Best Practices in Mathematics Education: A Perspective from the USA

Third African European Mediterranean Academies for Science Education Conference (AEMASE III)

October 4, 2017, Académie des sciences, 23 Quai de Conti, 75006 Paris

Gerald A. Goldin, Ph.D.

Distinguished Professor of Mathematics, Physics, Mathematics Education

Rutgers University, New Jersey, USA

… with appreciation to the organizers, particularly Professor M. Norbert Hounkonnou, for the opportunity to present this perspective.
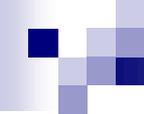
Outline of "best practices" talk

I. Importance of mathematics to science education

II. Classroom teaching of mathematics at the primary and secondary levels: best practices

III. Preparation for teachers of "inquiry-based mathematics": best practices

IV. Some pitfalls in current US policies

V. Implications for CESAME science centers

I. The Importance of Mathematics to Science Education

A. Mathematics as the language of science

B. Mathematical modeling of real-world situations and phenomena

C. Integration of mathematics education with science education

II. Best practices in the classroom teaching of mathematics

A. Developing conceptual understanding to underlie procedural fluency

B. Providing multiple representations and contexts, forming connections

   - Abstraction is not decontextualization

C. Projecting high expectations for students

D. Teaching *through* problem solving, including exploration, conjecture, pattern-finding, etc.
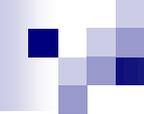
II. Best practices in the classroom teaching of mathematics (continued)

E. Differentiating instruction according to students' backgrounds and abilities

F. Motivating students, fostering deep engagement with mathematics

G. Relatng mathematics to the sciences, to students' life experiences, to the challenges of their cultures and societies, to ways of seeing the world

   - Local importance, global vision and connection

III. Best practices in teacher education

A. Developing teacher understandings through methods ideal for using with students

- *Inquiry methods may be unfamiliar to some*

- *Availabe time for professional development is an important factor*

B. Providing pedagogical content knowledge: mathematical understandings specifically relevant to teaching in multiple representations and contexts, and through problem solving.

III. Best practices in teacher education (continued)

C. Fostering attitudes, beliefs, emotional orientations in teachers that are optimal for motivating students

D. Providing continuing, career-long professional development and support

IV. Some pitfalls in current US policies

A. Problems with curriculum standardization

B. Abuses of mandated standardized testing in schools

C. Declines in teacher autonomy

V. Implications for CESAME science centers

A. Goals of the centers

B. Depth of experiences provided

C. Structures for long-term professional develoment networks
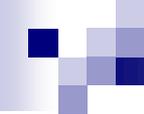
Thank you for your attention,

and for the opportunity to present

these ideas.