

80-Weekes - Mathematical Problem-Solving Skills of African American Teenage Males

**MATHEMATICAL PROBLEM SOLVING SKILLS OF AFRICAN AMERICAN MALE
MIDDLE-SCHOOL AND HIGH-SCHOOL STUDENTS**

A Field Study Research Project Presented at

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By

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Abstract:

The purpose of this study was to investigate the types of mathematical problem-solving skills African American middle-school and high-school males may have in common and to uncover their attitudes about mathematics. The study used a 12 question survey to uncover their attitudes about mathematics and a five question open-response mathematical assessment to investigate their problem-solving skills. Five African American males in grades 8-11 participated in the study. The results of the study revealed that all the participants had high levels of self-confidence in their mathematical skills and believed their math teacher had high expectations for their performance. However, they all indicated a low level of interest in mathematics. As a group, the young men proved to be moderately successful mathematics problem solvers who displayed good organizational and execution skills and demonstrated high levels of persistence, but rarely verified their intermediate steps or their final solutions. Contrary to the findings in much of the literature reviewed for this study, the participants showed a preference for analytical problem-solving approaches versus those based on holistic reasoning.

Presentation summary:

By assessing our students' problem-solving abilities, we can more accurately and effectively support their development as mathematicians.

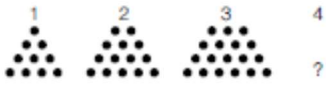
1. The six dimensions of mathematical problem-solving addressed in this study included:
 1. Orientation – how the participant attempts to understand or clarify the problem.
 2. Organization – how he plans to solve the problem and organizes his calculations.
 3. Execution and verification – how the participant carries out his chosen strategy and evaluates whether or not his approach will lead to success.
 4. Flexibility – his willingness to consider a broad range of problem-solving skills.
 5. Holistic or analytical reasoning – does the participant approach the problem in a holistic manner and then narrow down the results to find a solution or does he take a more analytical approach and look at the problems as a set of logical sequential steps
 6. Persistence – can the participant remain confidently engaged in the problem-solving process for the entire 10-15 minutes?

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2. Problem-solving skills assessment (Malloy & Jones, 1998):

Car Wash
Nakisha, Gregory, Kerstin, and Brandon had a car wash on Saturday. Nakisha washed twice as many cars as Gregory. Gregory washed 1 fewer than Kerstin. Kerstin washed 6 more than Brandon. Brandon washed 6 cars. How many cars did Nakisha wash?

Marbles
Marbles are arranged as follows:

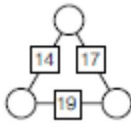


How many marbles would be in the fourth arrangement?
How many marbles would be in the 25th arrangement?

Hamburger
Henry's Hamburger Heaven is open 6 days a week and sells an average of 1,500 hamburgers a week. Each week, 375 pounds of hamburger and 125 packages of buns are used. The supplier brought 250 pounds of hamburger on Wednesday. How many days would this hamburger last?

Church
At a community church, the leader plans to place the page numbers for three different songs on a board in the front of the church. The leader must buy plastic cards to put on the board. Each card has one large digit on it. The leader wants to buy as few cards as possible. The song book has songs numbered from 1 to 632. What is the fewest number of cards that must be purchased to make sure that it is possible to display any selection of three different songs?

Triangle
In the three-sided figure below, the number in each square must be equal to the sum of the numbers in the two circles on either side of the square. Find the numbers that go inside the circles.



Answers: 1) 22; 2) 22, 106; 3) 4 days; 4) 65 tiles; 5) 8, 6, 11

By assessing our students' problem-solving preferences and abilities we can adapt our curriculum and instructional strategies to leverage their strengths and help them develop their areas of greatest need.

1. Modifying curriculum and instructional practices as a result of better understanding our students' background and learning styles is a marker of culturally relevant pedagogy.
2. By starting with our students' preferred problem-solving approaches and then teaching them other approaches we can help them increase their problem-solving toolkit and help them develop a broader array of verification strategies.
3. By helping students expand their mathematical problem-solving skills we can support their development of analytical skills that are transferable across mathematical subjects and other content areas.