2 The Evolution of School Psychology to Science-Based Practice: Problem Solving and the Three-Tiered Model

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> In the struggle for survival, the fittest win out at the expense of their rivals because they succeed in adapting themselves best to their environment.
> —Charles Darwin, 1859

OVERVIEW

Darwin's words are as true for school psychological practice as they are for the phyla. As school psychology transitions into an outcome-oriented profession, we continue to evolve new ways to bring science into applied practice in schools. This evolution is critical to the continued importance and viability of school psychology in U.S. schools. In the years since the inception of school psychology, many applications of science in practice have occurred, each with increased effectiveness. We stand at the threshold of the next iteration in that direction.

This chapter chronicles some of the major steps school psychology has taken toward adopting science as the basis of practice. Each step has yielded benefits for students as well as practice challenges to be overcome.

SCIENCE AS A FOUNDATION OF PSYCHOLOGICAL PRACTICE

The idea of science driving applied practice in psychology is not a new one. Indeed, when clinical psychology was brought into being in 1949 in a joint meeting between the National Institutes of Health and the American Psychological Association, a unanimous conclusion was reached after an historic 2-week conference in Boulder, CO. In sum, it was agreed that the training of clinical psychologists should include an equal emphasis on both research and practice. It was believed that research was a vital and important part of practice that could yield valuable insights and important implications for practice. It was further argued that involvement in the clinical process would bring researchers into immediate contact with important research issues (Raimy, 1950).

The ideal practitioner, then, was conceived of as a scientist practitioner (Barlow, Hayes, & Nelson, 1984). This person would have the skills to apply the scientific method to studying problems in the natural universe (one definition of science). This person also would have the experience and savvy to work effectively in applied settings. This model was predicated on the medical model. That is, problems were conceptualized as residing primarily within patients, and the role of the therapist was to treat illness and to maximize human functioning and adjustment. Thus, the model was reactive, waiting for problems to occur and then responding to them. It was also an $n = 1$ approach in that individuals most often were the focus of therapy as opposed to groups or systems.

In the decades since this historic conference, applied psychology has grown and matured. School psychology has embraced many of the same concepts as clinical psychology and has clearly promoted the importance of science in both training and practice. This value is illustrated clearly by the inclusion of specific competencies by the National Association of School

Psychologists (NASP) in *School Psychology: A Blueprint for Training and Practice III* and in their Standards for School Psychological Services. Illustrations of the importance of science in school psychological practice from these documents are contained in Table 1. Indeed, in *Blueprint III*, the application of science and the scientific method are presented as basic foundations to the entire model being advocated for preservice school psychology training.

Many approaches to importing science into practices exist, whether explicitly or implicitly referenced as such. These include behavioral consultation (Bergan & Kratochwill, 1990; Kratochwill & Bergan, 1990; Sheridan, Kratochwill, & Bergan, 1996), the IDEAL problem-solving model (Bransford & Stein, 1984), functional analysis of behavior/functional behavioral assessment (Repp & Horner, 1999; Tilly et al., 1998), the scientist practitioner model (Barlow et al., 1984), curriculum-based measurement (Deno, 1995; Shinn, 1989), applied behavior analysis (Baer, Wolf, & Risley, 1968), action research (Calhoun, 1994), and the Heartland Area Education Agency 11 problem-solving model (Reschly & Ysseldyke, 1995). Each model contains unique features, protocols, and language. In some cases, specific philosophies of science or theoretical orientations predominate, and differential emphasis is placed on alternate parts of the process.

Foundation of Science-Based Practice in Schools: A General Problem-Solving Method

No matter which specific approach or model of science-based practice is considered, four thematic questions guide practitioner thinking:

- Is there a problem and what is it?
- Why is the problem happening?
- What can be done about the problem?
- Did the intervention work?

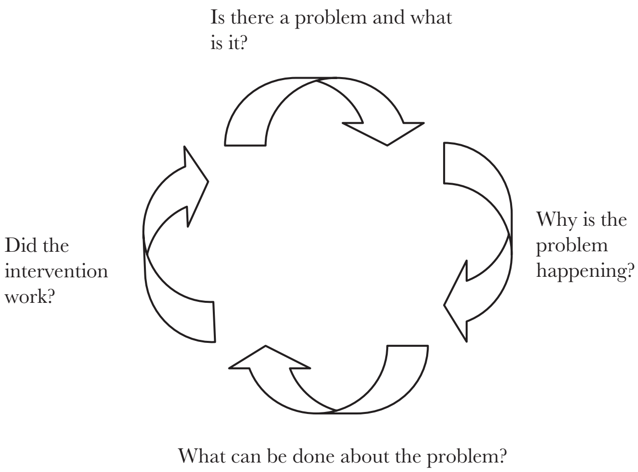
Taken together, these questions are referred to as the problem-solving method. A graphic depiction of this problem-solving logic set is contained in Figure 1. Clearly, problem solving is a logical process that most

Table 1. Inclusion of Science in NASP Training and Practice Expectations

Blueprint III domains	NASP standards
• *Data-Based Decision Making and Accountability:* School psychologists should be well versed in a variety of assessment and evaluation methods. These include the use of observation, interviews, standardized norm-referenced tests, functional behavioral assessment, curriculum-based assessment/measurement/evaluation, ecological or environmental assessment, technology enhanced assessment, and progress monitoring. Irrespective of the assessment method, the purpose of assessment remains clear: to define problems and student needs and assets, to estimate current status, to link results to the development of effective interventions, and to evaluate outcomes and inform future intervention decisions. Simply put, all assessment activities should relate to prevention and intervention. • *Enhancing the Development of Cognitive and Academic Skills:* School psychologists should know how to apply learning theory and cognitive strategies to the instructional process. They should know empirically supported components of effective instruction and alternative instructional methodologies, and they should be in a position to work with others to improve instruction; enhance achievement; and develop attention, problem-solving, and study skills. They should work to ensure treatment integrity (the extent to which interventions are implemented correctly) and assist school staff in helping students become increasingly responsible for their own learning (self-regulation and self-assessment). School psychologists should also be prepared to assist teachers and other educators in translating emerging critical research to instructional practice.	• Practice guidelines state that school psychologists use a decision-making process in collaboration with other team members to identify academic and behavior problems, collect and analyze information to understand the problems, make decisions about service delivery, and evaluate the outcomes of the service delivery. School psychologists must utilize current professional literature on various aspects of education and child development, translate research into practice through the problem-solving process, and use research design and statistics skills to conduct investigations to develop and facilitate effective services.

Note. Source: NASP (2000); Ysseldyke et al. (2006).

Figure 1. Problem-solving logic set.



people do every day, which adds to its practical appeal. Problem-solving practices are intuitive, easy to understand, and easy to explain to parents and teachers alike.

The next section illustrates the reasoning that occurs when addressing each of the four problem-solving questions. The synthesis is experience based, success driven, and for continuity will be based on an exemplar: the Heartland problem-solving model. This description will address only the *thinking processes* attendant to the four questions as opposed to procedural steps (for an extensive treatment of the procedural steps in Heartland's model, see Heartland's program manual: http://www.aea11.k12.ia.us/spr/HAEAProgManual05.pdf). Critical problem-solving assessment and intervention tools are beyond the scope of this chapter and have been detailed elsewhere (Flugum & Reschly, 1993; Tilly & Flugum, 1995; Upah & Tilly, 2002; Upah, chapter 12, vol. 2).

Is There a Problem? and What Is It?

In educational problem solving, it often makes sense to define problems as the difference between environmental expectations and what an individual does. Problems defined this way reflect naturalistically and accurately situations in educational settings. Indeed, most educational problems are brought to light when student performance deviates significantly from teacher expectations in classrooms. No matter where a problem falls on the severity scale, from mild through severe, the same thinking predominates in problem definition. Two things must be operationalized: What is the individual expected to do? What is he or she actually doing? The *difference between these two measurements represents the problem*, not the behavior that is the subject of the problem solving. This distinction may appear trivial. It is not. For example, physical aggression is not a problem if it occurs at the expected zero rate. The discrepancy between expectancy and performance in this case is zero, so there is no problem. If, however, Nancy is expected to turn in 70% of her homework to pass her American Government class and she is turning in less than 20%, there is a 50 percentage-point discrepancy between expectations and her actual performance, a substantial problem in most high schools. That the problem resides in the discrepancy is a key problem-solving concept that typically is easy to grasp.

There are important implications of defining problems as discrepancies. First, a discrepancy or difference score causes problem solvers to become objective about the nature of a problem. Important problem-related variables are defined in a way that promotes agreement about "what the problem is" by all involved parties. When there is objective agreement regarding a problem, there also can be objective agreement "that the problem is improving" as interventions are effective. Second, discrepancy-based problem definitions allow direct scaling of problem magnitude. The larger the discrepancy between observed performance and the standard, the larger the problem. Third, discrepancy-based problem definitions most often are created based on naturally occurring units of behavior, which usually lend themselves directly to analysis and intervention. For example, if a behavior of concern (response class) is aggression, direct measurement of the problem may include counting all incidents of kicking, hitting, or throwing of projectiles within a time span. The number of acts could then be compared to a peer standard collected during the same observation periods. The same problem could be quantified less directly through rating scales or personality tests that yield a standard score, a diagnosis, or description of personality variables. The former problem definition in this case lends itself directly to clear analysis and intervention using clearly articulated procedures with a high likelihood of successful resolution of the problem (O'Neill et al., 1997). The latter process may not.

The scientific method requires observation to drive hypothesis. When problems are defined in naturalistic behavioral units as discrepancies between what is expected and what occurs, direct observation drives problem analysis (i.e., hypothesis generation). The problem identification phase of problem solving tracks directly to the first stage of scientific investigation; that is, observation of the environment as the basis for further analysis. Precise tools that yield consistent, objective measurement are used to provide a clear, unambiguous index of the situation. Problem definition then sets the stage for the second problem-solving phase: problem analysis.

Why Is the Problem Happening?

After operationalizing the problem, an analysis of problem etiology ensues. The purpose of problem analysis is to identify interventions for student problems that are (a) directly and empirically linked to problem occurrence and (b) have a high likelihood of successful outcome. Low-level inferences predominate. That is, inferences are typically made about student skills rather than abilities; inferences are made about student behaviors, rather than the traits the behaviors may represent; and, most important, inferences are made about the relationships between observed student performance and the highest likelihood variables related to observed performance. The necessity of low-level inferences in turn drives the types of assessments that are completed to assist in problem analysis. In most cases, school psychologists move away from assessments of student disability to measures of student ability. Indeed, one school psychologist has captured the concept underlying problem analysis when describing its purpose as ''diagnosing the learning enabled'' (J. Grimes, personal communication, October 20, 1998). Instead of measuring student performance to find disabilities, our purpose is to diagnose the conditions under which students' learning is enabled. Assessment for problem analysis requires quite different skills and procedures from those traditionally used in special education entitlement assessments. The key to effective problem analyses is crafting clear summary statements or hypotheses that plausibly link observed performance to presumed causes (i.e., deduced from direct observation) of the performance problems, which in turn leads to treatment recommendations with a high probability of success. The general form of the logic is:

- *For skill problems (can't do issues):* X problem is occurring because of Y. Therefore, if we do Z, the problem will be reduced (recall here that the problem is represented by a discrepancy).
- *For performance problems (won't do issues):* When X problem occurs, the student does Y in order to (description of contingency). Therefore, if we do Z, the problem will be reduced.

The interventions represented by Z are thus logically linked to the analysis of the problems. Variables that served as targets for the problem analysis often, in this case, translate directly into actions that can be taken to enable learning.

As with problem identification, the critical shift in assessment for problem analysis is in thinking. The thinking shift in turn drives practice shifts. Rather than selecting tests for their technical characteristics and marketing, most competent problem-analysis assessments do not rely on published tests at all. In most cases, materials used for these assessments are selected directly from the materials and situations the students are working with in school. While these materials may not have been validated empirically for the purpose of disability identification, they operationalize the performance demands of the present environment and consequently are the most performance-valid assessment materials available.

Operationally, school psychologists need to be able to tease out variables related to observed levels of performance in relation to direct environmental demands. The difference between problem-solving practice and historical practice is illustrated in the following example where two different approaches to analyzing the same student's reading problems are presented.

One school psychologist may describe a student's reading performance as two standard deviations discrepant from the student's verbal ability with possible emotional overlays. These factors may indicate the presence of dysphonemic dyslexia, which may lead to prescribing a multisensory approach to reading instruction. These are impressive sounding words, but not particularly helpful from an instructional perspective. What exactly is dysphonemic dyslexia? What specifically does it mean for this particular student? What skills does the student have and not have? What is the probability that a multisensory approach to instruction will work with this student and not with other students? What functional increment of information does the assessment process add?

A school psychologist from a problem-solving orientation would likely assess the same student's reading skills directly. A sample of the student's oral reading would be collected. Specific-level tests (specific tests of component reading skills) would be given in priority order (skills with the highest probability of contributing to the reading problem are assessed first), yielding a general picture of the student's component reading skills. Resulting analyses might hypothesize that the student's reading comprehension deficits result from (a) a lack of direct phonics instruction, which has caused the student to read disfluently; (b) the student not linking new information to prior knowledge; (c) the student not understanding critical vocabulary words in the passages read; and/or (d) the student not monitoring meaning while reading.

These data-based observations then would be used to develop a need-specific intervention program tailored to the individual student. The difference between the former and latter reading assessments is the ability to directly pinpoint the specific skills that a student does or does not have and the level of inference needed to program instruction. As a general rule, the higher the level of inference used to prescribe instruction, the less certain we can be in the effectiveness of the intervention prescribed.

Professional judgment and experience play as significant a part in the analysis of problems as they did in problem identification. Indeed, it is not possible in problem-solving systems for school psychologists to competently analyze student performance in any performance domain if they do not have significant knowledge in that domain. More than any other component of problem solving, problem analysis requires assessors to have broad and deep knowledge about the subject matter they are assessing. It is not possible to competently analyze the etiology of developmental reading problems if the school psychologist does not understand the process of learning to read. In the same way, it is not possible to discuss the etiology of behavior problems without reference to an accepted professional framework for understanding behavior. The content knowledge and experience requirements placed on school psychologists are perhaps the greatest professional development challenge associated with implementation of a problem-solving system.

The problem analysis phase of problem solving corresponds directly to the second stage of scientific investigation, that of creating hypotheses regarding variables that could plausibly explain the occurrence and nonoccurrence of the problem. To assist in hypothesis development, school psychologists can use whatever diagnostic measurements they choose, but those with most utility are those that measure student behaviors most closely resembling the behaviors that are considered problematic in the natural environment.

What Can Be Done About the Problem?

Once problems are defined and analyzed, the most complex part, if not the most challenging part, of problem solving is completed. When problem analysis is completed accurately, reasonable environmental modifications with plausible connections to problem remediation usually become apparent. At this point, based on data collected from problem identification and problem analysis, educational interventions can be put in place.

There is a series of components that need to be thought through in setting up interventions. An intervention is defined in this context as a planned modification of the environment made for the purpose of changing behavior in a prespecified way. Specifically, who will do what, when, and in what manner needs to be determined. A specific goal for the intervention may be set in measurable terms, and procedures for monitoring the effectiveness of the intervention must be put in place. Any supports or materials that will be needed to carry out the intervention need to be located or created, and any training for implementers needs to be completed if necessary. (An expanded discussion of educational interventions can be found in Upah, chapter 12, vol. 2.)

It is important that multicomponent interventions be considered for significant problems to ensure the highest likelihood of success. Not all components will be necessary for every intervention; however, all of the components should be considered thoughtfully in all cases. Intervention components that should be considered when building educational interventions are presented in Table 2.

Table 2. Intervention Components

- *Antecedent interventions:* What changes can be made to the environment to prevent the problem from occurring?
- *Alternative skills instruction:* What skills can be taught to the individual that will reduce the occurrence of the problem?
- *Instructional consequent strategies:* What changes can be made to the instructional process to reinforce new skill acquisition and diminish problem occurrence?
- *Reduction-oriented consequent strategies:* What consequences, if any, need to be put in place to reduce the occurrence of the problem behavior?
- *Long-term prevention strategies:* What other individual or situational factors can we support to improve the individual's functioning?
- *Support for team members:* What support needs to be provided to team members to enable them to contribute to the intervention in an optimal way?

The intervention process in education is analogous to the component in the scientific investigation process that tests hypotheses. In this instance, educational programs are put in place based on reasoned hypotheses (derived from problem analysis) in an attempt to confirm the accuracy of the problem analysis (hypothesis). Just as experiments in science are conducted to allow inferences to be made about hypotheses, interventions in education allow us to draw inferences regarding the accuracy of our hypotheses and to improve student performance in the deal.

Did the Intervention Work?

The final question addressed by the problem-solving process regards evaluation of interventions, both formatively and summatively. Because it is not possible to predict with certainty the effectiveness of any educational intervention prior to its implementation, a progress-monitoring process must be put in place to evaluate intervention effectiveness (see Fuchs & Fuchs, chapter 136, vol. 6). As with other components of the problem-solving process, procedures used to monitor progress vary in their rigor, precision, and comprehensiveness. The important feature of progress-monitoring systems is the ability to accurately illustrate progress over time. Typically, the behavior that was used to operationalize the existence and magnitude of the educational problem is used as the indicator of progress in progress-monitoring systems. Data are collected multiple times per week, and a pattern of behavior emerges over time, which is often depicted graphically. Using systematic procedures and decision rules (Kazdin, 1982) to examine the pattern of performance, the effectiveness of an intervention can be determined. Extensive resources are available on monitoring student performance (Alessi & Kaye, 1983; Kazdin, 1982; Parsonson & Baer, 1978; Shinn, 1989; Sulzer-Azaroff & Mayer, 1991).

At some point during intervention, the magnitude of the problem is revisited. A process very similar to procedures used to identify the initial problem ensues. Student performance is measured and compared with a standard of acceptable performance, and a performance discrepancy is identified. Two standards of comparison are now available to assist in evaluating the magnitude of the discrepancy. As before, current performance can be evaluated against the criterion of acceptable performance, and the size of the problem can be gauged in an absolute sense. Also, the size of the discrepancy can be evaluated in light of the size of the discrepancy at the time of problem identification.

The program evaluation component of problem solving is analogous to evaluation of hypotheses in scientific inquiry. The intervention provides the basis, and the monitoring and measurement provide the evaluation. Generally, if interventions work in improving performance, an inference can be drawn that the analysis of the problem was accurate (our hypotheses are supported). More precisely, the analysis was sufficient to result in significantly improved performance. In applied practice, this level of support for the analysis is sufficient. For problem solvers, the purpose of their efforts is socially meaningful behavior change. When intervention efforts result in this outcome for clients, universality of hypothesis application is secondary.

Using the Problem-Solving Method Alone in Schools: Benefits and Limitations

In the early days of problem solving, the problem-solving method just described provided an extremely valuable and important springboard for science-based practices in schools. It provided the thinking structures necessary for framing school-based problems, for analyzing their etiology, for deriving hypotheses about potentially effective solutions, and for testing the effectiveness of these solutions. These thinking structures are foundational to all data-based implementations of the scientific method in practice. And, indeed, the problem-solving method did improve educational practice. It provided an iterative, self-correcting approach to treatment of educational problems. It provided an empirical method to select treatments from the universe of possibilities, and it allowed parents and teachers to evaluate objectively whether the treatments being applied were working.

What the problem-solving method when used alone lacked was a supportive context for implementation and structures within schools that embraced and promoted science-based practices. Most teachers and administrators in schools were not trained in application of the problem-solving method, and most educational structures (e.g., methods for problem identification, referral processes, service delivery structures) and practices were not driven using science or student outcome data as a guide. As such, early application of the problem-solving method relied heavily on experts to bring the practices to schools, to provide the structures for application (e.g., a consultation framework), and for these individuals to provide assessment and intervention services when referrals were received. Most often, the problem-solving method was used for moderate to severe problems after these problems had manifested in the school environment. As such, problem solving was not positioned well to address problems early when the problems are most workable. Moreover, there were no school-based structures in place to address these shortcomings.

Despite these limitations, adoption of the scientific method as a decision-making structure for applied psychology began the process of embedding science in the practice of school psychology. Use of hypothesis testing to drive treatment was a novel idea, but one with great merit. Application of these procedures produced improvements in client outcomes that set the stage for the next evolutionary step.

BRINGING SCIENCE TO SCHOOLS

Moving education toward a problem-solving enterprise requires changing both system structures and practices within the system. The historical special education system structures grew out of legal mandates (Education for All Handicapped Children Act of 1975, the Individuals with Disabilities Education Act [IDEA]) that dictate many structures and practices. From the Individualized Educational Program (IEP) development through procedural safeguards and due process provisions, special education structures have remained fixed for more than 30 years. How might a shift to a problem-solving structure occur if so many things are dictated? The answer is that the "whats" of special education are fixed. For example, no matter where one lives in America, students with disabilities are guaranteed heightened due process, procedural safeguards, quality assessments, and IEPs. Considerable variability in how these "whats" are carried out is allowed to states by the federal Office of Special Education Programs (Hehir, 1996; Tilly, Reschly, & Grimes, 1999). For example, states have wide latitude in how special education identification, assessment, and programming are carried out. One state may use a simple discrepancy process for identifying students with learning disabilities, another might use regression-based formulae to identify similar students, and a third state may use functional assessment procedures and noncategorical identification procedures. All can be legal. What is critical is that districts and states ensure that the basic requirements of law are met.

Deploying the Problem-Solving Method as a Decision-Making Structure: Heartland's Problem-Solving Model

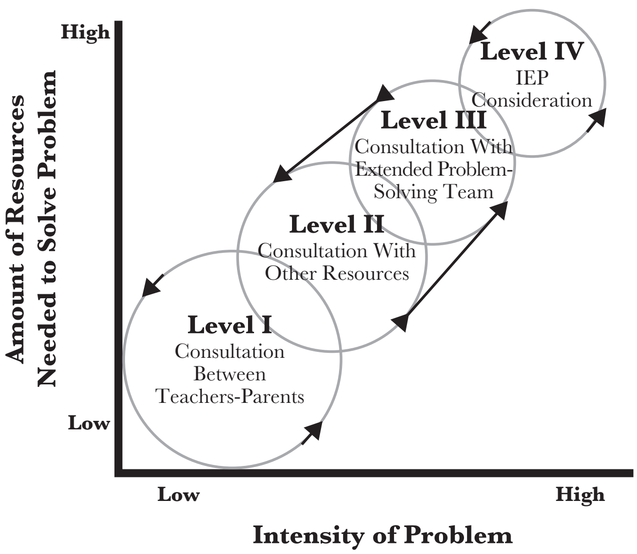
Shifting structures in special education requires rethinking some of the assumptions underlying how our system was structured originally. Most important is rethinking how services can be delivered in direct relation to need. States and districts in most cases have organized their services typologically. That is, students with similar types of needs are grouped together to make service delivery to these students efficient (consider talented and gifted education, Title I, and special education as examples in our schools). Underlying this practice is the assumption that students' needs exist in discrete groupings (Ysseldyke & Marston, 1999) and that discrete groupings for service delivery will thus meet students' needs optimally. In reality, student needs exist more on a continuum. Some students need more or fewer services than others both within and across different "typologically labeled" groups.

The solution to this situation is to create ways that service intensity can be varied in direct proportion to individual student needs both within and outside special education boundaries. This situation is desirable from a student-learning standpoint and cost efficient from a resource-allocation standpoint. Instead of waiting for students to fall so far behind that their performance qualifies them for special education, resources can be expended early within a problem-solving system, when problems are less intense, in the hope of remediating the problems prior to their escalation.

One problem-solving model that accomplishes the goal of matching resources with problem intensity is the Heartland problem-solving approach (Heartland Area Education Agency 11, 2005). This model will be described because it is a general-case model that includes desirable characteristics from a number of different problem-solving models. Moreover, it has been implemented successfully in practice for more than 15 years, so its viability has been tested empirically.

In the Heartland problem-solving approach (Figure 2), the abscissa represents the intensity of the educational problem experienced by the student. The scale ranges from low-intensity problems to high intensity problems. The ordinate represents the amount of resources necessary to resolve educational problems. The circles in the center represent the ideal match between the intensity of any given problem and the amount of resources that may be warranted to address the problem.

Figure 2. Heartland problem-solving approach.



Parents, teachers, counselors, school nurses, principals, building assistance teams, community providers, or others having direct contact with students may express concerns and initiate problem solving. In the Heartland model, assistance can be provided to students at any of four levels. These levels vary in terms of precision of problem identification and depth of problem analysis, as well as in systematicity and amount of resources brought to bear on the problem. Level I problem solving involves parent–teacher collaboration for addressing problems. At level II, other teachers contribute expertise along with the primary teacher and parents to solve the problem. At level III, related service persons such as school psychologists guide the problem-solving process with the other participants. Level IV continues problem solving at even a more intense level, and one of the questions addressed at this level is entitlement for special education (note that level IV represents the smallest circle in the diagram, depicting that relatively few educational problems get to this level). At level IV, problem solving continues. The only administrative difference is that in some cases, special education resources may be used to address students' educational needs as part of the problem-solving process.

The next section briefly describes problem-solving practices at each of the four problem-solving levels.

Level I: Consultation Between Teacher and Parent

Level I problem solving typically begins when a parent or teacher has concerns about an individual child's performance. Problems can arise in any educational performance domain, and there is no limit to the types of problems that might be addressed at this level. Typically, a conference will be held between the teacher and parent(s) where a plan of action will be crafted.

At level I, teachers and parents focus their attention on specific behavior(s) of concern. Typically, they discuss the nature of a problem and consider strategies that may be effective. They then determine a course of action to follow and informally monitor whether the intervention works. At level I, related services persons are not involved with defining the problem or implementing general education interventions. Indeed, level I simply acknowledges the informal problem-solving system that has been used for decades within our schools. Level I practices are described in greater detail in Ikeda, Tilly, Stumme, Volmer, and Allison (1996).

Level II: Consultation With Other Resources

Level II problem solving begins when level I has not been successful or when either the parents or teacher determines there is a need for additional resources. The purpose of level II problem solving continues to be resolving the presenting problem. At level II, additional resources are brought to bear on the problem, the processes are a bit more structured, and information from level I problem solving provides the initial input into level II problem solving. Components of the level II process include (a) more systematically gathering information about the severity of the problem, (b) redefining the problem if necessary, and (c) developing and monitoring new plans to address the problem. At level II, most schools use assistance teams to address problems. These assistance teams consist of the child's parents (or caregiver) and teacher, other teachers in the school, and local support staff (such as the guidance counselor) to the extent appropriate. Additional staff from outside of the school or the student also may participate on the team if deemed desirable and appropriate by the team.

During the initial level II meeting, the assistance team discusses the concerns surrounding the performance of the child. Through this discussion, the assistance team serves as a resource to the teacher and the parent. The team helps further clarify the nature of the problem and offers strategies that the classroom teacher can use to address the problem. The parents and teacher agree upon a reasonable intervention for addressing the problem. The team then decides each member's role for assisting with the intervention and develops ideas for evaluating the intervention. The intervention is implemented, and if performance does not improve, the general education intervention is refined. This process recycles as often as needed.

Evaluations at level II also help the school determine if accommodations under Section 504 of the Rehabilitation Act of 1973 are required. In this way, one problem-solving process can meet the requirements of multiple programmatic requirements. If a 504 plan is deemed appropriate, accommodations are implemented to support the child in the particular problem area. Ongoing monitoring of interventions help gauge the effectiveness of accommodations. This frequent review allows only those accommodations that are helpful to be continued. If interventions and accommodations at level II do not change the behavior at desired rates or to desired levels of performance, the child is referred to the Extended Problem-Solving Team for further consideration.

Level III: Consultation With the Extended Problem-Solving Team

As illustrated in Figure 2, levels II and III of problem solving overlap and are connected. These connections illustrate that in some cases the processes and procedures used at these levels overlap. The primary distinction between levels II and III is that related service personnel with specialized expertise and techniques are significant members of the level III Extended Problem-Solving Team. School psychologists, instructional consultants, school social workers, speech and language pathologists, occupational therapists, and physical therapists, among others, all can participate in problem-solving activities at level III. At this point in the process, the purpose of the members' involvement is neither special education assessment nor programming but helping to resolve the presenting problems in general education. To this end, a systematic and structured deployment of general education resources will be undertaken by the Extended Problem-Solving Team at level III.

At level III, the team reviews all information collected at levels I and II to begin its analysis. The team examines whether the problem was identified accurately at levels I and II, and the effectiveness of interventions to date is reviewed. The team also ensures that all appropriate screenings (e.g., hearing, vision, health) have been conducted to rule in or out other plausible contributors to the problem. Based on these data, the team uses a standardized thought process to guide their next steps (Heartland Area Education Agency 11, 2001). The team specifies an assessment plan to guide collection of additional problem-related information. Data then are collected to determine the nature and severity of the problem (problem identification) as well as to analyze problem etiology (problem analysis). At level III, the problem analysis will be systematic and more in depth than at levels I or II. That is, an explicitly articulated thinking process will be used in problem analysis. This thinking process involves the integration of information from multiple sources with research-derived knowledge and experience in the problem area to specify and test hypotheses regarding specific etiology of the observed problems. Based on the problem analysis, an intervention plan with a high likelihood of success can be written. As a part of this plan, specific goals are written and a progress-monitoring plan including a decision-making plan are put in place. The intervention then is implemented and its effectiveness evaluated. The most critical distinction between level III and previous levels is that level III requires practitioners to use a structured thinking process and specialized tools to assist in the problem-solving process. It is at this level that specific professional standards of quality problem solving have been defined (Iowa Area Education Agency Directors of Special Education, 1994) that serve as expectations for practitioner performance.

Level IV: Problem-Solving Intervention and Entitlement Consideration

In moving to level IV, the Extended Problem-Solving Team acknowledges that special education resources may be warranted to address a student's educational problems. When taking a case to level IV, all the due process and procedural protections available under IDEA are provided. One of these protections is asking parents (or caregivers) for written permission to have their child evaluated with the intent of determining special education entitlement. It is at this point that special education entitlement becomes a consideration and thus parental notice and permission are sought.

Entitlement for special education is only *one* of the questions addressed at level IV. The purpose of level IV problem solving continues to be determining interventions necessary to address student needs, including whether required interventions include special education services. As a result, the focus of assessment is on direct student performance and environmental variables that are modifiable and directly related to student learning (e.g., curriculum, instruction, the learning environment). During level IV assessment, extensive record review is conducted because a large portion of the information necessary for the special education entitlement decision has been gathered throughout problem-solving levels I through III. Additional problem-solving assessments are then conducted to address additional factors related to improving the student's learning. Specific procedures and criteria for identifying educational disability in a problem-solving system are beyond the scope of the current chapter. A detailed description of these procedures and a rationale for their use can be found in Tilly et al. (1999). Moreover, statewide standards for entitlement in a problem-solving system have been published by the Iowa Department of Education and can be downloaded at http://www.iowa.gov/educate/content/view/619/592/1/1/.

In addition to the use of a problem-solving approach as a resource-deployment structure in schools, problem solving is also a structured thinking process that is used to attack problems directly. It represents an important advancement of implementation of science into applied practice. In Heartland, this thinking structure is referred to as the problem-solving method. Each of the circles in Figure 2 represents one application of the problem-solving method. The problem-solving method is the same at every level of the process and recycles multiple times as interventions are carried out for an educational problem.

The Heartland problem-solving approach solved a number of important problems inherent in implementation of the problem-solving method alone. It also tackled some of the problems inherent in the traditional special education model that grew out of Public Law 94-142. Some of these solutions are described in Table 3.

Reengineering the Problem-Solving Approach Within a Three-Tier Model

When Heartland's problem-solving approach was initially implemented, there were no models available to integrate special and general education using tiered systems. The impetus for changing practices for struggling students came significantly out of special education. As a result, the problem-solving model was predicated on an $n = 1$ approach. That is, it was designed to work with one student at a time, from initial problem identification all the way through problem resolution, no matter where in the model that led in terms of services needed. Implementing a problem-solving approach to service delivery provided a series of advancements as chronicled earlier in this chapter. It also created a series of unintended challenges that resulted from engineering the problem-solving system in a student-by-student, case-by-case manner. Some of these were practice-based challenges. Others occurred

Table 3. Problems in the Traditional System Solved by Implementing Heartland's Problem-Solving Approach

Problem in the traditional system	Solution in a problem-solving system
• Resources are organized as all or none. There was not an efficient way to systematically vary intensity of resources based on student needs.	• Instructional interventions allow services to be delivered more on a continuum (from few to many) rather than all or none (the student gets special education or not).
• General and special education often operated as separate systems.	• Problem solving creates and requires collaboration between general and special education and support and related services staff. Additionally, support and related services staff are able to work with nonspecial education–identified students.
• Parents are often not invited into the decision-making process until referral to special education was imminent.	• Parents are involved in problem solving early, when problems are small, and stay with the process the whole way. With this characteristic, there are very few surprises, and parents understand clearly the rationale for each decision made.
• General education interventions are often informal and not intensive.	• Structured individual interventions are available to students in general education.
• Support and related services staff are limited to working with students in special education or students who are referred for special education.	• Support and related services staff are available to support general education teachers.
• A student who receives individualized intervention often has to be identified as a student with a disability.	• A student does not have to be identified as a student with disabilities to receive interventions.
• There is often a significant delay between identification of a problem and provision of intervention services. Comprehensive assessment takes significant time.	• The delay between identification of a problem and the provision of services is significantly reduced.
• Resources are organized typologically, by category. A student often gets a category of resources rather than resources matched directly to individual need.	• Interventions are matched to specific student need.

due to systems structures. Still others resulted from challenges in system engineering. Five major challenges emerged:

- Solving problems one at a time is not particularly efficient from a resource-utilization standpoint, especially when many children with educational problems have similar instructional needs.
- There is no way to deal proactively with the entire curriculum and instructional programs that were creating the educational problems seen by the problem-solving system. This statement is in no way an indictment of educational practices at the time. However, there are situations where particular combinations of curriculum, instruction, and students create student performance problems due to errors of commission (e.g., unintentionally teaching misrules) or errors of omission (e.g., leaving out or not sufficiently emphasizing critical skills or content). The problem-solving model is the recipient of school-based problems and is at the mercy of whatever problems come its way. There is no mechanism for being proactive at a school-wide or district-wide level.
- Our experience has taught us that individual teachers cannot implement more than one or two simultaneous interventions with integrity at any given time and continue teaching an entire classroom effectively. As a result, when more than two problems occur in the same classroom, the situation can become problematic for teachers as they work on varied individual interventions.
- Because the problem-solving model is still reactive to teacher-referred problems, many teachers perceive problem solving as the new way to get students into special education, which is, of course, not its purpose. These perceptions can unintentionally undermine the implementation effectiveness of general education interventions for students who teachers believe need to be in special education.
- In recent years, the possibility of reengineering the problem-solving model to incorporate recent developments in both research and practice has emerged. With the passage of No Child Left Behind (NCLB) in 2002, accountability requirements for the entire educational system have been heightened. As a result, all districts are accountable for the learning of all students, and the expectation is that all students will become proficient in basic skills. Schools are now looking for ways to effectively raise all students' achievement to at least a minimum level of proficiency, including those who historically have struggled learning basic skills. These accountability contingencies and their attendant instructional expectations (i.e., scientific research-based practices) have allowed and promoted the reengineering of the problem-solving model into a more systemwide model. That being said, it is important to point out that the science and principles underlying Heartland's original problem-solving approach were correct and remain valid.

What has shifted is the possibility of engineering the delivery system to encompass *all* children, rather than only those who struggle. A series of fundamental changes have been made in the engineering of the problem-solving system. These include the following changes:

- *Allowing the problem-solving model to work for all students in a system, not only those who struggle:* This component typically includes conducting universal screenings in basic skills areas with all students in a school or district. These screenings identify objectively which students are potentially in need of educational interventions beyond the general education curriculum alone.
- *Examination of core curriculum based on student performance data:* If a sufficient percentage of students are not becoming proficient based on the core curriculum alone, data can alert the district to analyze their curriculum and instruction to determine what components may be modified to improve overall student performance. This proactive examination of the school curriculum was never possible within the original Heartland problem-solving approach.
- *The ability to implement data-based group-level interventions and individual interventions, as opposed to implementing only individual level interventions:* Once students are grouped based on their performance strengths and deficits, teachers can come together and design group-level supportive instruction to meet those students' needs. While this was always allowable under the original problem-solving approach, the system structures were not engineered to efficiently provide group-level data and direct group-level solutions.

One thing that has been held consistent with the old and the new systems engineering is that students with intensive instructional needs still receive individualized diagnostic evaluations of their skill strengths and weaknesses, and individualized, intensive interventions are provided to these students.

The Heartland problem-solving approach is evolving into what has been described in the literature as a three-tier model (American Academy of Pediatrics, 2004; Sugai, Horner, & Gresham, 2002; Vaughn Gross Center for Reading and Language Arts at The University of Texas at Austin, 2005). In this model, the same descriptions provided earlier (Figure 3) about matching resource intensity with problem intensity still hold. Indeed, all of the descriptions of the underlying logic and rationale are the same. What is different is that *all* students are encompassed in this new model, not just students with learning or behavioral problems. The model is designed to support school success for all learners in both academic and social–emotional areas. Also, problems in the new model are not defined based on teacher referral of struggling students in their classrooms. Instead, student problems are defined directly by performance on critical indicators of basic skills. A graphic depiction of the relationship between Heartland's problem-solving approach and a three-tier model is presented in Figure 4.

Figure 4. Relationship between the Heartland problem-solving model and a three-tier model.

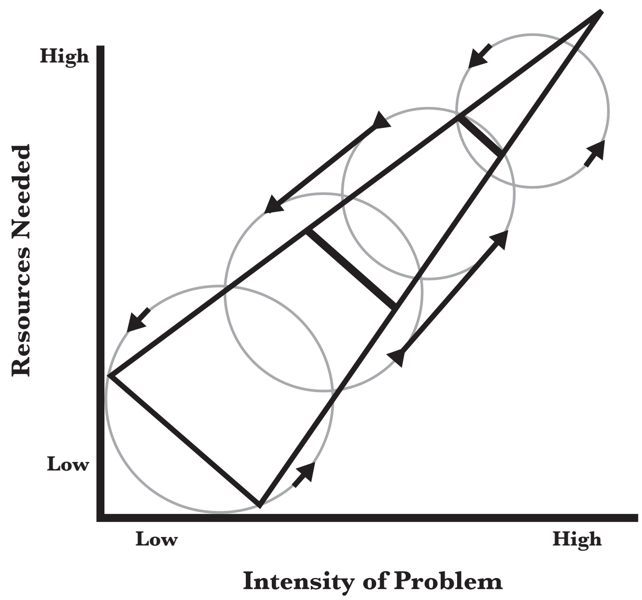
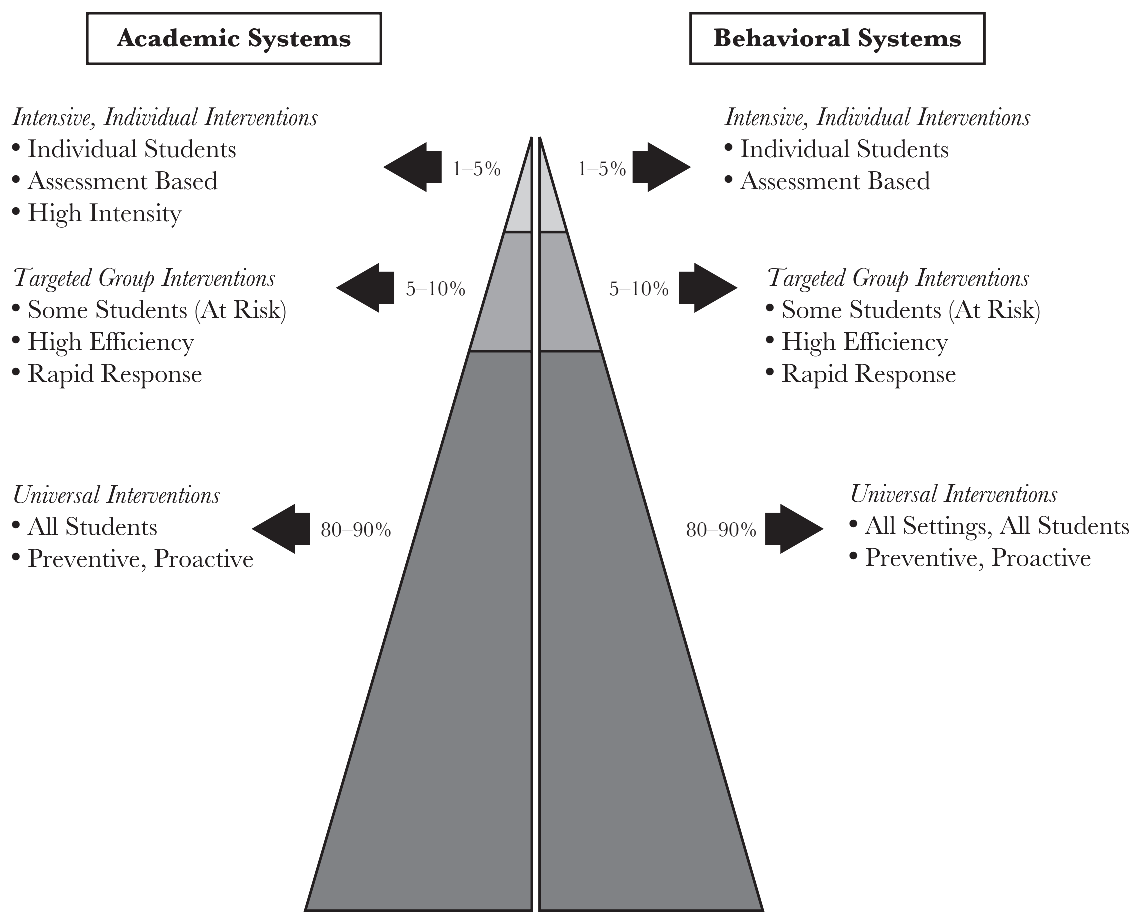


Figure 3. Three-tier model for school-based service delivery.



NCLB Context in Schools

With the passage of NCLB in 2002, the education landscape for all students, and all educators including school psychologists, changed precipitously. The education system is now held accountable for student learning, and there are rewards and sanctions in place as incentives. No matter what one thinks about the policy direction, the accountability provisions in NCLB had and continue to have strong bipartisan support in Congress, so it appears that though some changes may ultimately be made in the law in coming years, educators will still be held accountable for results. This shift in thinking has fundamentally rearranged the educational equation. In the old system, students were taught using the school's curriculum and the instructional methods used by the teachers in the school. Few modifications were systematically made to the curriculum or instruction as it was implemented with all students. What varied was student achievement. Most students profited and learned from the curriculum, a few excelled, and another group of students struggled to learn. These struggling students were often put in categorical programs such as special education or Title I. This situation created the familiar normal distribution of students' skills we are all so familiar with. With NCLB, the expectations have fundamentally shifted. One fundamental assumption underlying the NCLB statute is that *all* students will be proficient in basic academic skills (reading and mathematics) by the school year 2013–2014. The expectation is that all students will perform to at least a basic level of proficiency. To achieve this level of proficiency, it is expected that curriculum and instruction will flex and be varied based on student need. Indeed, the equation has been transposed from historical practices. NCLB even provides teachers and schools direction about what it is that they should do to accomplish total proficiency. They are to use scientific research-based practices. The words "scientific research-based practice" in some variation appear in the NCLB statute 111 times. It seems that Congress is trying to send a clear message.

All of these edicts work well in theory. They sound logical: Use research-based practices and students will learn. It should work. However, the statute neglects to mention that in many basic academic skills areas and for some behavioral issues, we do not as of yet have scientific research-based strategies. So, for example, if an eighth grader is struggling to comprehend what she reads because she does not understand the vocabulary in the passages she is reading, what scientific research-based vocabulary strategies are available to her teachers? Similarly, what scientific research-based practices are available to remediate a middle school student's confusion with quadratic equations? And the list goes on. Beyond not acknowledging the dearth of research-based practices in many areas, NCLB also does not acknowledge the lack of delivery mechanisms for research-based practices in schools. As noted earlier, most schools are not structured to flexibly provide access to a variety of research-based practices, and there is not a strong tradition of research-based practices in schools.

Despite these realities, NCLB has created a new context. Since 2002, schools have become avid collectors and users of data. They have learned much about data-based decision making. They have learned much about large-scale assessment. Teachers and administrators now know, with data, which students are proficient in critical basic skills areas and which ones are not. In sum, they know *who* is not getting it. They generally, however, do not know *why* they are not getting it. This information is critical to efficient remediation of students' problems. More specifically, knowledge of why students are not proficient is necessary to match instruction to specific student needs (see Batsche, Castillo, Dixon, & Forde, chapter 10, vol. 2). The assessment systems in place in most schools do not allow schools to complete diagnostic assessments with sufficient specificity to help prescribe specific instruction either for groups of students or for individual students.

For example, in the current system, a school might know that a fourth grader did not pass his reading comprehension state accountability assessment. This is important information, to be sure. However, knowledge of lack of proficiency in reading comprehension provides only minimal information about what to do about it. An initial instinct in many schools is to provide strategic comprehension instruction to students like this. While this strategy might prove effective for some subset of students with comprehension problems, it is analogous to putting a person with a high body temperature in an ice bath. It may, for many students, not be treating the cause of the problem but instead is treating symptoms. A more reliable response would be to dig deeper into the student's comprehension problem using direct, skill-based assessments and then to *match* specific instructional strategies to the student's underlying deficits. Students with reading comprehension problems may be having comprehension problems for a variety of specific reasons. For example, the student may not comprehend because she does not understand the vocabulary in the passage she has been reading. She may not comprehend what she is reading because she is missing critical decoding (phonics) skills that cause her to misread many words. She may not comprehend because she does not have a large sight-word vocabulary. She may not comprehend because she does not read fluently enough. She may not comprehend because she is not monitoring meaning as she reads. And the list goes on.

Similar examples could be identified for social–behavioral problems. The same outward behaviors may be occurring for different reasons within the school context. These different reasons are often referred to as *functions* in the behavioral literature (O'Neill et al., 1997). Without understanding the underlying functions of these behaviors and matching a treatment to these functions, it is less likely that an effective treatment will be found.

In sum, NCLB has taken us part of the way toward creating results-based accountability. The new context in schools is basically that all students must become proficient, schools are being held accountable for teaching them, there are rewards and sanctions associated with successful student outcomes, there is an urgency in schools about raising student achievement, and schools have become savvy at using large-scale accountability data to identify who is not proficient.

To create even more positive results at a larger scale in our schools, we must take the next steps beyond NCLB. NCLB alone is like a moped. It gets us going fast enough to get us into trouble but not fast enough to get us out. To create the additional horsepower, our next steps are to help schools understand, with data, why their students are not proficient and what to do about it. Technologies for answering these questions are becoming available, and implementing them will take us to the next level of importing science into applied practice.

Next Iteration of Science-Based Practice in Schools: A Three-Tier Model

When the need to import science into practice, the need to improve upon $n = 1$ problem-solving models, and the need to address the new NCLB contexts for schools is combined, a need for the next evolution in importing science into practice becomes compelling. The new system needs to have all of the positive characteristics of early science-based practice implementations, it needs to maintain the positive characteristics associated with earlier problem-solving approaches, and it needs to both improve on these practices and make them available in a more efficient and broader scale.

Fortunately, an alternate model for importing science into practice has emerged in recent years. This model maintains all of the advantages of earlier problem-solving models and adds improvements that will increase effectiveness. The model has been variously referred to in the literature as the three-tier model and a school-wide model (e.g., Simmons, Kame'enui, & Good, 2002; Vaughn Gross Center, 2005). This model has its roots in medicine (e.g., American Academy of Pediatrics, 2004), and has been translated to schools effectively in recent years. The three-tier model is often represented as a triangle (see Figure 3).

The three-tier model is applicable to nearly any curricular area including reading, math, science, and social–emotional growth and development. One primary difference between earlier structural models (e.g., Heartland's problem-solving approach) and the three-tier model is that the three-tier model encompasses *all* students within a school as opposed to only students who were identified with specific learning problems. A second characteristic of the three-tier model is that it assumes *all* students within the triangle (which is all students) will become proficient in basic skills. The three tiers of the model each represent a group of students and a level of support that is necessary for those students to be successful.

Nature of Interventions in a Three-Tier System

In tiered systems, resources are allocated in direct proportion to student needs. Some students will achieve district- or state-defined levels of proficiency based on general education instruction (also referred to by some as core instruction). Some students will need core instruction plus something additional to achieve these proficiency levels. And a smaller number of students will need intensive instructional interventions as well. A brief description of each of these levels of intervention follows.

Tier 1: Core Instruction

Tier 1 represents students who will become successful based on the core curriculum alone. These students become academically healthy based on learning in the core curriculum. Core curriculum is generally defined as the curriculum that covers the school's standards and benchmarks that all students at a grade level receive. If a school's core curriculum is effective, approximately 80%

of students should reach proficiency, based on the core curriculum alone (e.g., Horner & Sugai, 2002; Walker et al., 1996). The 80% number is not a number set in stone and is something of an estimate based on the best evidence available. It is a logical and rational approximation of how effective core instruction should be. For example, if only 50% of students become proficient/have their needs met through core instruction, that means that 50% of students will need either core plus supplemental instruction/intervention or core plus intensive instruction. In most public school systems, sufficient resources (time, money, and expertise) do not exist to provide this level of support to this many students. So, in this example, a prudent school's choice would be to invest significant resources in improving their core with the goal of ensuring its sufficiency for a greater number of students, in addition to working on providing effective supplemental and intensive services.

As we have said, in recent years, since passage of NCLB, schools have worked hard to adopt curricula that are scientific research-based. This is an important step that has improved curricula in schools across the country. In addition, schools are using their student performance data to guide their curricular and instruction decision making far better than was the case in previous years.

There are important considerations in addition to these features, however, that are also part of effective core curriculum programs. These include instructional match and universal screening. Tiered models assist in putting these practices in place within schools. The term *instructional match* refers to the process of matching the curriculum and instruction provided in a school to the needs of the student population being served. Scientific validation is a necessary but not sufficient characteristic of a curriculum. Curricula must also be matched to student need. So, for example, if a school with a very high poverty population is considering adopting a new early literacy curriculum, they may want to use the data they have collected to help steer their decision making toward one scientifically validated curriculum over another. Perhaps their data suggest the need for a very strong early language development component or the need for additional materials that parents (or caregivers) can use to work with their children. The district may then use this information to help prioritize among the various research-based curricula available.

A most important addition that tier models add to the core level of instruction is universal screening for students with learning problems. Schools routinely screen vision and hearing. In tiered systems, schools become familiar with the concept of early screening in basic academic skills as well. In the past, when our special education system was teacher-referral driven, the burden was on the teacher to perceive when students fell sufficiently far behind in order to warrant a referral for additional assessment and, potentially, additional services. There were a number of limitations to this system. First, most teachers were never given specific training about what to look for nor directed as to how bad a student's performance needed to be before they were to make a referral. Also, teachers differ in their skills at working effectively with struggling students. Moreover, the number of student needs within a classroom could limit even the best teacher's ability to work effectively with all struggling students. Finally, some students with significant learning needs simply were not detected efficiently and effectively using this referral system; that is, many students were missed. As we in the field were recognizing the limitations of our current referral system, our nation's researchers were solidifying two major findings. First, it is not efficient nor particularly effective to wait until learning problems get large to intervene; instead, it is most effective to address learning problems early when they are small. Second, the researchers identified critical indicators that could be used universally to screen all students for academic problems early, without waiting for students to fall extremely far behind their peers. Implementers using tiered models have taken what they have learned about the limitations of the historical referral system, have married them with the researchers' findings, and have come to the conclusion that universal screening must become a part of business as usual in our schools. Thus, in tiered systems, universal screenings of critical basic academic skills are used to help identify students who may need additional assessments and, potentially, additional services. Teachers still have the ability and responsibility to refer students who they are concerned about in tiered systems. There is just an additional mechanism in place to assist with the process.

In the case of early literacy, most tiered systems set forth standards for the implementation of their curricula. Many schools have adopted a 90-minute per day instructional block in grades K–3. During this time, core instruction in reading is provided to all students at a grade level. Interruptions are kept to a minimum, and teachers take their instructional responsibilities for quality delivery of the core very seriously. Student progress in the core is measured using classroom assessments, accountability assessments, grades, and periodic screening assessments.

Tier 2: Supplemental Instruction/ Interventions

In Tier 2, core plus supplemental instruction occurs. Even with very effective core curriculum and instruction in academic or social–emotional areas, there will be some students, perhaps 10–15% or so, who will need something supplemental to become proficient/have their needs met. It is important to note at this level that both core instruction *and* something supplemental are received by students. That supplemental can range from additional time in the core curriculum to additional opportunities and/or more time to learn, all the way through additional, strategically planned supplemental instruction. For some group of students, core plus supplemental will be sufficient for them to become proficient/have their needs met. Indeed, within the three-tier model, some students who receive supplemental instruction become successful enough that they ultimately do not require supplemental assistance and decisions can be made, based on progress-monitoring data (e.g., Shinn, chapter 14, vol. 2), to move them back to core instruction alone (e.g., Powell-Smith, Stoner, Bilter, & Sansosti, chapter 76, vol. 4).

Supplemental instruction is general education instruction. There is no suspicion that the student may have a disability. The student simply may need additional instruction to become proficient. There are currently two schools of thought on how to approach providing this additional instruction. One group of educators and researchers takes the position that these students need additional, supercharged balanced instruction in addition to their core instruction, with their response to this instruction continuously monitored. Research on this approach demonstrates that many children respond to this type of supplemental instruction.

A second approach is to administer additional assessments to students who do not reach desired levels of proficiency and then to provide additional, supplemental instruction focused on the areas where their skills require remediation. The idea underlying this approach is that it may be a more efficient use of resources to try to target supplemental instruction to areas where students' skills are most in need. There is less published research on this approach; however, there are data in some implementation sites documenting positive gains for students receiving intervention in this model.

No matter which approach is taken to determine the content and focus for the supplemental instruction, Torgesen (2004) has identified the following series of components that must be present in the supplemental instruction:

- *Supplemental instruction must be explicit*: Children with either specific or general learning disabilities, or who are poorly prepared to learn to read, must be *explicitly taught* most of what they need to know to learn to read. A major emphasis on word recognition is essential.
- *Supplemental instruction must be more intensive than core instruction:* More things must be directly taught, and children with disabilities, in particular, acquire skills more slowly and need more opportunity to apply reading and writing skills.
- *Supplemental instruction must be more supportive, both emotionally and cognitively:* Emotional support, in the form of encouragement, feedback, and positive reinforcement, is required because learning is more difficult and proceeds more slowly for some students needing supplemental instruction. Intellectual support, in the form of more carefully scaffolded instruction, is required because learning is more difficult.
- *Supplemental instruction must include methods for student progress monitoring*: This must be for both the short term and the long term.

Supplemental instruction in all cases is put in place *in addition* to core instruction. It does not replace it. It is usually delivered in groups of three to six students. Often, 30–45 minutes of supplemental instruction are provided to students. Usually 10 weeks of supplemental instruction might be provided in a cycle with the option of an additional 10-week cycle being available if student performance warrants it.

Tier 3: Intensive Instruction

In Tier 3, an even smaller set of students (perhaps 5% or so) will receive core plus intensive instruction. It is important to note at this level that intensive instruction does not connote special education. Special education is one service that might be brought to bear to meet *some* students' intensive instructional needs. However, there will be students who have intensive needs that will not qualify for nor would it be appropriate to provide them special education services. So, for example, there may be talented and gifted students who need intensive instructional services who do not qualify for special education. In another example, a student whose academic difficulties stem from the fact that he is learning English as a second language may need intensive instructional support, though he may not qualify for special education services. Tier 3 refers to the need for intensive instruction, not for a particular program.

For students with more extensive and significant needs, intensive instruction is sometimes needed. Torgesen's (2004) characteristics apply at this level of instruction as well, and both the amount and intensity of instruction at this level are even more concentrated. Intensive instruction for students is typically individualized in both type and amount. The question to answer is what type of instruction, with what type of intensity, will allow the student to learn at an acceptable rate. For many students with intensive instruction, 180 minutes of explicit, intensive instruction a day may be required. These students are already behind in the curriculum, and it is the school's objective to accelerate their learning to a rate where they potentially can begin making gains to close the gap with their peers.

An emerging evidence base suggests that implementation of a three-tiered system is effective at remediating academic and behavioral problems for a significant number of students (e.g., Burns, Appleton, & Stehouwer, 2005; Colvin, Kame'enui, Sugai, 1993; Lau et al., 2006; Torgesen et al., 2001; Vellutino et al., 1996; Walker et al., 1996). In addition, ongoing research is demonstrating that tiered models of service delivery can produce important improvements for special populations such as English language learners (e.g., Healy, Vanderwood, & Edelston, 2005; Linan-Thompson, Vaughn, Prater, & Cirino, 2006) and minority populations (e.g., Hosp & Reschly, 2004; Marston, Muyskens, Lau, & Canter, 2003; Shinn, Collins, & Gallagher, 1998).

From the Three-Tier Model to Response to Intervention

As part of the 2004 reauthorization of IDEA, Congress acknowledged implicitly many of the practices associated with a three-tier model. This acknowledgement supports and bolsters their NCLB admonition to use scientific research-based practice and heralds yet additional support for the use of science in educational practice. In their description of practices for the identification of students with specific learning disabilities, Congress stated:

> (A) IN GENERAL.—Notwithstanding section 607 of this Act, or any other provision of law, when determining whether a child has a specific learning disability as defined under this Act, the local educational agency shall not be required to take into consideration whether the child has a severe discrepancy between achievement and intellectual ability in oral expression, listening comprehension, written expression, basic reading skill, reading comprehension, mathematical calculation, or mathematical reasoning. (69 FR 77968 Section 614)
>
> ADDITIONAL AUTHORITY.—In determining whether a child has a specific learning disability, a local educational agency may use a process which determines if a child responds to scientific, research-based intervention. (69 FR 77968 Section 614)

This additional authority has come to be known in practice as response to intervention (RtI). The statute does not specify a tiered model of RtI nor does it explicitly promote one model over another. However, the core principles underlying RtI have been made explicit based on the literature and practice experience by the National Association of State Directors of Special Education (Batsche et al., 2005). These are presented in the Appendix.

These principles are the same principles as those used in tiered models, and, indeed, there is fair consensus in most experts' opinions that RtI needs to implement science-based practice broadly within education systems, rather than narrowly as allowed for in specific learning disability identification in the statute (Batsche et al, 2005). This general across-the-system implementation can offer the benefits of RtI practices to both general and special education students and can also provide reliable and valid data to assist with specific learning disability identification. A more narrow implementation of RtI practices, focused only on special education identification, not only does not offer the broader benefits of RtI but also may be very difficult to implement in practice, given that core and supplemental instruction provide a majority of the basis needed for using RtI concepts in special education entitlement decisions.

CONCLUSION

Since the 1970s, school psychology has continued its evolution toward science-based practices. There is every reason to believe it will continue. With the increasing and continued focus on educational outcomes, the environmental conditions are right for natural selection pressures to be placed on school psychological practices. Practices that contribute to improved student academic and social–emotional growth will be selected for retention, and those without documentable large effect sizes will be selected for extinction. In this milieu, it is our collective responsibility to not only select those procedures associated with positive results but to also contribute to the natural selection. It is a moral and an ethical issue. Continuing to evolve our profession toward practices with demonstrable effectiveness both will continue the evolution toward implementing science in practice and will move school psychology closer to accomplishing our collective purpose: helping students. Our kids deserve no less.

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APPENDIX. RTI CORE PRINCIPLES

These are the RtI core principles from Batsche et al. (2005):

- *All children can be effectively taught:* All RtI practices are founded on the assumption and belief that all children can learn. The corollary is that it is the educator's responsibility to identify the curricular, instructional, and environmental conditions that enable learning. Educators then must determine the means and systems to provide those resources.
- *Intervene early:* It is best to intervene early with learning and behavior problems, when problems are relatively small. At a general level, solving small problems is both more efficient and more successful than working with more intense and severe problems. Highly effective universal interventions in K–3 informed by sensitive continuous progress monitoring enjoy strong empirical support for their effectiveness with at-risk students.
- *Use a multitier model of service delivery:* Use efficient, needs-driven, resource deployment systems to match instructional resources with student need. To achieve high rates of student success for all students, instruction in the schools must be differentiated in both nature and intensity. To efficiently differentiate instruction for all students, tiered models of service delivery are used in RtI systems.
- *Use a problem-solving method to make decisions within a multitier model:* Research has supported the effectiveness of using a clearly defined method to determine student need and to develop and evaluate interventions. At its core, the problem-solving method requires answering four interrelated questions: Is there a problem and what is it? Why is the problem happening? What can be done about the problem? Did the intervention work?

  This thinking process can be applied to all students in a system, to small groups of students, and to individual students. Some authors and scholars have suggested that multitier systems might use either a problem-solving method within their multitier model or a standard treatment protocol approach. This is an artificial distinction. All RtI systems must consider implementing the best features of both approaches. Standard treatment protocols provide efficient, research-based vehicles for addressing the needs of a large number of students at a secondary tier. Individual problem solving is necessary at tertiary levels within a multitier system. In both systems, however, a problem-solving logic set is used in data-based decision making. Hence, a problem-solving method is an important core principle of RtI.
- *Use research-based, scientifically validated interventions/instruction to the extent available:* NCLB and the 2004 reauthorization of IDEA both require use of scientifically based curricula and interventions. The purpose of this requirement is to ensure that students are exposed to curriculum and teaching that have demonstrated effectiveness for the type of student and the setting. Research-based, scientifically validated interventions/instruction provides the best shot at implementing strategies that will be effective for a large majority of students.
- *Monitor student progress to inform instruction:* The only method to determine if a student is improving is to monitor the student's progress. The use of assessments that can be collected frequently and that are sensitive to small changes in student behavior is recommended. Determining the effectiveness (or lack thereof) of an intervention early is important to maximize the impact of that intervention for the student.
- *Use data to make decisions:* A data-based decision regarding student RtI is central to RtI practices. Decisions in RtI practice are based on professional judgment informed directly by student performance data. This principle requires both that ongoing data-collection systems are in place and that resulting data are used to make informed instructional decisions.
- *Use assessment for three different purposes:* In RtI, three types of assessments are used: screening applied to all children to identify those who are not making academic or behavioral progress at expected rates, diagnostics to determine what children can and cannot do in important academic and behavioral domains, and progress monitoring to determine if academic or behavioral interventions are producing desired effects.