



Solo Worksheets

Frequent, Inefficient, and Replaceable

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“Insanity: Doing the same thing over and over again and expecting different results.”

—Albert Einstein

After visiting classrooms in forty countries,

I can say with confidence that a very common instructional strategy world-wide is to first teach a skill or impart knowledge and then have students practice the skill or review the knowledge by working alone to complete a worksheet. I call this approach to knowledge and skill acquisition, “Solo Worksheet Work,” and refer to worksheets that are given to students to work on alone as “Solo Worksheets.” In this paper I argue that this frequently used approach to knowledge or skill acquisition is inefficient and easily replaced with instructional strategies that are better aligned with the basic principles of learning.

Solo worksheets most commonly contain problems that can be solved by a target skill or ask knowledge-based questions. The skill can be a problem-solving skill (such as a series of multiplication problems) or can be a motor skill (such as printing letters of the alphabet). Knowledge-based questions include

filling in state and capital names on a blank map or drawing lines to match the names of animals with their pictures. Working alone on a worksheet and only much later receiving feedback, violates basic principles of learning and often has negative consequences. Most importantly, use of solo worksheets is easily replaced with more efficient and positive instructional strategies.

This paper has four parts:

Part I. What is the structure, Solo Worksheet Work?

Part II. Why is Solo Worksheet Work inefficient, often leading to negative outcomes?

Part III. Ways to easily replace Solo Worksheets.

Part IV. Benefits of replacing Solo Worksheets.

Part I. What is Solo Worksheet Work?

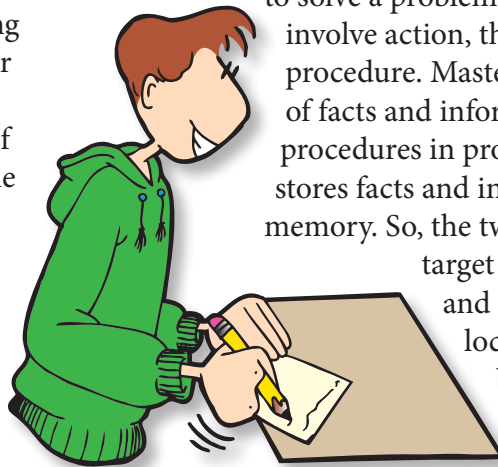
In this section we distinguish Solo Worksheet Work from Solo Project Work and distinguish two distinct types of solo worksheets.

Distinguishing Solo Worksheet Work from Solo Project Work

Solo Worksheet Work differs from Solo Project Work in several ways. Having students work

alone to construct something, write a book report, or prepare a presentation are forms of Solo Project Work. Solo Worksheet Work differs from Solo Project Work both in process and goal. Solo Projects have a single product, usually a different product for each student such as reading and reporting on a different current event; or creating a unique mind map. Completion of the project involves using a variety of skills. The goal is to create a unique product. In contrast, Solo Worksheet Work has students all performing the same task and involves either repetition of a single skill, or practice displaying knowledge of content that has been taught. The goal is either skill acquisition or cementing knowledge.

Solo Worksheet Work involves solving many problems or recalling information that has been taught. Repetition of a skill aligns well with how the brain acquires and retains a procedural memory. Recalling knowledge aligns well with how the brain acquires and retains semantic memories. In this paper I don't take issue with the repetition in Solo Worksheet Work; the main problem with Solo Worksheets is the context in which that repetition occurs.



Distinguishing Two Types of Solo Worksheets

There are two main types of Solo Worksheets. The first is designed to have students acquire and practice skills; the second is designed to have students acquire and master knowledge. These two types of Solo Worksheets are designed to create very different types of memory for content. Mastery of a skill is mastery of a procedure, usually a series of steps or actions to solve a problem or reach a goal. Procedures involve action, the steps of carrying out a procedure. Mastery of knowledge is recall of facts and information. The brain stores procedures in procedural memory; the brain stores facts and information in semantic memory. So, the two types of Solo Worksheets target different brain processes and different memory storage locations in the brain. Although both skill and knowledge Solo Worksheets are both frequently used, they are both inefficient approaches to fostering learning, and important to replace. In this paper we focus almost exclusively on Solo Worksheets used to master skills. The reason for limiting the discussion here is not that the problems with Solo Worksheet Work for skills and for knowledge are different. In fact, the long list of problems with use of Solo Worksheets presented in Part II are problems

Two Types of Solo Worksheets		
	Skill Worksheets	Knowledge Worksheets
Type of Memory	Procedural Memory	Semantic Memory
Type of Content	Steps of Process, Performance	Memory of Facts, Information
Optimum Coaching	Process Coaching	Outcome Coaching
Examples	<ul style="list-style-type: none"> • Long Division Problems • Punctuating Sentences • Lab Procedures • Creating Time-Lines 	<ul style="list-style-type: none"> • Stating Order of Operations • Matching Words and Definitions • Labeling Parts of an Animal • Writing State Capitals on a Map



common to solo worksheets used for both skill and knowledge acquisition. Where the two differ is how best to replace them. Instructional strategies that are better alternatives to Solo Worksheets for skills are different than instructional strategies that are better alternatives to Solo Worksheets for knowledge. For

example, a very different type of coaching is best when a student does not know a fact than when a student does not know a skill. We will leave the discussion of how best to replace Solo Worksheet Work for knowledge for a different paper.

The Steps of the Structure Solo Worksheet Work:

1. Teacher provides instruction on a skill, often by modeling the skill, or presenting information.
2. Teacher distributes a worksheet for students to practice the skill or recall or apply the knowledge.
3. Students work alone, completing the worksheet.
4. Worksheets are collected, corrected, and graded.
5. Corrected and graded worksheets are passed back to students.

Solo Worksheet Work is a very common instructional strategy, unquestioned by most educators. As we will see in the next section, it violates basic principles of learning, is an inefficient approach to acquisition of skills, and often results in negative consequences for learners.

Part II. **Solo Worksheet Work is Inefficient and Often Produces Negative Outcomes**

In this part of our analysis, we examine why Solo Worksheet Work is inefficient, often producing negative outcomes. To illustrate the problems with Solo Worksheet Work we contrast Solo Worksheet Work with RallyCoach, a Kagan Cooperative Learning Structure. First, we summarize the steps of RallyCoach, and then contrast RallyCoach and Solo Worksheet Work along many dimensions.

The Steps of RallyCoach

Students are seated with a partner and are provided a worksheet to practice a skill.

1. Partner A verbalizes their thinking as they solve the first problem or performs the task.
2. As Partner A solves the problem, Partner B watches, listens, and checks, coaching if necessary, and praises.
3. Partners switch roles for the next problem.
4. The process is repeated for successive problems.

Contrasting Solo Worksheet Work and RallyCoach

Solo Worksheet Work and RallyCoach differ along many dimensions, including immediacy of reinforcement, amount of reinforcement, source of reinforcement, immediacy of correction, level of engagement, elimination of frustration, reducing the achievement gap, emphasizing learning rather than grading, fostering positive social skills, social orientation, and social relations, and increasing liking for class and content.

Immediacy of Reinforcement

The power of reinforcement decays with the passage of time. The greater power of

immediate compared to delayed reinforcement is extremely well established in studies of learning. Immediate reinforcement creates a stronger association between behavior and its consequences because of temporal contiguity. Immediate reinforcement creates a stronger perception of a direct cause and effect relationship.

In Solo Worksheet Work, students work alone, papers are collected, and the student does not receive reinforcement until after the teacher has had time to correct and grade all the papers. The delay between performance and feedback is usually at least a day, sometimes longer. Long delays can occur: If the worksheet is turned in on a Friday, reinforcement of correct practice of the skill can occur only after the teacher has been able to correct and grade all worksheets, at the earliest on the following Monday. Given the delay between performance and feedback, the student can receive feedback or reinforcement when performing the skill is a vague memory. At that point students are likely to focus on the grade, not the corrective feedback. In contrast, when RallyCoach is used, the students receive praise from their partners immediately following completion of each problem they solve or skill they perform. Praise immediately follows skill performance making it far more powerful than a mark on a paper received long after skill performance.

Source of Reinforcement

For many students, praise from a peer is far more powerful than a mark from the teacher on their paper. Most students today are more oriented toward and influenced by peer approval compared to teacher or parent approval. Social acceptance and desire for social media “likes” are extremely influential for today’s youth. Unlike

RallyCoach, traditional Solo Worksheet Work does not harness the power of peer praise.

Amount of Reinforcement

When completing Solo Worksheets, students receive reinforcement once per worksheet. In RallyCoach students receive reinforcement once per problem they perform, multiplying by many times the amount of reinforcement received.

Immediacy of Correction

Receiving immediate rather than delayed correction prevents practicing a skill incorrectly and provides more opportunity to practice the skill correctly.

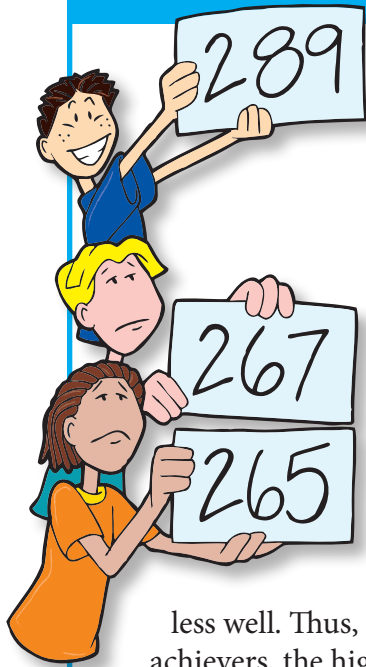


With Solo Worksheets, because students do not receive corrections until after completing all the worksheet problems, a student who thinks they are performing correctly can practice the target skill incorrectly on each worksheet problem. There is no correction until after all worksheet problems have been completed. In contrast, with RallyCoach students receive immediate correction if needed so are prevented from practicing wrong procedures.

Picture a student who thinks they know the correct procedure when in fact they do not. They practice wrong on all the worksheet problems, turn in their paper expecting a good grade, and instead receive a failing grade. This cannot happen if students receive immediate correction.

Elimination of Frustration

Some students are unsure of the correct procedure to solve the worksheet problems. If the student is shy and/or suffers from anxiety, they are likely to be afraid to publicly admit their inadequacy. Not asking for help, some students struggle through solo worksheets as best they can. This is a frustrating experience. In contrast,



with RallyCoach, frustration is side-stepped because if a learner is unsure, their coach explains or models how to perform the skill.

Reducing the Achievement Gap

With Solo Worksheets, every student is working alone. Higher achievers do quite well whereas lower achievers do

less well. Thus, in contrast to the lower achievers, the higher achievers get more practice performing the worksheet skill correctly. This increases the achievement gap. In contrast, with RallyCoach, because all students are put back on track if they are not performing correctly, weaker students practice more problems correctly than working alone. Thus, the achievement gap is reduced.

Placing Emphasis on Learning Rather than on Grading

After completing Solo Worksheets, students do not receive feedback until their graded worksheets are returned. At that point, focus is on the grade. “How did I do?” Often, this takes the form of social comparison: ‘Who did better; who did worse?’ The emphasis is on grades, not learning. In contrast, with RallyCoach the students get feedback on their performance as they do each problem so emphasis is on learning, not grades. RallyCoach emphasizes process feedback; Solo Worksheet Work provides only outcome feedback. Process feedback focuses on learning; outcome feedback focuses on evaluation.

Fostering Positive Social Skills and Relations

Students work alone on solo worksheets, so they do not have the opportunity to acquire positive social skills and social relations. In

contrast, with RallyCoach, students experience themselves as being on the same side, with a common goal of learning the target skill. Working together with a common goal leads students to develop a prosocial orientation and prosocial skills. Students practice and acquire a “With” rather than an “Alone” or “Against” social orientation. During RallyCoach students are taking turns, learn to take a leadership role, and encourage and appreciate each other. In the process of coaching, students are listening for understanding and can experience empathy for their partner.

Level of Engagement; Liking for Class and Content

Ongoing feedback, coaching, encouragement, and praise create a very high level of engagement during cooperative learning. In contrast, while working on Solo Worksheets, students ‘get nothing back’ for their effort until graded papers are passed out—at the very best, the next day. Working alone on repetitive tasks is a prescription for boredom, mind wandering, and/or off-task behavior.

Students are energized and thrive when they receive a high level of stimulation. RallyCoach and other instructional strategies that provide immediate feedback are much more stimulating than working alone. With RallyCoach students receive immediate praise and coaching from a peer. This higher level of stimulation and frequent positive peer feedback translates to increased liking for class and content.

Part III. **Ways to Replace Solo Worksheet Work**

RallyCoach is a more engaging, positive, research-based instructional strategies than is Solo Worksheet Work. RallyCoach is but one of many Kagan Cooperative Learning Structures to

replace Solo Worksheet Work. Among the most popular pair alternatives:

Sage-N-Scribe. The Sage gives the Scribe step-by-step instructions how to perform a skill. Scribe performs the skill, carrying out each step, writing on an answer sheet. Scribe coaches at any point, if necessary, and praises. Partners switch roles for the next problem. Sage-N-Scribe is very engaging because at any moment both the sage and scribe are active, one giving instructions and the other carrying them out.



DoOne-TellOne. First, working alone, all students solve a problem. They then pair up, display their answers and describe their problem-solving procedures to each other. They coach, if necessary, and celebrate. The pair repeats the process with the next problem alternating who goes first in displaying and describing their problem solving.

SeeOne-DoOne-TeachOne. Teacher or a classmate models for half the class the correct procedure to perform a skill. Classmates who see the model, practice the skill on their own. When ready, they teach the skill to a partner from the other half of the class who has not seen the skill modeled.

Part IV. Benefits of Replacing Solo Worksheet Work

The benefits of replacing Solo Worksheet Work with Kagan Cooperative Learning Structures as presented in Part II can be summarized as increasing positive outcomes and reducing negative outcomes, including:

Increased

- Immediacy of reinforcement
- Amount of reinforcement
- Peer-based reinforcement
- Immediacy of correction
- Emphasis on learning rather than grading
- Acquisition of positive social skills and social orientation
- Level of engagement
- Liking for class and content

Reduced

- Achievement gap
- Boredom, mind wandering
- “Against” and “Alone” social orientation
- Student frustration

Benefits for Teachers. Immediate feedback, process-oriented, cooperative learning structures offer many benefits for the teacher as well, including:

- Fewer papers to grade
- Students more fully engaged, on-task, enjoying class more
- Increased opportunities for formative assessment
- Higher academic achievement
- Improved social relations and social orientation among students
- Increased social skill acquisition
- More positive class climate
- Expanded repertoire of instructional strategies
- Enhanced enjoyment while teaching

Conclusion

By substituting one or more Kagan Cooperative Learning Structures for Solo Worksheet Work there are many benefits for both teachers and students, not the least of which is more success in teaching and learning, and a greater love of the learning process for both teachers and their students.

