THE PEER-LED TEAM LEARNING INTERNATIONAL SOCIETY
PROCEEDINGS OF THE INAUGURAL CONFERENCE
MAY 17-19, 2012
NEW YORK CITY COLLEGE OF TECHNOLOGY OF
THE CITY UNIVERSITY OF NEW YORK
BROOKLYN, NY 11201-2983

How Can the Peer Leader Help Students' Learning Through Questioning?

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The most common question peer leaders often ask themselves is how can they improve on maintaining the students engaged and interested in learning a certain topic. One way of improving on this is to observe how students learn and process information taught in class.

Before I became a peer leader, I was a tutor for many years. I was used to teaching students by explaining the material very carefully and reiterating it until they've understood it. I was for the main part giving answers and not questioning what they knew, which is a way to help jog their memory on what they already knew about the material. During the peer leading training course (MEDU 2901), I was taught various learning styles on keeping students engage and aiding them in understanding the materials given to them. One of the topics I learned was to use questions to guide students in their learning process. This is the method I implemented in my mathematics workshop.

In 1956, Benjamin Bloom and colleagues created taxonomy of educational objectives which detailed levels of important learning characteristics. These objectives dictated how people learned new information. Bloom's Taxonomy consists of three domains: Cognitive, Affective and Psychomotor. The Cognitive domain deals with knowledge, comprehension and critical thinking. The Affective domain focuses on how one reacts to things emotionally and stages in which there is growth. The Psychomotor domain deals with the development in physical and social skills. We will only be covering the Cognitive domain because it is most relevant with how people learn.

The Cognitive domain consists of six levels: Knowledge, Comprehension, Application, Analysis, Synthesis, and Evaluation. Each level depends upon the student's ability to perform at the level or levels that precede it (Bloom, 1956). The Knowledge stage deals with students being able to recall or reproduce previously learned material. The Comprehension level deals with students grasping the meaning of the material and how they are able to explain it. The Application level deals with students being able to solve problems by applying acquired knowledge. The Analysis level deals with students being able to solve a problem by examining the question and breaking the information into parts to get a better understanding. The Synthesis level deals with students combining different methods and information together to solve a problem. The Evaluation level deals with the students being able to justify and explain the methods used to solve the problem. Evaluation, the highest level in the cognitive taxonomy, is predicated on the assumption that for the student to be able to evaluate, he or she would need to have the necessary information, understand the information he or she had, be able to apply it, be able to analyze it, synthesize it and then eventually evaluate it (Eisner, 2002).

During the Knowledge stage questions like 'What is the formula for the power rule?" will prompt the students to recall the formula of something they have previously learned. In the Comprehension stage questions/statements like "Explain the steps needed to solve a related rate problem". In the Application stage

questions/statements like "Find the derivative of a problem" will prompt the student to actually use what they have learned to solve a problem. In the analysis stage questions like "What method or strategy would you use to solve this problem?" will prompt the student in being able to solve a complex problem by breaking the question into a simpler one. In the Synthesis stage questions like "What can you predict about the first and second derivative of the line based on the information given on the graph?" In the Analysis stage questions/statements like "Explain how you arrived at your answer and each step you used to get there" will allow the student to explain and justify their reasoning for taking a certain approach at solving the problem.

The following is my observation in my Calculus workshop. The students were working on the topic 'Higher Derivative' which is a complex problem that incorporates more than one method learned in the class. The workshop consists of 5 students (4 males and 1 female).

The problem was for the students to find the derivative of $\frac{3x^2+2}{x^2+2x+1}$.

Student A: "I'm not sure how to solve this problem."

Peer Leader: "OK, what is the first thing you must do in order to solve this problem?"

Student A: "What rule we are going to use?"

Peer Leader: "Ok, so what rule are we using?"

Student A: "We can try the quotient rule"

Peer Leader: "Why are we using the quotient rule?"

Student A: "We use it when two functions are being divided and we want to find the derivative."

Peer Leader: "Does everyone agree with that?"

(All the students nod in agreement)

Peer Leader: "What is the formula for the quotient rule?"

Student B: $\left(\frac{f}{g}\right)'(x) = \frac{f'(x)g(x)-f(x)g'(x)}{g(x)^2}$

Peer Leader: "Can you guys explain what f(x) and g(x) is?"

Student C: "f(x) is the function in the numerator and g(x) is the function in the denominator."

Peer Leader: "Now that we have all this information can you put it all together to solve this problem."

(The students all arrive at the solution.)

Peer Leader: "Compare your results with a peer and explain to each other how you arrived at that solution."

Although the students initially weren't sure how to solve the problem, after following levels in the taxonomy they were able to reach the application level where they used the previous levels to help guide them. Each level of questioning allowed the students to recall previously learned material and use it to solve the problem. The students used their knowledge (recalled information) and their comprehension of the information and applied it to solving the problem.

In the end the students were able to enter the evaluation level by comparing and explaining their results to each other. The evaluation level boosts the students understanding of the subject because they are able to explain how they arrived at the answer.

The first three cognitive levels of Bloom's Taxonomy were useful in showing how student learned new materials. From my experience, teaching this workshop, I was able to help my students in guiding them towards a solution by allowing them to think and use their own knowledge to solve problems.

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Cite this paper as: Okoro, J. (2013). How can the Peer Leader help students' learning through questioning? *Conference Proceedings of the Peer-Led Team Learning International Society*, May 17-19, 2012, New York City College of Technology of the City University of New York, www.pltlis.org; ISSN 2329-2113.