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Sustainability of Systems-Level Evidence-Based Practices in Schools: Current Knowledge and Future Directions

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INTRODUCTION

Recent research advances have focused on the use of evidence-based practices to improve academic and behavior support in schools (Hoagwood, 2004; Walker, 2004). Simultaneously, education policy has advocated for strategies that will allow implementation of these practices on a meaningful scale (Adelman & Taylor, 2003; Elias, Zins, Graczyk, & Weissburg, 2003; Mihalic & Irwin, 2003). These complementary efforts are shaping an agenda for transforming research to practice by training typical school personnel to provide efficient and effective interventions. The effectiveness of these practices is measured in part not only by immediate effects but also by sustained effects (Adelman & Taylor, 2003), and some have argued that the widespread use of practices is only significant to the extent that these practices are sustained (Coburn, 2003; McLaughlin & Mitra, 2001). Therefore, if comprehensive school reform is to occur, researchers must make efforts to ensure that implemented practices are both effective and sustainable.

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Sustainability may be defined as durable, long-term implementation of a practice at a level of fidelity that continues to produce valued outcomes (Han & Weiss, 2005). In practical, school-level terms, sustainability is the creation of a social norm, the point at which a practice ceases to be a project or initiative and becomes institutionalized. Descriptions of certain practices by personnel as "what we've always done" or "the way we do business" are an indication that these practices are being sustained (Rogers, 2003), at least at the present moment. Such comments may also indicate that the process becomes easier to continue than it was to initiate.

As a behavioral principle, sustainability is different from maintenance. For the sake of clarity, we draw a distinction between maintenance of effects and sustainability of practices designed to produce those effects. At the student level, maintenance describes the continued benefit in individual student outcomes from a practice that was implemented and is no longer is in place. After a successful intervention is discontinued, students who initially received and benefited from the intervention may not necessarily continue to benefit (August, Lee, Bloomquist, Realmuto, & Hektner, 2004; Hinshaw, Klein, & Abikoff, 2002); further, incoming students who did not receive the intervention are highly unlikely to benefit. At the systems level (e.g., school, district, or state), maintenance describes the continued use of a practice by school personnel once initially trained. What distinguishes sustainability from maintenance are the continual reexamination and *changes* in regular adult behavior that continue a practice. The regular turnover of the student population in schools ensures a dynamic, changing environment that makes a static practice obsolete. And, mirroring the continual replenishment of students, the regular, predictable turnover of personnel in schools provides a challenge to maintenance that may be addressed through sustainable practices, in which new hires are introduced to the practice as a regular, integral part of the workplace. Clearly, the best way for school personnel to improve student outcomes is to implement and sustain effective practices.

Sustainability is often perceived by researchers and implementers as a desirable, yet elusive phenomenon in which continued use is controlled by unknown variables (Vaughn, Klingner, & Hughes, 2000). This mystery occasions many questions. How can a research community predict if an effective, evidence-based practice will be implemented for 5, 10, or even 25 years? Which variables make practices more likely to sustain? Are there critical features of the practices themselves, or the implementation contexts, that increase the probability of sustained use? These questions have been raised regularly in the literature, but what little current research is available is primarily anecdotal (Gersten, Chard, & Baker, 2000). Because of its importance, a consistent, focused research agenda is needed to understand the principle of sustainability and increased durability of evidence-based practices. We provide here a conceptual model of sustainability, an example of how this model applies to one educational innovative (schoolwide positive behavior support, SW-PBS), and the initial elements of a research agenda addressing sustainability in education.

Understanding the Importance of Sustainability

In general terms, the sustained use of evidence-based practices clearly may be viewed as an important goal for researchers and one that benefits key stakeholders—any practice that results in short-term benefits could potentially result in benefits from continued use. Logically, continuing with an effective intervention to address an area of concern is a better use of resources than changing interventions every few years, as is evident by the volumes of program manuals gathering dust in school supply closets across the world. Cycles of repeated implementation without significant durable change have distinct costs, not only in terms of money, effort, direct intervention time, and school in-service programming, but also in terms of increased resistance to new implementation efforts, regardless of need or demonstrated efficacy. This may perpetuate a cynical view that any new programs will soon be replaced with a new program within the year. All in all, the expenses of continual reimplementation may far exceed the costs associated with sustainability efforts. If so, implementing a practice without taking specific actions to sustain it may be irresponsible or even unethical (Coburn, 2003; McLaughlin & Mitra, 2001).

Yet, universally adopting a goal of sustaining every intervention implemented in schools may overlook a critical variable in sustainability. Sustainability is difficult to achieve in large part because the importance of sustaining a practice may be directly associated with the importance of the outcome the practice delivers. If the outcome is important, attention to sustained use of effective practices becomes relevant. If the outcome is no longer viewed as important or relevant (e.g., a shift in priorities takes place), the practice is likely to be reevaluated and abandoned. One message is that first identifying an important, valued outcome and then identifying a practice that can produce the outcome may lead to more sustainability than identifying a practice and then determining how it can be sustained. The outcome must be valued by the school-level implementers, not just researchers assisting with adoption and initial implementation (Bernfield, Blase, & Fixsen, 1990; Greenberg, Weissburg, & O'Brien, 2003). Without outcomes that are valued by school-level personnel, sustainability is unlikely and perhaps undesirable.

Barriers to Sustainability

Implementation of any systems-level practice can be difficult to achieve in schools, but sustainability is a challenge on a higher level of magnitude. Sustainability is the exception rather than the rule, and we should take immediate notice when it occurs by carefully examining any conditions that allow it to occur (Vaughn et al., 2000). We would also do well to take notice when it does not occur and analyze the variables at work in those circumstances. The literature points to a number of commonly identified threats and barriers to sustained implementation of a practice that has already been implemented to criterion. From a behavior analytic view of this research, they fall into three categories that align with the traditional

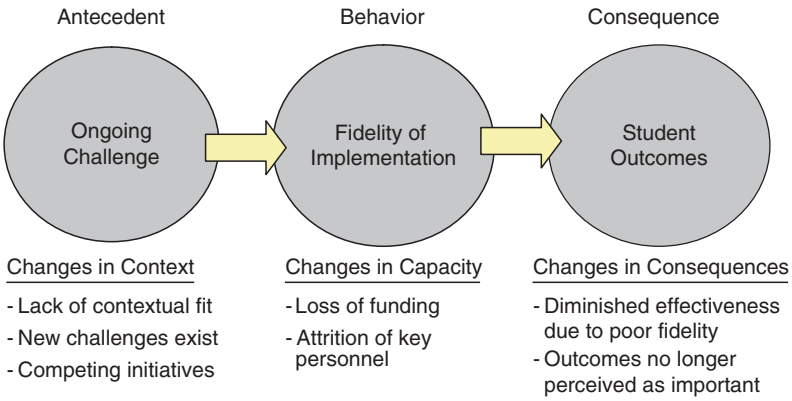

Fig. 14.1. Competing variables that prevent sustainability.

three-term contingency of behavior (see Fig. 14.1): change in context, change in capacity, and change in contingencies.

Change in Context

Initial implementers may adapt a practice to the needs of the school based on contextual fit, an assessment of the match among the identified need (outcome), the practice, and the beliefs, skills, resources, and values of school personnel (Albin, Lucyshyn, Horner, & Flannery, 1996; Elias et al., 2003; Fixsen, Naoom, Blase, Friedman, & Wallace, 2005; Wolf, 1978). The results of this assessment are used to improve the alignment between the practice and the presenting problem and desired outcomes. If the school context should change, as often occurs, the new and previous antecedent variables may no longer occasion use of the practice or may occasion use of another practice entirely, resulting in discontinuation of the previous practice (Han & Weiss, 2005; McLaughlin & Mitra, 2001). In other words, the nature of the problems change, rendering the practice irrelevant and necessitating a different solution.

Another context change is the introduction of competing initiatives or priorities that occasion adoption of different and frequently competing practices. Schools today face a constant barrage of new initiatives at the district, state, and national levels. When these new initiatives are associated with powerful contingencies (e.g., legislative mandates, funding reductions, and publication of failure in local newspapers), school administrators may dilute existing efforts by, for example, adding new practices, redirecting limited resources, and reducing time investments. Even when competing initiatives are striving toward similar outcomes, differences in programmatic and implementation features inhibit integration and collaboration. The result can be constant addition of new initiatives, none of which are implemented with adequate fidelity or produce effects (Furney, Hasazi, Clark-Keefe, & Hartnett, 2003; Sindelar, Shearer, Yendol-Hoppey, & Liebert, 2006).

Change in Capacity

Change in capacity refers to adjustments made to the personnel, systems, or resources supporting the implementation of the intervention. To maximize effects or outcomes, an intervention must be implemented with fidelity or accuracy. Any reduction in fidelity risks loss of effects. Clearly, funding plays a role in many failures to sustain. For example, states and districts frequently use external funding to "seed" or pilot a practice or initiative, which often has a lifespan of 1 to 3 years. When this funding stream comes to an end, school personnel must continue with their additional responsibilities but without the funding that may have provided additional personnel or release time (Adelman & Taylor, 2003; Coburn, 2003; Han & Weiss, 2005). If the state or district has not used the external funding strategically to build capacity that can be sustained under existing budget and resource conditions, the fidelity of practice or initiative implementation is likely to decrease because of competition for a limited and static general fund, creating a strain in existing personnel and material resources (Waterhouse & Chapman, 2006). If the funding allocated to implement a new initiative is not accompanied by the resources needed for continued operation, the new practice may cease to be implemented, even if initial implementation produced desired effects (Latham, 1988).

A reduction in local implementation capacity can affect fidelity of implementation in two phases. First, if implementation leadership and coordination are not established at the local level, the withdrawal of researchers or outside implementers creates a deficit in which sites no longer have the skills to continue the practice. Second, fidelity of implementation is decreased when key personnel (particularly administrators), who have experience with the practice through initial implementation and training, move to other positions (Mihalic & Irwin, 2003; Sindelar et al., 2006). The impact is especially damaging when these individuals have championed the program and held pivotal roles in essential implementation tasks and responsibilities (Elliott, Kratochwill, & Roach, 2003; Hanley, 2003). In this case, a strength during initial implementation becomes a liability for sustainability.

Change in Contingencies

In a well-run system, outcomes drive the process, and a reduction in desired outcomes can be disastrous. If using the practice no longer leads to desired outcomes, the practice is no longer useful to personnel. Outcomes can be affected negatively by a number of mechanisms, although the most obvious is poor fidelity of implementation. As noted, when fidelity suffers (as a result of change in capacity or context), outcomes are likely to suffer as well, in turn reducing interest in implementation.

Another mechanism for change in consequences occurs when the outcomes that the practice produces are no longer valued by school personnel or stakeholders, even if still effective (Wolf, 1978). This situation could occur if the school context changes or if the outcome is experienced differently. A pertinent metaphor is the pharmacological wellness

myth—individuals experience negative symptoms, take medications that eliminate those symptoms, and then stop their course of medication, assuming that it is no longer needed. For example, school personnel who implement an intervention to reduce bullying behavior may stop implementing the intervention because bullying events are reduced, not knowing that ending the intervention could lead to an upswing in future bullying behavior.

It is likely that these competing variables have an additive risk effect in that school personnel may sustain a practice when one or a few of these variables are present, but sustainability becomes far more difficult as the number of risks increase (Sindelar et al., 2006). Although this may be the case, these barriers need not be viewed as death knells for a particular practice. It is a distinct possibility that practices do not sustain because (a) sustainability is not a stated goal; (b) when stated, sustainability efforts are not enacted directly and formally; or (c) sustainability efforts themselves are not implemented with fidelity over time. For instance, just as the "train-and-hope" strategy is ineffective for implementing a program, an "intervene-and-hope" strategy is unlikely to promote sustainability (Newton, 2008). Rather, formal sustainability efforts should be part of the plan at initial implementation (Adelman & Taylor, 2003).

A PROPOSED MODEL OF SUSTAINABILITY

To better understand the factors that contribute to or compete with sustainability, we reviewed the literature base. The results of this review indicated that most efforts to identify factors that affect sustainability have been theoretical or descriptive analyses. In this section, we propose a model of sustainable implementation for any school-based systems-level practices, including academic, social-emotional, or behavioral programs, based on this literature and our experiences implementing SW-PBS (Horner, Sugai, Todd, & Lewis-Palmer, 2005). Much of this model is based on the work of many pioneers in the field, whom we cite regularly in the following sections and to whom we are indebted. To present this model, we detail (a) the principles under which the model operates, (b) the features and process of the model itself, and (c) descriptions of the sustained implementation variables.

Principles

The model is based on the science and principles of behavior that have been documented with individuals and applied to groups of individuals (e.g., school-level personnel) over the past 60 years. The principles emphasize observable behavior, reinforcement, maintenance, competing schedules of reinforcement, and generalization. The behaviors of interest in the model include tasks involved in implementing the program as well as the skills needed to implement them correctly. Reinforcement is related to the impact of valued outcomes achieved by implementing the practice. Maintenance describes conditions in which personnel continue

to implement the practice because they have the needed skills and regular opportunities to use them and perceive that this use leads to beneficial outcomes. The principle of competing schedules of reinforcement explains how personnel make decisions about continuing the practice, abandoning it, or adopting a new practice. Generalization describes how personnel might adapt the practice or use it in different contexts.

Features and Process

The process of the model is comprised of three mechanisms by which the variables, situated within the context of the particular school, affect sustainability (see Fig. 14.2). First, school personnel identify valued outcomes as targets for the change process. Second, practices that may produce those outcomes are identified and adopted. Third, school personnel implement the critical features of the practices with fidelity. Fidelity (i.e., accurate and consistent change in adult behavior) is a key component of the model because it is the mechanism by which valued outcomes (change in student performance) are achieved (see a review by Mihalic & Irwin, 2003). If fidelity is high, an effective practice is more likely to produce the desired outcomes. If fidelity is low, outcomes are less likely to be reached. If the valued outcomes are produced, momentum to maintain implementation increases, but if outcomes do not improve, maintenance is threatened. As school personnel gain experience through continued implementation, the

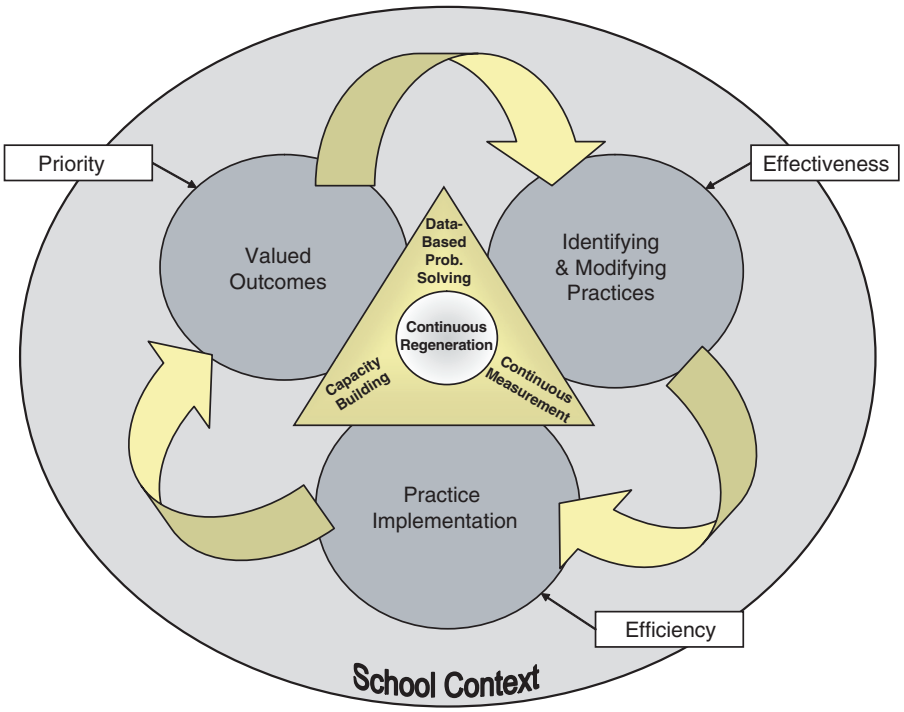

Fig. 14.2. A proposed model of sustainable implementation of school-based practices.

steps to achieve fidelity may become more efficient, and the practice may be modified to improve its effectiveness within the context. A continuous cycle, or feedback loop, develops in which each iteration may change the relation among the variables. This iterative process is known as *continuous regeneration*, a central element of the model.

Sustained Implementation Variables

Effectiveness

The effectiveness of a practice is the extent to which implementation results in desired outcomes; this is directly related to its fidelity of implementation and potential impact. Before change in outcomes should be expected, practices should be implemented initially to a criterion degree of fidelity and stability (August et al., 2004). Practices that are excessively difficult to implement or do not improve outcomes without perfect fidelity are unlikely candidates for sustained implementation. As noted, a practice is deemed effective to the extent that outcomes are experienced by large numbers of students and are valued and perceptible by school personnel (Adelman & Taylor, 2003; Datnow & Castellano, 2000; Kealey, Peterson, Gaul, & Dinh, 2000; Merrell & Buchanan, 2006). Accordingly, selection of ineffective, non-evidence-based practices is a critical error that would make meeting valued outcomes, and hence sustaining those practices, highly unlikely.

The principle of *reinforcement* is central to considerations of effectiveness. That is, school personnel must experience the effects of their practice implementation through improved outcomes, including improved student performance, improved work climate, reduction in work effort, or reduction of aversive teaching situations (Klingner, Arguelles, Hughes, & Vaughn, 2001; Vaughn et al., 2000). In addition, personnel may only view the practice as effective if they believe that their implementation of the practice was directly related to improved outcomes. If personnel attribute improved outcomes to other events or factors, they may be less likely to perceive the practice as worthwhile (Han & Weiss, 2005).

Efficiency

Efficiency describes the relationship between effectiveness and the effort required to produce effects, that is, weighing the costs of continued implementation with the benefits of outcomes (Vaughn et al., 2000). If the potential outcomes are perceived as more valuable than the effort required to sustain the practice, use of the practice is more likely to continue (Rogers, 2003). Efficiency also relates to the overall costs associated with continued implementation. If the resources needed to sustain the practice are so large that they interfere with other practices or exceed the capacity of the school system, the practice cannot be efficient, even if the outcomes are immensely valuable. For example, providing all students with daily one-on-one instruction could significantly increase academic skills, but the cost of continuing it would be prohibitive. As such, resource-heavy

programs implemented with the support of substantial grant money have little chance of sustained implementation once that support is removed (Elias et al., 2003).

In terms of sustainability, the critical features of efficient practices include efficiency in relation to other practices and differences in effort between initial and sustained implementation. First, practices are more likely to be sustained if they are the most cost-effective or the only viable method of obtaining desired outcomes. If more efficient alternative practices exist for obtaining the same outcome, school personnel are more likely to select those practices than to continue with a more expensive option (Rogers, 2003). Second, an important planning objective during initial implementation is to decrease the effort required to sustain a practice after initial implementation. In essence, the process should become more efficient over time in terms of personnel (i.e., the experience of using the practice should make continued use easier) and money (e.g., fewer release days for staff training and visits by external consultants).

Maintenance is the principle related to efficiency of practice implementation. Use of the practice continues because the practice is already in place, and school personnel are fluent in its use (i.e., its procedures become familiar to personnel with use), regular opportunities exist to use it, and valued outcomes are being achieved (Sindelar et al., 2006). If these conditions exist and it is viewed as a low-cost alternative to other approaches, the practice is more likely to be sustained.

Priority

Priority describes the relative visibility and importance of a practice in comparison to other practices. Priority is essential to retain the support initially offered by stakeholders, including administrators, school personnel, and families. Sustained implementation may take place if a practice has visibility as an effective, efficient, and essential part of the school system (Gager & Elias, 1997). This visibility can be affected by connecting the practice to the core values of individual school personnel who are implementing the practice (Han & Weiss, 2005) or with the vision and mission of larger entities, such as school boards or state departments of education (Benz, Lindstrom, Unruh, & Waintrup, 2004; Center for Mental Health in Schools, 2001; Coburn, 2003; Greenwood, Tapia, Abbott, & Walton, 2003). Such visibility is essential for securing access to ongoing resources, particularly when projects move from grants to regular funding (Coburn, 2003; Sadler, 2004).

Priority is not a vague, ethereal concept but rather the result of careful planning. Implementers can take a number of specific actions to increase the priority of a practice, including advocacy, policy, and blending with new initiatives. An important advocacy activity is presenting to important groups who control funding for the practice or otherwise exert influence on its priority and value. Effective presentations include sharing successful outcomes, such as data showing large-scale benefits or case studies illustrating individual benefits, and describing the continued need for the practice, possibly explaining the costs associated with abandoning the

practice (Adelman & Taylor, 2003). Policy actions include incorporating the practice into existing written policy (Vaughn et al., 2000). Such policies may include mission, vision, or goal statements; long-term school or district improvement plans; or statements of practices used or supported by the school system as core components.

Blending or "braiding" the practice into new initiatives may be an especially potent method of ensuring high priority for a practice (Adelman & Taylor, 2003; McLaughlin & Mitra, 2001). These terms describe a process in which the practice is regularly incorporated into new initiatives in the school system. If implementers can explain how the practice can be a vital part of new projects, they are more likely to be able to keep the practice on the list of important, worthwhile programs (Waterhouse & Chapman, 2006). If the practice cannot be reshaped as important to new projects, it may be abandoned in favor of practices that are aligned with new critical objectives (Sindelar et al., 2006). Local administrators can play a key role in this area by acting as a buffer between new initiatives and their personnel. Principals can continue to support the existing practice and reframe new initiatives as new phases of the current practice (Cherniss, 2006; Huberman, 1983). These minor changes in language allow school personnel to continue implementing the practice without receiving conflicting information about district or state priorities that might signal a lack of priority (Waterhouse & Chapman, 2006). In the current climate of school reform, new initiatives are inevitable, and the extent to which practices can be regarded as components of future initiatives may ensure their continued priority and hence their survival.

The principle involved in the priority variable is *competing schedules of reinforcement*. This principle influences both groups with funding capabilities and individual school personnel. Just as students are faced with choices in responding to antecedent events (i.e., engaging in problem behaviors or desired behaviors), funding agencies and school personnel are faced with similar choices, such as continuing to implement a practice or discarding it and adopting a new practice. Given the limited resources of most school systems, administrators and personnel must regularly choose among a sea of competing initiatives, all with different purposes, outcomes, and competing contingencies (schedules of reinforcement). When implementation tasks are viewed as a high priority by staff and contingencies are in place for completion, these behaviors may be seen as more viable than other tasks. The actions described may result in increased priority for certain practices, thereby increasing the probability that they are selected over tasks for implementing other practices.

Continuous Regeneration

Continuous regeneration is the process of (a) iterative monitoring of both fidelity and outcomes, (b) adaptation and readaptation of a practice over time while keeping its critical features intact, and (c) ongoing investment in implementation and reimplementation (Han & Weiss, 2005; McLaughlin & Mitra, 2001). Adaptation of a practice is crucial because it allows the practice to be spread to new areas, modified to meet changing features of the

context, and adjusted to become more efficient or effective. A practice that can evolve in this way is eminently valuable and is ultimately more likely to remain relevant to the school, particularly after significant changes in the implementation context over time (Elias et al., 2003; Rogers, 2003).

Continuous regeneration may take place in two ways. First, the practice may be regenerated through application to new areas (Coburn, 2003). A practice may be expanded to new settings (e.g., from classrooms to common areas), new stakeholders (e.g., from students to parents), or new levels of support (e.g., from all students to individual student support). Such an expansion could broaden the practice, making it more effective, visible, and valuable, and preserve the practice's novelty to staff, thereby avoiding stagnation.

Another form of continuous regeneration is responsiveness to change, which is needed for problem solving when environments and needs change or greater implementation effectiveness and efficiency are indicated. If the practice can be regenerated in response to changes in context, its worth to a school can be maximized (Han & Weiss, 2005; McLaughlin & Mitra, 2001; Newton, 2008). Yet, this process is more difficult in practice than in theory. For example, although they provide potential for high fidelity of implementation, the use of manualized treatment protocols may be too strictly interpreted by school personnel and run the risk of failing when the context and needs change (Elias et al., 2003; Carter & Horner, 2007). Practices that do not evolve to meet these demands may cease to be effective or be viewed as incompatible with new initiatives (McLaughlin & Mitra, 2001). As such, school personnel may need explicit instruction in how to adapt the practice to address contextual challenges while still maintaining the integrity of the practice (Coburn, 2003; Han & Weiss, 2005).

One method of promoting continuous regeneration is to connect a specific implementer to a larger community of practice implementers. Such a community could be accessed through Web-based listserves or conferences, particularly if the community is focused on the specific practice being implemented. Such connections allow school personnel to learn and share new approaches, receive encouragement and inspiration from each other, and use their collective strengths to respond to common challenges (Coburn, 2003; McLaughlin & Mitra, 2001; Sadler, 2004; Waterhouse & Chapman, 2006). Too often, schools and school districts enact reform and adopt practices in isolation from each other, which is less advantageous than connecting with other schools implementing similar programs (Togneri & Anderson, 2003).

Continuous regeneration is most related to the principle of *generalization*. Although an ambitious goal, generalization is important to sustainability in many ways. A practice becomes more valuable when used in a variety of contexts rather than limited to the original area of implementation (known as *stimulus generalization*). The result is increased effectiveness and efficiency, as well as continued behavioral momentum. In addition, a practice that is flexible can be adapted to changing situations to produce similar outcomes (known as *response generalization*). To allow for generalization to take place, continuous regeneration has three core components: capacity building, continuous measurement, and data-based problem solving.

Capacity Building

Capacity building describes the ongoing and systematic process of cultivating local expertise, which is the extent to which school or district-level personnel have the skills needed to continue the practice when trainers and external startup supports fade and are discontinued. In contrast, external expertise is provided by those outside of the school system, such as practice developers, implementers, or researchers at the university or regional level. After initial implementation, these external individuals or groups often transition out of active, regular consultation with the school system, leaving the active implementation of the practice to internal personnel. If these internal personnel do not have the knowledge and fluency to implement and use the practice, fidelity of implementation may drop to levels that render the practice ineffective, preventing access to reinforcement through achieving valued outcomes (Adelman & Taylor, 2003; Coburn, 2003; Han & Weiss, 2005; Stokes, Sato, McLaughlin, & Talbert, 1997). As such, the cultivation of local expertise, and thus capacity, is a critical concern for sustainability.

Local expertise is unlikely to develop as a result of initial implementation alone (Blase & Fixsen, 2004; Sarason, 2004). Rather, capacity building should be considered as one of the primary initial goals in an implementation plan (Lucyshyn et al., 2007). The central task in such a plan includes creating a structured system for developing and maintaining such expertise (Greenwood et al., 2003). Such a system can provide existing personnel with needed skills in initial implementation and show incoming personnel that the practice is an integral part of the school staff culture (McLaughlin & Mitra, 2001). Training may occur through multiday trainings or summer institutes or a schedule of half- and full-day training throughout the school year. These trainings focus on the day-to-day skills typical personnel need to use the practice effectively. Eventually, individual schools may discontinue implementation trainings and instead send new staff to a district or regional practice orientation training. A strategic, long-term vision of sustainability assumes that schools will lose personnel every year, and this system of training is targeted to ensure that each school maintains a basic level of skill in using the practice (Elias et al., 2003; Hatch, 2000).

This basic level of knowledge about a practice is necessary but not sufficient to sustain its complex, systems-level use. Core personnel with key skills are also needed to ensure sustainability at the district, regional, and state levels (Adelman & Taylor, 1997). These personnel should have not only a familiarity with the daily activities associated with the practice but also a deep understanding of its theory and critical features (Han & Weiss, 2005; McLaughlin & Mitra, 2001). Such an understanding allows school personnel to customize some aspects while maintaining the integrity of the practice (Elias et al., 2003). Without this knowledge, personnel may preserve irrelevant features and discard the effective components, leading to what McLaughlin and Mitra described as “lethal mutations” (2001). For example, school personnel may continue to provide schoolwide reinforcement tickets to students but cease to acknowledge the expectations that

students followed to earn them. Experienced core personnel can take on a number of important roles in sustaining the practice, including coordinating the capacity-building and training system described, presenting to stakeholders and funding agencies, measuring fidelity of implementation, evaluating outcomes, and providing ongoing consultation and performance feedback (Ikeda et al., 2002; Noell et al., 2005).

Although individuals certainly play vital parts in motivating staff to adopt and fully implement practices (Rogers, 2003), the practice is likely to suffer when these powerful advocates leave without a plan for replacement (Elliott et al., 2003; Han & Weiss, 2005). As such, there is a distinct advantage to creating ongoing positions rather than relying on specific individuals to fill these roles. In fact, establishing ongoing district-level positions can play a critical role in sustaining practices when key school-level personnel, such as building administrators, turn over. Hence, we recommend that school systems create ongoing positions with duties pertaining to the practice written into the job descriptions (e.g., Comer, Ben-Avie, Haynes, & Joyner, 1999).

Continuous Measurement

Ongoing measurement and evaluation of the practice is not simply best practice, but rather a critical element of sustainability. Indeed, the sole act of measurement itself may make a difference, even without data-based decision making (Mihalic & Irwin, 2003). Scheduling regular cycles of measurement as an integral part of the practice signals two important messages: The practice and its outcomes are valued, and personnel will hold themselves accountable for its implementation. Measurement on a regular, scheduled cycle should be built into the practice itself (Elliott et al., 2003). If measurement does not play a role in initial implementation, adding it as a later component or measuring only sporadically may not improve prospects for sustained implementation.

A valuable plan for continuous measurement consists of two sets of variables: valued outcomes and fidelity of implementation (Elias et al., 2003). Outcomes to be measured include the direct effects of the practice as well as indirect effects as they apply to other initiatives. Practices that have such complementary, or crossover, effects may have even greater value to schools than those that affect only one area (Kellam, Mayer, Rebok, & Hawkins, 1998). For example, a schoolwide behavior intervention might result in improved outcomes in student behavior and school safety (direct effects) as well as improved academic performance (indirect effects). Documenting both direct and indirect effects would be likely to increase the practice's value, particularly in terms of its value to academic achievement initiatives. In addition, fidelity of implementation, as a key mechanism in the model, plays a vital role in sustainability (NIMH Intervention Workgroup, 2001). Any loss in fidelity could lead to a loss in effectiveness, setting into motion a downward spiral that could end in abandonment of the practice (Hanley, 2003). With regular measurement, such a reduction in fidelity could be detected and remediated. As such, measuring fidelity of implementation is as important as measuring outcomes.

Data-Based Problem Solving

Data-based problem solving is the process of systematically and regularly assessing the measurement data described and converting it into action planning. When action plans are based on the results of measurement, problem solving is a powerful method of continuous regeneration through systematically altering components of the practice to improve its effectiveness, efficiency, and relevance (Deno, 1995; Gray, 1963; Riley, 1997). These changes are made to counter threats to sustainability (i.e., changes in context, capacity, and consequences) outlined in the first section. The effectiveness of the program can be enhanced by monitoring and improving fidelity of implementation. The efficiency of the process can be improved by assessing the steps of the process and allocating resources based on the severity of the problem. The relevance of the practice can be assessed by considering the school context and determining if the practice should be modified based on the changing needs of the school and key stakeholders (e.g., parents, community members). Such alterations of the practice, if completed systematically and based on available data, would not only improve its relevance but also could improve effectiveness and efficiency (Fullan, 2005; Greenwood, Delquadri, & Bulgren, 1993). These actions are completed not simultaneously but rather in a targeted manner, based on careful analysis of data, through a process in which measurement information is used to diagnose and find solutions to problems that would interfere with sustainability.

DEMONSTRATION OF SUSTAINABILITY: SCHOOLWIDE PBS

Schoolwide positive behavior support offers an example of one educational reform approach that formally considers and plans for sustainability (Lewis & Sugai, 1999; Sugai & Horner, 2005). SW-PBS has emerged over the past 20 years from (a) application of behavior analysis (Sulzer-Azaroff & Mayer, 1994; Walker, Ramsey, & Gresham, 2005), (b) implementation of effective practices at larger units of analysis (e.g., whole schools and communities; Biglan, 1995; Mayer, 1995), and (c) integration of social skills instruction, academic instruction, environmental redesign, and systems-level interventions (Greenberg et al., 2003; Greenwood et al., 1993; Gresham, Sugai, & Horner, 2001; Sugai & Horner, 2005, 2006). SW-PBS is a multitier approach to establishing the schoolwide social culture needed to improve social competence and academic achievement for all students. Attention to the social culture of a school is achieved by defining, teaching, monitoring, and regularly acknowledging the positive social behaviors expected for all students in a school. In addition, school personnel employ a continuum of corrective consequences for inappropriate behavior and collect data on social behavior and academic performance to assess the effectiveness of the school's efforts.

According to the logic of the SW-PBS approach, these initial efforts to establish a positive social culture can result in behavioral success for approximately 80% of students. Students who do not respond to this

primary intervention will require additional support (secondary or tertiary tiers). These additional tiers of support become increasingly more individualized and intensive to meet the needs of individual students.

Core Features of Sustainable SW-PBS Systems

The SW-PBS approach has been adopted by over 5,300 schools over the past 15 years, with large-scale evaluation reports documenting (a) high fidelity of implementation, (b) improved social behavior, (c) improved academic performance, and (d) sustained effects (Mass-Galloway, Barrett, Bradshaw, & Lewis-Palmer, 2008; Doolittle, 2006; Eber, 2006; Mass-Galloway Panyon, Smith, & Wessendorf, 2008; Horner et al., in press; Muscott, Mann, & LeBrun, 2008). Based on its effectiveness and large-scale adoption, we use SW-PBS as an example to demonstrate how a school-based practice can be applied with a deliberate goal of sustained implementation. The following are critical features for implementing SW-PBS systems that can sustain (Center on Positive Behavioral Interventions and Supports, 2004):

Implementation Is Coordinated by a Leadership Team

Implementation of SW-PBS typically is coordinated by a state, regional, or district leadership team with the responsibility for providing the funding, political support, and coordination of the implementation effort, especially related to developing coaching, training, and evaluation capacity. This team also is responsible for evaluating the effects of implementation and reporting on the extent to which school teams not only receive training, but also actually implement SW-PBS with fidelity.

Educational reforms are seldom simple efforts. The coordination, adaptation, monitoring, and support for large-scale educational reform start with establishing the political, administrative, and financial foundation that will allow initial implementation to occur with high fidelity. If practices are not initially implemented with high fidelity, their chances of taking root are severely diminished.

Social Behavior Is Defined as a High Priority

School teams adopting SW-PBS practices agree to establish the social behavior of students as one of the top three improvement goals for their school. In addition, a school moving to adopt SW-PBS is expected to demonstrate formal administrative support, an 80% commitment from the full faculty, and an agreement to invest in improving behavioral capacity for at least a 3-year period.

Specific Practices Are Effective and Efficient

SW-PBS systems have been adopted and adapted from a wide range of research and demonstration efforts over the past 50 years (Biglan, 1995; Colvin, Kame'enui, & Sugai, 1993; Lewis & Sugai, 1999; Nelson, 1996; Nelson, Martella, & Marchand-Martella, 2002; Sugai,

Horner, et al., 2000; Walker et al., 2005). A key feature, however, has been a commitment to adopting practices that are both evidence based (Kratochwill & Shernoff, 2004) and consistent with principles of human behavior (Sugai, Horner, et al., 2000).

The practices that typically compose SW-PBS systems are drawn from research literature, but the practices are not implemented without attention to contextual features. To achieve efficiency, SWPBS implementation efforts emphasize that school teams should (a) self-assess what they already do well, (b) never stop doing things that already work, (c) always look to implement the smallest changes that will have the largest effects on student outcomes, and (d) adapt practices and systems to fit the culture and context of the school and community.

Collection and Use of Data for Decision Making

Among the major contributions of SW-PBS to the discussion of sustainable educational reform is the commitment to use evaluation data for ongoing problem solving and decision making. Educators have long been involved in measuring the academic achievement of students, but seldom have schools (a) included ongoing measures of social behavior, (b) adopted the expectation that student outcomes should be reported frequently within an academic year, and (c) measured the fidelity of implementation as well as impact of implementation on student outcomes. Yet, these three features of measurement are core tools in promoting data-based decision making, a component necessary for continuous regeneration.

Leadership teams coordinating implementation of SW-PBS are expected to develop an evaluation plan that specifies measurement of both implementation fidelity and impact on student behavior. Two measures of implementation fidelity have been most common:

1. The Team Implementation Checklist (TIC; Sugai, Horner, & Lewis-Palmer, 2001) is a brief, 17-item, self-assessment used by a school implementation team to assess their status/progress on implementation of core SW-PBS features. The team builds a single "team summary" and can enter these data on a Web site (www.pbssurveys.org), where the results are instantly transformed into a visual display and compared with previous scores. The summary of the TIC is used by the school team for action planning.
2. The School-wide Evaluation Tool (SET; Sugai, Lewis-Palmer, Todd, & Horner, 2001) is a research-validated instrument that employs external observation of school practices to document if a school is implementing the core features of SW-PBS (Horner et al., 2004). The SET is used annually to validate TIC self-assessment scores.

In addition to regular monitoring of implementation fidelity, schools adopting SW-PBS are expected to establish formal systems for assessing student behavior. Ideally, a measure of student social behavior would focus on the social and emotional strengths of students. At present, however, direct observation of appropriate behavior and standardized assessment of

social and emotional well-being remain prohibitively expensive (McIntosh, Reinke, & Herman, in press). The most common option for school teams to monitor student social behavior is to assess levels of problem behavior. The pattern of office discipline referrals serves as one functional metric (Irvin et al., 2006; Irvin, Tobin, Sprague, Sugai, & Vincent, 2004; Sugai, Sprague, Horner, & Walker, 2000; Tobin, Sugai, & Colvin, 1996). The School-wide Information System (SWIS; May et al., 2006) is a Web-based information system used by over 3,000 schools to monitor ongoing patterns of office discipline referrals. The key feature of this process is that data about the type, frequency, location, and time of problem behavior is easily available to teachers, school psychologists/counselors, administrators, and the whole faculty for both ongoing action planning and evaluation of social behavior support efforts.

The use of data within SW-PBS efforts moves beyond the traditional summative (end-of-year) evaluation of academic achievement. Measures of social behavior and regular assessment of implementation fidelity both become sources of information that are readily available to the whole school and can be used for ongoing problem solving.

Capacity Building and Continuous Regeneration

The process of SW-PBS implementation addresses directly the expectation that building capacity of school systems is as important as building the skills of individual faculty and staff. School teams, teachers, and staff receive direct training and support in implementation of SW-PBS procedures. In addition, initial training typically also includes support from a district coach, who is present in the school at least monthly for ongoing problem solving. The coach is available to help a team when school personnel, administration, or local policies change. An explicit role of the coach is to help build the knowledge of the school teams, thereby cultivating local expertise.

The team also has a regular, annual process for planning, implementing, assessing, and adapting SW-PBS practices. Once the practices and procedures are implemented with fidelity, the amount of effort decreases, but because schools are dynamic environments, a modest investment is reserved for (a) orientation of new teachers, (b) orientation of substitute teachers, (c) annual teaching of behavioral expectations to students, and (d) annual review of data for adjustments and adaptation of more intense behavior support practices. The basic assumption is that as the context changes (e.g., new students, school personnel, and administrators join the school; district and state policies shift; community of families changes), the school team will need to adapt SW-PBS practices to ensure that the core features and outcomes are sustained.

Current Results

Two examples suggest that sustained implementation of schoolwide behavior support is feasible. A school-level example comes from Fern Ridge Middle School (FRMS) in Lane County, Oregon. The rural middle school of

approximately 500 students (Grades 6–8) has been cited as an exemplar of SW-PBS in earlier publications (Taylor-Greene et al., 1997; Taylor-Greene & Kartoub, 2000). During the 1994–1995 academic year, FRMS was in a state of significant social behavior unrest. Students were sent to the office for unacceptable behavior over 2,500 times in a 9-month period, and faculty identified the social behavior of students as a major barrier to effective instruction. In 1995–1996, the faculty began implementation of SW-PBS and were among the first schools to demonstrate high fidelity of implementation using the TIC and SET. The school's implementation of SW-PBS was associated with a dramatic reduction in the level of problem behaviors that resulted in office discipline referrals (47% reduction in the first year). The annual number of major office discipline referrals from FRMS from 1994–1995 to 2005–2006 is provided in Fig. 14.3. This school has retained high-fidelity implementation even with transitions in administrators and school personnel and fading of external expertise and funding provided by the University of Oregon. Ongoing use of data and annual adaptations to the practices in the school have retained core SW-PBS features and been associated with a sustained low level of office discipline referrals.

A national-level study of sustained SW-PBS implementation was conducted by Doolittle (2006), who examined 285 schools adopting SW-PBS over a 3-year period. Doolittle used SET total and subscale scores to examine if schools were actually implementing SW-PBS with fidelity (i.e., at the 80% criterion recommended by Sugai, Lewis-Palmer et al., 2001), and which core features of SWPBS were sustained over time. Doolittle found that 214 of the 285 schools (75%) met the implementation criterion within a 2-year period, and 140 of these 214 schools (65%) sustained criterion levels for at least 2 years.

Doolittle (2006) used logistic regression analysis to examine which features best predicted sustained implementation. The factors in her model that accounted for the largest effect sizes were (a) the presence of an ongoing

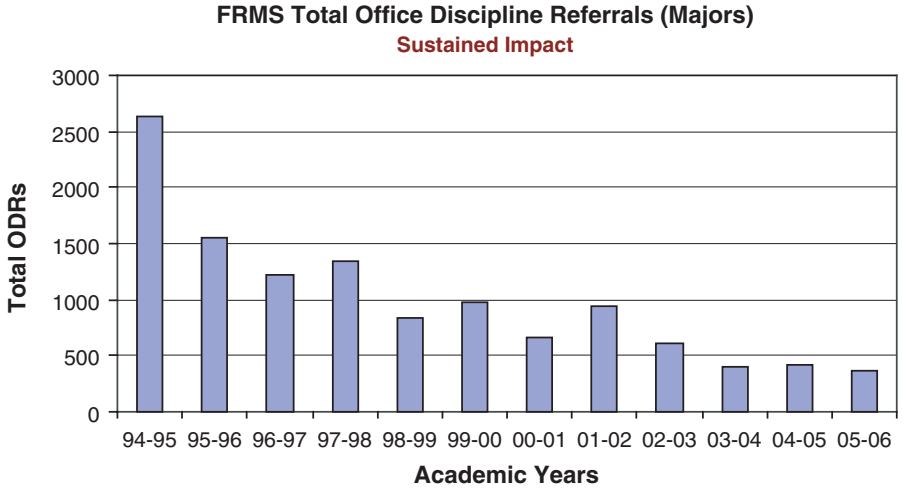

Fig. 14.3. The total number of major office discipline referrals per year from 1994–1995 to 2005–2006 for Fern Ridge Middle School (FRMS). ODR, office discipline referral.

system for acknowledging student appropriate behavior and (b) consistent administrative support in the form of active leadership, ongoing use of schoolwide action planning, and coordination of regular team meetings. Implementing effective strategies for encouraging prosocial behavior and retaining administrative support and coordination were the variables that distinguished schools with sustained implementation. These data are consistent with conceptual models that predict the need for an administrative infrastructure that monitors and supports implementation of educational practices that are sustained (Adelman & Taylor, 2003).

ESTABLISHING A RESEARCH AGENDA TO ADDRESS SUSTAINABILITY

The descriptive data given are both encouraging and provocative. Demonstrations of schools adopting and sustaining educational reforms suggest that meaningful school reform is possible. However, these results remain only suggestive without the causal links between model features, adoption fidelity, implementation protocol, and sustainability. Our conceptual thinking about sustainability exceeds our empirical demonstrations. We need to move our understanding of sustainability beyond theory and into effective and relevant practice. Effective policy on large-scale application of educational reform will require clear information about the variables that affect sustained use of effective practices. The absence of a research foundation addressing sustainability is a major barrier to large-scale dissemination of effective educational reform.

Conducting research on sustainability, however, presents a number of logistical challenges. First, the current models for funding national research lack the scale and length to conduct empirical tests of sustainability (Adelman & Taylor, 2003). Traditional funding cycles of 3 and 5 years allow the study of practice implementation but will not allow a functional test of sustainability, which can only be measured *after* controlled implementation (Elliott et al., 2003). Second, conducting studies on questions related to sustainability requires using a school or school district as the unit of analysis. When applied to the current "gold standard" of randomized control trails, the number of schools needed for a rigorous analysis stretches the study of sustainability beyond current levels of educational research funding and support. Finally, sophisticated statistical tests are needed to analyze results that are associated with schools as the unit of analysis; such approaches involve multiclass, nested, multitier subject and data clustering, and increased sources of error variance (Hedges, 2007).

These challenges notwithstanding, a research agenda on sustainability is possible (Han & Weiss, 2005). An effective sustainability research agenda will include formal systems for assessing and exploring failure, assessing fidelity, and documenting outcomes after external support is removed (Coburn, 2003). The methods needed for this research agenda will include multiple repeated measures that range from direct observation and indirect data sources (e.g., ratings, surveys, archival review) to large-scale assessment results (e.g., standardized statewide assessments).

To be convincing, the research will need to be conducted by multiple collaborating research centers. In general, sustainability research is likely to look more like the research programs conducted by other large social change disciplines, such as pharmacology, public health, medicine, and disease control (Brass, Nunez-Neto, & Williams, 2006).

In addition, careful consideration of the types of acceptable research designs will be needed. Many kinds of designs, ranging from quasi-experimental to experimental, possibly within the same program of research, will be needed (Kratochwill, 2002). The research community must define the value and role of single-subject research designs, requirements for conducting large-scale longitudinal studies, and statistical and design rules and guidelines for confirming and validating functional or causal relationships between molecular and molar variables. The value, trustworthiness, and meaningfulness and role of basic and applied research will need to be discussed, especially as research efforts move toward replication, effectiveness, and adaptation.

As our research methodologies improve in sophistication, scope, sensitivity, and trustworthiness, we will be able to launch credible programs of research addressing sustainability. Organizing to support these endeavors will benefit from attention to the following: conceptual models, investment in measures, innovative designs, integration of research methods, and analysis procedures.

Conceptual Models

Large-scale analysis of sustainability will require clearly defined conceptual models that define valued outcomes, the practices needed to achieve those outcomes, and the variables needed to sustain implementation of effective practices. Although the outcomes and specific practices of the model may vary by domain (e.g., reading improvement model), the principles of sustainability would remain constant in these models.

Investment in Measures

The conceptual models will be useful in defining the measures that will be essential for conducting the descriptive, correlational, and experimental research base for understanding sustainability. It will be necessary to measure a broad range of variables beyond immediate student outcomes and fidelity of implementation. Effective designs will include precise measurement of the process and context of implementation, such as dosage (i.e., intensity, quality, and duration) of training and technical assistance provided to school teams, and features of school and community environments that enhance and inhibit sustainability.

Innovative Designs

A functional research program addressing sustainability of educational practices will require application of all currently available research designs and additional innovations. It will be essential to document both

the strategies and practices needed to transform a school from ineffective to effective *and* the strategies and practices needed to sustain this achievement. Historically, education has operated as if initial implementation is sufficient to achieve sustainability. Emerging conceptual models of sustainability rely more on assumptions that ongoing procedures (e.g., continuous regeneration) will be needed for sustained implementation. This conceptual shift will require design adaptations and poses new challenges for isolating nested effects.

Integration of Research Methods

Any substantive study of sustainability will likely include systematic measurement and analysis of the efficiency and costs associated with educational reforms. Researcher precision will be needed to separate the efforts needed to achieve initial effects from those needed to sustain the effects.

Analysis Procedures

Interpreting sustainability research for scholars, policy makers, practitioners, decision makers, and the public will require multiple modes of analysis. Measurement and documentation of direct effects will fit within traditional models. Challenges will remain, including complex documentation of interaction effects, mediator/moderator variables, and the effects of variables that may be insignificant early in implementation and of large importance later in implementation.

Taken together, it seems likely that a substantive research agenda addressing sustainability of education reform will require a larger scope and duration than traditionally has guided federal funding. Useful investment in a research agenda focused on sustainability is likely to require (a) documentation of conceptual models with predictive validity; (b) measures that assess outcomes, practices, and implementation protocols and contextual variables; (c) designs that allow assessment of initial and delayed effects; and (d) analysis protocols that allow both a systematic testing of the conceptual model and definition of effects that can guide future policy making.

CONCLUSION

The evolution of efforts and knowledge to improve the social climate of school classrooms, hallways, cafeterias, and other common school settings is growing exponentially. In this chapter, we suggested that attention must be given to research and practice related to the sustained and adapted use of effective educational practices and approaches. Focusing this attention is not without challenges, especially with respect to designing and conducting sustainability research in real, applied settings.

However, we believe that this shift in attention and focus is critical given our current focus in education reform and evidence-based practices.

We believe that such investments will be highly valuable in all areas of education (e.g., behavior support, early literacy, response-to-intervention models). An inherent tension exists between "exciting and new" (constant innovation) and "the way we do business" (institutionalization); however, the ultimate goal is to bring the two together to maximize student outcomes over the long term.

ACKNOWLEDGMENT

This research was supported in part by Educational and Community Supports, University of Oregon, and U.S. Department of Education grant H326S980003. Opinions expressed herein do not necessarily reflect the policy of the Department of Education, and no official endorsement by the department should be inferred. We would like to acknowledge Susan Barrett and Jennifer Doolittle for their thoughtful contributions.

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