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Question:
If high school students are given instruction in Bloom's Cognitive Taxonomy and in posing questions at various levels, will this lead to richer mathematics content-related classroom discussions? If so, will students identify discussion as contributing to their mathematics learning?

Problem:
Concerns about students' acquisition and application of higher level thinking skills have reached an all time high. Students must be taught to go beyond low level comprehension and mere regurgitation of facts and formulas. The classroom "discussion" in one of my mathematics classes generally consisted of my posing questions, students answering my questions, and me trying to elicit richer discussion by asking other students to agree with or refute these answers. Even when the students worked in groups there was little real discussion and the discussion that was generated was predominantly at Bloom's lowest cognitive levels.

Plan of Action:
After analyzing audio recordings of two typical classroom sessions, my original hunch was confirmed that pre-existing class discussions were low level. A pre-assessment survey was administered to determine the types of questions students would generate about a new topic introduced. The survey also checked for students' familiarity with Bloom's Taxonomy and the value students placed on discussion as a learning strategy in mathematics class.

Methodology:
Over the next two months mathematics lessons frequently employed the reciprocal teaching strategy, which required students to summarize, visualize, question, predict, and clarify portions of a mathematics passage. On a day when many students were attending a field trip the remaining class members conducted online research about Bloom's Taxonomy. The next day these students presented their research to their peers and all students practiced posing questions at the various cognitive levels.

Following these lessons, reciprocal teaching was no longer used as an overt structure for mathematics lessons. Bloom's Taxonomy was mentioned occasionally by the students or me as we analyzed the difficulty of questions from various assignments, but was not "required" in any assignments. Audio recordings of additional class sessions were made and analyzed. A post-survey was also administered.

Results:

Class discussion showed marked improvement in both quantity and critical thinking demonstrated. The cognitive levels of students' questions also increased. Some students indicated an increased appreciation for the value of discussion in mathematics. As students verbal interactions improved, they improved in mathematics learning as well.

Policy Implications:
Higher-level mathematics instruction is generally focused on the use of formulas to solve pre-determined mathematics problems. Mathematics teachers should be trained in the use of reciprocal teaching methods, discussion techniques and upper level inquiry methods. Instruction in Bloom's Cognitive Taxonomy as it pertains to mathematics should be incorporated into the mathematics curriculum.