



UNIVERSITY OF MINNESOTA
Driven to DiscoverSM



RIPS

Research Institute
for Problem Solving

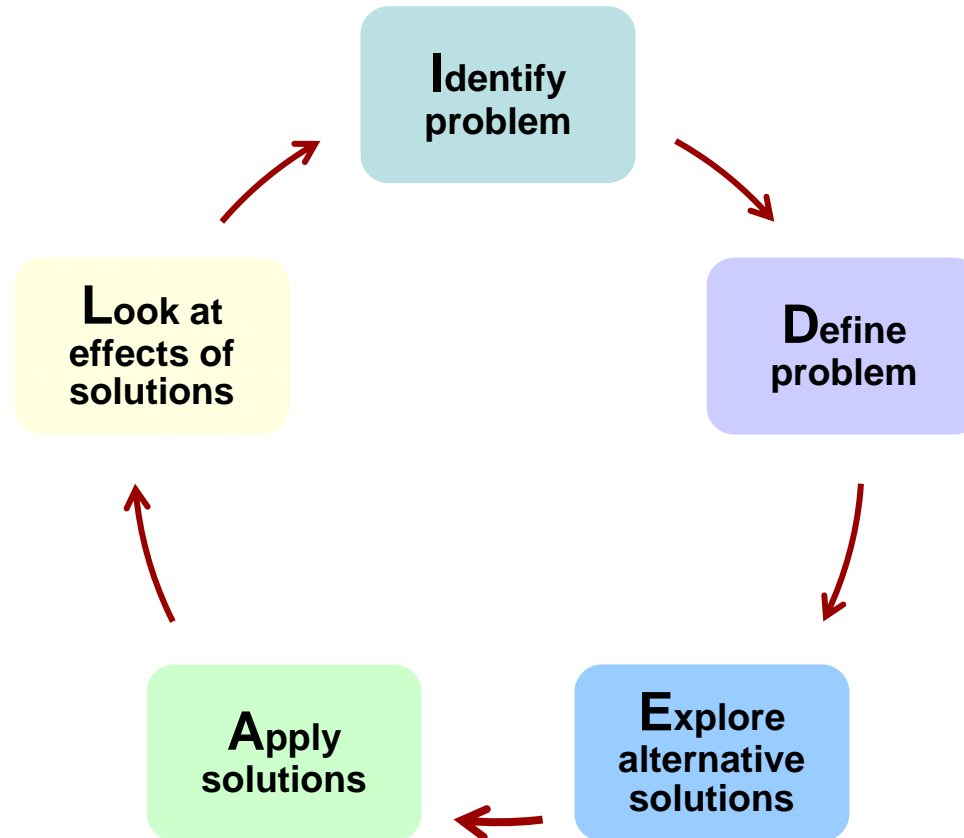


The Problem Solving Model:

An Interview with Dr. Stan Deno

April 28, 2010

The Problem Solving Model: Bransford's IDEAL Model (1984)



How do you define a problem?

A problem is ...

The difference between what is
observed and what is expected.

The discrepancy between “what
we get and what we want.”



RIPS

Research Institute
for Problem Solving

CEHD

College of Education + Human Development

Pitfalls in Problem Definition

- Establishing consistency among individuals who attempt to identify a problem
- Establishing problem with precision



RIPS

Research Institute
for Problem Solving

CEHD

College of Education + Human Development

Problem Solving & Assessment

- In the “Identify problem” step, we haven’t measured exactly what the problem is, just that we sense there is one.
- Defining the problem requires assessment:
 - Allows for precise, quantitative definition
 - Identify precisely the difference between student’s performance and expected performance
 - We must assess before we apply a solution



Problem Solving & Educational Standards

- To establish standards, we need to look at empirical relationships between valued outcomes and student performance.
- Ensure performance on assessment tools is predictive of student performance.
- We must first develop assessments that are reliable and valid for predicting future performance.
 - Tests used for accountability are not themselves valid.
 - There is a need for empirical work around test development.



Problem Solving & Educational Standards

- Setting standards is arbitrary
 - No gold standards exist
 - Example: State agencies determine standards for their own students, which then determines percentage of students who will fail or succeed.
- **Implication** is that we know the desired level of performance, based on reliability and validity evidence.



Case Example Activity

Now that you have heard Professor Deno's perspective on identifying and defining problems, please take a moment to read the following case example of a student who is experiencing difficulties with writing.

Then, consider the discussion questions that follow. We encourage you to jot down your thoughts or discuss them with a peer.



Problem-Solving Case Example

At Lakeview Elementary School, the principal, grade-level teachers, special education teacher, school psychologist, and other support staff meet regularly in Problem Solving Teams (PSTs) to discuss student progress.

Mrs. Penn is a first-grade teacher who has been implementing 30 to 40 min of daily writing instruction as part of her core language arts program. Her writing instruction consists of a combination of handwriting, spelling, and writing composition activities conducted with her whole class. Mrs. Penn has recently become concerned that Marie, one of her first-grade students, is experiencing significant difficulty with the writing activities. For example, in her daily journal, Marie writes random strings of letters that are barely legible, and is not able to spell any of the words that the class has been practicing. Mrs. Penn expresses her concerns about Marie during a meeting with her PST. The PST agrees that there seems to be a problem, and determines that they need to better define it.



Reflection Question 1.

The PST has identified a problem; in other words, they have sensed that a problem exists.

What steps should they take to clearly define the problem?

Please jot down your thoughts.



Reflection Question 1 Answer.

Compare your thoughts and ideas with the PST's action.

To define the problem, the PST needs to determine the discrepancy between Marie's current writing performance and what is expected.

They decide to administer a curriculum-based writing measure to Marie as well as to the rest of the first-grade class, to determine how much her writing skills differ from other first graders. So, Mrs. Penn administers three 3-min Picture-Word prompts (CITE) to all of her students, scores them for the number of words spelled correctly (WSC), and records the median score for each student (the median score provides a more stable estimate of performance than a single score provides). The average median score for the class is 10.5 WSC; Marie's score is 0. Mrs. Penn shares this information at the next PST meeting.

The team decides that the problem (i.e., the discrepancy between Marie's performance and the rest of the class) should be addressed immediately.



Reflection Question 2.

How did the PST define Marie's problem?



Reflection Question 2 Answer.

A *discrepancy of 10.5 WSC* between Marie's curriculum-based writing performance and the average first grade performance.



Reflection Question 3.

What standard did they use?



Reflection Question 3 Answer.

The median class performance.



Exploring Alternative Solutions

- Brainstorming and flexibility
 - This step occurs when the tried and true solutions have already been tried, but not successful.
 - Indicates a difficult problem to solve.
- Establish priorities among solutions
- Whatever you try is a hypothesis!
- May take many attempts, so keep hypothesizing and implementing solutions.



Applying Solutions

- Fidelity of implementation
 - Delivering instruction or intervention in the way it was designed to be delivered (Gresham et al., 2000)
- Systematic observation of intervention implementation
- A systematic, experimental approach to solving problems
- Solution testing to determine whether intervention is effective



Back to the Problem-Solving Case Example

Now that you have heard Professor Deno's perspective on exploring alternatives and applying solutions, let's return to the case example to find out how these steps might be applied in a real-world situation.



Problem-Solving Case Example (cont.)

- The Lakeview Elementary School PST determined that it would be important to explore possible solutions to Marie's writing problem.
- They brainstormed solutions to the problem based on Mrs. Penn's observations of Marie in class. Their hypotheses included:
 1. Marie needs additional reinforcement to do the writing activities,
 2. Marie needs more practice,
 3. Marie needs more explicit modeling and feedback or
 4. some combination of 1, 2, and 3.
- They determined that Mr. Wright, the special education teacher, would conduct a series of brief, systematic tests of these hypotheses.



PST Action Plan: Step 1

- First, Mr. Wright tested Marie's motivation by testing whether she could create letters and words when presented with a highly desired incentive for her work.
- He presented her with the opportunity to earn stickers for correctly-formed letters and correctly-spelled words.
- Marie was excited to earn stickers and worked very hard, but it was immediately clear that the task was too difficult, and Marie became frustrated.



PST Action Plan: Step 2

- Next, he tested whether Marie needed additional practice creating letters, words, and text. To conduct this test, he had her complete three identical writing tasks to see if her handwriting and spelling improved by the third time.



PST Action Plan: Step 3

- Then, he tested whether she needed explicit modeling with immediate feedback. Using a new set of writing tasks, Mr. Wright explained and modeled the tasks to Marie. She then copied his models, and finally she completed the tasks with the models covered.
- Mr. Wright helped Marie compare her final product with the models, giving her explicit feedback and immediate practice with any errors.



PST Action Plan: Step 4

- Finally, Mr. Wright tested combinations of his previous hypotheses, such as pairing modeling with repeated practice.
- After each hypothesis test, Marie completed a curriculum-based writing task independently, and he charted the number of words spelled correctly.
- These data revealed that a combination of modeling and repeated practice resulted in Marie's best performance.



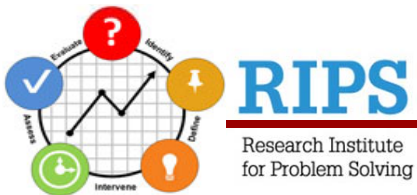
PST Action Plan: Intervention

- Therefore, Mr. Wright recommended an intervention that consisted of a combination of modeling and repeated practice.
- He demonstrated these techniques to Mrs. Penn, and she began implementing them 3 to 4 times per week for 15 min per session.
- Mrs. Penn asked Mr. Wright to periodically observe her and provide feedback to ensure that she was implementing the techniques correctly.



Reflection Question 4.

How did the PST determine how to explore possible solutions?



Reflection Question 4 Answer.

By writing problems and systematically testing them.



Reflection Question 5.

*Why did Mrs. Penn asked Mr. Wright to observe her
implementing the solution?*



Reflection Question 5 Answer.

To ensure that the intervention was *delivered with fidelity*.



Progress Monitoring within Problem Solving

- We need a way to quickly determine effectiveness of implemented solution.
- Monitoring growth during intervention.
- Repeated, frequent observations of the student.
- If solution isn't working, based on progress results, then move on to alternative solution.
- Progress monitoring is a type of formative evaluation.
 - Formative evaluation is repeated measurement of a skill to inform instructional planning.



Back to the Problem-Solving Case Example

We return once again to the case example to see how progress monitoring might be applied to evaluate the effects of an academic intervention.

Then use the graph following the description to decide whether the PST solved the problem



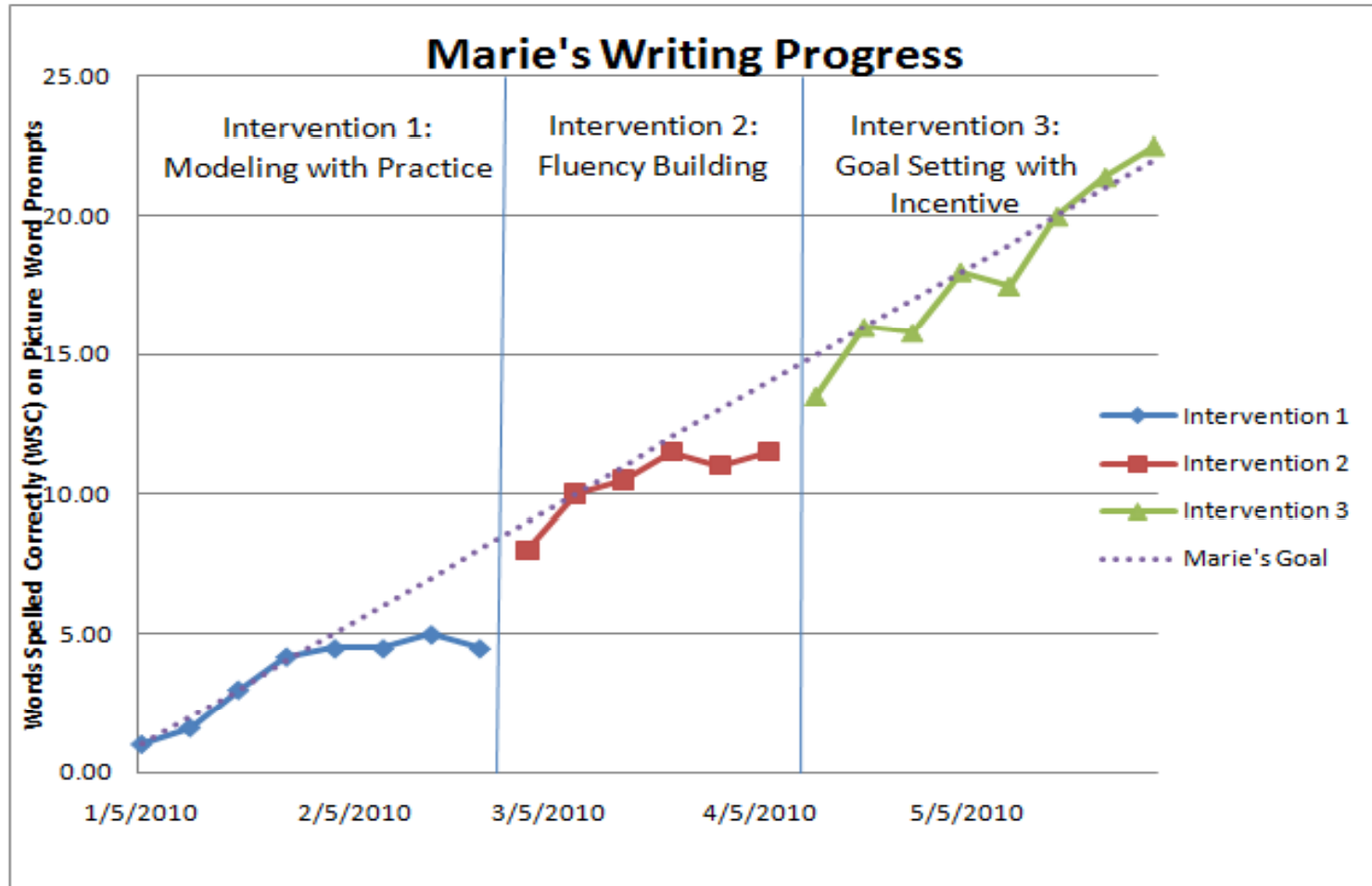
PST Action Plan: Implementation and Monitoring

- The PST set a reasonable but ambitious goal for Marie to improve her writing by 1 WSC per week on the Picture-Word task, or 22 WSC by the end of the year. Mr. Wright plotted this goal on a graph (see Figure 1), and began to monitor her writing progress (using curriculum-based writing measures) on a weekly basis.
- Marie began to make progress, but not at the rate needed to meet her goal. Although her spelling and handwriting began to improve, she continued to write very slowly. When four of Marie's data points fell below the goal line, the PST followed the same brief, hypothesis-testing procedure described earlier to make an instructional change, and determined that a timed fluency-building component to Marie's practice sessions would likely improve her progress. Marie continued to make progress, but continued to fall below the goal line.
- Again, the PST followed the hypothesis testing procedure. This time, Marie responded well to daily goal-setting during the fluency-building activity and receiving incentives for meeting daily goals. After this addition, Marie made steady progress, and by the end of the year, exceeded her goal.



Was the problem solved? Why or why not?

Use the graph to determine if the problem was solved.

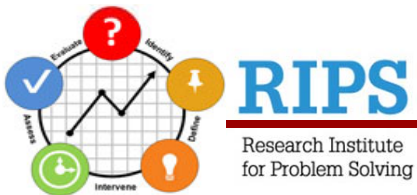


RIPS

Research Institute
for Problem Solving

Reflection Question 6.

Why was it important to monitor Marie's progress while she was receiving a writing intervention?



Reflection Question 6 Answer.

Because the progress monitoring *data showed* whether Marie was making *sufficient progress or* whether *a change was needed.*



When is a problem solved?

- If we have precisely defined the problem and precisely defined goals, we can determine if student is achieving desired level of performance.



Problem Solving in General Education

- Response to Intervention (**RtI**)
 - Problem Solving is one approach to RtI (Minneapolis Public Schools)
 - Universal screening = all students
- School change/reform
- Appropriate for addressing social/emotional behavior difficulties



Research in Problem Solving

- Establish standards
 - Predictive standards from one level of schooling to the next (E.g., elementary to secondary level)
- Progress Monitoring procedures
 - Technical adequacy
- Training professionals to use the Problem Solving Model
 - Use data, be flexible and resourceful, experimental teaching



References

Bransford, J. & Stein, B. (1984). *The IDEAL Problem Solver: A guide for improving thinking, learning, and creativity*. New York: W.H. Freeman.

Deno, S.L. (2005). Problem Solving Assessment. In R. Brown-Chidsey (Ed.), *Assessment for intervention: A problem-solving approach* (pp.10-42). New York: Guilford Press.

Gresham, F.M., MacMillan, D.L., Beebe-Frankenberger, M.E., & Bocian, K.M. (2000). Treatment integrity in learning disabilities intervention research: Do we really know how treatments are implemented? *Learning Disabilities Research & Practice, 15*(4), 198-205.

