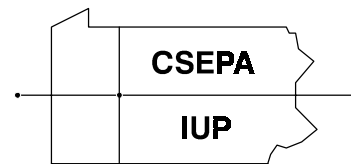


Quantitative Literature

August 2000
Number 18



Center for Statistics
Education in PA at IUP

Opportunity for In-Service Leaders

Do you continue to use SEQuaL inspired activities in your classroom? Would you like an opportunity to share those with your colleagues? Consider applying to be a SEQuaL In-Service Leader for this school year. What is required? Make a plan to conduct at least 3 hours of in-service within your school, IU, or professional organization. Be sure to have the approval of your administration or IU. Send a letter (or email) of application describing your plan to:

Isabella Wiggins, Program Coordinator
Center for Statistics Education
Stright Hall, Room 202A
210 South Tenth Street
Indiana, PA 15705-1087
or email iwiggins@grove.iup.edu

Please send your letter by September 30, 2000. We will reply to your application by October 30 with a reporting packet to be completed after the in-service is finished. You may choose either payment of \$100 for preparation time or \$100 worth of quantitative literacy materials for your school. Perhaps you could use the \$100 to leverage matching funds from your school.

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Calendar back cover

From the Director: Larry Feldman

Are We Having Fun Yet?

I noticed that in Elaine Carbone's report on the Clarion SEQuaL site she mentioned that students had fun with a SEQuaL lesson. I am reminded of a story a friend told me that relates to this concept of fun. An irate parent of a seventh grader that my friend was teaching was very angry with my friend because the parent's son came home and said he had fun in math class. The idea of fun in a math class is very disturbing to some. If children are enjoying math they must not be learning enough. It's the "castor oil" syndrome. We know that the castor oil must be good medicine because it tastes bad. Never mind that there are better remedies that also taste better.

The other extreme would be to say that we should never challenge children because they might not like it and could end up being turned off to school. According to this point of view the teacher must just be an exciting actor, ready to entertain and delight the students. If the students are having fun then school must be successful no matter what they are learning.

I find both views to be unacceptable. Children (and adults) learn best when motivated and challenged by a fun and meaningful question. At the other extreme, fun solely for fun's sake reflects sadly lost opportunities.

At this point you must be wondering what this has to do with SEQuaL. We recently completed the second Data-Driven workshop at IUP and the first one primarily run by SEQuaL staff. Our main goal was to find hands-on data activities that use real-life data to teach standard topics in the secondary math curriculum. What struck me about these wonderful activities was that they hit the "fun / meaningful content" balance right on the nail. The concepts being taught are at the core of the rigorous content of the rigorous content of the PA and NCTM Standards. At the same time, the activities were fun. It is possible to have both worlds.

Continued on page 2

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One of Arthur Combs' short essays in his *Myths of Education* is "The Myths That If It's Hard, It's Good For You and Kids Won't Learn Unless You Make 'Em'". Combs writes that challenges are generally positive experiences but threatening experiences for the most part are counter-productive. The difference is in how the child senses the activity. Children grow through problem solving activities that they "perceive to be within their abilities to solve".

The problem is compounded when we devise activities that are seen as useless to children. We then have to increase the threats to replace real motivation with punishing motivation (such as failing grades). I have heard people even say that a course cannot be any good unless there are significant numbers of low grades and failures.

If you run into the Data-Driven (DD) Teaching staff give them a big congratulations. Members of the national Data-Driven team have recognized them as being among the very best in the country. They are Glen Butters, Gary Merrick, Mary Lou Metz, Anita Smith, John Uccellini, and Mark Zilinskas. Pennsylvania is again at the forefront of a national movement due to SEQuaL.

In addition to the IUP Data-Driven workshop, we had three outstanding Quantitative Literacy (QL) workshops throughout the state. This type of workshop has been run continuously by SEQuaL since 1992. Teachers continue these workshops (and they learn a lot). Again, the "fun / meaningful content" balance is in full operation here.

We had three super QL teams this year. Fred Morgan, with the team comprised of Marlene Davis, Gary Merrick, and John Uccellini opened a new site in Hazleton. Jim Bohan again ran the workshop at Manheim Township (outside of Lancaster) with the team of Peggy Lunardini, Ann Massey and Bernie Schroeder. Finally, Patty Flach directed the workshop at Edinboro with Barbara Kaufman, Wes Hunkler, and Mark Zilinskas. All should be congratulated for their fine work.

You, the reader, can make a difference in the future of QL and DD in PA. (OK, can anyone think of some more 2-letter acronyms?) Here are just a few things you can do.

1. Encourage yourself and / or a colleague to attend next year's workshops when they are announced in this newsletter.

2. Become an in-service leader for your district or area (see Isabel's article on the front page).

3. If you live close to Indiana, come to one of our Mathematics Alliance for Quantitative Literacy meetings, held 3 times a year.

4. Give a presentation at a conference, such as PCTM.

5. Teach a QL or DD course through your IU (we would be glad to help).

6. Help the teachers in your building one-on-one to start with one fun and meaningful QL or DD lesson.

7. Have fun and teach profound content.

8. Make your students think that they are not really doing math when they really are working with significant content.

Data Driven Leadership Seminar Held at IUP

Henry Kranendonk and Jim Landwehr, two of the authors of the Data-Driven Mathematics modules, met with the Data-Driven Workshop staff and SEQuaL site directors in preparation for the Data-Driven Workshop held at IUP from June 18 - 23.



Anita Smith, Homer Center H. S., and Henry Kranendonk, an author of the Data-Driven Mathematics modules, refine a lesson.

Jim Landwehr, an author of the Quantitative Literacy Series and Data-Driven Mathematics modules, makes a parachute.



2000 Pennsylvania Statistics Poster Competition Results

Grades K-3

First Prize:

“Presidential Birth States”
by Daniel Choroser
Teacher: Ellen Brown
Rydal East Elementary School, Huntingdon Valley, PA

Second Prize:

“Who Spends More Time on the Computer in 3rd Grade, Girls or Boys?”
by Greg Brenner and Jonathan Zubkoff
Teacher: Ellen Brown
Rydal East Elementary School, Huntingdon Valley, PA

Third Prize (Tie):

“Paper Towels: Do You Buy the Best?”
by Kelly Gallagher, Eric Cross, Paige Glassman, and Joseph Joyce
Teachers: Nina Marczyk, Helen Naab, and Debbie Peters
Russell Elementary School, Broomall, PA

“Magically Delicious Data”
by Kelsey McGlade, Lucy Chen, Max Gilbert, Chris Monaco, and Dan Giordano
Teachers: Nina Marczyk, Helen Naab, and Debbie Peters
Russell Elementary School, Broomall, PA

Honorable Mention:

“Who is Most Popular in Oz?”
by Monte Labash III
Marion Elementary School, Belle Vernon, PA

“How Many Children Are in Your Family?”
by Daniel Gurmankin
Teacher: Ellen Brown
Rydal East Elementary School, Huntingdon Valley, PA

“Pokemon”
by Michael Schwartz and Michael Brofft
Teacher: Mrs. Houck and Mrs. Nitsche
Vincent Elementary School, Spring City, PA

“The Paper Airplane Experiment”
by Lucas Van Houten
Teacher: Marlene A. Davis
Merion Elementary School, Merion, PA

“Collections”
by Maeve M., Daniel K., Marcus C., Christine C., and Matt L.
Teacher: Rhonda Lewis,
Glenside Weldon Elementary School, Glenside, PA

“Does Practice Make Perfect?”
by Mrs. Davis' 2nd Grade Class
Teacher: Marlene A. Davis
Merion Elementary School, Merion, PA

Grades 4 - 6

First Prize:

“What's Your Favorite Candy Bar?”
by Jennifer Bonnes, Korin Reid, and Jessica Neff
Teacher: Miss T. Eichinger
Lakeview Elementary School, Ridley Park, PA

Second Prize:

“Do We Speak the Same Languages?”
by Monica Wagner
Teacher: Mr. West
McKinley Elementary School, Elkins Park, PA

Third Prize:

“Which Water is Best? Taste vs. Test”
by Shayleigh Dickson
Teacher: E. Jane Evans
Strath Haven Middle School, Wallingford, PA

Honorable Mention:

“Uniforms”
by Julie Naugle, Emily Costello, and Jamie Driadon
Teacher: Miss T. Eichinger
Lakeview Elementary School, Ridley Park, PA

“How Many T.V.'s Do You Have in Your House?”
by Ryan Gever
Teacher: Ellen Brown
Rydal East Elementary School, Huntingdon Valley, PA

Grades 7-9

First Prize:

“Recorded Music Data from Various Years”
by Melinda Cook
Teacher: Brian Griffith
Mechanicsburg Area Intermediate School,
Mechanicsburg, PA

Second Prize:

“Does Smoking Affect Grades?”
by Christina Paolucci
Teacher: Karen Husted
East Norriton Middle School, Norristown, PA

Third Prize:

“Who Will Break Hank Aaron's All-Time Home Run Record of 755?”
by Pete Roller, James Conmy, Ryan Curtin, and Pat Gannon
Teacher: Anna Marie Croney
Norwood-Fontbonne Academy, Philadelphia, PA

Honorable Mention:

“Favorite and Owned Pets”
by Margareth Tran
Teacher: Geraldine Casey
Wyoming Valley West Middle School, Kingston, PA

Grades 10-12

First Prize:

“Does Brand Name Affect Preference More Than Taste?”
by Tom Childers
Teacher: Valinda Degler
Great Valley High School, Malvern, PA

Second Prize:

“Which Gender Adds Up in Mathematics?”
by Jennifer Laughery and Abby Minnich
Teacher: Mary Lou Metz
Rockwood Area High School, Rockwood, PA

Third Prize:

“What Thematic Words are More Common to Shakespeare's Comedies vs. His Tragedies?”
by Megan Paustian
Teacher: Karen Zaffiro
Cedar Crest High School, Lebanon, PA

Honorable Mention:

“How Cereals Deceive”
by Becky Dunlap and Stef Lawlor
Teacher: Ruth Carver
Germantown Academy, Fort Washington, PA

“The Flu: It Could Happen to You”
by Mark Heere and Margaret Whitman
Teacher: Ruth Carver
Germantown Academy, Fort Washington, PA

“Does Hand Length Correlate to Height?”
by Kelly Gorman and Lisa Brown
Teacher: Nancy Adams
Conestoga High School, Berwyn, PA

“High School Girls and Smoking”
by Angela Colletta and Danielle Heeney
Teacher: Mary Reil
St. Hubert Catholic High School, Philadelphia, PA

A BIG THANK YOU goes to Dr. Tom Short and Rosemary Reshetar for organizing the event. Entries in the competition were sent to the ASA national Poster Competition.

Sponsors of the 2000 PA Competition were:

- Association of Teachers of Mathematics of Philadelphia and Vicinity,
- Center for Statistics Education in PA at Indiana University of Pennsylvania,
- Pennsylvania Council of Teachers of Mathematics,
- Philadelphia Chapter of the American Statistical Association,
- Pittsburgh Chapter of the American Statistical Association,
- Harrisburg Chapter of the American Statistical Association, and
- Department of Mathematical Sciences at Villanova University

WE ARE PLEASED to note that many of the winning entries were submitted by teachers who are SEQuAL alumni! Keep up the great work!

Clarion SEQuAL Final Projects

The final session of the Clarion University SEQuAL workshop was held on Saturday, April 29, 2000. The elementary group began the day with an activity led by Bradley Wagner on the TI-73 calculator that reviewed entering lists and allowing the calculator to perform an algebraic formula on columns of data. He used a formula for determining a quarterback rating and data from several known quarterbacks. The secondary group was introduced to the Fathom software through a demonstration by Bill Finzer. They enjoyed the dynamics of the software as Mr. Finzer employed United States population data to show examples of the functions Fathom can perform.

The presentations by all participants were wonderful. Throughout the day, both elementary and secondary teachers noted how all of their students were able to enjoy the quantitative literacy activities. They emphasized that even the students who usually struggled mathematically were able to be successful in completing quantitative literacy projects, sometimes performing even better than the above average students.

Many of the activities that were modeled during the summer workshop were used in the classrooms of the teacher participants. The teachers reported that the students enjoyed the hands-on activity based lessons, where they gathered their own data and then analyzed the results. As the project Director, I have read all of the journals and submitted activities. Some of the unique lessons that I found particularly creative are highlighted in this article.

Karen Raybuck, a secondary science teacher from Union High School, entitled her lesson "Frogs, Frogs, Frogs." The purpose of the activities in this unit is to determine if there are increasing numbers of mutations in frogs due to an increase in solar radiation. First, students researched and reported on various topics related to frogs: identification of species, frog calls, habitat, reproduction, etc. The concept of global warming and the possible effects of increased ultra-violet rays on organisms was also discussed. Students gathered data throughout the year on ultraviolet radiation using a UV meter and entered the information online to a national database. Teams of students searched for frogs locally, gathering data such as location, weather conditions, time of day, and environmental area (i.e. wetlands, woods). They photographed frogs that they captured, identi-

fied the species and looked for abnormalities. A field trip to the Beaver Creek Project in Knox was the culminating activity. The information collected about the frogs was part of a nationwide effort in collecting frog data. (For more information, the Frog Hotline number is 800-888-2182.)

Students in Jenie Galillot's first grade classes at Freeport each read seven books by Dr. Seuss in celebration of Read Across America Week. The students first predicted which book would be the class favorite, then created a class bar graph, and interpreted the results.

Ted Grice from Belle Vernon High School had his students determine the best size of square to cut from each of the four corners of a rectangle to maximize the volume of an open box created from what is left of the rectangle. Students were given a 5" x 8" index card (12.7 cm x 20.3 cm) to start. They were told to cut away a square from each corner of the card and to fold what was left of the card into an open box. Each student chose the size of the square (between 1 cm x 1 cm and 6 cm x 6 cm) to remove from the four corners. Students then calculated the volume of the box using the formula

$$(20.3 - 2x)(12.7 - 2x)(x),$$

where x is the measure of the side of the square cut away. Class data was accumulated on a spreadsheet. The TI-83+ calculator was used to set up a table, and a scatterplot was created with the independent variable being the size of the square and the dependent list being the volume. The amazing result is that a one inch square (2.54 cm) cut from the four corners of a 5" x 8" index card will maximize the value of the open box. Ted was excited that the class results mimicked the cubic function, and that regression equations and curve fitting worked so well.

While substituting at Saxonburg Elementary School in South Butler County School District, Tiffany Schmidt taught second grade students to use and interpret spreadsheets with data that they gathered concerning attributes of their family members. She notes that due to the fact that this unit was solely based on the students and their families, the interest level never subsided. The students had ownership in the entire project, beginning with the creation of the survey to the final class Big Book on their families. "The QL components were well-disguised in the lessons I presented and it seemed as if we were just 'having fun,' not learning about data collection and

Continued on page 6

How Good a Guesser Are You?

The basic premise of the data-driven approach is to use data gathering and analysis as the setting and motivation for the teaching of mathematical concepts. If one starts with data, statistics can be embedded in pre-algebra, algebra, and geometry.

The idea of using an age guessing activity in the teaching of line of best fit, linear regression, and residuals appears in Exploring Linear Relations (one module in the Data-Driven Mathematics series). Refer to the accompanying worksheet on page 7.

Students are asked to guess the ages of several famous people. The actual ages are given and they calculate the difference between their guess (G) and the actual age (A). Who is the best guesser?

The class may consider various methods for determining the best guesser:

- the sum of the differences (create “G-A” column and compute),
- the sum of the absolute value of the differences (create “abs(G-A)” column and compute),
- the sum of the differences squared (create “(G-A)²” column and compute).

Find the student in the class who would be the best guesser using each of these methods. Discuss the merits of these (and other) methods, highlighting that the abs(G-A) and (G-A)² are better computational methods for determining who is the best guesser.

Then approach the situation graphically. Graph the ordered pairs (G, A) for each of the famous people. Ask the students to consider what the graph of a perfect guesser would look like (G = A). Discuss the meaning of a point above this line or below this line.

To answer the question who is the best guesser, ask the students to consider that at county fairs, people who guess ages usually “win” when their guess is within 5 years of the actual age. Graph $A = G + 5$, $A = G - 5$, $A < G + 5$, and $A > G - 5$. A discussion of the meaning of these lines and inequalities and their relationship to the question of who is the best guesser should conclude that whoever has the most data points in the shaded region between $A = G + 5$ and $A = G - 5$ is the best guesser.

Our famous people and their birthdays are:

George W. Bush	July 6, 1946
Tom Cruise	July 3, 1962
Jamie Farr	July 1, 1934
Oprah Winfrey	Jan. 29, 1954
Derek Jeter	June 26, 1974
Sandra Day O’Connor	March 26, 1930
Harrison Ford	July 13, 1942
Venus Williams	June 17, 1980

Almanacs, newspapers, and the internet are a good source of celebrity birthdays.

This activity has been adapted by John Uccellini for the 2000 Data-Driven Workshop. The list of famous people was contributed by Anita Smith for the Governor’s Math Institute this summer.

SEE THE WORKSHEET ON PAGE 7.

Continued from page 5

graphing. Their completed graphs were a fantastic reminder of all the fun you can have in math class!” she reports.

Tiffany’s statement clearly summarizes the SEQual experience and the incorporation of QL activities in the classroom.

Our two undergraduate mathematics education majors, Amy Dubler and Josh Williams, went beyond the call of duty, and presented with me at PCTM in Harrisburg in March. Our presentation, “From Chocolate Chips to Credit Cards: Teaching and Assessing Statistical Knowledge through the Use of Real Data,” gave Josh and Amy the opportunity to discuss their summer group projects, as well as give statewide exposure to quantitative literacy and the SEQual project.

Submitted by Dr. Elaine Carbone, Site Director of the 1999-2000 SEQual workshop at Clarion University of PA.

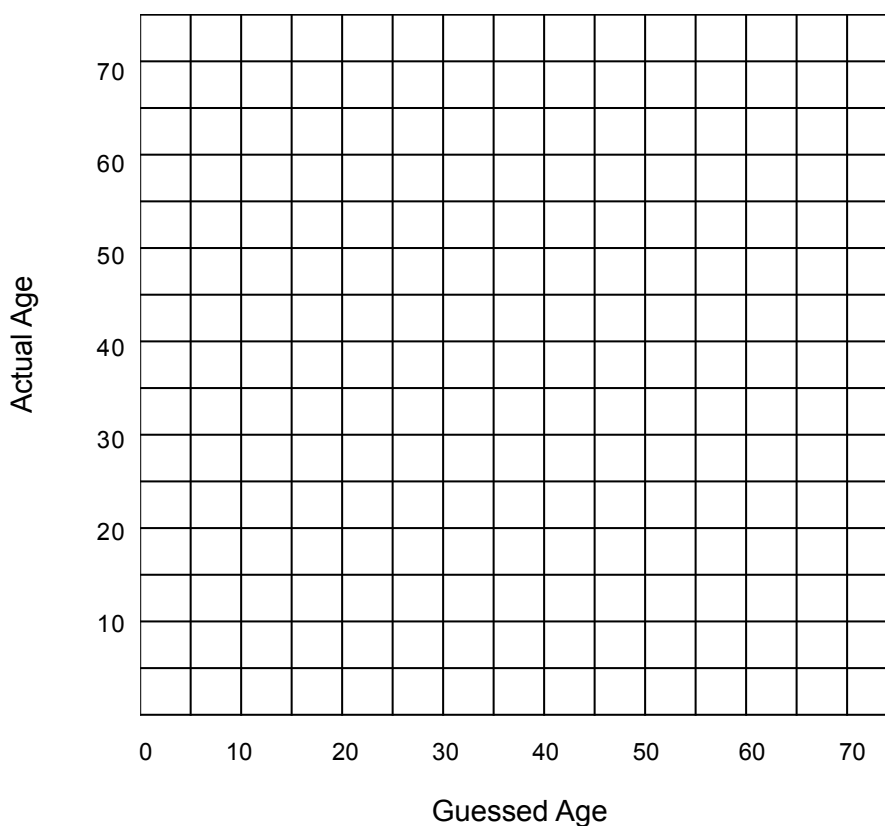
Visit us on the web:

www.ma.iup.edu/projects/SEQual

How Good a Guesser Are You?

Person	Your Guess	Actual Age			
George W. Bush					
Tom Cruise					
Jamie Farr					
Oprah Winfrey					
Derek Jeter					
Sandra Day O'Connor					
Harrison Ford					
Venus Williams					
		SUM			

Make a scatter plot with your guessed ages on the horizontal axis and the actual ages on the vertical axis, (Guessed age, Actual age).



Adapted from Burril, Gail F. and Patrick Hopfensperger. Exploring Linear Relations. Data-Driven Mathematics. Dale Seymour Publications, 1998. 94-107.

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UPCOMING DATES . . .



- | | |
|-----------------|---|
| AUGUST 16-17 | SEQUAL AT THE GOVERNOR'S MATH INSTITUTE STATE COLLEGE |
| SEPTEMBER 23 | EDINBORO SEQUAL FALL POST-SESSION |
| OCTOBER 12 - 14 | NCTM REGIONAL MEETING PHILADELPHIA
<i>HOPE TO SEE YOU THERE!</i> |
| OCTOBER 20 | IUP DATA-DRIVEN FALL POST-SESSION |
| OCTOBER 27 | HAZLETON SEQUAL FALL POST-SESSION |
| NOVEMBER 4 | MANHEIM SEQUAL FALL POST-SESSION |