SABES Math Bulletin

Building Research Into Practice

Volume 1, Issue 2, January, 2007

Welcome to the SABES Math Bulletin

As part of the three-year SABES Math Initiative, quarterly newsletters highlighting research and professional literature related to math instruction will be available to adult educators on line. Feel free to download and copy the newsletters for friends. It's all part of spreading the word about best practices and general information regarding math teaching and learning.

In This Issue

This issue focuses attention on the integration of research into practice. Using materials adapted from Cristine Smith's National Center for the Study of Adult Literacy and Learning (NCSALL), Mev Miller of the Massachusetts SABES Southeast Region, prepared a research guide for math practitioner leaders managing a year-long professional development activity for adult educators. We think you will find this outline a useful primer and encourage you to share it, discuss it, and grow with it.

Looking Ahead

In our next issue, due out in April, we will share information and data from *The Components of Numeracy,* a NCSALL occasional paper authored by Lynda Ginsburg, Myrna Manley, and Mary Jane Schmitt along with other research documents. See you then!

Tricia Donovan,* Bulletin *Editor

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Using Research to Guide Practice in Adult Numeracy Development

Facilitator Information for SABES Teacher to Teacher: Exploring MathStudy Circles Prepared by Dr. Mev Miller, October 2006

Adapted from materials developed by Dr. Cristine Smith for the National Center for the Study of Adult Literacy and Learning (NCSALL)

What is evidence-based practice?

Evidence-based practice is "the integration of professional wisdom with the best available empirical evidence in making decisions about how to deliver instruction" where professional wisdom is "the judgment individuals acquire through experience" and empirical evidence is "scientifically-based research" and "empirical data on performance used to compare, evaluate and monitor progress."

—Grover Whitehurst, the Director of the Institute for Educational Sciences Whitehurst, 2002 <http://pli.cls.utk.edu/research.htm>

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What are the distinctions between scientifically-based research and evidence-based practice?

Scientifically-based research: This is rigorous, systematic, objective, empirical, peer reviewed, and relies on multiple measurements and observations, preferably through experimental or quasi-experimental methods. It's about what type of research should generate the empirical evidence. (See Vol. 1 Issue 1 for brief outlines of research types.)

Evidence-based Practice: The integration of professional wisdom with the best available empirical evidence in making decisions about how to deliver instruction. It's about what should ***drive practice*.**

How does professional wisdom develop?

Research provides advice and then practitioners develop approaches to using this advice in ways that work best for their particular students. Decisions are made based on empirical evidence rather than tradition, opinion, or untested theories. An evidence-based adult education system would have **three components:**

- basic and applied research that provides evidence to build program models,
- program model evaluation that tests the effectiveness of program models, and
- practitioner knowledge that improves implementation of program models.

These three components would work together in a cycle that continually improves program models.

Research produces knowledge that can be used to design models of program service.

Evaluation tests models of program service to see if they work or to see which of two or more models works best.

A Tip Sheet of Terms & Basic Concepts

There are basically two kinds of research, quantitative and qualitative. Each of these basic types may have various methodologies or approaches. In practice, researchers will likely use a blended approach —using more than one methodology to study their research question(s). In both quantitative and qualitative methods, an important part of the researcher's work includes establishing a clear statement of purpose (research question), developing an appropriate and definable methodology to study the question(s), gathering data, and using appropriate tools to understand the data gathered.

Quantitative	Qualitative
Relationships between variables can be identified and measured, and so goals are: • explain reality with facts • show cause and effect • predict what will happen under certain conditions • generalize findings to other people and places for a more detailed description, visit: http://www.ncsall.net/?id=470	Variables are inter-connected and difficult to measure, and so goals are: • understand reality from subjects' perspective • understand why, when, and how variables are interconnected • see patterns and draw conclusions from one context that may be applicable to another For a more detailed description, visit: http://www.ncsall.net/index.php?id=468
Determines the scope of a problem or strength of a solution Exp: approach X works well with 60% of target population Large samples may generalize to all but miss explanations related to human interactions.	Determines why something is a problem or a particular solution works or not Exp: approach X may not work well with 40% of target population because… Small samples may not generalize to all but provide information about real events in classrooms and communities

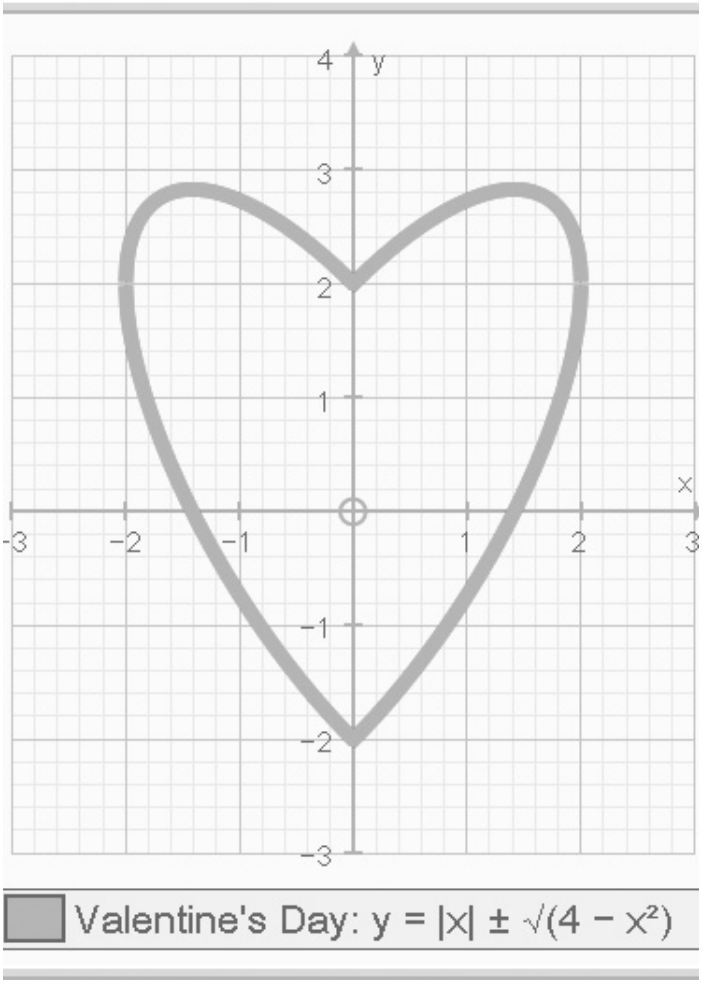
Additional Approaches to Qualitative Research

Theory-driven: Qualitative research that is driven by a general question ("What is going on here?") that is based on previous research, theory and knowledge in the field, about what is happening and why.

Grounded theory: Qualitative research that is not driven by any hypothesis; a wide range of information is collected and reviewed, an initial theory is proposed, more data is collected and analysis done, the theory is revised, etc., until a final theory is arrived at.

Action research: Qualitative or quantitative research that is driven by the question "What happens (to X) when I/we do Y?" This might also be described at "practitioner inquiry."

Mixed-method: Research that intentionally collects both quantitative and qualitative data and combines them to understand both whether there's a difference between groups or approach-



What to Consider for Understanding and Judging Research

Questions to ask:

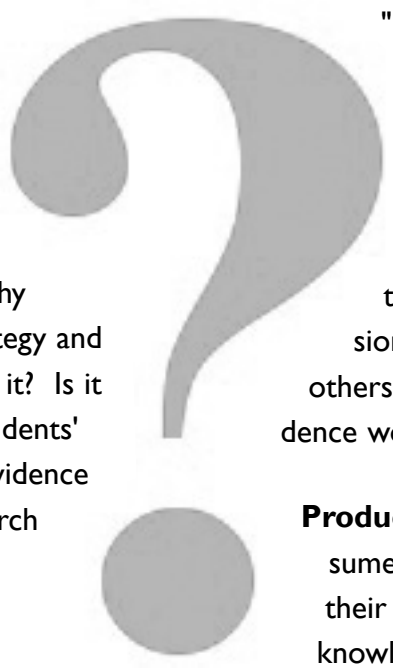
- What was their question?
- Who and how many did they study?
- Do the population and setting resemble those familiar to you?
- What data did they gather?
- What did they find?
- What did they conclude?
- Does this fit with your experience?
- What else might account for these findings?

Be cautious of:

- unconditional conclusions
- conclusions involving hypotheticals
- conclusions that diverge from evidence
- strong calls to action
- mixtures of opinions with evidence
- low prestige publication outlet
- publication outlet with ideological agenda

How Do Teachers View Research?

We should understand that not all practitioners are ready to be consumers of research. …As we encourage practitioners to use research and to engage in reflective practices, we recognize that teachers may approach research in various ways.



Questioners: Teachers adopt a stance that evidence should underlie practice. Teachers ask, "Why should I use this technique or strategy and what is the evidence that supports it? Is it based on evidence I have about students' performance, on other teachers' evidence (professional wisdom), or on research evidence?"

Adopters: Teachers who access, understand, judge and use research. They know enough about the research and its findings to integrate what's been found to be effective with their knowledge of students and then to change their practice accordingly.

Proactive consumers: Teachers are "research consumers", who not only access, understand, judge and use new research findings but proactively seek research evidence. They adopt the attitude that new evidence is critical to their work, and they also generate knowledge (professional wisdom) that can be shared with others about whether and how such evidence worked in their classrooms.

Producers: Teachers are not only consumers but also become researchers in their own classroom. They add to the knowledge base in our field through classroom research or co-research with university-based researchers.

What Math Adults Really Use

Research Material

Two hundred adult volunteers recorded the mathematical calculations they completed in a typical 24-hour period as part of the SAUCER (So Adults Use Calculations Everyday Research) Project, conducted in 1998. The volunteers ranged from early school leavers to university lecturers. What math did they use? In her article, *What Mathematics Do Adults Really Do in Everyday Life* (APMC, Vol.4, No.1, 1999) Maria Northcote reported that "over two thirds of the calculations reported were at a level within the range of an average Year 4 (grade 4) child." Most commonly, adults used addition and subtraction.

Elaborating on the research findings, Northcote observed that nearly 85% of all calculations involved some form of mental rather than written mathematics. About 7% of the adults' everyday calculations involved calculators while about 20% involved physical objects. Furthermore, most (60%) of a calculations involved estimates rather than precise calculations.

And what types of problems did adults solve with their mainly mental, mainly estimation skills? Nearly a quarter of all calculations recorded in the research involved time while slightly

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What Math Adults Really Use

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less than that (22.9%) involved shopping. Nearly half of all calculations were performed in the home, and almost 1/5 were made in shops. Adults do about 1/10 of their math calculations in the car.

These results can help inform mathematics instruction for young students as well as adults. Northocote suggests the following implications for classroom practice: emphasize mental computation and estimations; incorporate practical activities, especially involving time and money; and plan activities requiring more than one operation. She implies that two goals worth pursuing - longer retention and more effective use of mathematics in everyday lives - can likely be attained by focusing instruction on ways adults really use mathematics. (Reprinted from the Fall 2002 *Problem Solver,* published by SABES West.)

Biggest Barriers to Changing the Way We Teach

Canadian ABE teachers reported that "time constraints" and "student resistance" were the top barriers they face when trying to implement positive changes in their classrooms, according to research released in December 2006 by Kate Nonesuch. Nonesuch interviewed 56 teachers and asked them which of her 'findings' from earlier research they would like to implement. Below is a chart showing the strategies teachers most wanted to institute to change their practice teaching adults math and the barriers they perceive to making those changes.

For more information, see *Changing the Way We Teach Math: A Manual for Teaching Basic Math to Adults*, by Kate Nonesuch. To access the report, go to: www.nald.ca/library/learning/mathman/mathman.pdf

Strategy	Number of instructors interested in adopting the strategy	Barrier: Time constraints	Barrier: Student resistance	Barrier: Instructor's lack of training or discomfort	Barrier: Rigid curriculum
Use concrete or visual activities	19	10	7	6	
Situate problem-solving tasks within familiar contexts	15	3	5		3
Provide opportunities for group work	11	6	6		2
Develop shared power relationship in the classroom	12	2	4	3	

RESOURCES

SABES Math Initiative Website:
<www.sabes.org/curriculum/math/index.htm>

ALE Wiki: Numeracy Research and Practice
http://wiki.literacytent.org/index.php/Numeracy_Research_and_Practice

NIFL (National Institute for Literacy) Science & Numeracy Special Collections
http://literacynet.org/sciencelincs/

***Focus on Basics* (Special Math Issue)**
www.ncsall.net/index.php?id=156
The September 2000 issue of *Focus on Basics* (FOB), the quarterly newsletter of the National Center for the Study of Adult Learning and Literacy, is a special focus issue on math. Well worth investigating!

***Field Notes* Vol. 11, No. 2** (Fall 2001) - Theme: Math
<www.sabes.org/resources/fieldnotes/vol11/fn112.htm>

PDF version:
www.sabes.org/resources/fieldnotes/vol11/fn112.pdf

***Field Notes* Vol 16, No. 1** (winter/spring 2006) Theme: Math

Radical Math Conference

Creating Balance in an Unjust World: Conference on Math Education & Social Justice

Date & Location
April 27th - April 29th, 2007 Brooklyn, NY

Friday, April 27th, El Puente Community Center

Saturday, April 28th, Long Island University

Sunday, April 29th, Long Island University

Keynote Speaker
Bob Moses
Founder, the Algebra Project
Saturday, April 28th, 6pm

<www.nysun.com/article/47301>

Go to this Web site to read the article in the January 24 issue of the *New York Sun:* "Do Social Issues Belong in Math Class?"