

Mathematics and Social Justice A Course Development Network

We welcome your participation in a growing network of mathematics faculty introducing civic engagement themes into their courses.

The Second Course Development Workshop on the Mathematics of Social Justice took place at Middlebury College in June of 2007. Twenty-three faculty members from a variety of colleges and universities worked in small groups to produce modules for use in mathematics and statistics courses. Our purpose is to help students connect questions of equity to quantitative analysis and deductive reasoning, and to extend their analytical and reasoning abilities in the process.

We continue to develop the modules on a password-protected Web site, and we invite you to join our testing team. In exchange for access to the Web site, we ask only that you provide feedback on any materials that you use in your courses.

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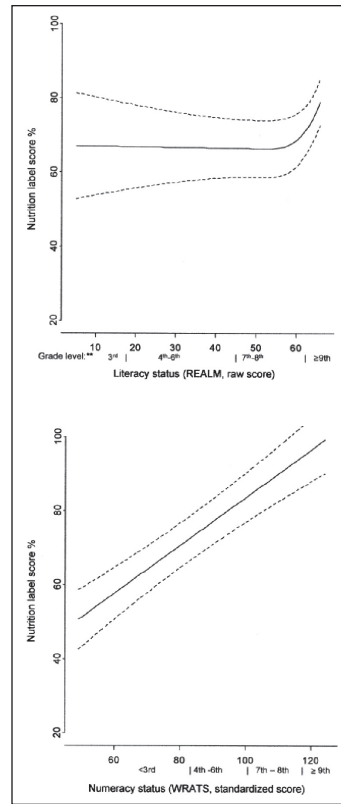
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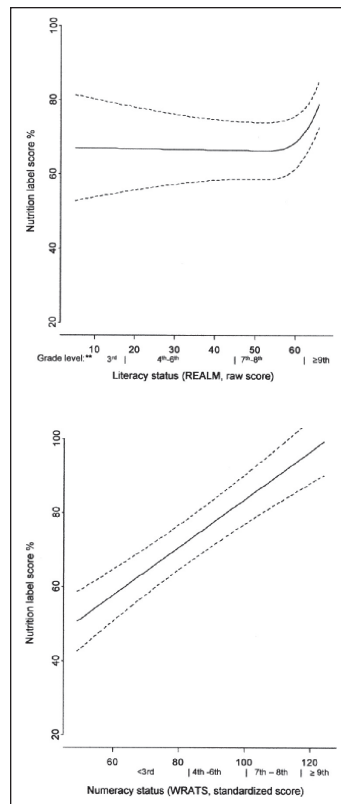
Now we are offering early access to the MSJ2 Web site. There you will find modules in various forms and stages, each with a place to submit comments. Visitors may also contribute modules of their own. Whether you've developed a unit with a social justice theme that you want to share or you'd like to test one of ours, we look forward to hearing from you.

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Source: The Food and Agricultural Organization of the United Nations, www.fao.org

Mathematics and Social Justice

A Course Development Network

Response to a Workshop at
Middlebury College (MSJ2)



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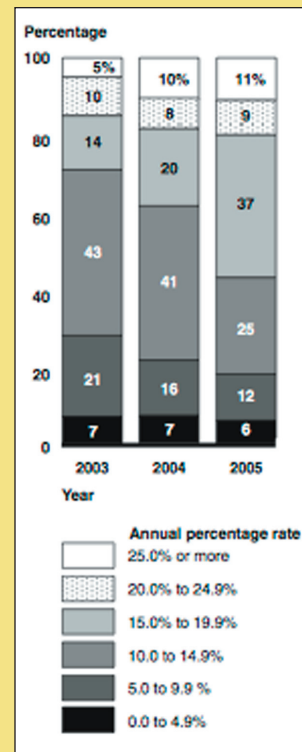
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Module Samples

Proportion of Active Accounts of the Six Largest Card Issuers with Various interest Rates for Purchases, 2004 to 2005

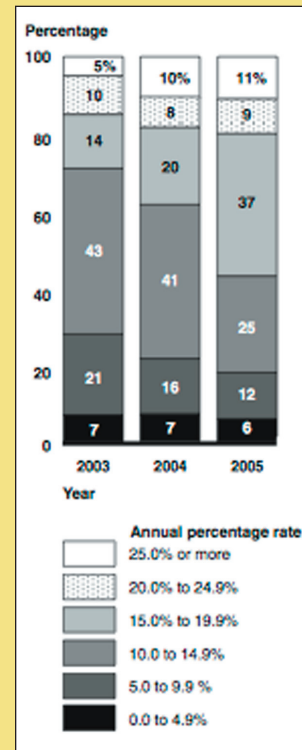


Source: GAO Analysis of data reported by the six largest credit card issuers, GAO Report 06-929, page 71; available at www.gao.gov

The **Lending and Access to Money** module consists of nine fifty-minute class sessions. It is intended for general education courses, and includes readings and writing assignments about such topics as credit cards, bankruptcy, and predatory lending. There are several suggestions for service-learning projects, both on- and off-campus. This section also has an extensive bibliography.

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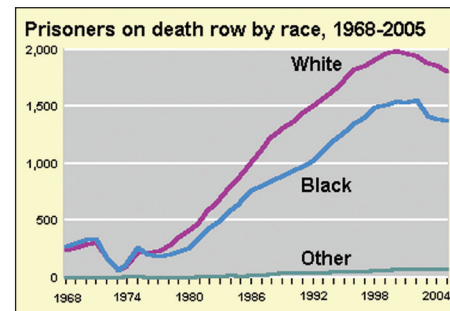
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The **Mathematics for Understanding Criminal Justice Issues** module is actually a plan for an entire course. The course is designed to give an overview of topics in discrete mathematics together with their applications to criminal justice issues. The module has suggestions for projects and writing assignments, as well as an assortment of service-learning project ideas. There is also a collection of syllabi from courses that connect statistics with criminal justice questions.



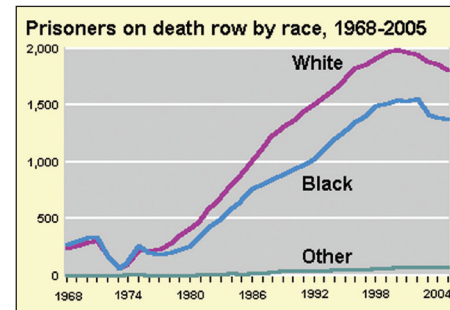
Source: U.S. Department of Justice Bureau of Justice Statistics, www.ojp.usdoj.gov

UNITED STATES POPULATION BY RACE 2005

	Estimate
Total:	288,378,137
White alone	215,333,394
Black or African American alone	34,962,569
American Indian or Alaska Native alone	2,357,544
Asian alone	12,471,815
Native Hawaiian/Pacific Islander alone	397,030
Some other race alone	17,298,601
Two or more races	5,557,184

Source: U.S. Census Bureau, 2005 American Community Survey. Available at <http://www.census.gov/>

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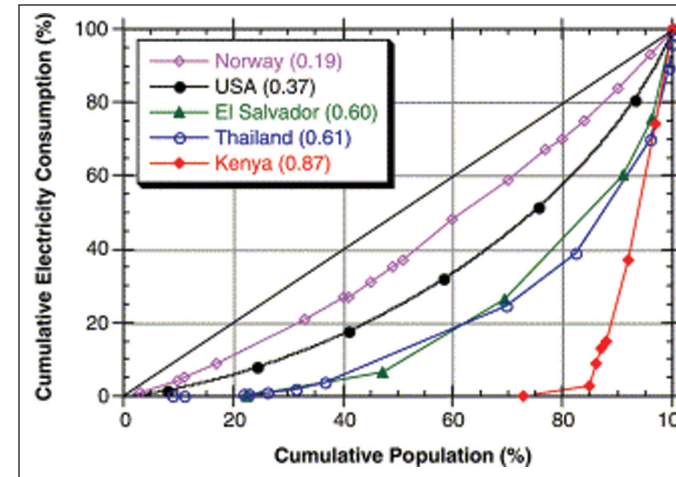


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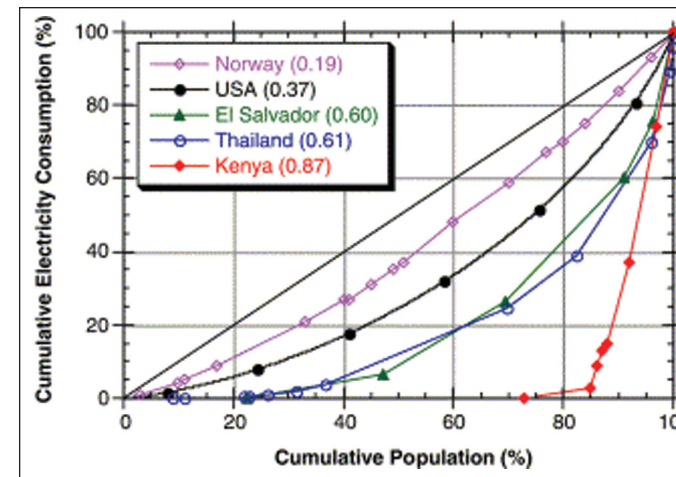
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Reprinted from *Energy Policy*, Volume 33, Arne Jacobson, Anita D. Milman and Daniel M. Kammen, *Letting the (energy) Gini out of the bottle: Lorenz curves of cumulative electricity consumption and Gini coefficients as metrics of energy distribution and equity*, Page 1827, Copyright (2005), with permission from Elsevier.

The **Energy and Environment** group has put together a calculus module that uses the Lorenz curve and the Gini coefficient to analyze measures of energy consumption. This application reinforces basic integration rules, as well as interpretation and analysis of graphs and functions. Instructors have the option of moving beyond the basic exercises to longer projects.



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How to Join

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One aim of this collaborative approach is to enlarge and improve a set of course materials for college mathematics instructors. Another is to foster communication among mathematicians who are engaging similar themes in their teaching. For more information, contact Priscilla Bremser (bremser@middlebury.edu).

The Middlebury Workshop was made possible by a grant from the Learn and Serve America Corporation through the Pennsylvania/New York Campus Compact Consortium. Matching funds came from Middlebury College, Lafayette College, Moravian College, West Chester University, and the East Stroudsburg University.



New York | Campus Compact



Pennsylvania | Campus Compact

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New York | Campus Compact



Pennsylvania | Campus Compact

First-Year Seminar Course Module

What is Quantitative Literacy?

Rob Root, Lafayette College

adapted and condensed by Priscilla Bremser, Middlebury College

This module is designed to take the first seven 75-minute meetings of a first-year seminar; that is, course of limited enrollment with a writing component.

Texts:

Niederman, Derrick and Boyum, David, *What the Numbers Say*, Broadway Books, 2003.

Mathematics and Democracy: The Case for Quantitative Literacy, National Council on Education and the Disciplines, 2001.

Class Period 1.

Students fill out nametags.

“Famous Number” activity.

Discussion of how numbers gain their significance from their context.

Students spend 20 minutes writing their mathematical autobiographies, then discussion.

Homework for Period 2: Read the first two chapters of *What the Numbers Say*. Choose one passage that you find interesting and important. Copy it, and write a brief explanation for your choice of this passage. Bring the book and a hard copy of your response to class.

Class Period 2.

Discussion of the college’s Honor Code and the definition of plagiarism, and any questions from syllabus.

Students pair up and read each other’s writing assignments.

Full class discussion of the assignments, and the reading. Questions: How would you explain the consistency of the rules “Only Trust Numbers” and “Never Trust Numbers” offered by N&B? Can you think of examples in your lives where bad things happened despite good decisions, or vice-versa? Which of the habits offered by N&B have you developed? Did it happen in a math class, or elsewhere?

Homework for Period 3: Read “The Case for Quantitative Literacy” in *Mathematics and Democracy*. Read Chapters 3 and 4 of *Numbers*. Start a writing log on the theme of QL. You might consider: which definition of QL do you like best and why? What do you see as your strengths as a quantitative thinker? Describe an important learning experience in your own QL development.

Class Period 3.

Discussion of reading. Questions: What examples can you think of where measurement changes people’s behavior? What are some measurements used in gauging issues of social justice? (CPI, unemployment rate, inflation, poverty line, child mortality...) What do you know about how they are measured? Where in the reading do we find the problem of looking at the appropriate fraction? These chapters address topics covered in grade school mathematics. In what ways are these presentations different from what you saw in school?

Homework for Period 4: Read pages 61-5, 99-105, and 107-116 in *Mathematics and Democracy*. Read Chapters 5 & 6 in *What the Numbers Say*. Write another entry in your writing log. Create a cluster map on the topic of your own QL.

Class Period 4.

Students meet peer writing tutor.

Class looks at “Megapenny” website as a way of visualizing large numbers.

Discussion of reading. Questions: Wade Ellis, Jr., in M&D, asserts that “The nation now requires that its citizens and workers have the ability to reason in a commonsense way in situations involving numbers, graphs, and symbols.” How do you experience this? Why is it happening? He continues, “Yet such abilities are de-emphasized and even shunned in our schools, colleges, and universities.” Does that match your experience? Why should we care about international comparisons of mathematics performance? Do you think Pareto’s Law is understood and acknowledged in political discourse?

Homework for Period 5: Write a thesis statement and a plan for your own personal QL assessment.

Class Period 5.

Students exchange thesis statements and plans in groups of three. Each group chooses one thesis statement to write on the chalkboard. The class as a whole discusses them, considering whether each is interesting and manageable. We then continue the discussion of the readings from the last class.

Homework for Period 6: Read chapter 7 of *Numbers*. Write a first draft of a personal QL assessment and bring to the next class.

Class Period 6.

Discussion of reading. Questions: The chapter begins with the assertion “Life is about making decisions under uncertainty.” Does this make sense to you? How do you respond to the section about the Bible Codes? The authors also say that “Gut feelings are undependable...” Does that fit your experience? Are there times when going with your gut is a good idea? Are gut feelings the same as intuition? Where does intuition come from?

Writing workshop; students trade drafts. Specific questions for readers: What is the writer’s purpose in this paper? How does each paragraph serve that purpose? What parts of the paper did you find particularly convincing, interesting, amusing, creative?

Homework for Period 7: Read chapters 8 & 9 of *Numbers*. Make at least one contribution to the online discussion at the course web site. Questions posted there: What do you think of the authors’ description of “statistics” (page 197)? Did the example of the SAT help you understand the notion of regression to the mean? Were the baseball examples, in this and other sections, useful? Can you think of examples in the news or elsewhere that demonstrate the common confusion of correlation and causation?

Class Period 7.

Follow up on discussion online.

Discussion the online format: how does it compare to class discussion?

Wrap-up discussion. Questions: based on the reading we’ve done, what obligations do schools have for QL education? What does it have to do with democracy, equity, justice? Should QL education be within math classes, or separate, or across the curriculum?