

Hello, my name is Joshua Schultz and today I'm going to go over how to teach fifth-grade students in Idaho public schools to multiply multi-digit numbers using the standard algorithm.

This instructional design process for a math lesson for fifth-grade students will include learner analysis, needs analysis, task analysis, terminal/enabling objectives, assessments, nine events of instruction, and formative, and summative evaluation plans.

Learner analysis

1. Who is the intended audience?

The intended audience for the instruction is fifth-grade students in Idaho public schools. According to Idaho content standards for math, all fifth graders must, "Demonstrate fluency for multiplication of multi-digit whole numbers using the standard algorithm. Include two-digit $\times$ four-digit numbers and three-digit $\times$ three-digit numbers" (SDE). All fifth-graders in Idaho need to be able to multiply multi-digit numbers.

2. What common traits do members of the learning group possess?

The common traits they would have would be strategies for multiplication that they learned in fourth-grade Idaho public schools.

3 What are the differences among learners within the group?

Within any given group there could be students that have learning disabilities, behavioral challenges, or students that have moved in from out of state and may not have the same standards in their fourth-grade class as Idaho may have.

4 What is the range of ability among the learners?

The range of abilities is measured in categories of *basic*, *proficient*, and *advanced*. Basic means students have a limited understanding of grade-level material. Proficient means students have a general understanding of grade-level material. Advanced means students have a thorough understanding of grade-level material. Idaho fifth-grade students proficient in math account for about 41.5% of the students.

5 What is the motivation for participating in the instructional event?

To have the skills needed to pass on to sixth grade.

6 Do the learners have non-instructional needs (e.g., rest, food, safety) that must be met so they may focus on the instructional activity?

Yes, the learners need to feel that they are in a safe and caring environment that has opportunities for food and clothing if needed.

7 What will make the instruction effective, efficient, and appealing?

I will present different strategies that will make connections to the standard algorithm.

8 How will you (as the instructional designer or member of a design team) plan for the accommodation of culturally and physically diverse learners?

I will incorporate accommodations for auditory, visual, and hands-on learners.

9 What evaluation strategies will you (as the instructional designer or member of the design team) use to determine the success of the learner analysis and how to refine future analysis for the instructional event?

I will have students take a twelve-question multi-digit test before instruction.

Needs analysis

- 1 What change is being requested (including who is being asked to change and what is currently taking place)?

Fifth-grade students in Idaho public schools are being asked to change. The change being requested is the ability to learn the standard algorithm for multiplication.

- 2 Who is requesting this change?

The state of Idaho is requesting the change and fifth grade teachers are helping to facilitate that change.

- 3 Where will this change need to take place?

The change will need to take place in the classroom

- 4 Is instruction the most appropriate means for bringing about the desired change?

Yes, various forms of instruction including visual, auditory and hands-on approaches are the most appropriate means for a change.

Task Analysis

- 1 What are the tasks that individuals need to be able to accomplish or perform?

The tasks that the student needs to be able to accomplish is to first know their basic multiplication facts (EX: $9 \times 2 = 18$, $7 \times 8 = 56$, etc).

- 2 What are the key components of those tasks (That is, the skills and knowledge an individual needs in order to successfully complete or perform the task)?

Typically, this requires rote memorization of the basic facts and powers of ten.

- 3 What is the sequence in which those tasks are accomplished or performed and should be learned and taught?

Different strategies should be taught that tie into the standard algorithm. Students are encouraged to use the scaffolding strategies as needed with the goal of connecting them to the standard algorithm.

4 How can you determine whether an individual is able to complete the tasks?

The pre-test will be given at the beginning of the unit and post-tests will be given at the end to measure growth in completing the task.

Terminal/enabling objectives

Terminal Objective 1

Students will demonstrate how to use the partial product with an area model strategy.

Enabling Objective 1

Students can identify how to decompose numbers and line them up in the area model.

Terminal Objective 2

Students will identify patterns with the area model and standard algorithm.

Enabling Objective 2

Students can demonstrate connections and use of the standard algorithm.

Assessment

Objective 1

Students will demonstrate how to use partial products with an area model by decomposing and lining numbers properly.

Assessment 1

Students will be able to answer 2 by 1 number (56×2) using the partial product with an area model strategy. As the master 2 by 1 numbers, they will progress up to 2 by 2, until they get to 3 by 3 numbers.

Objective 2

Students will be able to answer multi-digit multiplication problems using the standard algorithm. They will be scaffolding from the partial product strategy.

Nine Events of Instruction

Lesson Objective: Participants will solve multiplication problems using the standard algorithm.

Main Learner Characteristics: Fifth-grade students.

Event 1: Gaining Attention

Students will be introduced to the standard algorithm and how effective and efficient it is compared to repeated addition.

Event 2: Informing Learners of Objectives

I will then inform students of the different strategies we will learn that will help guide us to the standard algorithm.

Event 3: Stimulating Recall of Prior Learning

I will ask what they remember about multiplication from the fourth grade. I will ask for examples of strategies that they remember and build upon those.

Event 4: Presenting Information

I will present the different strategies on the whiteboard and have the students follow along on their mini whiteboards.

Event 5: Providing Guidance

Students will be put in groups of three to four learners per group. They will each be given a specific problem and integrate the strategies that have been written on the whiteboard.

Event 6: Elicit Performance

The groups of students will work on their respective problems and present their work to the class.

Event 7: Providing Feedback

The teacher will provide feedback during each group's presentation.

Event 8: Assessing Performance

An exit ticket will be given where the student will have to answer the question 561×23 using both, partial product and standard algorithm.

Event 9: Enhancing Retention and Transfer

The class will reflect on the above problems and work as a class to dispel any misconceptions.

Formative and Summative Evaluation Plan

For a formative assessment, students will be given a homework assignment consisting of four problems. The homework will be reviewed as a class.

After the review of the homework has been completed then a final summative assessment will be administered consisting of eight questions. Students need to show work and use any strategy that has been covered in class.

Idaho State Department of Education (SDE). SDE. (n.d.).
<https://www.sde.idaho.gov/academic/standards/>