Blaise Pascal: Mathematician and Inventor

Action Plan for Interviewing Teacher’s Alumni Workshop October 2010 Creating Educational Oral Histories Renee Reiff
Subject Area/ Course: This API would be used in a mathematics classroom, particularly a high school Algebra 2 class.

PA Teaching Standards:

Mathematics

PA.M.2.8.11.C. Use patterns, sequences, and series to solve routine and non-routine problems.

PA.M.2.11.8.C. Continue a pattern of numbers or objects that could be extended infinitely.

Reading

PA.R.1.2.11.B.1. Select appropriate electronic media for research and evaluate the quality of the information received.

**Duration:** The duration of this lesson will be one block period (90 minutes).

**Materials:** Pascal’s Triangle worksheets; Photograph of the Pascaline found at the Library of Congress website: [http://www.loc.gov/pictures/item/2006690493/](http://www.loc.gov/pictures/item/2006690493/)

**IBLM:**

**Ask Questions:** The teacher will ask the students if they can determine how to figure out the next few lines of Pascal’s Triangle.

**Create Hypotheses:** The students will be given time to look at the beginning of Pascal’s Triangle to attempt to determine the pattern.

**Investigate:** Once the students have created their hypotheses, they will be permitted to research Blaise Pascal and his famous triangle on the internet.

**Construct New Knowledge:** During their research, the students will learn about his works and contributions to the field of mathematics.

**Discuss and Reflect on Discoveries:** We will regroup and discuss the uses of Pascal’s Triangle.

**Apply Newly-Acquired Knowledge in Own Life:** The students will brainstorm ways to utilize Pascal’s work in their own lives.

**Generate New Questions:** We will create a list of questions that they would like to ask a mathematics professor that teaches Pascal’s work.
Description of Procedures:

To begin this lesson, we will begin class by passing out blank worksheets that have Pascal’s Triangle on them. I will instruct the students to fill in the first line with a “1,” the second line with “1, 1,” and the third line with “1, 2, 1.” I will ask the students if they can determine how to figure out the next few lines of Pascal’s Triangle on their own. Without assisting them, the students will be given time to look at the beginning of Pascal’s Triangle to attempt to determine the pattern by creating a hypothesis. The students should be able to see that the numbers in each consecutive line in the triangle are comprised by finding the sum of the two numbers above that blank space. After the students have been given the time to develop their theories, they will then investigate their hypotheses by researching Blaise Pascal and his famous triangle on the internet. The students will be instructed to also research the various uses for this triangle. During this time, they will be constructing new knowledge by learning about his works and contributions to the field of mathematics.

Once their research has been completed we will regroup as a class and discuss and reflect on discoveries made by the students. At this point, we will note how useful this is when multiplying binomials. For example, when multiplying

\[(x+1)(x+1)\]

we see that the product is equal to

\[x^2+2x+1\]
We can note that the third line of Pascal’s Triangle denotes the coefficients of each factor (1, 2, 1). Furthermore, if we were to multiply

\[(x+1)(x+1)(x+1)\] or, more simply \[(x+1)^3\]

we could use line four Pascal’s triangle to determine the solution to be

\[x^3 + 3x^2 + 3x + 1\]

rather than taking the time to multiply each binomial individually. This will prove to save a significant amount of time, especially when you would be given a problem such as

\[(x+1)^8\]

Once we have thoroughly discussed the uses of Pascal’s Triangle, we will also discuss his most famous invention: the Pascaline. The students will share from their research how the creation of this calculator was an immense achievement at the time, even though it was limited to addition and subtraction functions. The students will consider the historical impact that Blaise Pascal had on the mathematical society, and how his work is still being taught today. They will apply the newly acquired knowledge in their own lives by brainstorming ways that they can utilize Pascal’s work. We will consider all of the ways that the students hypothesize as a class.
Finally, after researching Blaise Pascal and his mathematical works, we will hold a class discussion in which the students will generate new questions that they would like to ask a professor that teaches Pascal’s work. We will compile these questions in an interview format.
Discovering Patterns
Name _____________________

Provided by The Math Forum - http://forum.swarthmore.edu
<table>
<thead>
<tr>
<th></th>
<th>4 points</th>
<th>2 points</th>
<th>0 points</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Contribution to Class Discussion</strong></td>
<td>Provided insight into the class discussion</td>
<td>Provided limited insight to the conversation</td>
<td>Did not contribute to the class discussion</td>
</tr>
<tr>
<td><strong>Conducted Research</strong></td>
<td>Used time wisely to conduct research</td>
<td>Wasted time; very little information found</td>
<td>Did not conduct research relevant to topic</td>
</tr>
<tr>
<td><strong>Solved Problems</strong></td>
<td>Correctly solved problems using Pascal’s Triangle</td>
<td>Solved problems without using Pascal’s Triangle, making minimal mistakes</td>
<td>Did not make an attempt to solve problems</td>
</tr>
<tr>
<td><strong>Generated Questions</strong></td>
<td>Created questions relevant to the topic</td>
<td>Created some questions after being prompted</td>
<td>Did not attempt to create questions</td>
</tr>
</tbody>
</table>