guide to creating your own patient-oriented website. *Journal of the Royal Society of Medicine, 95*(2), 64–67.

Collins, C., Harshbarger, C., Sawyer, R., & Hamdallah, M. (2006). The diffusion of effective behavioral interventions project: Development, implementation, and lessons learned. *AIDS Education and Prevention, 18* (Supplement A), 5–20.

Cowley, K., & Good, K. (2010). Using evaluation to refine and focus technical assistance. In S. Harsh, K. Bradley, K. Good, & J. Ross (Eds.), *Capacity building technical assistance*. Nashville, TN: Edvantia.

DeMatteo, J. S., Dobbins, G. H., & Lundby, K. M. (1997). The effects of accountability on training effectiveness. *Training Research Journal, 3*, 39–57.

Donabedian, A. (1996). The effectiveness of quality assurance. *International Journal for Quality in Health Care, 8*, 401–407.

Drucker, P. (2008). *Classic Drucker: Essential wisdom of Peter Drucker*. Boston, MA: Harvard Business Press.

Duffy, J. L., Prince, M., Johnson, E. J., Alton, F. L., Flynn, S., Faye, M., et al. (2012). Enhancing teen pregnancy prevention in local communities. Capacity building using the interactive systems framework. *American Journal of Community Psychology*.

Durlak, J. A., & DuPre, E. P. (2008). Implementation matters: A review of research on the influence of implementation on program outcomes and the factors affecting implementation. *American Journal of Community Psychology, 41*, 327–350.

Eysenbach, G., & Jadad, A. R. (2001). Evidence-based patient choice and consumer health informatics in the internet age. *Journal of Medical Internet Research, 3*(2), e19.

Fagan, A. A., Hanson, K., Hawkins, J. D., & Arthur, M. W. (2008). Bridging science to practice: Achieving prevention program implementation fidelity in the community youth development study. *American Journal of Community Psychology, 41*, 235–249.

Fawcett, S. B., Paine Andrews, A., Francisco, V. T., Schultz, J. A., Richter, K. P., Lewis, R. K., et al. (1995). Using empowerment theory in collaborative partnerships for community health and development. *American Journal of Community Psychology, 23*(5), 677–697.

Feinberg, M. E., Greenberg, M. T., & Osgood, D. W. (2004). Readiness, functioning, and perceived effectiveness in community prevention coalitions: A study of Communities That Care. *American Journal of Community Psychology, 33*, 163–176.

Feinberg, M. E., Ridenour, T. A., & Greenberg, M. T. (2008). The longitudinal effect of technical assistance dosage on the functioning of Communities That Care prevention boards in Pennsylvania. *The Journal of Primary Prevention, 29*(2), 145–165.

Fixsen, D. L., Blase, K. A., Naoom, S. F., & Wallace, F. (2009). Core implementation components. *Research on Social Work Practice, 19*(5), 531–540.

Flaspohler, P., Duffy, J., Wandersman, A., Stillman, L., & Maras, M. A. (2008). Unpacking prevention capacity: An intersection of research-to-practice models and community-centered models. *American Journal of Community Psychology, 41*(3–4), 182–196.

Florin, P., Mitchell, R., & Stevenson, J. (1993). Identifying training and technical assistance needs in community coalitions: A developmental approach. *Health Education Research: Theory and Practice, 8*(30), 417–432.

Furman, C., & Caplan, R. (2007). Applying the Toyota production system: Using a patient safety alert system to reduce error. *Joint Commission on Quality & Patient Safety, 33*(7), 376–386.

Gawande, A. (2009). *The checklist manifesto: How to get things right*. New York: Metropolitan books.

Gibbs, D., Napp, D., Jolly, D., Westover, B., & Uhl, G. (2002). Increasing evaluation capacity within community-based HIV prevention programs. *Evaluation and Program Planning, 25*, 261–269.

Grimshaw, J. M., & Russell, I. T. (1993). Effects of clinical guidelines on medical practice: A systematic review of rigorous evaluations. *The Lancet, 342*(8883), 1317–1322.

Groi, R., Daihuijsen, J., Thomas, S., In'tVeld, C., Rutten, G., & Mokkink, H. (1998). Attributes of clinical guidelines that influence use of guidelines in general practice: Observational study. *British Medical Journal, 317*, 858–861.

Grol, R., Baker, R., Roberts, R., & Booth, B. (1997). Systems for quality improvement in general practice. *European Journal of General Practice, 3*, 65–68.

Haag, S., Cummings, M., McCubbrey, D., Pinsonneault, A., & Donovan, R. (2006). *Management information systems for the information age* (3rd Canadian ed.). Canada: McGraw Hill Ryerson.

Hall, G. E., & Hord, S. M. (2006). *Implementing change: Patterns, principles and potholes* (2nd ed.). Boston, MA: Allyn and Bacon.

Harvey, G., & Kitson, A. (1996). Achieving improvement through quality: An evaluation of key factors in the implementation process. *Journal of Advanced Nursing, 24*(1), 185–195.

Hiruma, F., & Kaiho, H. (1991). Optimal design for a presentation of action-sequences in a user manual. *Japanese Journal of Educational Psychology, 39*(4), 461–466.

Ho, T., & Antunes, P. (1999). Developing a tool to assist electronic facilitation of decision-making groups. *String Processing and Information Retrieval Symposium, 10*, 243–252.

Joyce, B., & Showers, B. (2002). *Student achievement through staff development*. Alexandria, VA: Association for Supervision and Curriculum Development.

Kahn, B. K., Strong, D. M., & Wang, R. Y. (2002). Information quality benchmarks: Product and service performance. *Communications of the ACM, 45*, 184–192.

Keener, D. C. (2007). Toward a science of capacity building: An examination of technical assistance following a training program for prevention professionals. Unpublished doctoral dissertation, University of South Carolina, Columbia, SC, USA.

Kegeles, S. M., Rebchook, G. M., & Tebbetts, S. (2005). Challenges and facilitators to building program evaluation capacity among community-based organizations. *AIDS Education and Prevention, 17*(4), 284–299.

Kelly, J. A., Somlai, A. M., DiFranceisco, W. J., Otto-Salaj, L. L., McAuliffe, T. L., Hackl, K. L., et al. (2000). Bridging the gap between the science and service of HIV prevention: Transferring effective research-based HIV prevention interventions to community AIDS service providers. *American Journal of Public Health, 90*(7), 1082–1088.

King, D. L., Ben-Tovim, D. I., & Bassham, J. (2006). Redesigning emergency department patient flows: Application of lean thinking to health care. *Emergency Medicine Australasia, 18*(4), 391–397.

Kirkpatrick, D. L. (1959). Techniques for evaluating training programs. *Journal of American Society of Training Directors', 13*(3), 21–26.

Kitchenham, B., Pickard, L., & Pfleeger, S. L. (1995). Case studies for method and tool evaluation. *IEE Software, 12*(4), 52–62.

Knatterud, G. L., Rockhold, F. W., George, S. L., Barton, F. B., Davis, C. E., Fairweather, W. R., et al. (1998). Guidelines for quality assurance in multicenter trials: A position paper. *Controlled Clinical Trials, 19*(5), 477–493.

Knowles, M. S. (1970). *The modern practice of adult education: Andrology versus pedagogy*. New York: New York Association Press.

Kraemer, H. C., Measelle, J. R., Ablow, J. C., Essex, M. J., Boyce, T., & Kupfer, D. J. (2003). A new approach to integrating data from multiple informants in psychiatric assessment and research: Mixing and matching contexts and perspectives. *Journal of Psychiatry, 160*, 1566–1577.

Lammers, J. C., Cretin, S., Gilman, S., & Calingo, E. (1996). Total quality management in hospitals: The contributions of commitment, quality councils, teams, budgets, and training to perceived improvement at Veterans Health Administration Hospitals. *Medical Care, 34*(5), 463–478.

Lee, Y. W., Strong, D. M., Kahn, B., & Wang, R. Y. (2002). AIMQ: A methodology for information quality assessment. *Information & Management, 40*, 133–146.

Letts, C. W., Ryan, W. P., & Grossman, A. (1999). *High performance nonprofit organizations: Managing upstream for greater impact*. New York, NY: Wiley.

Lewis, K., Lesesne C. A., Zahniser, S. C., Wilson, M. M., Desiderio, G., Wandersman, A. & Green, D. C. (2012). Developing a prevention synthesis and translation system to promote science based approaches to teen pregnancy, HIV and STI Prevention. *American Journal of Community Psychology*. doi:10.1007/s10464-012-9510-1.

Lovelle, J. (2001). Mapping the value stream. *IIE Solutions, 33*(2), 26–33.

Mahapatra, R., & Lai, V. (2005). Evaluating end-user training programs. *Communications of the Association for Computing Machinery, 48*(1), 67–70.

Marguerite Casey Foundation. (2007). The Marguerite Casey Foundation organizational capacity assessment tool. From http://www.caseygrants.org. Retrieved December 21, 2010.

McConnon, A., Kirk, S. L., Cockroft, J. E., Harvey, E. L., Greenwood, D. C., Thomas, J. D., et al. (2007). The internet for weight control in an obese sample: Results of a randomized controlled trial. *BMC Health Services Research, 7*, 206–215.

McGehee, W., & Thayer, P. W. (1961). *Training in business and industry*. New York: Wiley.

McLaughlin, T. J., Soumerai, S. B., Wilson, D. J., et al. (1996). Adherence to national guideline for drug treatment of suspected acute myocardial infarction: Evidence for under treatment in women and the elderly. *Archives of Internal Medicine, 156*, 799–805.

Meyers, D. C., Katz, J., Chien, V., Wandersman, A., Scaccia, J., & Wright, A. (2012). Practical implementation science: Developing and piloting the quality implementation tool. *American Journal of Community Psychology*.

Mihalic, S. F., & Irwin, K. (2003). Blueprints for violence prevention: From research to real world settings—factors influencing the successful replication of model programs. *Youth Violence and Juvenile Justice, 1*, 307–329.

Mitchell, R. E., Florin, P., & Stevenson, J. F. (2002). Supporting community-based prevention and health promotion initiatives: Developing effective technical assistance systems. *Health Education & Behavior, 29*(5), 620–639.

Mitchell, R., Stone-Wiggins, B., Stevenson, J. F., & Florin, P. (2004). Cultivating capacity: Outcomes of a statewide Support System for prevention coalitions. *Journal of Prevention and Intervention in the Community, 27*, 67–87.

Mizzaro, S. (2003). Quality control in scholarly publishing: A new proposal. *Journal of American Society for Information Science & Technology, 54*(11), 989–1005.

Mumtaz, S. (2000). Factors affecting teachers' use of information and communication technology: A review of the literature. *Journal of Information Technology for Teacher Education, 9*(3), 319–342.

Nemec, P. B., Forbess, R., Cohen, M. R., Farkas, M. D., Rogers, E. S., & Anthony, W. (1991). Effectiveness of technical assistance in the development of psychiatric rehabilitation programs. *Journal of Mental Health Administration, 18*(1), 1–11.

Noe, R. A. (2010). *Employee training and development* (5th ed.). Boston, MA: Irwin/McGraw-Hill.

O'Donnell, L., Scattergood, P., Alder, M., San Doval, A., & Al, E. (2000). The role of technical assistance in the replication of effective HIV interventions. *AIDS Education and Prevention, 12* (Suppl. A), 99–111.

Parnas, D. L., & Lawford, M. (2003). The role of inspection in software quality assurance. *IKEE Transaction on Software Engineering, 29*(8), 674–676.

Powell, A. E., Rushmer, R. K., & Davies, H. T. O. (2009). *A systematic narrative review of quality improvement models in health care*. Scotland: NHS Quality Improvement.

Quinby, R. K., Hanson, K., Brooke-Weiss, B., Arthur, M. W., Hawkins, J. D., & Fagan, A. (2008). Installing the communities that care prevention system: Implementation progress and

fidelity in a randomized controlled trial. *Journal of Community Psychology, 36*(3), 313–332.

Ray, M. L., Wilson, M. M., Wandersman, A., Meyers, D., & Katz, J. (2012). Using a training-of-trainers approach and proactive technical assistance to bring evidence-based programs to scale: An operationalization of the Interactive Systems Framework's Support System. *American Journal of Community Psychology*.

Rowold, J. (2007). Individual influences on knowledge acquisition in a call center training context in Germany. *International Journal of Training and Development, 11*(1), 21–34.

Salyers, M. P., McKasson, M., Bond, G. R., & McGrew, J. H. (2007). The role of technical assistance centers in implementing evidence-based practices: Lessons learned. *American Journal of Psychiatric Rehabilitation, 10*, 85–101.

Salzer, M. S., & Bickman, L. (1997). Delivering effective children's services in the community: Reconsidering the benefits of system interventions. *Applied & Preventive Psychology, 6*, 1–13.

Scaduto, A., Lindsay, D., & Chiaburu, D. S. (2008). Leader influences on training effectiveness: Motivation and outcome expectation process. *International Journal of Training & Development, 12*(3), 158–170.

Shojania, K. G., & Grimshaw, J. M. (2005). Evidence-based quality improvement: The state of the science. *Health Affairs, 24*, 138–150.

Sieber, J. E. (2008). When academicians collaborate with community agencies in effectiveness research. *Clinical Psychology: Science and Practice, 15*(2), 137–143.

Silimperi, D. R., Franco, L. M., Van Zanten, T. V., & Macaulay, C. (2002). A framework for institutionalizing quality assurance. *International Journal for Quality in Health Care, 14*(Suppl 1), 67–73.

Sobeck, J., & Agius, E. (2007). Organizational capacity building: Addressing a research and practice gap. *Evaluation and Program Planning, 30*, 237–246.

Speroff, T., & O'Connnor, G. T. (2004). Study designs for PDSA quality improvement research. *Quality Management in Health care, 13*(1), 17–32.

Spoth, R., Claire, C., Greenberg, M., Redmont, C., & Shin, C. (2007). Toward dissemination of evidence-based family interventions: Maintenance of community-based recruitment results and associated factors. *Journal of Family Psychology, 21*(2), 137–146.

Squires, D., & Preece, J. (1996). Usability and learning: Evaluating the potential of educational software. *Computers Education, 27*(1), 15–22.

Stevenson, J. F., Florin, P., Mills, D. S., & Andrade, M. (2002). Building evaluation capacity in human service organizations: A case study. *Evaluation and Program Planning, 25*(3), 233–243.

Stvilia, B., Twidale, M. B., Smith, L. C., Gasser, L. (2005). Assessing information quality of a community-based encyclopedia.

Tai, W. (2006). Effects of training framing, general self-efficacy and training motivation on trainees' training effectiveness. *Personnel Review, 35*(1), 51–65.

Thomas, L., Cullum, N., McColl, E., Rousseau, N., Soutter, J., & Steen, N. (2000). Guidelines in professions allied to medicine. *Cochrane Database Systematic Review, 2*, CD000349.

Trivedi, M. H., Kern, J. K., Marcee, A., Grannemann, B., Kleiber, B., Bettinger, T., et al. (2002). Development and implementation of computerized clinical guidelines: Barriers and solutions. *Methods of Information in Medicine, 41*, 435–442.

Varkey, P., Reller, M. K., & Resar, R. K. (2007). Basics of quality improvement in health care. *Mayo Clinic Proceedings, 82*(6), 735–739.

Wandersman, A., Duffy, J., Flaspohler, P., Noonan, R., Lubell, K., Stillman, S., et al. (2008b). Bridging the gap between prevention research and practice: The interactive systems framework for dissemination and implementation. *American Journal of Community Psychology, 41*(3–4), 171–181.

Wandersman, A., Flaspohler, P., & Saul, J. (2008a). Illuminating the interactive systems framework for dissemination and implementation. *Special issue of the American Journal of Community Psychology, 82*, 6.

Wandersman, A., Imm, P., Chinman, M., & Kaftarian, S. (2000). Getting to outcomes: A results-based approach to accountability. *Evaluation and Program Planning, 23*, 389–395.

Wesley, P. W., & Buysse, V. (1996). Supporting early childhood inclusion: Lessons learned through a statewide technical assistance project. *Topics in Early Childhood Special Education, 16*(4), 476–500.

Whiting, P., Rutjes, A. W., Reitsma, J. B., Bossuyt, P. M., & Kleijnen, J. (2003). The development of QUADAS: A tool for the quality assessment of studies of diagnostic accuracy included in systematic reviews. *BMC Medical Research Methodology, 3*(25), 1–13.

Yasin, M. M., & Zimmer, T. W. (1996). The role of benchmarking in achieving continuous service quality. *International Journal of Contemporary Hospitality Management, 7*(4), 27–32.

Young, W. F., Montgomery, D., Nycum, C., Burns-Martin, L., & Buller, D. B. (2006). Web-based technical assistance and training to promote community tobacco control policy change. *Health Promotion Practice, 7*(1), 78–85.