

Example of national council of teachers of mathematics (nctm) standards: website ...

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Four websites containing lesson plans that support the standards of NCTM on number sense and operations were visited. The first featured lesson plan is Discovering Math: Computations from discoveryeducation.com. The second lesson plan is Counting and Place Value from mypages.iit.edu. The third lesson plan is Multiply and Conquer from ; and the fourth lesson plan is Using Guess, Check and Revise from usmint.gov.

All the featured lesson plans contain the main components of a good lesson plan that serves its purpose of guiding a teacher towards a cohesive and effective lesson. These main components include the objectives, materials, procedures, assessment, and the national standards that the lesson adheres to. But each plan has a specific approach that makes it different from the others. The first lesson plan (Discovering Math: Computations) uses games and creation of game boards as its main activity to teach basic math operations and the concept of squares and cubes of numbers. The second lesson plan (Counting and Place Value) utilizes a phenomenological approach to give first graders a solid understanding of place value. The third lesson plan (Multiply and Conquer) provides conceptual understanding of what happens in a 2-digit multiplication problem. The fourth lesson plan deals with solving math problems using the concept of coins.

The rest of this paper shall be portioned into the four lesson plans explained in detail.

Discovering Math: Computations

The methodology of number sense in this lesson is used in a form of a game where students craft their own game boards and create the game directions based on the concept of numbers. The lesson begins by telling students that

they will be creating a game to practice operations on integers and rational numbers. The class reviews the operations by displaying practice problems in the board. The students are asked to complete the problems, share and explain their answers. After the review session, the class is divided into groups of four students, with each group holding a copy of “ Creating a Game Directions” and the game board where the students will have to fill in with the operation symbols. After completing the game board, the students will be asked to play the game within their group. The same game strategy will be utilized for other skills, such as ordering operations, squaring and cubing numbers.

This lesson uses the operations addition, multiplication and division of rational numbers, aims to teach using these operations in the correct order of use and evaluate expressions as well. Aimed for Grades 6 – 8 students, this lesson plan uses differentiation instruction strategies such as pairing students to work together and help each other out. This strategy of assigning partners is one way to target diverse groups of students and maximize their learning potentials. The activity of using game boards and creating game directions is a good way to promote student understanding of mathematics because learning is made experiential and therefore meaningful. This lesson also uses several strategies to improve student achievement, such as the use of mnemonics and mental math. The use of objects, such as number cards, colored chips, number cubes, and game boards are some of the manipulatives used in this lesson.

Counting and Place Value

The second lesson plan uses number sense methodology through simple practice counting. It is a lesson designed for first graders to provide young students a concrete understanding of place value by giving them concrete opportunities to use them to practice counting, adding and subtracting. It begins with a review of numbers 0 - 9 and counting various objects within the classroom. As they count, the teacher leaves representations of numbers on the board. Each student will then be given a place value board that is made of a board or construction paper. The teacher must explain how to use these place value boards, how to read them, and how to interpret what they represent. The plan also suggests using a bell to signal the process of adding a cube to the place value board. This method of ringing a bell as a cue is used repeatedly in order to let the students comprehend well the concept of place values.

The lesson plan claims to use a phenomenological approach in teaching math to young first graders. A phenomenological approach is that which starts with the real experience of the students. Though there is no explicit section to explain the differentiated instruction (DI) of this lesson plan, it actually uses DI strategies by appealing to the students' diverse learning styles. As can be gleaned from the plan, there is a mix of use of graphics for the visual learners and manipulatives for the more kinaesthetic learners. Concretely, this lesson uses manipulatives such as place value boards, beans and cups that help make the activities more meaningful and experiential to the students. The fact that it uses a phenomenological approach in teaching, it does improve student achievement.

Multiply and Conquer

The Illuminations website is one of the most known sites that support the National Council of Teachers of Mathematics standards. One of its lesson plans is Multiply and Conquer, which is aimed to teach K-12 students to decompose 2-digit numbers using an area model and calculate products using the distributive property. This lesson plan on multiplication assumes students to have already previously mastered the multiplication arrays on 10 x 10 grids. The main lesson begins with 2 x 1 problems which can be used by teachers to gauge the students' level of understanding. A teacher conscious of the need to differentiate instruction can use the data to determine the pacing for the succeeding 2 x 2 activity. It then lets teachers model the partial product arrays for students using the 14 x 6 sample array. This is also a good strategy that promotes differentiated learning because it enables beginning students to catch up with the lesson. Using a step-by-step modelling process helps in providing students with a good grasp and comprehension of number sense and operations.

The main mathematical operation that is focused on in this plan is multiplication and its properties. The approach of this lesson helps improve student achievement as it taps the fundamental process of understanding numbers and the multiplication operation through the use of area models. It aims to make students have a solid comprehension of the process until they reach fluency in the use of the models that reflect the product method. The plan, however, uses illustrations of the area models and is therefore limited in the use of manipulatives. It is suggested that objects be used for manipulatives to be present in the lesson and thus, target diverse groups of

learners. But when it comes to differentiated instruction, this lesson plan has clear provisions. The plan proposes to teachers who utilize it to have their less capable students work with a partner. More so, the plan suggests that for better transition to more individualized work, have individuals and pairs compare their work with that of others and describe their partial arrays aloud. This strategy encourages differentiated learning and improves student achievement at the same time.

Using Guess, Check and Revise

The US Mint also features lesson plans that are aligned to the standards of NCTM. One of these lesson plans teaches number sense and operations through guessing, checking and revising. This lesson focuses on teaching coin-related math questions through the methodology of guess-check-and-revise process. The plan suggests that teachers begin the lesson by explaining that there are many different strategies for solving math problems. There is emphasis on teaching that it is important to know the various strategies that can be used and also to know what strategy to use at the best time or when the appropriate situation calls. This becomes the springboard for the teacher to introduce the guess-check-revise strategy. This method begins by letting the class solve a problem together, and then let students give out several guesses to solve the problem. The teacher then works with students to develop a chart with the possible solutions. With the charts that show the possible solutions, the class is then able to revise their answers. After the modelling done by the teacher, the students are then asked to work on their own. They may use the same method as they did with

the problem that the whole class worked on.

The plan works best for K-12 levels because the difficulty of context may vary so as to match the students' level of learning as well. The lesson has provisions for differentiated instructions. There is a provision wherein students can create their own problems involving coins and combinations for a certain total and share them with each other. Another strategy this lesson plans provides for differentiated learning is that students can use real coins to check their guesses. The plan definitely helps in improving student achievement as it helps them to become independent learners eventually by enabling them to check their own answers and revise them towards more accurate answers. It also utilizes actual coins that serve as the manipulatives the students use for actual learning.

References

Discovering Math: Computations. Retrieved from

Counting and Place Value. Retrieved from

Multiply and Conquer. Retrieved from

Using Guess, Check and Revise. Retrieved from