

When Technology Integration Goes to Math Class

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The principal goal of education is to create men who are capable of doing new things, not simply of repeating what other generations have done—men who are creative, inventive and discoverers. The second goal of education is to form minds that can be critical, can verify, and not accept everything they are offered; we need pupils who are active, who learn early to find out by themselves, partly by their own spontaneous activity and partly through materials we set up for them; we learn early to tell what is verifiable and what is simply the first idea to come to them.

—Jean Piaget

I think you should learn, of course, and some days you must learn a great deal. But you should also have days when you allow what is already in you to swell up inside of you until it touches everything. If you never take time for that to happen, then you just accumulate facts, and they begin to rattle around inside you. You can make noise with them, but never really feel anything with them. It's hollow.

—From *The Mixed-Up Files of Mrs. Basil E. Frankweiler* by *E L Konigsburg*, 1967

Math classes from my learning past had a definite cookie-cutter appearance: rows of desks, lined scribblers, pencils, textbooks and the teacher at the front. These were housed within the most predictable of all, a quiet classroom. Math instruction is well suited to a traditional teaching format. Because of the logical and sequential nature of math, it often attracts teachers whose thinking and learning styles match the subject.

Therefore while other teaching disciplines are branching out to encompass a constructivist style of instruction that is full of collaboration and technology integration, many middle and high school math teachers continue to use a more teacher-centred approach.

As a math teacher, I believe change is on the horizon. Language arts and social studies colleagues are embracing the power of the Web to push their students' creative and critical thinking skills, and many math teachers are looking for ways to enhance the curriculum using digital media. Realizing that digital media can facilitate critical thinking and higher-order learning, teachers are looking for math-related online projects and resources that will help students and challenge their thinking skills.

Telecollaborative Projects

Statistics: A Curiosity Factor (www.masters.ab.ca/bdyck/Staff/Olson2) was my first attempt at integrating telecollaborative project work into math class. I had developed many language arts and social studies-based telecollaborative projects to connect learners in other countries. Shared learning projects could challenge students' critical thinking skills, engage their interest and expand their global perspective while covering curriculum requirements. The question was, how could I use this style of instruction in math class? Using the unit on Collecting and Analyzing Data as a jumping-off point, I began looking for Internet resources that would add pizzazz to a unit that had, in my class, been traditionally textbook driven. I uncovered an abundance of exciting statistical resources that would grab student interest:

- Articles that shed light on how numbers can inform or misinform readers
- Online surveys that explored hot topics, such as spam and property rights in cyberspace

- The Gallup Poll's webpage containing information on how the Gallup Organization uses polls to predict trends and inform the public. This site is loaded with videos examining everything from cloning to those sticky ethical questions that students love to debate.
- An online site that turned student data into a variety of colourful graphs with just a click of the mouse
- An array of sites that provided up-to-date information on topics that interest all kinds of learners

Using these resources, students developed a deeper understanding of how numbers can lead or mislead the usefulness of unbiased data, the art of creating a good survey question and how to analyze data and present the results effectively. For examples, see the Student Work section of the website, Statistics:

A Curiosity Factor. Without question, using technology engaged them in a way that textbook graphs and data charts never did. Knowing that their learning would be online encouraged the students to put more effort into their work and to increase their global perspective as schools from Ohio, Florida, Pennsylvania, Texas and Canada joined in to share survey results with each other.

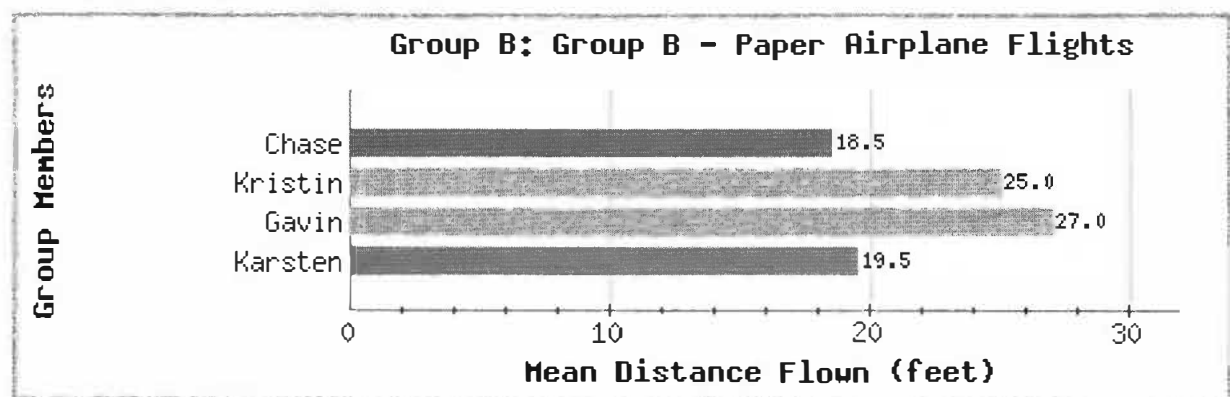
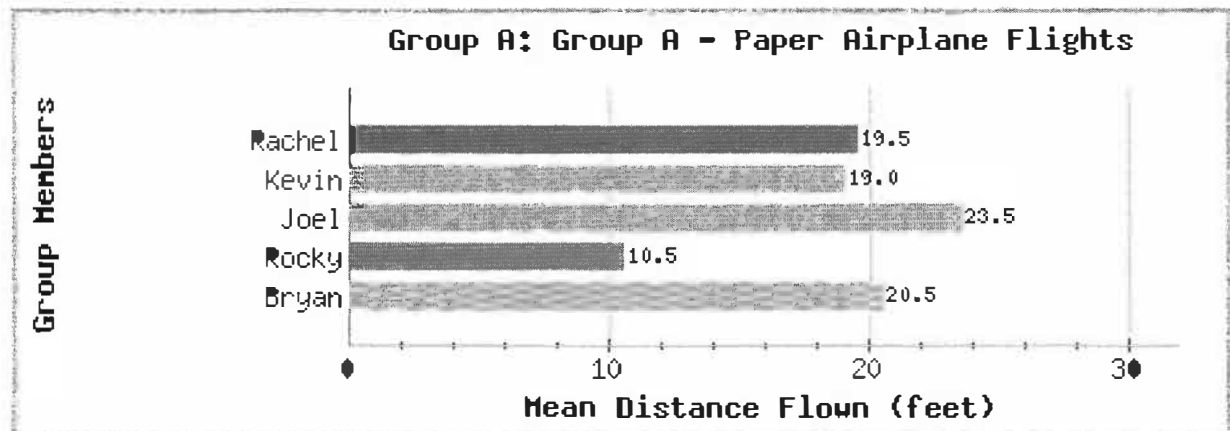
Several years ago, Houghton Mifflin's Education Place website, which no longer exists, contained a resource called the Data Place. After registering, teachers had access to grade-appropriate collaborative projects whereby students collected and worked with real data by analyzing and drawing conclusions. Not only did students compare data from their own classrooms, they had access to a data bank containing project results from classrooms worldwide. The

We're Just Winging It!: Compare 2 Groups

Class: Grade Six Math

Group A: Group A

Group B: Group B



activities were interactive, imaginative and thought provoking.

We encountered the Data Place through a project called, We're Just Winging It! In this project students made paper airplanes, gathered data about how far the airplanes flew, compared results with the class and then, using the graphs created on the Data Place website, compared their results with their peers and other Data Place users from other countries, such as Thailand and Australia.

According to the students, the best part of this project was throwing the paper airplanes down the hall. Surprisingly, these enthusiastic data collectors were totally on task and meticulous about measuring the distance the planes flew. Students took their results and, using an online metric converting tool, changed their metric measurements into the American Imperial Measurement system. From here they calculated the mean distances (individually and as a class) and entered their data into the Data Place website. Everyone was delighted with the colourful graphs that appeared within seconds.

During the following class, I hooked up an LCD projector. The students and I analyzed the graphs and discussed the variables that would have made some airplanes fly farther than others. Student thinking was evident as they suggested that flying distances could

have been affected by differences in size, how airplanes were folded, weight of the paper, unexpected breezes in the hall, direction of breezes, styles of throwing or the humidity in the air.

To extend the learning gleaned during the We're Just Winging It! activities, I created a telecollaborative project called Come Fly With Me! (www.masters.ab.ca/bdyck/Fly). This hands-on, technology-supported project merged data collection and analysis skills with a science unit on flight. Throwing airplanes down the hall, using technology to analyze the learning, competing with students across the world and having their math class results on the Web made for one of the best math classes of the year!

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