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3: Teaching and Learning Plans

The teaching and learning plans that follow provide examples for teachers to teach number and operations, algebra, geometry, measurement, and data analysis and probability incorporating *Musical Mathematics Skip Counting*. The plans are interchangeable between number facts. The format is provided in a table. The table consists of the following areas: a description of the lesson, questions to be answered from the learning experiences, and a lesson format. The plan format includes introduction, exploration, explanation, differentiated instruction, assessment, and reflection. The objectives to be achieved by the lesson are common and are addressed collectively. Other objectives inherent in the lesson are explained in the description. The plans are formatted such that students experience multiple representations of multiplication facts including pictures, tables, words, symbols, and graphs. Materials and equipment needed for delivery are noted in the teaching and learning plans. Some materials are included in the Appendix and are referenced in the lessons.

Five Components of an Effective Lesson

Larson (2002) outlines the essential characteristics of effective mathematics instruction. He suggests using a balanced, comprehensive, and rigorous curriculum for student success in mathematics. A solid curriculum alone, however, is not sufficient to ensure student success. He further suggests that there is evidence that effective instruction is as important as curriculum in helping students learn mathematics. Researchers advocate different ways of learning mathematics. Some educators support hands-on activities and student discovery; others emphasize teacher exposition and paper-and-pencil practice. Others call for a more balanced approach, which focuses on conceptual understanding, procedural fluency, and reasoning and problem solving. Considering the various learning approaches of students, the *Musical Mathematics Skip Counting* series emphasizes a balanced approach to learning – one that focuses on the whole child.

In his research, Larson found that effective mathematics teachers, whether they tend toward the student-discovery or the teacher-directed end of the continuum, do certain things in common when delivering mathematics instruction. They incorporate five components in their mathematics lessons:

1. **Introduction** to or engagement in the lesson
2. **Development** of the concept or skill
3. **Guided Practice**
4. **Summary** and Reflection
5. **Independent Practice**

Musical Mathematics Skip Counting supports the implementation of these five essential lesson components in the teaching and learning plans for students. The plans also include an overview and essential questions.

Introduction of the Lesson

Every effective math lesson has a distinct beginning. There are varieties of ways to begin a mathematics lesson. Some people refer to it as ‘the hook’ or warm-up. Usually the introduction is brief and serves to connect the students to mathematical learning or get them ready for the lesson. One of the *Musical Mathematics Skip Counting* facts can be explored during the introduction of the lesson. It can be used to assess students’ prior knowledge, provide a motivational, energetic start to learning, or engage students in the lesson goals and objectives. Larson suggests that the introduction helps the students and the teacher focus on what is important and makes the purpose of the selected learning activities clear.

Development of the Concept or Skill

When developing a concept or skill, relevant and rigorous tasks that engage students in active learning are needed. Students’ needs should be assessed and strategies that will incorporate developing meaningful relationships between the students, teacher, and mathematical learning should be applied. In addition to the content, the process standards of problem solving, reasoning and proof, communication, connections, and representation (NCTM, 2000) are incorporated. Processes that focus on concrete, pictorial, and abstract methods should be used based on students’ level of understanding. Connections between these methods are made to promote student understanding.

Guided Practice

Providing students with an opportunity to experience what they are learning is critical to students’ understanding. Practice can be done in a cooperative setting or individually. Cooperative group settings provide the opportunity for students to explore what they have learned and to “organize and consolidate their mathematical thinking through communications (NCTM, 2000).” Guided practice also provides students with the opportunity to use their knowledge to recognize and make connections among mathematical ideas (NCTM, 2000). Teachers can assess students’ understanding of the mathematical concept that was the focus of the lesson during their phase of the teaching and learning plan. Use of the Project IMPACT (NCTM, 2000) questions during this phase of the plan can enhance student understanding of the mathematical concepts. Interactions among students and between students and teacher are strongly encouraged.

Summary and Reflection

The summary and reflection provide an opportunity to recap what the lesson was all about in the voices of the students. This component of a teaching and learning plan is

crucial to understanding students' level of learning for the concept. For example, reflection may require that students respond to a thought-provoking question about the concept, write in journals, or translate learning to objects or the written word.

Independent Practice

Team and individual practice allows for the differentiating of instruction to meet the needs of students. Practice is needed to continue to build mental math concepts, mental computation, and mental problem solving. Practice assists in building mental mathematics capabilities in the student and thereby increasing students' conceptual understanding and problem solving (Seeley, 2005). Practice should allow for student engagement through hands-on activities and student interaction as well as written practice.

General Objectives and Prerequisites

The teaching and learning plans incorporate the following objectives:

- Develop a sense of whole numbers and represent them in various ways.
- Connect number words and numerals to the quantities they represent.
- Understand situations that involve multiplication.
- Develop fluency with basic number combinations.
- Recognize equivalent representations for the same number.
- Describe classes of numbers according to characteristics.
- Understand meaning of multiplication.
- Understand the effect of multiplying whole numbers.
- Develop fluency with basic number combinations for multiplication.

Each plan presents a unique approach to student engagement and learning. Before beginning the lesson on skip counting, students should meet certain prerequisites:

- Students should know how to count and what counting tells them.
- Students should understand addition and subtraction.
- Students should also have experienced spatial relationships (relationships of figures existing or happening in space) with numbers.