NSF/IERI Project Scale-Up Model Findings

- **Perspectives on Basic Elements of the Scale-Up Model**
  - **Systemic capacity development issues for sustainability / expansion successfully addressed**
    - Specialized teacher expertise
      - Science concept understanding
      - Science IDEAS implementation
    - Teacher leadership cohort
      - Delivered PD series to new schools/teachers
      - Provided in-house school support for new teachers
      - Leadership (with principal) in grade level planning for multi-day lessons/cumulative review
      - Established Science IDEAS school committee
      - Provided support to new schools
    - Principal leadership
      - Developed and field-tested principal-implemented fidelity process
      - Developed "talking points" for Science IDEAS model as overall school priority

NSF/IERI Project Scale-Up Model Findings

- **Perspectives on Basic Elements of the Scale-Up Model**
  - **Systemic capacity development issues for sustainability / expansion successfully addressed (Continued)**
    - Development of "model" school sites as basis for expansion
      - "Strong" implementation of Science IDEAS model in multiple schools
      - Served as reference sites for schools considering adoption of model
      - Provided evidence of feasibility of model application
      - Strengthened evidence of effect of model on student achievement
      - Adapted Science IDEAS model to K-2 (modified 45 minute/day) to strengthen overall schoolwide priority

NSF/IERI Project Scale-Up Model Findings

- **Model Refinements via "Lessons Learned" Through Scale-Up Initiative**
  - **Operational standards for developing elements of effective scale up model as "reverse-engineered" Instructional Systems Design (ISD) with "value-added" facet**
    - Use of ISD for start-up, sustainability, expansion requirements
    - Use of ISD for identifying areas for capacity development
    - Development of systemic "value" components that support intervention
  - **Distinguishing (and addressing) two complementary perspectives for scale-up design**
    - Bottom up (e.g., For researchers who want to scale-up an intervention, what are the requirements for optimal fidelity of implementation)
    - Top down (e.g., For superintendents who want to implement an intervention Districtwide, what process should be followed and what tools are necessary to accomplish this goal)

NSF/IERI Project Scale-Up Model Findings

- **Model Refinements via "Lessons Learned" Through Scale-Up Initiative**
  - **Insure dynamic scale-up initiative keeps within scope of available implementation support**
    - Maintain resource capability for all project commitments (e.g., PD, classroom support, implementation monitoring, communication of implementation status to school participants and central administrators)
    - Build capacity development of participants as a necessary foundation for expanding scope of intervention
  - **Develop and implement explicit plans for establishing systemic value of intervention as basis for sustainability, future expansion**
    - Identify and communicate with appropriate school / district personnel on a continuing basis
    - Work to establish the relevance / contribution of intervention to school / district systemic value structure

NSF/IERI Project Scale-Up Model Findings

- **Model Refinements and "Lessons Learned" Through Project Scale-Up Initiative**
  - **Web-based teacher support tools (in progress)**
    - Science curriculum framework linking standards with instructional content: Grades K-5
    - Video modeling of Science IDEAS instructional strategies
    - Support for teacher multi-day lesson planning
    - Provide access to Science IDEAS instructional resources
    - Support for teacher collaboration / planning / sharing
    - Classroom tool for assessing mastery of science concepts
  - **Web-based scale-up management-support tools (in progress)**
    - Implementation planning tool
      - Consists of operational framework for specifying scale-up tasks linked to timelines over 3-year period
        » Science IDEAS implementation
        » Systemic capacity development
      - Supports monitoring of planning task completion

NSF/IERI Project Scale-Up Model Findings

- **Model Refinements and "Lessons Learned" Through Project Scale-Up Initiative**
  - **Web-based scale-up management-support tools (in progress)**
    - Instructional implementation management tool (for central administrators)
      - School reported implementation data re: time scheduled, pull-outs, % time spent reading, implementation fidelity by classroom/teacher/grade/school
      - Report Structure- Implementation status description and trends of obtained data within and across years
      - Complementary management strategy for validation of school-reported status data via school visitations

NSF/IERI Project Scale-Up Model Findings

- **Model Refinements and "Lessons Learned" Through Project Scale-Up Initiative**
  - **Web-based scale-up management-support tools (in progress)**
    - Establishment of longitudinal student achievement trajectories
      - Comparing longitudinal achievement trends of project schools with controls
      - Relating student achievement growth to implementation fidelity
      - Providing capacity for predicting expected improvement in student achievement resulting from school adoption / implementation of model
      - Establishing predictive validity of student success in middle/high school from participation in Science IDEAS model in grades K-5 (vs. controls)

NSF/IERI Project Scale-Up Model Findings

- **Model Refinements and "Lessons Learned" Through Project Scale-Up Initiative**
  - **Issues reflecting large-scale / multi-year complications**
    - Maintaining ongoing project communication with central administrators, principals, and teachers in the face of changing school personnel/priorities
      - Communication of status of project (e.g., implementation, achievement outcomes)
        - » Person to person dialog
        - » Participants acting as advocates
        - » Regularly updated management reports
      - Communication of status of project (e.g., benefits to students via parent contacts)

NSF/IERI Project Scale-Up Model Findings

- **Model Refinements and "Lessons Learned" Through Project Scale-Up Initiative**
  - **Issues reflecting large-scale / multi-year complications**
    - Establishment of "added value" of project re: advancing district systemic goals to central school administrators, principals, teachers, parents
      - Encouragement of direct classroom visits/observation (e.g., student engagement, learning performance, interest, cumulative learning)
      - Teacher-reported scenarios (e.g., student behaviors demonstrating in-depth science understanding in classroom/out-of-school settings)
      - Student "take-homes" to parents (e.g., share / explain work completed)
      - Hard data / data projections (e.g., achievement outcomes / projections re: District priority achievement outcomes)
      - Management reports addressing systemic priorities (e.g., preparing students for success in high school)

Implications of Science IDEAS Scale-Up Model

- **Implications for science education research and practice**
  - Use integration of reading in science as basis for advocating increased time for science in grades K-5
    - To increase student reading comprehension proficiency
    - To prepare students for future success in secondary science
  - Pursue interdisciplinary research perspectives for addressing the problem of meaningful, cumulative, learning in science
- **Implications for scale-up research and practice**
  - Approach design of scale-up initiatives from an instructional systems perspective
  - Design initial (start-up) phase of scale-up initiatives in a manner that includes all of the elements required for subsequent expansion
  - Insure that the design of a scale-up model provides for the evolution of the implementation and sustainability of the intervention without the active involvement of the research initiator(s)
  - Make the establishment of the "added value" of the intervention a high-priority element of the overall scale-up initiative

Implications of Science IDEAS Scale-Up Model

- **Intervention effectiveness, methodological challenges**
  - Science IDEAS was effective in accelerating science and reading achievement in grades 3-4-5 and in impacting subsequent science and reading achievement in grades 6-7-8
  - Major methodological challenge was developing a scale-up model that linked a research intervention to a subsequent scale up initiative
- **Problems with partner districts that limited/threatened project design**
  - Implementation of a small paradigmatically different research initiative in large districts requires potential conflicts with districtwide policy and initiatives to be resolved
  - Continuing personnel changes in central administrators and principals require substantial communication attention
  - Local district pressures for schools to allocate extensive instructional time to preparation for State accountability tests impacted Science IDEAS instructional time

Implications of Science IDEAS Scale-Up Model

- **Intervention "scale-up" and "sustainability" status**
    - Project participating schools increased from 2 to 12 over a 5-year period.

      Present implementation of all participating schools, given limited support the present year:
        - 7 schools are strong or model implementations schoolwide
        - 4 schools are strong, but not 100% schoolwide
        - 1 school was strong, but presently has become inconsistent
        - 2 schools only implemented in very "spotty" fashion

      New schools added 2008-2009 and expected 2009-2010:
        - 1 school- new Science-Mathematics Magnet
        - 1 school- Environmental Center
        - 1 school- low SES with new principal who was in project school
    - Strong vs. weak principal leadership was a major factor in schoolwide implementation of Science IDEAS (but would not be problem with "top-down" implementation)

Implications of Science IDEAS Scale-Up Model

- **Generalizability of research resulting from the project**
  - Science IDEAS model
    - Consistently effective in improving science and reading achievement
    - Feasible to implement if supported effectively
  - Multi-Phase Scale-Up Model
    - Indications are that scale-up model developed will support the start-up, sustainability, expansion of Science IDEAS
    - ISD scale-up framework and majority of web-based tools (e.g., planning, status monitoring, achievement projections) are generalizable to any instructional intervention in grades K-5

Project Scale-Up Model Conclusions

- **Project Conclusions**
  - Science IDEAS model findings
    - Provides basis for increasing time allocated to science in K-5
    - Encourages a greater emphasis on interdisciplinary perspectives in science education research
  - Multi- Phase Scale-up model findings
    - Instructional systems design (ISD) provides a useful framework for engineering comprehensive scale-up initiatives
    - Major criteria for determining scale-up effectiveness are possible to accomplish
      - Consistent replication of achievement outcomes demonstrated in original, controlled research studies
      - Sufficiently robust scale-up models for engendering sustainability / expansion without active involvement of original researchers (i.e., through school-based implementation)