

When Is Basic Fact Drill Appropriate?

What are some guidelines for drill?

Contrary to what some people believe, drill or the use of timed tests does not need to cause children harm. Granted, if drill is used too soon, and children do not have an efficient way of thinking to solve the problems for which they are expected to answer quickly, drill will not help and it may cause undue stress. There is no benefit for children under those conditions. However, if drill is appropriately delayed, children can benefit by becoming more fluent. Drill can increase the speed at which students respond and it can increase the accuracy of the responses.

Do not use drill on a group of basic facts until after the children are able to use an efficient thinking strategy to solve those basic facts. Then the drill will increase the speed and accuracy of the use of that efficient thinking. Without that ability to figure out the problems quickly, children are forced to guess or to simply not respond. Neither of these possibilities is consistent with the goal of helping children make sense of mathematics.

Organizing practice in clusters of basic facts, that can easily be solved with a given thinking strategy, enables children to have success with that cluster of facts as they practice using that thinking strategy. After children learn a new thinking strategy, they can benefit from practice on those facts that can easily be solved by using that strategy.

Two other conditions help children master the basic facts. First, practice a few minutes each day or every other day. Second, introduce only a few new facts at a time. It has been shown to be very effective to introduce only about 10-15 new facts at a time and then provide about two weeks of practice with those before introducing other new facts.

Some guidelines for drill might include:

- Delay drill (timed tests) for a group of facts until students have an efficient way to think about those facts. No exceptions to this rule lead to positive outcomes.
- Provide activities where every student has some success.
- Keep the drill periods very brief, perhaps only a few seconds at time.
- Work on a few facts at a time.

What are some teaching strategies that meet these guidelines?

The following procedure for timed tests has been used effectively. Provide each child three rows of problems. Time each row separately. Make sure that every child has success on the first row of problems by waiting until all of them have finished before you stop them. Select the amount of time so that all children can finish in the allotted time. Then on the second row, allow less time to complete the row. For the last row, allow only enough time to challenge the best students. The times you allow will vary according to your class, but it will not take long for you to get down to 30 seconds for the first row, 20 seconds for the second row, and 10 seconds for the third row. A sample dialogue might be as follows:

"Do the first row as quickly as you can. I'm going to give you 30 seconds to complete the row. Start." Watch the children rather than the clock on this row. Wait about 5 seconds after the last child completes the row and say, "STOP!"

"Everyone got done before I stopped you on that row. On the second row I'm only going to give you 20 second. Start." This time watch the clock and stop them after 20 seconds. "STOP!"

"There were still some people who got done before I stopped you. On the last row I'm going to try to stop you before anyone gets done. This time you only get 10 seconds. Start." Watch the clock and stop them in 10 seconds. "STOP!" "Some of you still got done. We'll have to do it faster next time."

"Now I am going to read the problems and the answers very quickly. Listen closely and put a mark by the problems that are incorrect. Do not try to take time to correct them now."

Read the problems and the answers as quickly as you can. If you have not made an error by the end of the last row, do so on purpose for one of the last problems. The children soon learn to listen very carefully for your error.

"If you answered every problem that you had time to do correctly, put a star at the top of the page. Do I get to put a star on mine?"

Another procedure is to give the students a set amount of time to respond to each fact. The teacher can orally present a basic fact problem, wait 4 seconds (then 3 or 2), then say the answer. After presenting ten facts, the students can compare the number they were able to answer before the teacher did. Ten more problems can be presented with 3 or 2 second wait time. Nearly every student will be able to answer more quickly than the teacher will for five or more facts if they are given 4 seconds to respond. Consequently, they will have success in answering before the teacher does for the first ten problems. Remember that they have an efficient thinking strategy before the drill.

About once every month give the children an entire page of basic facts that they can solve efficiently with the strategies they already know. Tell the children you will give them 60 seconds to complete as many problems as they can. Also tell them that they will not have enough time to complete the entire page. Start them. Stop them in 60 seconds. Collect these papers so you can check for speed (the number of problems correctly answered in one minute) and accuracy (the percent of correct responses). These scores can be recorded and compared to the last set of scores you collected about a month earlier. Children are amazed at the amount of progress they make in that amount of time. They may even want to graph their scores to show the progress they are making.

What are the benefits of practice worksheets?

Asking the students to complete pages and pages of basic facts on practice worksheets as a way to help them learn the basic facts is not productive. In general, most worksheets that are not timed simply give the students and opportunity to practice inefficient thinking strategies, probably counting strategies. That does not help and it may postpone the memorization of

those facts. On the other hand, if the worksheet is designed to help them learn a new thinking strategy or if it is designed to let them practice a thinking strategy, then it has the potential to be very helpful to the student.

How quickly should students be expected to respond to basic facts?

Some teachers believe that students should be able to provide immediate responses to a basic fact. Just how fast is an immediate response? There is no right or wrong answer to this. Each of you will have to make your own decision. Realistically, many students will never be able to respond to some of the facts in 1 second. Teachers, who expect students to complete all 100 facts for an operation in 2 minutes or less, are creating a situation where many students can not succeed. It simply takes many students longer than 1.2 seconds per problem to process the information and write their answer. On the other hand, if it takes as long as 10 seconds for a student to figure out a fact, will that student take the time and effort to use that fact in an estimation situation? Probably not.

From years of experience, almost all students can learn to solve facts in about 3 seconds. As teachers help the class work towards that goal of 3 seconds, many of the students are able to solve the fact problems in 2 seconds or less. You may decide to select a different number of seconds as your goal. Just be realistic in your expectations for students. Do not set up goals that many students can never achieve.