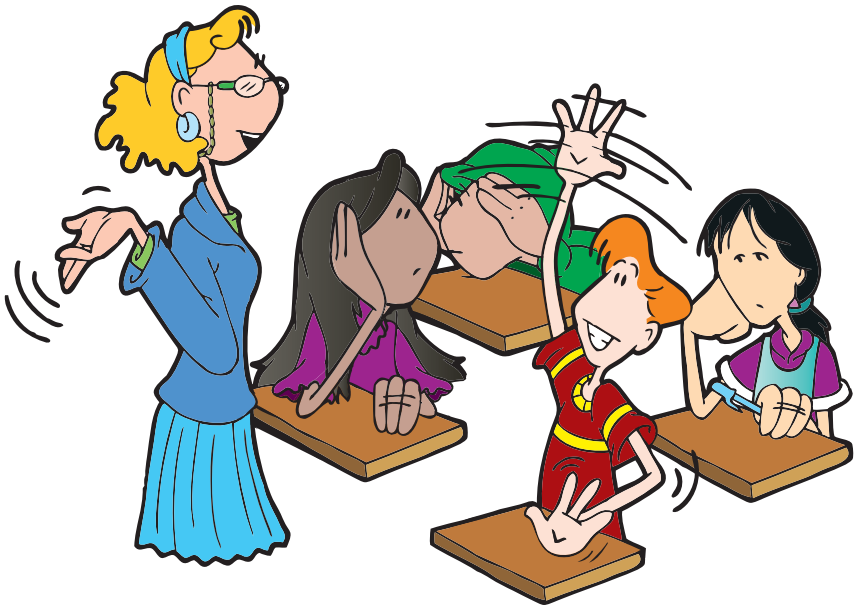

Calling On One

Destructive, Frequent, and Replaceable

Dr. Spencer Kagan

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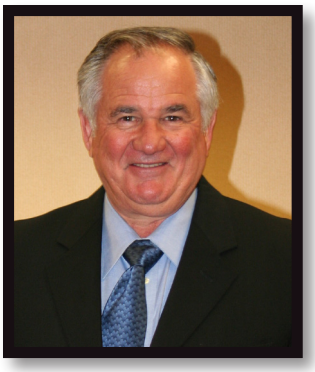
To cite this article: Kagan, S. *Calling On One: Destructive, Frequent, and Replaceable.* San Clemente, CA: Kagan Publishing. ***Kagan Online,*** 2023. **www.KaganOnline.com**



"When the only tool you have is a hammer, everything looks like a nail."
—Abraham Maslow

I have presented workshops and keynotes in 40 countries. In most of those countries I have visited classrooms to observe teaching and learning. I can testify that the most frequently used instructional strategy in classrooms around the world is a structure I call *Call On One*. Every teacher I have met is familiar with *Call On One* and almost all of them use it frequently.

The steps of *Call On One*:

1. The teacher asks a question of the class.
2. Students who want to answer raise their hands.
3. The teacher calls on one student to answer.
4. The teacher responds to the answer.

This frequently implemented instructional strategy is generally accepted without question. The purpose of this paper is to challenge the acceptance of *Call On One* and to present simple, more positive alternatives.

This paper has three interrelated parts:

Part I: How Call On One produces negative outcomes.
Part II: An important reason why Call On One is used so frequently.
Part III: Positive alternatives to replace Call On One.

Part I. *Call On One* Creates Negative Educational Outcomes

There are many negative outcomes produced by *Call On One*.

Call On One Creates Peer Norms Against Achievement

Picture a class. The teacher has just asked a question of the class. Ten of the thirty students raise and wave their hands, hoping to be called upon. They are excited, hoping to receive attention and approval from their teacher and classmates. The teacher calls on one. The other nine lower their hands and make a sound registering their disappointment. They did not get what they hoped for. In this little competition for attention the ratio is not good: there is one winner and nine losers.

But it gets worse: Sometimes the student who was called upon wanted attention more than they knew the answer and begins to falter or states the

wrong answer. The student may try again, hoping to save face. The other nine get excited, thinking *He is going to fail. I get another chance for the attention and approval I wanted.* In this situation many students become happy when they know a classmate is going to fail. The situation has placed students against each other: the failure of one increases the chance of success for others. When they see a classmate about to stumble, to get the public pain of failing in front of the whole class, rather than empathy, they experience excitement at the prospect of their own potential gain.

What do other students call the student who always knows the answer and who can always add to the answers of others? Classmates label a very high achiever: *teacher's pet, nerd, geek, brown noser*. Why does the group give them pejorative labels? Because as the very high achiever shines, others look dimmer by comparison. In situations in which the gain of one is associated with the loss of others, the success of the high achiever is not applauded by the group, rather it is shunned. Peer norms are set against knowing too much or always having the right answer. This causes a dilemma for the highest achievers: *Should I come out being the best student I can be, or should I be liked?* Unfortunately, some potential high achievers choose to be liked rather than achieve at their highest level. In Part III, I present structures that create peer norms favoring rather than shunning high achievement.

When peer norms don't favor achievement, potential high achievers face a dilemma: Do I choose to be the best I can, or to be liked?

Call On One Allows Some Students to Hide

Call On One is voluntary participation. Students choose whether or not to raise their hand. Thus, a student can take the stance that it is not that important to have studied or have done the homework assignment. They know when the teacher asks questions of the class, they can simply choose not to raise their hand. No one will know what they don't know. They are off the hook. They can skate by. They can hide. In Part III, I examine structures that have every student respond to every question, so no one can hide.

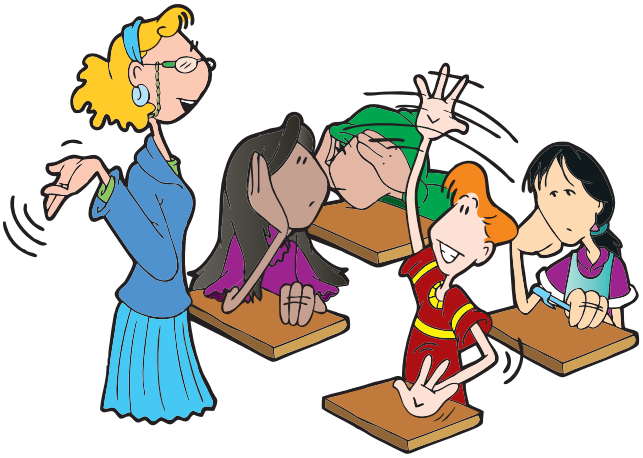
When we use *Call On One*, we call most on those who least need the practice and least on those who most need the practice, increasing the achievement gap.

Call On One Increases the Achievement Gap

Every time we use *Call On One* we increase the achievement gap between the high and low achievers. Why? Who is it that we call on? Is it the high or low achievers who have their hands up to be called upon? We end up calling most on those who least need the practice and least on those who most need the practice! By calling most on the high achieving students, we create more practice and engagement for that subgroup of students. Further, it is the high achievers who are more often verbalizing. Because we remember dramatically more of what we say than what we hear, by calling most on the high achievers we improve the retention of the content more by the higher achievers than the lower achievers. There is a positive cycle created for the high but not the low achieving students. If I know I am likely to be called upon, I study more. In turn I am more likely to know the answers and more likely to be called upon. I am more often rewarded for studying. The structures described in Part III are carefully designed so there is equal participation for all students.

Call On One Creates Disengagement

The mathematics of engagement during *Call On One* reveals the structure is exquisitely designed to create disengagement among students. Having students verbalizing their thinking is a powerful approach to improving thinking and engagement.



Each time we verbalize our thoughts, we become more fluent and better able to articulate our thinking. With this goal in mind, let's say we want to give each student in the class one minute to share their thoughts. Using *Call On One*, it will take over an hour for us to reach our goal! Why? Let's analyze the structure. First, the teacher asks the question and later the teacher responds to the student answer. Thus, the teacher talks twice for each time a student talks. Careful observation reveals that the response of the teacher to the student's answer usually is longer than the student's answer because the teacher wants to compliment or correct, add missing information, and/or share related information. Assuming a class of thirty with the teacher talking somewhat longer than each student, it takes over an hour to give each student one minute to verbalize their thinking. How are the students spending their time? One minute verbalizing their thinking and over 59 minutes waiting their turn!

Now, you may say to yourself, *I would never do a whole hour of Call On One*. It is true no teacher would do a straight hour of *Call On One*, but almost every teacher does a great deal more than an hour using that structure. Teachers do five minutes at the beginning of a class period, five minutes at some point in the lesson, and five minutes to review at the end of the lesson. This happens day after day. *Call On One* is the most frequently used instructional strategy among teachers across the globe. Each time we use *Call On One*, we should focus on the faces of the 29 students not answering, not on the one face of the one student actively engaged. As the one student answers and as the teacher responds to the answer, it is time for mind wandering for many students. In Part III, I present structures that allow the teacher to call on everyone, not just one. As we will see, to give each student one minute to verbalize their thinking, using Timed PairShare takes slightly over two minutes, not over an hour!

Why call on one if we can call on everyone? Why spend an hour to give each student a minute when we can give each student a minute in slightly more than two minutes?

Call On One Fails to Achieve Teacher Objectives

If you ask teachers what they hope to accomplish when they use the structure *Call On One*, they give a variety of answers. Examination reveals *Call On One* fails to achieve these intended objectives. Let's examine several of these objectives in turn.

"I Use *Call On One* to Check for Understanding."

Teachers often use *Call On One* to pose right/wrong questions: *What is the chemical formula for salt? What year did the stock market crash?* It is true that when we call on one student to answer a factual question, we find out if that student knows the correct answer. But the objective of the teacher is or should be to assess if ***most*** or all classmates understand the content. Because it is almost always the highest achievers in the class who raise their hands to be called on, the teacher is taking a very biased sample of the class. The student states the right answer, and the teacher

thinks, *Great, they know it.* Later comes the test, and many students do poorly. The teacher is puzzled, *What happened? They knew it when we reviewed in class.* No, the high achievers knew the answers. By calling on one, teachers create an illusion for themselves. They think the class is at a much higher level of achievement than it is. In Part III, I examine structures that create an unbiased sample of the knowledge of the class.

"I Use *Call On One* to Review the Content."

Call On One is often used to review content. We increase memory for the content by revisiting it so the teacher asks questions reviewing the key points of a lesson. Beyond the problem of having only the high achievers respond, there is the problem that many students who don't know the content are not raising their hands and are not called on. Knowing they can get away without participating, they may mind wander, not tuning into and not reviewing the content. In Part III, I present structures in which every student verbalizes the correct answers, dramatically increasing the probability of recall.

"I Use *Call On One* to Allow Students to Express their Ideas and Opinions."

Call On One is sometimes used to have students express their ideas and opinions. The teacher may ask, *What do you think will happen next in the story? Do you agree or disagree with abolishing the death penalty?* Having one student express their idea or opinion does not meet the goal of having all *students* express their opinions. When we call on one, we call on those students who are generally more verbal, assured, and outgoing. We call least on those who most need practice in expressing their ideas. As noted, in Part III, I examine structures that have every student verbalize their responses to every question.

"I Use *Call On One* to Hold Students Accountable."

Call On One holds accountable the one student who is called on. The goal, however, is to hold all students accountable. *Call On One* fails to hold all students accountable because students know they can hide: all they have to do is not raise their hand. The probability of being called on is very low. This lack of accountability has negative effects in the moment we call on one, but it has negative effects as students do their homework. As students decide how hard to study or whether to study at all, they know that when there is review in class, when *Call On One* is used, they can mask the fact they have not studied. To not be held accountable they need only not raise their hand. *Call On One* allows students to hide.

With *Call On One* we create a subset of the class who seldom or never participate. We allow students to hide.

"I Use *Call On One* to Create Student Engagement."

As teachers, we know we can only lecture for a certain amount of time before the eyes of our students become glazed over and their body language reveals boredom and disengagement. As we approach that point, we know we need to increase student engagement. Some teachers turn to *Call On One* to generate student engagement. While it is true that having some students raising and waving their hands hoping to be called on is increased engagement, as we have seen, it is those who least need increased engagement who are waving their hands; those who most need increased engagement sit passively and let the high achievers play the game.

"I Use *Call On One* to Have Students Share What Was Shared in Pairs and Teams."

Following pair or team interaction teachers sometimes use *Call On One* to have a partner or teammate share with the class what was shared in their pair or team. The desire to have the whole class know what was shared within pairs or teams is laudable, especially if there are valuable ideas for the whole class to hear. Unfortunately, by

asking for volunteers to raise their hand to be called upon to share with the class what was said in their pair or team, we are playing the lottery. What they share may be something of value, something of little importance to the class, or even wrong information. If wrong information is shared, the teacher must correct it, sometimes creating public embarrassment to the student who shared the wrong answer and their partner or teammates. In Part III, a method is presented to allow the teacher to become the filter of what is shared with the whole class, so only ideas and information of value are presented to the class.

Why play the lottery if instead we can be sure the class hears only the most valuable information?

Part II. Why Is *Call On One* Used So Frequently?

Before examining positive alternatives to *Call On One*, let's ask an important question: If *Call On One* produces many negative outcomes, why is it used so universally and so frequently?

One answer is that *Call On One* is simple. All a teacher must do is ask a question. The students know to raise a hand to answer. The teacher then calls on one of the students to answer and afterwards responds to their answer. That *Call On One* is simple begs the question of why it is used universally. Where did so many teachers learn this simple structure in the first place? In the answer to that question reveals a very important process.

Teachers go into training to become teachers not when they enter formal teacher training but rather when they enter kindergarten. The subset of students in every class who are to become teachers begin their training to be a teacher as they watch their teachers. As teachers, we unconsciously adopt teaching methods like those used when we were students. Without questioning, we teach the way we were taught. This is so because of two brain processes: mirror neurons and myelination.

Mirror Neurons. Each time we observe someone doing something, our brain fires as if we were doing that thing.[1] Not completely, but almost. For example, if we watch someone picking up a heavy object, our brain fires as if we were picking up the object, with the exception of the motor

component of the sequence. That is, we do not actually make the movement of picking up an object, but those neurons associated with picking up the object do fire. This is the basis for empathy. This is how we know what the other person is feeling. We experience their experience.

Myelination. Each time a neural track fires, the brain lays down a fatty substance around that neural track called myelin. The more times that neural track fires, the more the track is insulated by myelin. Myelin is like the insulation around an electrical cord. The more myelin that surrounds the track, the faster and more efficiently the neural track can fire.[2] How fast a neural impulse travels depends on many factors such as age, the neural pathway type, and the degree of myelination. In general, unmyelinated neural

tracks transmit at between 1 and 10 meters a second; myelinated axons transmit between 30 and 100 meters a second! Repetition increases myelination; this is the way the brain allows us to carry out repeated procedures more and more efficiently. In fact, we can carry out very highly myelinated procedures without the involvement of the prefrontal cortex — without thinking.

In order to create highly myelinated, efficient neural tracks, the army has new recruits break down and reassemble their rifle many, many times. When under fire it is nonadaptive to have to think about how to clear the rifle of a jam. The army wants that procedure to be fast, accurate, and automatic — no thinking involved. Myelination produced by repetition results in a procedural memory that we can perform automatically. This explains how we can drive to work, find ourselves at work, and ask the question: *How did I get here? I was thinking about something else the whole time.* We carry out highly myelinated habits without prefrontal cortex involvement.

To take one more example: When scolding their child for the first time, a new mother or father may be surprised to hear their own mother or father's words come out of their own mouth, even if they were certain they would never reprimand their own child that way. The more often they heard those words and phrases as a child when they were reprimanded, the more likely it is those words will come out when they are first reprimanding their child. The same is true of actions their parents performed. Anything we have seen or heard repeatedly, via mirror neurons, becomes a latent habit ready to be performed without forethought when we are in the appropriate situation.

How do mirror neurons and myelination combine to explain the frequency of *Call On One*? As we attended school year after year, over and over we saw our teachers call on one. Because mirror neurons associated with that repeated sequence fired so many times, they became a highly myelinated latent habit. A latent procedural memory becomes actuated when we are in the appropriate situation, as when we first stood before a classroom as a new teacher. As a new teacher, when standing in front of the class for the first time, when we wanted to get student engagement or check for understanding, we actuated the latent habit we had unconsciously acquired via mirror neurons. We fired off the *Call On One* sequence without questioning it. It was a frequently rehearsed latent habit ready to be carried out. Via this process, beginning teachers are likely to teach the way they were taught.

Call On One became a latent habit we unconsciously acquired via mirror neurons by watching our own teachers call on one year after year when we were students.

Highly myelinated habits are difficult to break. Information does not help. The drinker knows drinking is bad for the liver and the smoker knows smoking is bad for the lungs, but the drinker continues drinking and the smoker continues smoking. Knowing a bad habit produces negative outcomes does not break the habit. This is why it makes little or no difference if we tell teachers that calling on one produces negative results. After learning that *Call On One* sets students against each other, allows the low achievers to hide, increases the engagement and achievement gaps, and produces disengagement and boredom among students, teachers nevertheless go back to their classrooms and use *Call On One*! Teachers get the message, understand it, and even agree with it, but that does not change their behavior! Telling someone that a bad habit has negative consequences does not break that habit. Knowledge does not break habits. How then do we overcome strongly formed habits? There is one powerful way: Repeatedly substituting a positive

alternative behavior in the moment we would otherwise run off the old habit. In effect, we want to myelinate the new behavioral sequence more highly than the old sequence, so the new behavior can run off automatically.

After acquiring the new replacement habit, for some time the old bad habit remains myelinated, ready to run off. This is why in a moment of distraction or stress we find ourselves reverting to the old habit —even when we know better. It is very important to avoid falling back into the old habit, because each time we run off that sequence, we strengthen that neural track. It is only after a considerable time of not using the old habit that synaptic pruning takes place. When neural tracks fall into disuse, they eventually get pruned like the dead branches of a tree. Because the *Call On One* sequence remains latent after acquiring more positive alternative habits, a teacher needs to remain vigilant to avoid falling back into the old habit of calling on one. This is especially true because students have acquired the habit of raising their hands when they hear the teacher pose a question to which they know the answer. Their raised hands tempt us to call on one. We need instead to say, *"Lower your hands; let's think about our answers; now turn to your partner…."*

Thus, we come to Part III: What are the positive alternative behaviors teachers can substitute instead of repeating and reinforcing the habit of calling on one?

Part III.
Simple Positive Alternatives to *Call On One*

When calling on one student to respond, the most common questions we ask are designed to have students either: 1) engage in thinking or sharing information; 2) engage in brainstorming or review when the question has multiple possible answers; or 3) engage in recall to review single answer questions. A different simple structure best handles each of these three types of questions:

PairShare

PairShare replaces *Call On One* to facilitate thinking and sharing.

Thinking Questions. To promote thinking skills, we ask questions to which there are not one right answer. These questions have been called low consensus questions: each student may come up with their own unique answer. The questions may be designed to have students express an opinion or thought on a topic, or to engage in predicting, analyzing, synthesizing, summarizing, inducing, deducing, or generating a question on a topic. Examples of thinking questions:

- *What do you think will happen next in the story?*
- *What questions would you ask this historical figure?*
- *Which part of the cell do you find most interesting?*
- *Which algorithm do you find harder — long division or three-digit multiplication?*

Sharing Questions. To have students share, we ask questions to have students share information. Sharing questions may or may not require critical or creative thinking. Examples of sharing questions:

- *Which part of the story was most exciting for you?*
- *What is something fun you did this weekend?*
- *Which do you enjoy more, chem lecture or chem lab? What makes you say that?*

Steps of PairShare. When asking thinking and sharing questions, a simple structure to engage all students is *PairShare*. In *PairShare*, students are in pairs; one partner is Partner A and the other is Partner B.

The steps of *PairShare* are as follows:

1. Teacher poses the question and provides think time.
2. Teacher calls for either Partner A or B to share their thoughts with their partner in either one, two, or three sentences.
3. The partner shares and their partner listens.
4. The partners switch roles.
5. Partners signal when finished, often by standing up.

Optional Steps: Following each partner sharing the teacher may ask for the listener to respond with either a Copycat Gambit (E.g., *Your ideas stimulate my thinking*) or a Complete the Sentence Gambit (E.g., *What I find interesting about your idea is...*)

In addition, the teacher may circulate and listen in as students share their thoughts and when the structure is finished, the teacher shares back with the class and/or compliments some of the more thoughtful answers. Because the teacher can't hear all answers, each time *PairShare* is used, the teacher samples the class, hearing only some pairs. Over time, the teacher can sample all pairs.

Advantages of *PairShare* compared to *Call On One*:

- Rather than having one student respond, all students respond.
- Rather than calling mostly on the high achievers, high and low achieving students are called upon equally.
- No student can hide.
- Students are more comfortable sharing with a partner than with the whole class.
- Rather than an hour, it takes only a little over two minutes for all students to verbalize for a minute.
- The teacher has more authentic assessment: rather than hearing mostly from the higher achievers, by walking around and listening in, the teacher obtains an authentic, representative sample of the quality of student thinking.
- Rather than playing the lottery and using *Call On One* to have students share what was shared during the *PairShare*, the teacher is the filter, sharing with the class only the best answers the teacher heard.
- *PairShare* fosters a cooperative rather than competitive social orientation among students. Instead of becoming excited and happy when a student falters, students are hoping their partner has strong ideas because the ideas of a partner help them formulate their own ideas. Students are on the same side, working together to produce ideas.

Timed PairShare

Timed PairShare is used for longer responses.

If a teacher wants students to share more than one, two, or three sentences each, the teacher can use *Timed PairShare*. The steps of *Timed PairShare* are the same as PairShare except the teacher allows a predetermined amount of time for each partner to share. By controlling the amount of time, the teacher ensures equal participation. Without equalizing time or turns, the higher achiever or more vocal student in each pair is likely to do most or even all the talking.

This is one problem with Turn-N-Talk: lack of structuring for equal participation.

RallyRobin

RallyRobin replaces *Call On One* for Multiple-Answer Questions that Do Not have a Right/Wrong Answer.

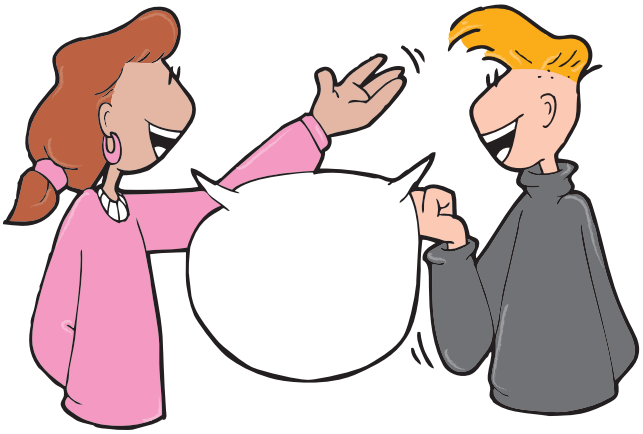
Brainstorming Questions. We stimulate brainstorming by having students respond to questions that have many possible answers. Brainstorming questions for RallyRobin do not have a right or wrong answer; they ask students to come up with thoughtful or creative ideas. Examples of RallyRobin questions:

- *Which events might happen next in the story?*
- *What are adjectives to describe an historical character?*
- *Which ways can we slow or end pollution on campus?*
- *How could we improve next week's test scores?*

The Steps of *RallyRobin*

Students are in pairs; one student is Partner A and the other is Partner B.

1. Teacher poses a question that has many possible answers and provides guided think time (*Think of one possible answer…; think of a second possible answer…; think of a third answer. Boil your answers down to one sentence [or one word] per answer.*) Teacher states if Partner A or Partner B will begin.
2. Partners take turns stating answers.



RallyCoach

RallyCoach replaces *Call On One* for Multiple-Answer Right/Wrong Questions.

The Steps of *RallyCoach*:

Students are in pairs; one student is Partner A and the other is Partner B.

1. Teacher poses a Right/Wrong question that has many possible answers and provides guided think time. (*Think of one possible answer…; think of a second possible answer…; think of a third answer. Boil your answers down to one sentence [or one word] per answer.*) Teacher states if Partner A or Partner B will begin.
2. Partner A states an answer.
3. Partner B listens, checks, coaches if necessary, and praises.
4. Partner B states an answer, and the process is repeated until time is called.

Examples of Multiple-Answer Review Questions. Many parts of the curriculum involve lists of items or questions that have a variety of correct answers. Review questions have a right or wrong answer. *RallyCoach* is excellent for multiple-answer review questions. Some examples:

- Name inert elements from the periodic table.
- State events from the story in the order they occurred.
- What were some of the causes of…?
- What were consequences of…?

Optional for both *RallyRobin* and *RallyCoach*:

The teacher may circulate and listen in as partners ping-pong answers, and afterwards may share with the class some of the stronger answers the teacher heard.

Advantages of *RallyRobin* and *RallyCoach* over *Call On One*

RallyRobin and *RallyCoach* enjoy the same advantages as those for *PairShare*. Additionally,

- Far more answers are generated in a shorter amount of time than when using *Call On One*.
- All students participate in the generating ideas or in the review.
- Each student generates many answers.
- We break the habit of mind of having students think of only one answer and stop thinking.
- Students feel a strong sense of cooperation working together to generate an oral list.

Typically, with Call On One, students think of one answer, raise their hands, and stop thinking, waiting to be called on. We promote flexibility of thought when we have each student continue thinking after generating a possible answer. *RallyRobin* and *RallyCoach* have each student generate many answers to a single question.

PairCoach

PairCoach replaces *Call On One* for review questions and problem solving when there is a single correct answer.

We boost recall of lesson content by asking review or problem-solving questions that have a single right/wrong answer. Typical review questions:

- What is the formula for….?
- What date did the historical event occur?

- Given a piece of pure metal you cannot touch, how would you use Archimedes' principle to determine which metal it is?
- How does the relation of supply and demand explain what will happen to the price of wheat following a drought?

Rather than using *Call On One* and having one student answer each question, it is much more powerful to use *PairCoach* and have half the class answer each question while the other half holds them accountable and checks for correctness.

The Steps of *PairCoach*:

Students are seated in pairs, and know if they are Partner A or B.

1. Teacher poses a right/wrong review or problem-solving question.
2. Partner A answers the question.
3. Partner B watches and listens, checks, coaches if necessary, and praises.
4. Teacher reveals correct answer.
5. If correct, partners celebrate. If not, they correct their answer.
6. Partners switch roles for the second teacher posed review question, which may be posed immediately or later in the lesson.

Coaching takes a different form depending on the type of question. If the partner does not know the answer or gives an incorrect answer:

For Simple Recall Questions: The coach states the correct answer, re-asks the question, partner states the answer, and coach then asks their partner, "How can we help each other remember this?" They then work together to develop a memory aide.

For Problem Solving Questions: To remind their partner of the steps of the problem-solving algorithm, the coach may use Tip-Tip-Teach-Try Again. That is, give one or two tips and if the partner does not get it, they teach the procedure by modeling and have the partner try it again.

The Advantages of *PairCoach* over *Call On One*

PairCoach enjoys the same advantages as does *PairShare*. In addition, *PairCoach* offers the following advantages:

- Immediate supportive peer feedback.
- Opportunity for every student to verbalize their problem-solving process.
- Individualized, differentiated coaching.
- Practice in the role of coach; acquisition of coaching skills.
- Peer praise.

Proven Positive Outcomes

The five structures described here as alternatives to *Call On One* do not cover every possible call on one question a teacher can ask, but they are useful as alternatives for the vast majority of *Call on One* questions. The five structures are carefully designed to create cooperative interaction, individual accountability, equal participation, and enhanced engagement. There is a great deal of empirical research demonstrating that when teachers implement instructional strategies incorporating those four principles the result is a wide range of positive outcomes including:[3]

- Increased Academic Achievement
- Reduced Achievement Gaps
- Improved Outcomes for Students with Disabilities
- Increased Student Satisfaction
- Increased Time on Task
- Decreased Disruptive Behaviors
- Increased Positive Social Behaviors
- Improved Race Relations

Conclusion

Implementing simple alternatives to *Call On One* holds great potential for improving a range of important educational outcomes. Because *Call On One* is used so frequently, there is tremendous leverage in phasing it out in favor of far more positive instructional strategies.

Placing strong emphasis on replacing *Call On One* with carefully designed, scientifically proven instructional strategies, gives professional development great focus, with implications for school improvement. Rather than training teachers in many strategies, each of which is likely to be used only occasionally, initially training teachers on a few key strategies that will be used very frequently holds great promise for improving instruction. Implementing this approach transforms coaching: Coaching programs can begin by focusing on just those strategies that are used most frequently, with the whole school supporting those initial focused transformations.

This paper is not designed to argue that successfully substituting positive instructional strategies for *Call On One* will produce the range of gains that result from cooperative learning. Cooperative learning produces gains from carefully designed team formation, teambuilding, classbuilding and techniques to foster social skill acquisition. Substituting positive instructional strategies to replace *Call On One* is but one step in harvesting the fruits of cooperative learning. But it is a very powerful step.

While there are very important short-term benefits to teachers and students for implementing more positive instructional strategies at those times teachers now use *Call On One*, there is also a very important long-term benefit to the field of education. *Call On One* is

so frequently implemented in part because it has been modeled for future teachers when they were students. If we are successful in substituting far more positive instructional strategies for *Call On One*, those strategies will be the ones modeled for future teachers. Via mirror neurons, the subset of students in each classroom who will become teachers will implement those more positive instructional strategies because that is how they were taught. When we get to the time when students experience *PairShare*, *Timed PairShare*, *RallyRobin*, *PairCoach*, and *RallyCoach* rather than *Call On One* throughout their years as a student, they will teach with those more positive strategies. At that point we will have overcome the resistance to change inherent in a system in which teachers teach the way they were taught. We will end the cycle of another generation of teachers using antiquated instructional strategies. It is primarily via mirror neurons that *Call On One* came to be used so frequently and unquestionably. In the long-run it will be via mirror neurons that *Call On One* will be replaced by more positive proven instructional strategies.

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