

Archived Information

RESEARCH GOAL MATRIX

Curriculum and Instruction

ISSUES:

- It is important to identify what works for whom and in what context, and to determine what curriculum and instruction can do to address declines in students' math performance in middle and high school.

IDEAL:

- Develop a coherent set of research questions
- Identify variables and measures on C & I that would allow us to aggregate outcomes from different interventions.
- Arrive at a consensus about results of research in these areas.
- To be able to match the right kind of teaching to the right learner at the right time.

BARRIERS:

- Research activities in the field are currently disjointed and not well integrated.
- There is a lack of alignment between instruction, curriculum, and assessment.
- Cost of research makes comprehensive, well-integrated, long-term programs of research difficult to achieve.
- No one solution or program will work for everyone.
- Different paths possible for getting to the same goal.
- Lack of a coherent theory.
- Lack of agreement about goals of math education.
- Lack of informed parental input.
- Vast differences in settings and programs.
- Teachers lack familiarity with thinking skills required for mathematical understanding.
- The cultural properties and belief systems of school mathematics impede changing current teaching practices, regardless of what research may show.

OPPORTUNITIES FOR COORDINATION:

- No Child Left Behind, along with its associated programs across the government, provides the most obvious point of coordination.
- Bring parents, mathematicians, and math educators together.

STRATEGIES:

- Collaborate to identify a limited set of well-defined, prioritized variables.
- Need neutral forums for continuing the dialogue

Cognitive Foundations of Mathematical Competency

ISSUES:

- How does mathematical conceptual learning evolve over time?
- How is the content and organization of math concepts and their relationships best represented, both in terms of external notations (e.g., language, tables, graphs) and internal symbolic representations

IDEAL:

- Incorporate/use models of cognition to understand representations and acquisition of mathematics with respect to conceptual understanding, procedural knowledge, and the relationships between these.
- Once the important variables within a given teaching situation have been identified, an appropriate intervention can be deduced from what is known to be most efficacious.
- Understand how teachers' cognitive development influences students.

BARRIERS:

- Available methodologies.
- Sampling – recruitment, attrition.
- Available data to support ideal and answer questions related to the above issues.
- Sense of isolation of different realms of research.
- Conflicting views as to what constitutes valid research evidence.
- Pressure that results of research should be immediately usable.
- Existing cognitive models not “rich” enough to capture the complexities of mathematical learning.
- An uneasy meshing of the field of mathematics and school math.

OPPORTUNITIES FOR COORDINATION:

- Coordinate activities of Federal agencies.
- Engage stakeholders -- schools, teachers, and parents.

STRATEGIES:

- Create productive networks to facilitate information flow.
- Create incentives for professional growth and buy-in for stakeholders.

Assessment

ISSUES:

- How can assessment results provide information regarding the most effective ways for administrators and teachers to improve curriculum development, instructional practice, and student learning?

IDEAL:

- Teachers would make use of all data (federal, state, local, and classroom) to evaluate their instructional skills.
- Teachers would know how to translate results to improve and individualize instruction.
- Assessments would be developed that lead to valid inferences about what students know, and thus could provide useful feedback to students, teachers, and researchers.
- To create rich interoperable data sets at the federal level, (drawn from data generated at all levels) for all researchers/constituents to tap into to answer critical questions.

BARRIERS:

- Pre-service, in-service preparation does not provide sufficient training with respect to assessment.
- Assessment is viewed primarily as an accountability issue, both for teachers and schools, rather than as a tool to improve school performance.
- Misuse of terminology (e.g., different meanings implied by “testing,” “assessment,” “evaluation”).
- High stakes tests often take precedence over use of assessments to inform educational practice.
- Quality of available assessments.
- Mistrust of the effectiveness of diagnostic assessments.
- Lack of appropriate instrumentation, especially for qualitative data that can be compared and meshed with quantitative data.
- Reluctance of schools to participate in pilot/research projects.
- Turnover of staff, students, and administrators impairs longitudinal tracking.
- The different data collection approaches used by different states do not produce comparable types of information.

OPPORTUNITIES FOR COORDINATION:

- Build an assessment system around learning goals and test it out.
- Adaptive assessment -- Use of technology.
- Train school personnel in working effectively with data.
- Work with information science professionals to learn more about the universe of knowledge management structures, knowledge and data aggregation and classification, systems interoperability, transparency of data, and access.
- Establish federal-level education data standards.