

DIVERSITY TOPICS IN THE DEVELOPMENTAL MATH CURRICULUM

Barbara Tozzi, Brookdale Community College

Introduction

Teaching developmental math courses at Brookdale Community College in Lincroft, New Jersey for the past five years has led me to encounter students of various backgrounds. The philosophy of the Basic Math course in computation is to have our diverse students: 1) recognize the existence of mathematics in their everyday lives and 2) have math confidence as well as appropriate mathematical skills. In our customized textbook and other curriculum materials, current newspaper articles, tables and graphs are included and discussed. Students begin to appreciate the importance of understanding basic math concepts so that they can read articles and not be intimidated by graphs and numbers.

The Basic Math course is taught in either two semesters or one; testing results determine placement in one or the other. The pace of the two semester course is generally much slower than the one semester course. The curriculum for the computation course includes whole numbers, fractions, decimals, integers, equations, ratio and proportion, and percentages.

Class size is limited. My classes have included a population that is rich in diversity because of age, ethnicity, multiculturalism, gender, and ability. Recent research on learning mathematics has inspired me to address issues of diversity in the mathematics classroom.

In this regard, a year ago last Spring, I participated in a Diversity Across the Curriculum (DAC) seminar at Brookdale. I met with the four DAC directors and about fifteen other faculty once a week for six weeks. During each session, I experienced at least one new teaching technique that could be used in a diverse classroom. I was introduced to readings and resources on the multicultural classroom and diverse learning styles, and our group had lively discussions. There was even a class where Brookdale students representing different cultures came in and spoke to us about their concerns. With each class, I became more committed to infusing that information into my developmental math courses.

Collecting graphs and newspaper articles that contain information on diverse populations and issues of diversity, and writing questions that require students to interpret the information and come to some conclusions about what they have read, were starting points to this process. All Basic Math courses at Brookdale include a lab component. I have infused problems of a diverse nature into the labs and have written new labs based on current and topical information (See Attachments). Students complete these labs by working in groups.

For example, I have one lab that includes a table listing four local communities, the percentage “minority”, number of businesses, home-loan rejection rate, and the number of bank branches. This table was extracted from an article in the September 10, 1995 *Asbury Park Press*, the local newspaper of Monmouth County, New Jersey, entitled “*No Checks or Balances -- the politics of bank branch placement and the impact on the communities left behind.*” Students working in small groups read the table and answer questions that engage them in discussions and require them to increase number sense through estimation and the use of calculators. Each group communicates, compares, and justifies conclusions collaboratively.

The sample of lab questions and lab assignments that I have written are limited here because of copyright laws. However, I have included a listing of other sources that may be useful. When using articles and graphs from newspapers and magazines in the classroom, if a clipping is only used once and not continuously, copyright permission is not necessary. I have also included copyright information and a Web Site for further information.

During one of my classes, I had my students read a poem written by a Chicano poet. The poem is about a grandfather who is a new visitor to this country, does not speak English, and is responsible for the care of his grandchild. A phone rings in a phone booth and he tries to answer it, but he becomes trapped inside and cannot communicate to the person on the phone, nor to his grandchild. He is frightened and only until he takes a break from pushing on the door extremely hard, does the door spring back and allow him to exit. At the end of his ordeal, he and his grandchild laugh with relief.

I gave my students questions to encourage a discussion about the frustration they feel if they cannot communicate, especially in a mathematics class, and what to do if and when that happens. I have included the poem, the questions, and my reaction to this session. An assessment survey that was given to my students at the end of the course also follows.

Recognizing articles to clip from news sources is the most difficult part of infusing topics of diversity into the curriculum. The reward is motivated students who identify with information and recognize the importance of increasing their ability to use mathematics in their daily lives. Moreover, for the teacher, this process is both enriching and challenging.

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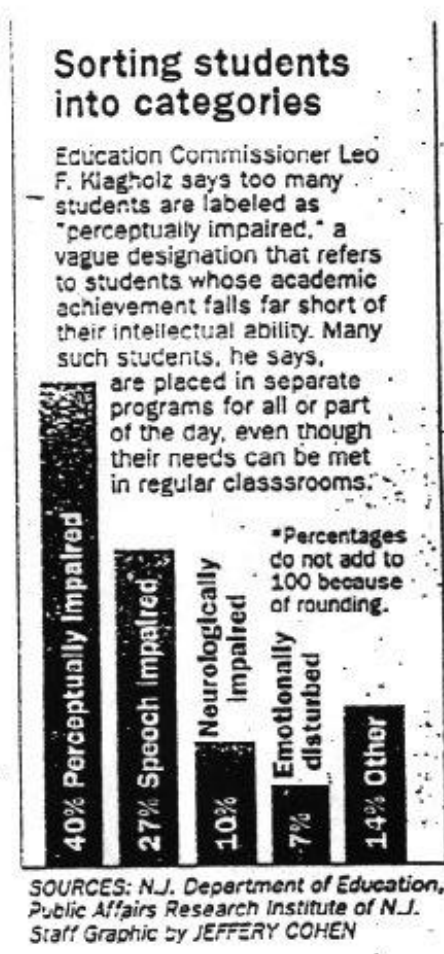
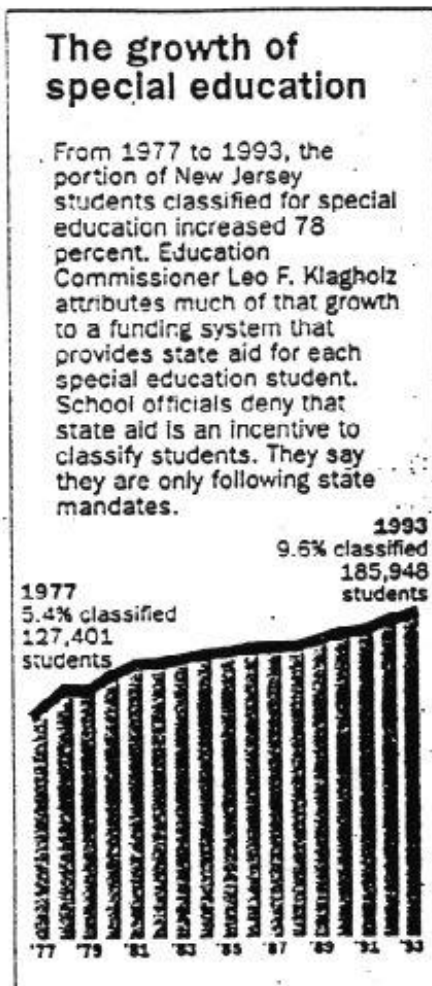
Sample Lab Questions on Diversity Issues

1. According to an article entitled “*Bridging Generations*” from the *NJEA Review*, September, 1995, in 1983, the number of people over age 65 surpassed the number of teenagers in this country. We are no longer a youth-dominated society. One of the reasons for this is that longevity has “snuck up” on us. In the year 100 BC, average life expectancy was 22 years; in 1900 AD, 47 years. It took 2000 years to increase life expectancy just 25 years. But from the year 1900 to today, in less than 100 years, life expectancy increased by 28 years.
Use the above information to state the average person’s life expectancy today.
2. The latest Census Report, conducted in 1990, indicates that America is changing from a nation of youth to a nation of grandparents -- there are about 50 million grandparents, some as young as 30 years of age. If there are 250,000,000 people in America, write the ratio of grandparents to people in America as a fraction in lowest terms.
3. According to an article entitled “*Sexual Harassment in Schools*” from the *NJEA Review*, March, 1995, the Project to Uncover Sexual Harassment in New Jersey Schools (PUSH: NJ Schools) was a survey given to 707 students in grades eight through twelve in nine New Jersey public schools. 558 students said they had experienced “sexual harassment” (which included sexual remarks, jokes, or physical contact) at least once. Write the ratio of the number of students who have not experienced sexual harassment to the number of students who answered the survey.
4. According to *Food for Thought*, a newsletter from The Foodbank of Monmouth/Ocean Counties, there are an estimated 185,000 people in Monmouth and Ocean counties who experience hunger on a regular basis -- 58% are children and the elderly. How many children and elderly experience hunger on a regular basis in Monmouth and Ocean counties?
5. *USA Weekend* reported the results of a survey on racial attitudes in their August 18-20, 1995 magazine. The participants were 248,000 students in grades six through twelve -- 45% stated that they personally had experienced prejudice in the past year. Of that number, 53% spoke up about it.
 - a) Of the students that participated in the survey, how many had personally experienced prejudice in the past year?
 - b) Of that number, how many spoke up about it?
 - c) How many kept the experience to themselves (didn’t speak up about it)?
6. In the survey on racial attitudes that involved 248,000 students, 84% think most teens are prejudiced, yet 71% would date someone of another race.
 - a) How many students think that most students are prejudiced?
 - b) How many students would date someone of another race?

Sample Lab Questions on Diversity Issues

The following graphs are cut from an article entitled “*Special education: setting limits*” in the *Asbury Park Press*, December 3, 1995. For a complete copy of the article, visit the *Asbury Park Press* Web Site (<http://www.app.com>).

7. Use the accompanying information and graphs to answer the following questions:



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- How many students were classified for special education in 1977?
- How many students were classified for special education in 1993?
- In what year did the number of students classified for special education decrease from the previous year?
- In the graph that sorts students into categories, do the percents add up to 100%? Explain.
- What percent of NJ students are categorized as “speech impaired”?
- Do you agree with Education Commissioner Leo F. Klagholz’s comment on students labeled as “perceptually impaired”? Explain.

Sample Lab Questions on Diversity Issues

The following graph is cut from an article entitled “*Job picture most bleak for young minority adults*” in the *Asbury Park Press*, August 4, 1996. For a complete copy of the article, visit the *Asbury Park Press* Web Site (<http://www.app.com>).

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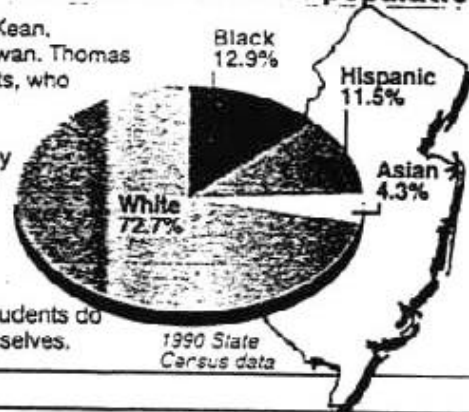
- What percent of persons employed by the Federal Government are of Hispanic origin?
- What percent of persons employed in private industry are black?
- The article states that “America’s 2.5 million black citizens between 20 and 24 faced an unemployment rate of 17% for the second quarter of this year.” How many black citizens between 20 and 24 were unemployed during this time period?

Sample Lab Questions on Diversity Issues

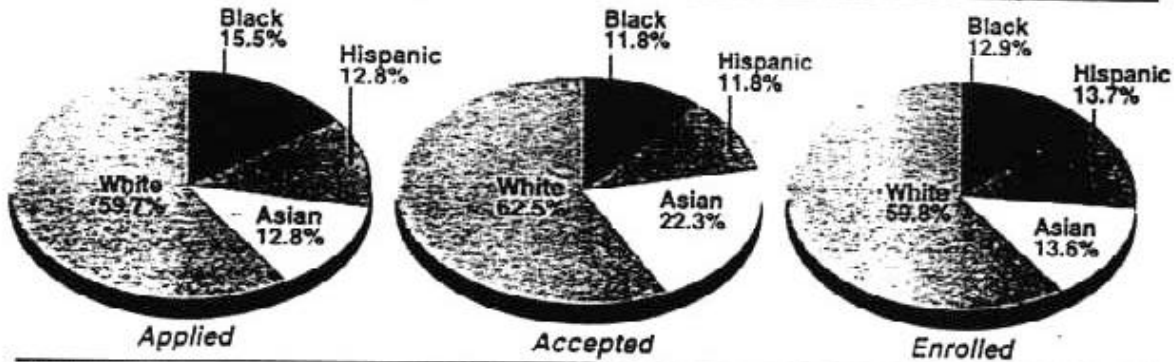
The following graph is cut from an article entitled "Admission of black students to state colleges lagging" in the *Asbury Park Press*, June 30, 1996. For a complete copy of the article, visit the *Asbury Park Press* Web Site (<http://www.app.com>).

Colleges accept smaller percentage of black students
Ethnic breakdown of population

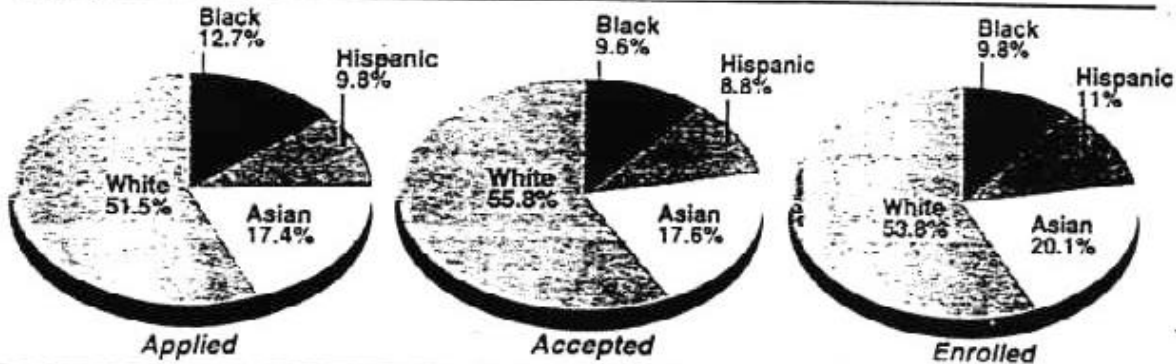
The admission numbers are from Rutgers, Trenton State, Kean, Montclair, William Paterson, Jersey City, Ramapo and Rowan. Thomas Edison was not included because it accepts all of its students, who are part-time adult students. The numbers do not include statistics from Stockton State or New Jersey Institute of Technology. Neither institution breaks down its enrollment by ethnic group. Numbers from Jersey City, where the majority of the campus is part-time, include part-time and full-time freshmen. All other colleges use only first-time, full-time freshmen. The numbers were collected from the colleges because the state does not collect the information. Some percentages do not add up to 100 percent because some students do not fall into any of the four categories or do not identify themselves.



Overall state college admissions



Rutgers



Staff graphic

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- 14,000 white students applied to Rutgers as freshman in 1995. What is the total number of students who applied to Rutgers as freshman in 1995

Sample Diversity Lab 1 - Applications of Percent

The following table is cut from an article entitled “*No Checks or Balances -- the politics of bank branch placement and the impact on the communities left behind*” in the *Asbury Park Press*, September 10, 1995. For a complete copy of the article, visit the *Asbury Park Press* Web Site (<http://www.app.com>).

Use the table to answer questions 1 - 5 that follow:

Both ends of the banking spectrum

Census tracts with a high proportion of minorities tend to have no bank branches and higher home-loan rejection rates when compared with predominantly white tracts. This holds true regardless of the number of businesses and business activity, even though banks prefer to locate near businesses. the Press found. Some examples:

	Central Elizabeth	Central Trenton	Central Sayreville	Central Old Bridge Twp.	State median
Population	5,372	5,190	3,981	5,134	3,824
Percent minority	70.7%	86.4%	5.5%	7.7%	10.6%
Number of businesses	152	143	59	63	113
Total sales (estimated)	\$417 million	\$397 million	\$39 million	\$27 million	\$69 million
Home-loan rejection rate	33.3%	23.0%	13.6%	14.3%	14.6%
Bank branches	0	0	4	11	2

NOTE: Areas were defined by census tracts; Population figures are based on the 1990 census; Other figures reflect 1994 data; Numbers do not include government offices.

Asbury Park Press
SOURCE: Compiled from U.S. Census Bureau data and information provided by Sheshunoff Information Services and Strategic Mapping

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1. Use your calculator and your knowledge of percents to find the number of minority residents in each of the four communities. Round answers to the nearest whole number.
2. Considering the population percents given in Central Elizabeth and Central Trenton, was it accurate for the writer of this newspaper article to have used the term “minority”? What word/wording would be more appropriate?
3. If 900 residents apply for a home-loan in Central Elizabeth, how many do you expect will **not be rejected**.
4. Use the symbol < or > to compare the home-loan rejection rates of Central Elizabeth to the state median. Based on your comparisons, what do you think is meant by the following statement quoted from David Valdes, Trenton Latino community leader in the article: “We call it economic justice. When you talk about civil rights, talk to us about economics first.”
5. For each of the four communities,
 - a) Write the number of bank branches to the number of businesses as a ratio.
 - b) Write this number as a percent, rounded to the nearest tenth of a percent.
 - c) Which representation, the fraction or the percent, helps you to interpret the data more easily?

Sample Diversity Lab 2 - Applications of Percent

The following article is from the *Asbury Park Press*, October 22, 1995. For a complete copy of the article, visit the *Asbury Park Press* Web Site (<http://www.app.com>).
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Use the article, graphs and tables to answer the questions that follow.

In Camden, 'It's just more people dying

By **ROBERT WESTON**
and **CHANTA L. JACKSON**
STAFF WRITERS

CAMDEN — Almost every night, before he goes to bed, 14-year-old Ifrain Laguer listens to the gunshots outside his home and wonders why no one cares enough to stop the violence.

"Most every evening I hear gunshots," said Ifrain, who wants to be a doctor. "I see people running and cars burning rubber. People don't see what's going on here.

"It's terrible, but I don't think they care about Camden because the majority of us are Puerto Ricans and blacks."

In many ways, Ifrain is like any other child his age; he wears Reebok shirts and shorts, Nike Airmat sneakers and rides a mountain bike. But there is one crucial difference: Every day Ifrain worries that he could be killed because someone might take a liking to his shoes or clothing.

"I just don't think people outside the city really care about what happens here," he said. "It's crazy."

The first thing a visitor notices about this city is the sense of despair. From the decrepit buildings falling to pieces before their eyes to the crack dealers standing on the corner, everything about the place seems to cry out for help.

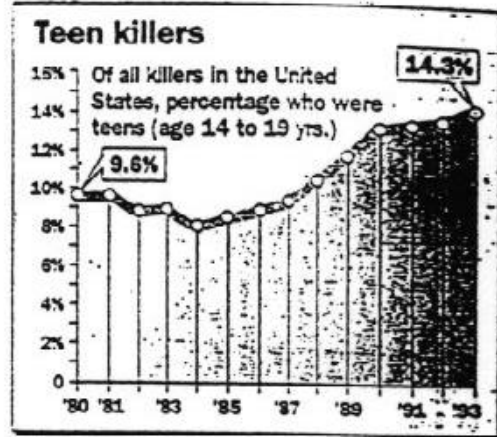
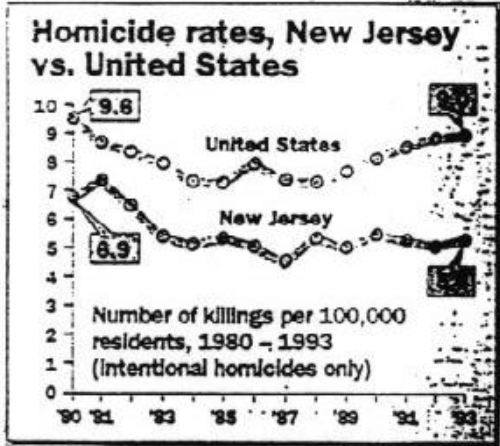
It is a feeling that few people living in relatively affluent places such as Tom's River or Rumson can imagine. Although some areas in Monmouth and Ocean counties are considered dangerous, they pale in comparison to Camden.

Since 1980, the homicide rates for most areas of New Jersey and the nation have decreased or remained fairly steady — good news if you don't live here. But those statistics are small comfort to the 88,000 people who call this city home, where the homicide rate has increased by more than 50 percent since 1980. It was the 15th deadliest place in the United States to live in 1993. Nearly half of the killings that year were drug-related shootings.

You have a greater chance of being killed here than in Miami, New York or Los Angeles.

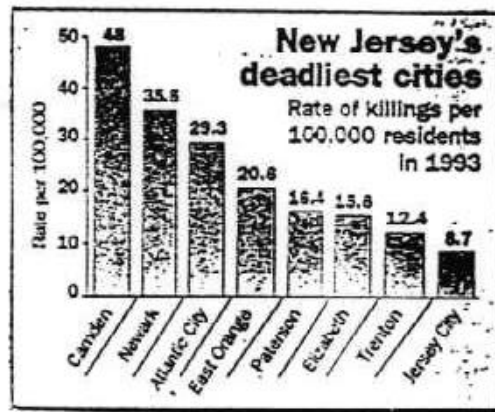
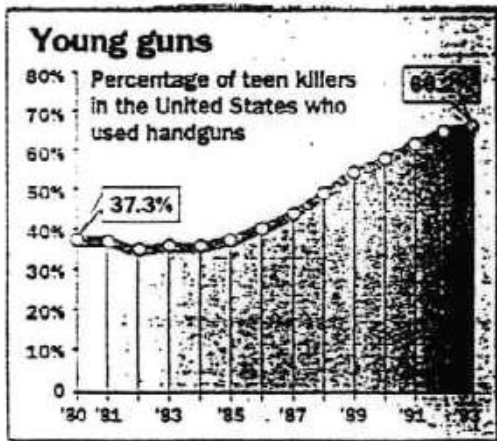
1. Children make up $\frac{1}{3}$ of Camden's population. How many children reside in Camden?
2. Camden ranked 15th worst among all US cities, with 48 killings per 100,000 residents. Write the rate of killings per residents as a percent.
3. In 1993, (excluding Washington, DC), Louisiana had the highest homicide rate at 17.3 killings per 100,000 residents. Maine had the lowest, 0.49 per 100,000. New Jersey ranked 30th at 5.3, or below the national average of 9.0. Write the rate of killings per residents as a fraction for Louisiana, Maine, and New Jersey. Change the fraction to a percent.

4. Ifrain stated that no one cares about Camden because “the majority of us are Puerto Ricans or Blacks”. Which of the following fractions could represent a majority: $\left\{ \frac{1}{3}, \frac{1}{2}, \frac{3}{4} \right\}$? Explain.



5. How does the homicide rate for NJ compare to the homicide rate for the US?

6. Which year from 1980 - 1993 had the lowest percentage of teen killers in the US?



7. Use the graph above to describe the trend in the percentage of teen killers who used handguns from 1980-1993.
8. Write the rate of killings per residents as a percent, for each of the cities listed.
9. Monmouth, Ocean and Middlesex counties were much safer than the rest of the state. Their homicide rates for 1993 were 1.9, 2.7, and 2.2 killings per 100,000 residents, respectively. Hunterdon County was the safest, with no homicides in 1993. Write the rate of killings per residents as a percent for each of these counties.

Sources of Information for Data on Diversity Issues

In addition to the magazines and newspapers cited in the sample of lab questions included in this paper, I have found that the following magazines contain articles and graphs on diversity issues that can be used in the classroom: *Time Magazine*, *Newsweek*, and *American Demographics*. The following newspapers are particularly good sources of graphs: *The New York Times*, and *USA Today*.

Information can also be found in newsletter mailings. For example, I have used many of the graphs that are in *River Views*, the publication of our local medical center. These graphs have been on health and age issues. There is even a graph on a comparison of male and female self-esteem in elementary school, middle school and high school. Once the commitment is made to include diversity issues in the curriculum, recognition of articles, tables, and graphs to utilize becomes easy. They can literally be found everywhere!

The following Web Sites are good sources for data:

American Demographics

<http://www.demographics.com>

Source for consumer and business data.

The Black Collegian

<http://www.black-collegian.com>

“Cornerstones of Diversity” is a location for articles on diversity issues.

Bureau of Labor Statistics

<http://www.bls.gov>

Select “Regional Information”, then select a “Region”. Select “Most Requested Series” to obtain BLS timeseries data from lists of the most commonly requested timeseries from various surveys, programs, BLS Regional offices, and BLS overall. “Selective Access” allows you to obtain BLS timeseries data based on a query you formulate and execute.

Census Bureau

<http://www.census.gov>

For an alphabetical listing of data, select “Subjects A to Z”. Data on Aging, Child Care, County Profiles, Employment, Immigration, Marital Status, Minority-Owned Businesses, Poverty, Women-Owned Businesses, and many more topics is available.

ERIC

http://www.cua.edu/www/eric_ae/search.html

Provides a list of known, publicly-available web, gopher, telnet, and TN3270 sites for searching ERIC databases.

Government Information Sharing Project - Oregon State University

<http://govinfo.kerr.orst.edu/>

Data based on “Demography”, “Economics” and “Education” is available. Also, select “Other Government Web Sites” for data provided by the Census Bureau, the Bureau of Economic Analysis, the National Center for Education Statistics and the MESA Group.

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An interesting document entitled “*Fair Use in the Electronic Age: Serving the Public Interest*” is available @ **<http://arl.cni.org/scomm/copyright/uses.html>**

Classroom Diversity Reading

The following poem is selected from: *Braided Lives -- An Anthology of Multicultural American Writing*, Minnesota: Minnesota Humanities Commission, 1991. Juan Delgado's poems have appeared in Best New Chicano Literature 1989, an annual that recognizes the work of emerging writers..

THE PHONE BOOTH AT THE CORNER

by Juan Delgado

Grandfather took a walk
down to the neighborhood bar.
That day mother had placed me
under his care-
at sixty he was visiting us
for the first time.

We stopped near a phone booth.
Outside the bar in a cage
a parrot whistled back at us.

The phone began to ring.
Grandfather pushed the door,
forgetting he spoke only Spanish.
He raised the phone to his ear:
there was nothing he could do.

Again, he pushed the door.
He didn't understand
it was divided by hinges
and would only open by pulling in.
He pushed even harder -- I could see
the fear in his face grow with his effort.

We were both unable to speak
as we pushed for what seemed minutes.
He finally stopped -- exhausted
and the door opened.

He stepped out laughing.
I began to laugh with him
and the bird whistled.
All three of us
broke the air with our voices.

Questions About the Poem:

The Phone Booth at the Corner by Juan Delgado.

This poem is selected from: *Braided Lives -- An Anthology of Multicultural American Writing*, Minnesota: Minnesota Humanities Commission, 1991.

Answer each of the following questions:

1. Who is the grandfather?
2. Where does the tension begin to build?
3. When is the tension broken?
4. Have you ever had an experience in a Math class where it seemed that you had difficulty communicating? Explain.
5. What is the significance of the three voices at the end of the poem?

Reaction to Reading

The Phone Booth at the Corner

IN MATH 012

Barbara Tozzi, Brookdale Community College

Math 012 is the second half of a two semester Basic Computation Math course. The pace is generally much slower than the one semester course (Math 015). This semester I am teaching two sections of Math 012. My morning section has a very diverse group of students -- differing by age, ethnicity, race, gender and learning abilities. There is a majority of slightly older women in that class. My afternoon group is young; most have only been out of high school for two years or less. About half of the students in that class are young, white men.

I distributed the poem *The Phone Booth at the Corner* to my classes during a session in which we had just finished the new material for test 1. This was a perfect time for a break/discussion, before beginning the review for test 1.

A student in my morning section immediately asked if she could read the poem aloud. When she read the introduction about the author, Juan Delgado, one of the older women asked if that was the person who approved the coffee beans. One of the Latina women in that class told me later that she was particularly amused by that statement. After the poem was read, I put the students in two concentric circles and asked the students in the inner circle to answer questions about the poem (See Previous Page). In responding to the question about the grandfather, one student (recognizing that this was, after all, Math class) asked if the grandfather was the variable, the "x", the unknown!

When I explained that they did not have to dig for an underlying Math message, and that I just wanted to strengthen the communication skills that we have been discussing all semester, they seemed to relax. Each person in the inner circle had a chance to respond to each question. Even students who were normally "quiet" in class participated. For question 4, they all agreed that they felt frustrated in Math class when they had difficulty communicating. I then switched circles, and the students who had been in the outer circle had an opportunity to respond. One Latina woman, who a couple of weeks earlier had asked if she really had to explain her work at the board because she did not like speaking to a group, was very outspoken about the difficulty in understanding and communicating in a language that she was not born with. After class, she told me that she was surprised that we read a poem in Math class, but that she was happy that it was written by a Chicano poet.

Reaction to Reading *The Phone Booth at the Corner* IN MATH 012

For my afternoon class, I decided to have only one circle. Each student had the opportunity to respond to each question. Some of the young men were not eager to participate though, and said that their answer had already been stated. They did come to the conclusion, however, that learning Math is sometimes similar to learning another language, since vocabulary is so important and words translate into Mathematical symbols in a very particular way. They also agreed that it can be a very frustrating experience. This led to a discussion of what they should do if and when this happened.

This poem provided me with a wonderful opportunity to discover my students' feelings about Math at a perfect time -- just before test 1. My students had the opportunity to recognize that they were not alone in their feelings, and that, like the grandfather, they should not give up, but continue trying. It was an especially positive experience for me because my "quiet" student in my morning section really identified with the poem and contributed such valuable personal information to our class discussion.

Assessment Survey Results -- Math 012

1. Briefly list what you liked and/or disliked about this course.

I learned a lot of new skills, especially in ratios and rates.

The material was made as easy as possible. This I liked.

Sections were taught in depth. A lot of examples were shown. Always went over work.

Preferred homework be collected every class.

What I liked about this course is that it was well taught and easily learned because of the methods and techniques we used in class.

I liked it because it goes at a pace I can understand.

I like the people in the class because the age group was greatly different in age. I didn't like the percents and changing decimals to percents.

A lot of homework, but it paid off.

2. Was working on labs with a group a positive experience for you? Explain.

Summary: nine students answered "yes", and one student answered "no".

Sample answers:

Yes, but not at first.

No because other people rushed by the labs and didn't explain how they did the problem.

Yes, they helped me whenever I needed help doing a problem.

Yes, if you need help there was always someone to help you out.

Yes, it allowed everyone to give their input on different ways to do things.

Yes, because I got to give and receive help.

3. Did you study or work with your group on problems or homework outside of class?

Summary: seven students answered "no", one "yes", one "sometimes" and one "always".

4. Did some of the articles, graphs and tables that we analyzed quantitatively, increase your appreciation of diverse populations and your global awareness? Explain.

Summary: eight students answered "yes" and two answered "no".

Sample answers:

Yes, because there were some graphs that I was interested in.

Yes, I learned about things like the price of daycare for working mothers.

Yes, it really gave me an appreciation of what's going on in the world.

Yes, some of the articles were very interesting.

Yes, I found some of the subjects very interesting to me.

Yes, because I did not know about many of these things so it was all new to me.

No, I really didn't pay much attention to the articles. Math was more important.

No, because I never really thought about the graphs outside of class.