2 *Oh No! 99!*

Overview

While older elementary students are typically engaged with larger whole numbers, many still need and benefit from practice with mental addition and subtraction of smaller numbers. In this two-person card game, players attempt to force their partner to be the one to push their jointly accumulating score above 99. The game provides practice with adding and subtracting while also giving students the chance to think strategically.

Materials Needed

A deck of playing cards (jokers removed) for each pair of students.

Card Values and Operations

Aces:	add 1
Jacks:	subtract 10
Queens:	wild cards that can represent any other card in the deck
Kings:	add zero
All others (2–10):	add their face value

Directions for Playing the Game

1. One player shuffles the cards and deals four cards to each player. The undealt cards remain in a stack, face down.
2. Players take turns playing one card at a time, adding or subtracting the value of their card to or from their jointly accumulating score.
3. Each time a player plays a card, he or she must replace it with the top card on the face-down stack.
4. Play continues until one player forces his or her partner to go over the score of 99.

IN THE CLASSROOM WITH CAREN

Introducing the Activity

To introduce Oh No! 99! to Kathleen Gallagher's fifth graders, I'd planned to go through a sample game with the whole class and then send them off to play with partners. I began by asking the class to join me in a circle on the rug, so everyone would have a good view of the deck of cards. After some adjusting of desks and bodies, we were ready to begin.

"I brought a lot of decks of cards here today because you're going to learn a card game," I announced.

"Is it poker?" asked Chip, to a round of giggles.

"No, it's not poker and it doesn't involve gambling," I replied. "It's a game you play with a partner that helps you with math. I like this game a lot. It gives you a lot of practice adding numbers in your head. It makes you think."

I walked to the board and wrote *Oh No! 99!*

"This game is called Oh No! 99! As I explain the game you might start to get some ideas about how it got its name. Now before I show you how to play, there are a few important things you need to know about the cards." I wrote *A, J, Q, K* on the board. "In Oh No! 99! an ace means add one point," I explained. I wrote *add 1* next to the *A*. "A jack means subtract ten. A queen is wild. That means you can assign the queen the value of any other card in the deck."

"It can be any number?!" asked Jeannette, wide eyed.

"Can it be 1,000?" asked Kenneth.

"Well, it can't be 1,000, because there's no other card in the deck worth 1,000. It's wild, but it's not that wild," I told the class. I proceeded with my explanation. "A king means you don't add or subtract anything. For the rest of the cards in the deck, add whatever their number is: an eight means add eight, a three means add three. I'm going to leave this information up on the board, because you might need it when you play with your partner. The object of the game is to make your partner go over 99. So I want to force you to put down a card that makes the total 100 or more, and you want to try to get me to do the same. Can you guess why this game is called Oh No! 99!?" I asked.

"Because if there's 99 already, you're in trouble," offered Enrique.

"You got it," I agreed. "Before you go back to your tables, though, we're going to play one game together so you can see what the game is like and I can answer any questions. Since this is a game for partners, I'll play with the whole class as my partner. We're going to take turns adding cards to the discard pile."

I dealt four cards to myself and four cards to the class. I dealt all the cards face up, although I explained that when they played by themselves, they'd keep their cards hidden so their partner wouldn't know what they had.

"Okay, I'll go first, and I'll put down this seven. And since I put down a card, I need to pick another card from the top of the deck. I always want to have four cards in my hand. Now it's your turn. Who would like to choose a card for the class?" Many hands shot up. I called on Greg.

"I'll use the nine," Greg announced.

I put the nine on top of the seven.

"So now what's the total for the pile?" I asked the class.

"Sixteen!" they responded in unison.

"Good," I said, "whenever you put a card down on the pile you have to tell what the new total is. Partners need to check each other and pay attention to make sure both of you know the total."

We continued playing. I called on various students to make a choice for the class, and had the whole class tell me the new total after each card was added. When the total of the pile was 88, I asked Jenny to choose a card for the class to play. Many students tried to influence her.

"Don't use the ace yet," advised Miguel.

"Put down the nine," suggested Annabel.

Realizing the advice was being motivated by strategic thinking, I stopped the game to point this out: "I'm noticing that many of you have ideas about which card to play next. Would anyone like to explain your thinking?" I called on Kate.

"I think we should save the ace."

"Why is that?" I asked.

"Because with an ace you only have to add one, and that's a low number. If the cards get up to a high number like 97 or 98, we can use the ace to make you go over 99."

Many students nodded in agreement.

"Okay," I continued, "Kate thinks you should hold onto your ace and save it for later. Does anyone have an idea about which card you might want to play next?"

"Use the nine," said Ana, "because then the total will be 97 and that's close to 99. If you don't have a low card or a jack, queen, or king, we could win."

The class played the nine, and my next play put the score over 99. I then sent the students off to their tables to play the game in pairs. "Remember," I told them, "this game is important for two reasons. First, it gives you a lot of practice adding in your head. Second, when the total gets close to 99, you have to do a lot of thinking to plan a good strategy."

Observing the Students

The students returned to their seats, and I circulated around the room. At first, I just wanted to make sure everyone understood the game and was playing with a partner. Then I spent some time observing individual games. Several students were quite animated and couldn't resist showing their cards to friends nearby. Miguel, for one, was proudly flashing his picture cards to anyone in his vicinity. I issued a few gentle reminders for students to stay in their seats and focus on the game.

I noticed that while many students were quickly and easily calculating the totals mentally, others were more hesitant; some were even using their fingers. I was surprised to see Chip use his fingers to add 10 to 43. Adding ten should come automatically to most fifth graders, especially one like Chip, who came from a very traditional math program. However, it was clear that he had not made the base ten connection in this context. While Chip was certainly capable of adding 10 and 43 on paper using the standard algorithm, he did not see the significance of the relationship between the two numbers nor that there was a very predictable pattern when adding ten.

A Writing Assignment

After about fifteen minutes, even though everyone was still very involved in playing the game, I called everyone back together. I wanted to see what kinds of strategies they were using at this point, and I wanted them to have the opportunity to hear some of their classmates' thinking about the game so far. I illustrated a hypothetical situation on a projected transparency.

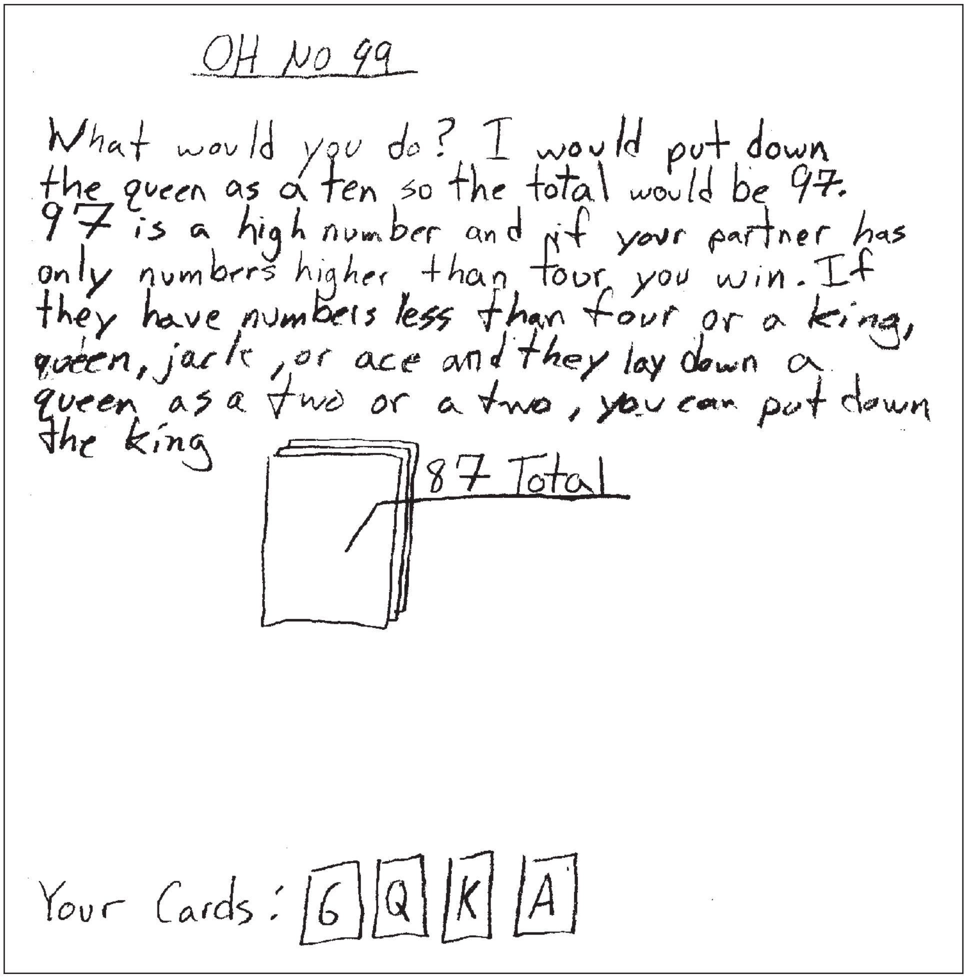
"Imagine," I said, "that you're playing Oh No! 99! and the total is up to 87. Your four cards are a six, a queen, an ace, and a king. Which card would you play next? As you think about this, pay attention to why you're choosing a particular card. I'm going to give you ten minutes of quiet writing time so you can tell me your ideas on this question. Make sure you put your name and date on the paper. Are there any questions?"

"You just want us to tell you which card we would use?" asked Jon.

"That's part of it," I answered, "but I also want to know why you would choose that card instead of any of the others. You might even want to tell me which card you definitely *wouldn't* want to use and why."

Most students chose either the six or the queen as their next card on the pile. Traci wrote, *I would put the 6 down because you should get rid of your high cards and save your low cards as you get in the high 80s and 90s. A, Q, K, are not high cards because a Q is a wild card and you can use it as a K. A K is a 0. An A is a 1.* Neal made a convincing argument for the queen (see figure 2.1): *I would put down the queen as a ten so the total would be 97. 97 is a high number and if your partner has only numbers higher than four you win. If they have numbers less than four or a king, queen, jack, or ace and they lay down a queen as a two or a two, you can put down the king.*

After reading through the class papers (additional examples are shown in figures 2.2 and 2.3), I realized the question didn't dig deeply enough into the methods the students used for adding the numbers. I got a general feel for their thinking about the cards, but the prompt I used focused more on strategy. I wanted to ask a question about the game that encouraged the children to tell me more explicitly how they were combining numbers. Did they use what they knew about place value to help? Were they merely counting on? Did they have more than one way to add numbers? I decided I would try to focus on these questions next time.



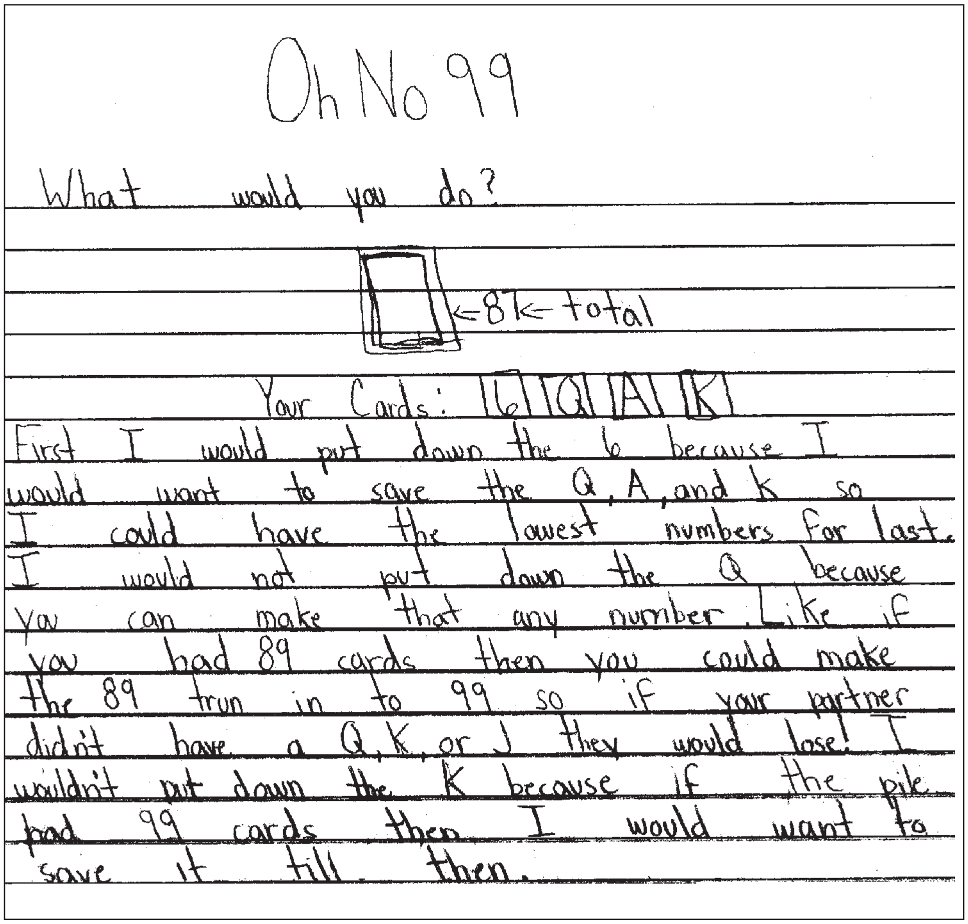
OH NO 99

What would you do? I would put down the queen as a ten so the total would be 97. 97 is a high number and if your partner has only numbers higher than four, you win. If they have numbers less than four or a king, queen, jack, or ace and they lay down a queen as a two or a two, you can put down the king

Your Cards: 6 Q K A

FIGURE 2.1

Neal's hypothetical strategy.



Oh No 99

What would you do?

←87← total

Your Cards: 6 Q A K

First I would put down the 6 because I would want to save the Q, A, and K so I could have the lowest numbers for last. I would not put down the Q because you can make that any number. Like if you had 89 cards then you could make the 89 trun in to 99 so if your partner didn't have a Q, K, or J they would lose! I wouldn't put down the K because if the pile had 99 cards then I would want to save it till then.

FIGURE 2.2

Another student's strategy.

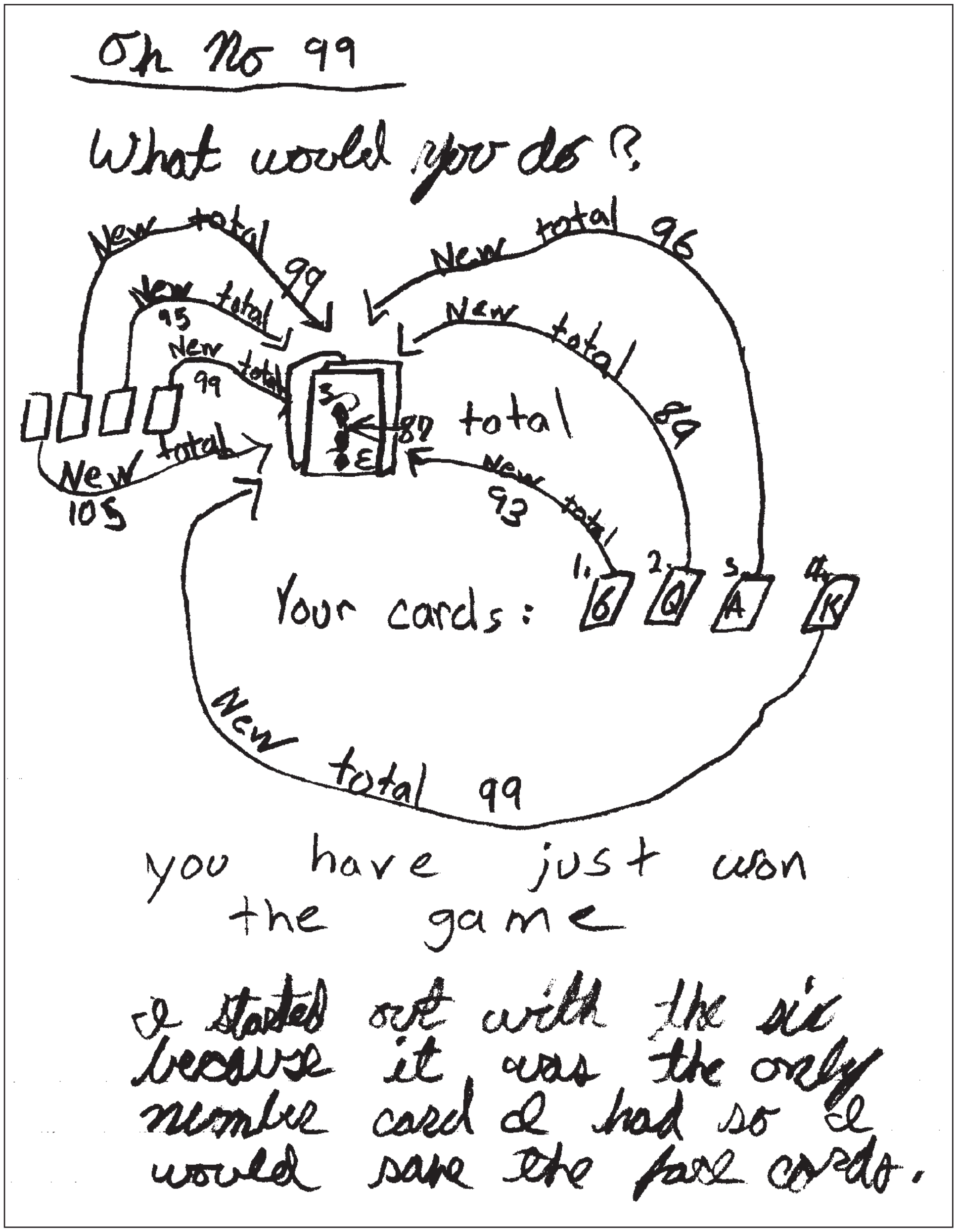


FIGURE 2.3

Still another strategy.

Continuing the Activity

When I returned to the class a few days later, student partners were playing the game with gusto. I gave them a few minutes to finish, and then I called for their attention. I began by talking about the papers they'd written during my previous visit. I told them I was impressed with both the range of their ideas and the way they were able to write about their thinking.

"The last time I visited I gave you a situation to think about. Does anyone remember what the total was for the question I asked?"

"It was 87," replied Charles.

I wrote *87* on a projected transparency.

"And the cards we had were six, ace, queen, king," added Lucy.

"Okay," I continued, "quite a few of you wrote that you would use the six and add it to the pile." I wrote + *6* next to the *87* on the overhead. "So what would the total be now?"

"Ninety-three!"

I wrote = *93* on the overhead to complete the equation. "Now comes the interesting part," I told the class. "You all know that 87 plus six equals 93, so that's not really a problem. The challenging part is to think about how you solved the problem in your head without paper and pencil. Does anyone want to try to describe how you solved it mentally?"

Traci volunteered first. "I took two away from the 87 to make it 85. Then I took one away from the six to make it five. I know 85 plus five equals 90. Then I just added back the two and the one and I got 93." As Traci talked through her thinking, I recorded the corresponding equations on the overhead:

$$87 - 2 = 85$$
$$6 - 1 = 5$$
$$85 + 5 = 90$$
$$2 + 1 = 3$$
$$90 + 3 = 93$$

It's important for students to see the connections between their thinking and the mathematical symbols that represent it. Often children don't realize that the words and ideas come first and that the equation is a shorter way to express those same ideas. Many children only see equations printed in textbooks and worksheets and don't connect them with any real-world context. As a teacher, part of my job is to help students connect equations and symbols with meaningful contexts. It's a challenge to listen to a student, try to make sense of her thinking, and record the corresponding equations all at the same time, but it's gotten easier with practice.

I asked the students to volunteer other approaches to solving 87 + 6. While the problem itself is not particularly challenging for fifth graders, explaining it verbally is. I wanted the students to focus on their own thinking without getting bogged down by the computation.

Ronald shared his strategy next. "Well, I know three plus three is six. So I took one of the threes and added it to 87. That made 90. Then I added the other three to the 90 and got 93." I recorded Ronald's thinking symbolically:

$$6 = 3 + 3$$
$$87 + 3 = 90$$
$$90 + 3 = 93$$

Then I recorded Jenny's, Josue's, and Enrique's thinking on the overhead as well. The class got to hear five different students talk about their thinking and were able to see there is more than one way to solve a problem. This idea is a big leap for students who have been accustomed to an algorithmic approach to mathematics. The more opportunities they have to expand their computational horizons, the better.

A Writing Assignment

Next I wanted each student in the class to have an opportunity to explain her or his thinking about computation. I chose a similar context. "Imagine you're playing a game of Oh No! 99! and the total score so far is 74." I wrote *74* on a projected transparency. "Your partner adds an eight to the pile." I wrote + *8* next to the *74.* "What's the new total?"

"Eighty-two," the class responded in unison.

"Okay," I told them, "now for the challenging part. I'm going to give each of you a piece of paper and on that paper you need to try to explain different ways you can add 74 plus eight." I put the previous overhead back up to remind students of our previous discussion. "We saw five different ways people solved the problem 87 plus six. Your job is to try to think of a lot of different ways to solve 74 plus eight. Maybe if you look at the ideas that Traci, Ronald, Jenny, Josue, and Enrique had it might help you. Probably there are even more ways to solve these kinds of problems."

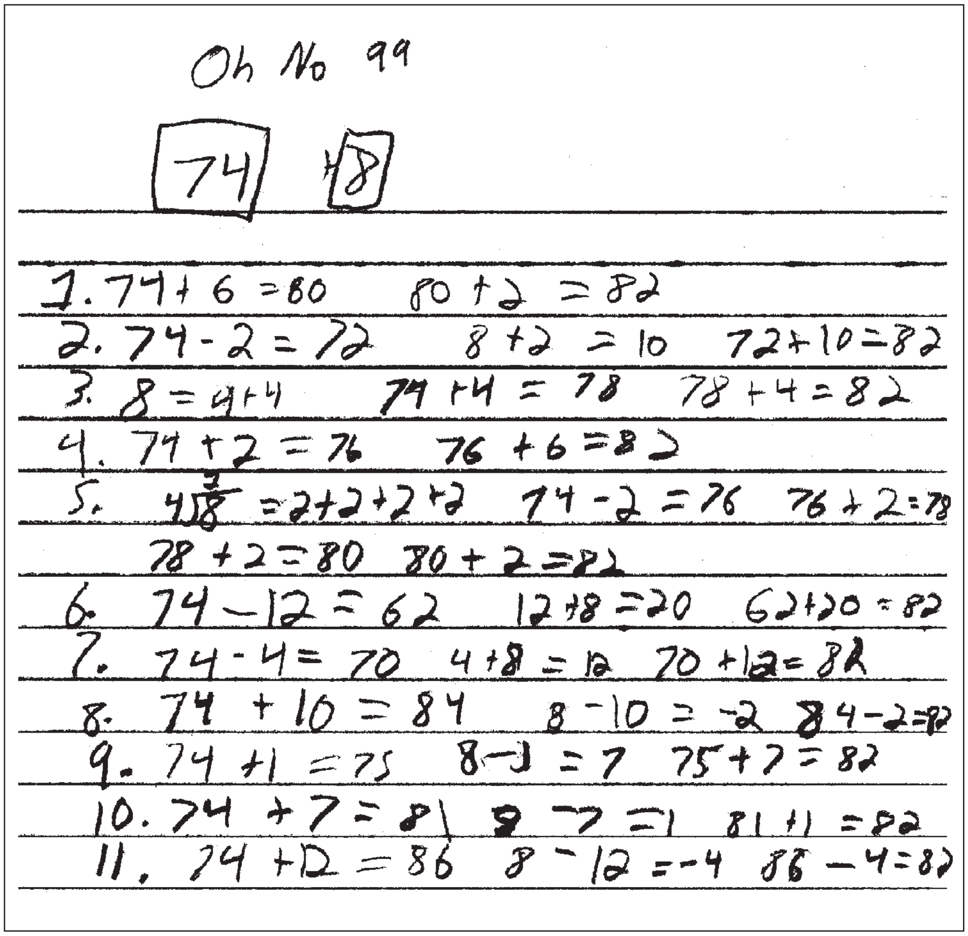
"How many ways are we supposed to get?" asked Cornelius.

"I don't have a specific number in mind," I told him. "Just try to stretch your brain to think of a lot of different ideas."

I handed out paper and the students began their work. I circulated and observed. There was quite a range of approaches. I noticed that several of the students were writing prolifically and not using symbols. While I was pleased that they were comfortable incorporating writing into their math work, I decided to steer them in a different direction.

"I'm sorry to interrupt you in the middle of your work," I told the class, "but I'm noticing that some of you are doing a lot of writing. It's great to write and use words to explain your thinking, but you can also use shortcuts and write some equations on your paper." I referred once again to the transparency with the five students' work. "You see I used equations to show how Traci took two from 87 to get 85. Probably on your papers there will be a combination of words and equations to show how you solved the problem. Don't feel that you need to use only words for this assignment."

The students resumed working. I



Oh No 99

$\boxed{74}$ $+\boxed{8}$

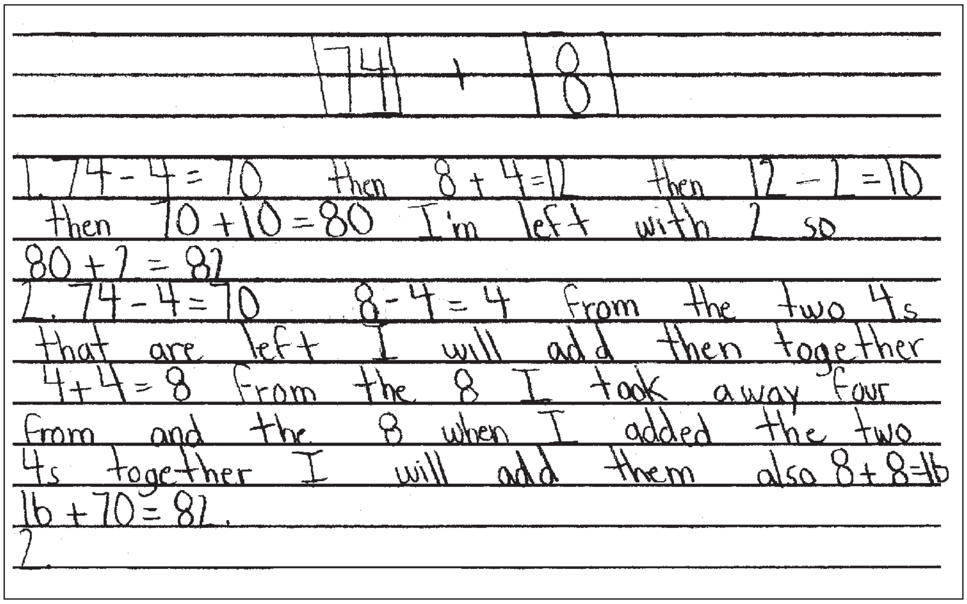
1. 74 + 6 = 80   80 + 2 = 82
2. 74 - 2 = 72   8 + 2 = 10   72 + 10 = 82
3. 8 = 4 + 4   74 + 4 = 78   78 + 4 = 82
4. 74 + 2 = 76   76 + 6 = 82
5. $4\overline{)8}^{\,2}$ = 2 + 2 + 2 + 2   74 - 2 = 76   76 + 2 = 78
   78 + 2 = 80   80 + 2 = 82
6. 74 - 12 = 62   12 + 8 = 20   62 + 20 = 82
7. 74 - 4 = 70   4 + 8 = 12   70 + 12 = 82
8. 74 + 10 = 84   8 - 10 = -2   84 - 2 = 82
9. 74 + 1 = 75   8 - 1 = 7   75 + 7 = 82
10. 74 + 7 = 81   8 - 7 = 1   81 + 1 = 82
11. 74 + 12 = 86   8 - 12 = -4   86 - 4 = 82

FIGURE 2.4

Shannon discovered eleven ways to add 74 and 8.

sat down briefly at different tables, watching students work and occasionally asking them a question about their paper. Several students described counting on as their strategy of choice. Romolo wrote, *This is how I did the adding. I add the number 8 into the pile. I just counted 74 and then I said 75, 76, 77, 78, 79, 80, 81, 82.* He had not recorded any other strategies. Kate had two ideas: *1. I knew the answer by counting on my fingers. 2. I added [standard algorithm with carrying].*

Shannon was clearly comfortable breaking the numbers apart and putting them back together. He had listed 11 different ways to do so (see figure 2.4). Jenny used an impressive combination of words and equations to explain her thinking (see figure 2.5): *74 – 4 = 70 then 8 + 4 = 12 then*


74 + 8

1. 74 - 4 = 70 then 8 + 4 = 12 then 12 - 2 = 10 then 70 + 10 = 80 I'm left with 2 so 80 + 2 = 82

2. 74 - 4 = 70 8 - 4 = 4 from the two 4s that are left I will add then together 4 + 4 = 8 from the 8 I took away four from and the 8 when I added the two 4s together I will add them also 8 + 8 = 16 16 + 70 = 82.

2.

FIGURE 2.5

Jenny's ways to add 74 and 8.

12 – 2 = 10 then 70 +10 = 80 I'm left with 2 so 80 + 2 = 82.

Jon used ten as a friendly number: *74 + 10 = 84 – 2 + 82. You – the 2 because you added 2 to the 8 and that equals 10.* I was pleased to see that quite a few of the students used division to describe breaking the eight into twos or fours. Mike wrote: *8 ÷ 2 = 4 ÷ 2 = 2, 74 + 2 = 76 + 2 = 78 + 2 = 80 + 2 = 82.*

I got the feeling some of the students were humoring me. They listed different ways to make 82, but didn't seem concerned with using the original numbers. Josue had a list that included: *60 + 22 = 82, 71 + 9 = 80 + 2 = 82.* It seemed Josue was showing what he knew about 82 rather than showing ways he might combine 74 + 8. One of Jon's contributions was: *74 ÷ 2 = 37 + 45 = 82.* I wasn't particularly concerned by these types of equations. While the original context seemed to have been lost, I was at least able to see some different ways the boys thought about numbers.

However, I found some of the written work very confusing. Annabel wrote: *70 – 4 = 70, 4 + 2 = 6, 76 + 7 = 82.* Not only was it unclear where the numbers had come from, the work also had computational errors. I would need to get back to Annabel one on one and have her explain her work to me. The paper alone left me with questions about her thinking.

A Class Discussion

After the students had been working independently for a while, I stopped the class and had them share their work in groups. Each student showed a way he or she had solved the problem. Then I called the class together to summarize the experience. "Does anyone have any comments about this activity?" I asked.

"I like the game," responded Miguel, "but it's hard to write about adding the numbers."

"I got eight different ways to add them," bragged Howard. "Probably I could find more."

"Why do you think I asked you to write so much about 74 plus eight?" I asked.

"Because you're the math teacher," quipped Ana.

"Well that's certainly part of it," I laughed, "but why did I ask you this particular math question?"

"It makes us think a lot," responded Kenneth.

"So you can see our ideas," added Enrique.

"You know," I said, "I think that's really it. I try to ask questions that get you to think. And I want to be able to understand your thinking so I can be a better teacher."

CAREN ANSWERS YOUR QUESTIONS

What is the purpose of this activity?

Oh No! 99! provides a context in which students can practice mental computation. During the game, the students are repeatedly adding and occasionally subtracting numbers between 1 and 99. This certainly gives them the practice they need to become computationally proficient and efficient.

Additionally, the game motivates students. Whereas they might be less than thrilled to do dozens of computation problems with no context, they actually choose to play Oh No! 99! Even after playing it several times in class, students still enjoy the game and are eager to play it during menu or choice time.

Then too, the game gives students an opportunity to use strategic thinking while they are playing. Students need to consider the value of the cards in their hand, hypothesize about what cards their partners might have, and make decisions based on their ideas.

Finally, the game provides a context in which students can do some written work. Their writing gives insights into how they communicate mathematically and how they think about breaking numbers apart and putting numbers together. It's important for students to have many opportunities to practice these skills.

Is this game too easy for fifth graders?

On the surface this is an easy game, but there is a lot of mathematics embedded in it. Students playing Oh No! 99! are practicing mental computation, using strategic thinking, and being exposed to probability. One test of the game is how interested the students are. If it were truly too easy, the students would lose interest rather quickly. How long would a group of fifth graders stay involved in a preschool puzzle or an episode of *Sesame Street*? In Kathleen Gallagher's class students continued to choose to play Oh No! 99! during their free time throughout the year.

Also, I noticed several of the fifth graders using their fingers to figure the totals during the game. This suggests they need much more practice with mental computation. While I don't forbid students to count on their fingers, I work with them to help them move on to more efficient strategies. The game, when combined with a discussion about computation strategies, offers the students opportunities to move beyond "counting on" approaches. The game also develops number sense in students who do not rely on their fingers. The strategies they learn and fortify while playing can be applied to larger, more challenging problems in the future.

What can I learn about my students from this game?

I found many opportunities to assess individual students while they were playing. By observing them and listening to their conversations I got a feel for their comfort with the computation and the ways they were adding in their head. The writing prompt I used gave me deeper insight into their strategic thinking. Also, the game proved to be an excellent springboard for a discussion about mental computation strategies and ways to put numbers together and take them apart. Such flexible thinking about numbers strengthens students' number sense.

During the game Chip had trouble mentally adding 10 to 43. As I watched him play the game with his partner, I saw he was clearly embarrassed and attempted to hide his finger counting and acted silly to distract his partner and me from his struggle. By the intermediate grades, students are painfully aware of their academic shortcomings and in some cases have become quite adept at hiding them. This is true not only in math, but in all areas. So a big part of my role as the teacher is to assess students informally. Observations, interviews, and student work really give me the big picture. When I do notice a student, like Chip, who is "sneaking by" without real understanding, I need to provide a safe environment for him to have more meaningful experiences with numbers.

What experiences would you provide for a student like Chip?

Chip definitely needs more opportunities to work with numbers in ways that make sense to him. The rote drills and algorithms he learned in the past did not serve him well when it came to doing even simple computation. I need to ask Chip questions about patterns he notices in numbers. This may help him begin to see the reason in our place value system. Perhaps a 1–100 chart will give him a visual model of our number system. He and his partner can use the

100 chart as a game board and move a marker along the chart as the total changes with each turn. I may also have Chip keep a record of the score by writing equations horizontally on a piece of paper. For example, if the total were 58 and Chip put a seven down, he'd write $58 + 7 = 65$. Writing the equations horizontally will help keep Chip from falling into the mindless algorithm trap. He'll be more apt to think about the numbers as quantities rather than digits to cross out mechanically.