Final Report

Conference of Models of Implementation Research within Science and Mathematics Instruction in Urban Schools

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ORGANIZERS

Jere Confrey
University of Texas, SYRCE
Jay Lemke
City University of New York (now at the University of Michigan)
Jill Marshall
University of Texas, SYRCE
Nora Sabelli
National Science Foundation (now at SRI International)

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Conference of Models of Implementation Research within Science and Mathematics Instruction in Urban Schools

EXECUTIVE SUMMARY

Introduction: Goals of the meeting

In October 2001, the National Science Foundation supported a meeting of representatives of four major research-oriented urban systemic science and mathematics education reform projects. These representatives joined with other leading education researchers with similar interests to articulate what has been learned about the process of creating productive and sustainable partnerships between researchers and urban schools, driven by student learning goals. The main goal was to contribute to the development of a base of research knowledge to inform and guide other researcher-practitioner collaborative teams in conducting further research more efficiently.

Participants

The four projects (see Chart), working in Chicago IL, Detroit MI, Austin TX, Nashville TN, and Union City NJ, brought to the meeting a decade of experience in creating researcher-schools partnerships to promote a systemic approach to student learning, teacher professional development, standards-based curricula, meaningful assessment, and effective use of technology. All the projects had NSF and other Federal and private funding, and have lived through major changes in the partner school districts and schools, or are in the process of analyzing and reformulating the partnering interactions. Fourteen representatives of these 4 NSF-sponsored or co-sponsored projects shared their decades of experience with researcher-schools partnerships.

Project	**Research Organization**	**Urban Sites**	**Participants**	**Years in operation**
LeTUS	NWU U Michigan	Chicago IL Detroit MI	62 schools	9
http://www.letus.org				
SYRCE	U Texas	Austin TX	6 schools	4
http://syrce.org				
SFT	Vanderbilt	Nashville TN	125	6
http://peabody.vanderbilt.edu/projects/funded/sft/general/sfthome.html				
Union City Online	EDC	Union City NJ School District	11 schools	6
http://www2.edc.org/CCT/cctweb/project/descrip.asp?2				

Additional attendees, not part of the projects, were invited to provide an experienced outsider's view of the discussion. These "reflectors" included 16 other senior researchers, NSF representatives, Foundation officers, and district administrators who served as discussion organizers, critics and facilitators (see Participant List available at

http://syrce.org/news/workshops.html). They brought a wide range of critical perspectives to the process of identifying both the key drivers that brought success or failure to these projects and the common challenges that they all faced.

Organization of the Meeting

The meeting organizers posed four Guiding Questions, one for each of four working groups. Each group included a representative of each project and two or more reflectors, including a Chair and a "scribe" from the organizing committee. In addition to substantial discussion time in-group meetings, three plenary sessions facilitated sharing draft reports from groups and general questions and comments on preliminary group reports.

The four Guiding Questions which defined the discussion groups were:

1. What is the **Relationship** between educational system, research on the system, and the models of change used in designing the work?
2. What are the **Open problems** with the existing models that could shape the future of this type of work?
3. Does the existence of models of change facilitate **Scaling and Adaptation** of reform efforts?
4. Is there a **Taxonomy** of such models where these projects and others are situated, and that can help in aggregating the knowledge generated?

All participants were also invited to submit two-page individual reflections on the issues of the meeting (available at http://syrce.org/news/workshops.html).

Key Findings

The meeting participants took special note of the important areas of agreement. Key findings, consistent across projects, are summarized in bullets below and then presented in more detail in the full report.

Conditions for Successful Researcher-Schools Partnerships

- A shared commitment to improving content learning for *all students*
- Close and ongoing *collaboration* among researchers, teachers, administrators, and policymakers
- Mutual *respect, trust, and negotiated alignment of interests* among all partners
- Recognition that needed *knowledge and expertise are distributed* among all partnership sectors

- Willingness to re-examine and *re-define role relationships* both within the partnership and in relation to home institutions
- *Professional development* for all partners, focused on improved content learning and teaching.
- *Multilateral communication* and feedback with focus on continuous improvement of student learning
- *Explicit human and technical infrastructure* (availability of computers and network capacity, requirements for time spent outside of regular school hours, necessity of 'champions' for the cause)
- *Sufficient political sensitivity and advocacy* to ensure project support and continuation.

Consideration of models underlying the research[1]

- It is useful to distinguish between models *of* the reform process and models *for* the implementation of reform of instruction.
- Collaborative work between researchers and school practitioners helps to strengthen the articulation of models *of* the structures and processes involved in organizational change.
- Collaborative work between researchers and practitioners helps in articulating and engaging in more sustainable and scalable *models for implementation of reform* than they do when these tasks are divided and pursued outside of collaborative partnerships.
- The lack of a model of reform implementation may lead to a series of ad-hoc, opportunistic changes, which in turn will lead to a small or even a negative impact on students' learning and in the sustainability of instructional changes
- All projects shared models of reform which focused on guiding implementation under local conditions and which developed mediating strategies and interrelationships among outside inputs, local curriculum, teaching methods, professional development, student needs, resource capacity, assessment schemes, and overall system change and outputs.

  These models were in marked contrast to:

- Models for reform which focus only on inputs (e.g. standards) and outputs (e.g. test scores) neglecting the complexity of interrelationships among curriculum, teaching methods, professional development, student needs, resource capacity,

[1] By model we mean an extension of what is referred to as 'local theory of change' in the study of reform. Examples are the local modifications created by NSF Systemic Initiative projects that were based on NSF's 'Six drivers of reform'. See also the papers of Confrey and Marx in the Education Psychologist issue (see references). These models are intended to capture the the strategies that research use as pressure points to change the education system at different levels, and the interactions between these pressure points.

assessment schemes, and overall system change. Such models are poor guides for implementation and continuous improvement*. ["Bookends" models]*

- Models for reform that specify a clear description of outcomes and then analyze and diagnose constriction points in pipeline to increase efficacy in production *["Business" models]*
- Models for reform which impose a *uniform view* of best practice regardless of local context. Such models have not demonstrated that this approach can succeed in achieving higher-order cognitive goals for all students or that they lead to the conditions that will support local continuous improvement, as opposed to targeted outcomes*. ["Franchise" models]*

Timescales, Critical Mass, and Capacity Building

- Successful partnerships evolve over *timescales* of the order of 5 – 10 years and require that researchers become familiar with local history and economic and political issues.
- Partnerships are more likely to be sustained over several years when they achieve the engagement a *critical mass* of practitioners to act as catalysts within the system (students, teachers, schools), as well as of researchers (faculty, post-docs, graduate students, experienced teacher mentors)
- Partnerships need to dedicate significant resources to improving the professional capacity of all participants so that continued leadership can be provided as people move and the environment changes.

Scalability and Sustainability

- Successful projects attend to issues of scalability and sustainability from their inception onward by considering the following points in their planning.
- Selecting an appropriate starting *unit of change* provides insight into how the overall system operates but which permits one to stage change in an incremental fashion and study it as necessary.
- Reform efforts scale more successfully when *adaptation to local conditions* takes precedence over replication of prior successes elsewhere. *This adaptation forms the basis of the value added by researchers.*
- *Scaling* a reform effort *up* from its initial unit of change to include, for example, a whole grade-level in a school, a whole school in a district, or a whole district *probes* the weaknesses of any specific reform model and provides opportunities to improve the model and the implementation practices. This stepwise strategy promotes buy-in from skeptics and establishes a culture of continuous improvements.

- Scaling a model *out*, to more diverse populations of students, teachers, and schools is as important to sustainability and continuous improvement as scaling *up* to larger numbers of participants similar in characteristics to those in the initial efforts. Scaling out is likely to identify weak implementation areas.
- The role of *intermediaries*, often researchers who interact with multiple components of the school system and community, is critical to tracing the linkages that aid or inhibit the success and sustainability of reform, and engage researchers in the conditions of school life.
- Reform efforts conducted by researcher-schools partnerships are more likely to be sustained when there is *prior assessment* of school system and community readiness for change and when incremental changes alternate with periods of reflection, consolidation, and buy-in by all partners, including parents and the wider community [*stepwise strategy*]
- The *momentum* of reform needs to be maintained by continuous dialogue and formative assessment, between periods of innovation and of consolidation of gains, impact analysis, and identification of further needs.

Access to and Use of Data

- Successful projects and guiding models require development and use of *longitudinal measures* of change and improvement that can be applied across long timescales.
- Longitudinal measures are needed for key factors at *multiple levels*: student progress, teacher professional development, whole school improvement, and whole district reform and renewal.
- Multiple types and sources of data are necessary to permit the triangulation of results.
- Measures suitable for ongoing *formativ*e assessment must be used at all levels to link evaluation and continuous improvement strategies across factors and levels.
- Access to disaggregated student data for joint analysis by teachers and researchers is of paramount importance.

Critical Issues and Open Questions

The four discussion groups reported a number of issues multiple times and from multiple discussion perspectives, based on the experience of many projects. We report and summarize these under a variety of general themes.

Overall,

- *The importance of considering the evolution of partnerships from dependence on personal relationships and heroic efforts to institutionalization, stakeholder and community buy-in, and sustainable continuing development*
- *The need for a stepwise strategy that promotes reflection by all participants and allows for non-disruptive change;*
- *The importance of building a cohort corridor for students through the system;*
- *The role of scaling up and of scaling out, of building buy-in strategies and of capacity building in achieving a critical mass*
- *The advantages of coordinating the reform of instruction with the reform of the environment in which learning by students and teachers can take place efficiently*
- *The implications of integrating research and practice approaches in the project activities to bypass the limitations and problems of non-systemic and non-collaborative work*
- *The importance of documenting the process of change, which is often overlooked and helps in inducting new participants*
- *The importance of insuring access and use of many types of data, including data disaggregated by student: Data for model-building; data for guiding collaboration and school improvement; data for longitudinal tracking; data for continuous formative assessment ;data to document difficulties with low-level testing; data on milestones for progress monitoring*

Each working group contributed a report based on its deliberations around the assigned guiding questions. These reports are available at http://syrce.org/news/workshops.html. Most groups, however, considered the guiding questions to be a starting point for discussion rather than a limitation to it, and many common themes emerged in all four groups. These themes, identified in the Key Findings and Open Questions sections above, provide the organization for the full report, available at http://syrce.org/news/workshops.html.

Introduction: Goals of the meeting

Many urban school districts fail to educate a disproportionate number of students to the levels of understanding in science and mathematics that our national education goals require. Addressing a problem of this magnitude requires building a systematic and reliable research base on effective strategies for implementing improved instruction under different conditions. In October 2001, the National Science Foundation supported a meeting of representatives of four major research-oriented urban systemic science and mathematics education reform projects. These representatives joined with other leading education researchers with similar interests to articulate what has been learned about the process of creating productive and sustainable partnerships between researchers and urban schools, driven by student learning goals. The main goal was to contribute to the development of a base of research knowledge to inform and guide other researcher-practitioner collaborative teams in conducting further research more efficiently.

The combined factors of system complexity, diversity, resources and scale pose special challenges for all urban education reform efforts. The interdependence and multiple levels of organization of the many components of an urban school system, together with the social, economic, linguistic and cultural diversity of urban students and teachers, the uniqueness of every school and district, and the sheer economic, political, and demographic scale of urban systems also challenge researchers to create useful models of how and why reform efforts succeed or fail, and of the interdependence of models and local conditions.

The most fundamental message of the meeting and of this report is that researchers have produced systemic knowledge that is both warranted by data and useful for guiding the continuous improvement of urban schools under a range of conditions. In all the cases discussed, trust and sustainability of research collaborations were based on thoughtful, flexible, and mutually respectful partnerships with teachers, schools, school districts, and communities. This collaborative-systemic research paradigm can provide a framework for integrating the results of studies that examine the individual components of urban educational systems separately. It demonstrates the possibility of continuous feedback between educational research and practice, making it unnecessary to postpone practical improvements until the completion of long research cycles. Finally, it provides an example of “research in the public interest” at its best: research rooted in social and community values that offer guidance for building up the very basis of democratic community--an educated citizenry.

The Goals of the workshop were:

- To articulate commonalties and differences between the projects, and identify the most significant and consistent reasons for the success of long-term research collaborations focused on school work and student learning;

- Describe in so far as possible a follow-up phase for this kind of research, and the funding and support needs of such a follow-up;
- Inform the shape of new funding approaches by helping to define the problematic of research within the context of implementing a process of sustainable improvements in school-based learning;
- Disseminate the findings to other researchers to increase national research capacity in conducting similar studies.

Participants

The four projects (see Chart), working in Chicago IL, Detroit MI, Austin TX, Nashville TN, and Union City NJ, brought to the meeting a decade of experience in creating researcher-schools partnerships to promote a systemic approach to student learning, teacher professional development, standards-based curricula, meaningful assessment, and effective use of technology. All the projects had NSF and other Federal and private funding, and have lived through major changes in the partner school districts and schools, or are in the process of analyzing and reformulating the partnering interactions. Fourteen representatives of these 4 NSF-sponsored or co-sponsored projects shared their decades of experience with researcher-schools partnerships.

Project	**Research Organization**	**Urban Sites**	**Participants**	**Years in operation**
LeTUS (Learning Technology in Urban Schools)	NWU U Michigan	Chicago IL Detroit MI	62 schools	9
http://www.letus.org				
SYRCE (Systemic Research Collaborative for Education)	U Texas	Austin TX	6 schools	4
http://syrce.org				
(SFT) School For Thought	Vanderbilt	Nashville TN	125[2]	6
http://peabody.vanderbilt.edu/projects/funded/sft/general/sfthome.html				
Union City Online	EDC	Union City NJ School District	11 schools	6
http://www2.edc.org/CCT/cctweb/project/descrip.asp?2				

[2] The number is approximate because the configuration of Nashville schools and teachers was in a continuous state of flux throughout the project. Accordingly, many teachers changed schools throughout the project. This makes it difficult to provide an exact number of schools because many of the teachers take the reform with them but the project has no access to data on what they do after leaving, how the reform survives, or the impact on student learning.

The four projects all had a common history of partnerships that include conducting research in the learning sciences, developing and using a variety of innovative technological tools in mathematics and science education, designing and evaluating the use of innovative curricula, and working in pre-service or in-service professional development. The researchers involved chose to extend their basic work to engage in the challenges of implementation on a broader and more systematic scale.

The projects addressed different educational goals in terms of subject matter, grade level, duration, nature of the partnership and scale. They all, however, encountered similar challenges in working systemically towards organizational change and effective implementation strategies, lending credence to the findings common across projects. The participants sought to articulate commonalities across two dimensions: (1) project trajectory or process (including educational goals, assumptions, approaches, roadblocks encountered, accomplishments and failures) and (2) project structure (relationship of partners, organization, hierarchy of needs, aspirations, and commitments). Some of these shared characteristics are listed in the table below.

Some shared characteristics

Trajectory/Approach Dimension

- Emphasis on student learning
- Work with students and teachers in and out of classrooms
- Field and laboratory research components
- Multiple forms of assessment, including long-term integrated assessment
- Iterative design and refinement process
- Focus on sustainability and on increasing the capacity of the system

Structure Dimension

- Reciprocity in partnerships, with mutual self-interest and alignment of complementary expertise and expectations.
- Emphasis on empowerment and engagement of practitioner-collaborators as opposed to provision of outreach or technical assistance
- Shared expectation of hard work
- A long term shared committed with an extended timeframe for achieving results.

Additional attendees, not part of the projects, were invited to provide an experienced outsider's view of the discussion. These "reflectors" included 16 other senior researchers, NSF representatives, Foundation officers, and district administrators who served as discussion organizers, critics and facilitators. [See http://syrce.org/news/participants.html.] They brought a wide range of critical perspectives

to the process of identifying both the key drivers that brought success or failure to these projects and the common challenges that they all faced.

Organization of the Meeting

The meeting organizers posed four Guiding Questions, one for each of four working groups. Each group included a representative of each project and two or more reflectors, including a Chair and a "scribe" from the organizing committee. In addition to substantial discussion time in-group meetings, three plenary sessions facilitated sharing draft reports from groups and general questions and comments on preliminary group reports.

An emphasis on discussing the models of change was chosen to move the discussion from descriptions of individual projects towards the identification of the assumptions and structures that underlie each project's implementation strategy. By model we mean a conceptual extension of what is referred to as 'local theory of change' in the study of reform. Examples are the local modifications created by NSF Systemic Initiative projects that were based on NSF's 'Six drivers of reform'. See also the papers of Confrey and Marx in the Education Psychologist issue (see references). These models are intended to capture the strategies that research use as pressure points to change the education system at different levels, and the interactions between these pressure points. In many cases, the models are not explicit but can be elicited by careful analysis. Using the word in this way, the projects represented quite different implementations of what can be considered a single model of change which focused on guiding implementation under local conditions and which developed mediating strategies and interrelationships among outside inputs, local curriculum, teaching methods, professional development, student needs, resource capacity, assessment schemes, and overall system change and outputs.

The four Guiding Questions which defined the discussion groups were:

1. What is the **Relationship** between educational system, research on the system, and the models of change used in designing the work?
5. What are the **Open problems** with the existing models that could shape the future of this type of work?
6. Does the existence of models of change facilitate **Scaling and Adaptation** of reform efforts?
7. Is there a **Taxonomy** of such models where these projects and others are situated, and that can help in aggregating the knowledge generated?

Each group re-interpreted its Guiding Question and discussed issues that overlapped with the work of other groups. This led to substantial opportunity for cross-discussion in the

plenary sessions, and to a coherent picture of where we stand as a field. Both immediately after and subsequent to the meeting, the Report was drafted and submitted to all participants for comments. All participants were also invited to submit two-page individual reflections on the issues of the meeting (available at http://syrce.org/news/workshops.html).

Joint Report of the Working Groups

The meeting participants took special note of the important areas of agreement. Each working group contributed a report based on its deliberations around the assigned guiding questions. These reports are compiled at http://syrce.org/news/groupsindex.html. Most groups, however, considered the guiding questions to be a starting point for discussion rather than a limitation to it, and many common themes emerged in all four groups. The following themes provide the organization for the elaborated joint report given here.

- Conditions for successful researcher-school partnerships
- Consideration of models underlying the research
- Timescales, critical mass, and capacity building
- Scalability and sustainability
- Access and use of data
- Critical Issues and open questions

Conditions for successful researcher-schools partnerships

The working groups identified the formation of viable researcher-school partnerships as a key to successful systemic reform research efforts. Viable partnership requires close and ongoing collaboration and negotiation, not just between researchers and classroom practitioners, but also with entities at higher (more remote) levels of the system, such as administrators, school boards and policy makers. The viability of these partnerships, or the lack thereof, was found to be a critical element in the success or failure of the four projects highlighted at this meeting. The following common drivers of successful researcher-schools partnerships emerged in the discussions of all four groups.

A focus on high achievement for all students

Educational reform projects are most effective in establishing a basis for continued improvement to the extent that all participants agree that improving academic achievement for all students to high levels is the ultimate goal, in relation to which all other policy and practice decisions should be made.

The most critical aspect of this shared commitment is the reference to "all students" because many of the weaknesses of our previous educational systems can be traced to a

tacit or explicit acceptance of the false assumption that some students, particularly students from poor families and underserved communities, who are also most often African-American or Latino, should not be expected to achieve the same high levels of academic proficiency as middle-class students. This assumption, in part a vestige of the historical racism of the United States, is not only no longer acceptable in education as in other areas of civil society, but it works in practice to exclude learning, in particular high levels of learning, from the accepted peer culture of schooling. It replaces an expectation of work and achievement with an assumed "natural ability" that does not require such effort, a particular problem in relation to learning mathematics and science.

Effective district or educational system and researcher goal-directed collaborations

Educational reform does not benefit from the participation of researchers unless the researchers are committed to genuine and long-term, rather than project-limited, collaborative relationships with teachers, administrators, and members of the school or district community. The failure of true collaboration can result from researchers being too strongly committed to conceptualizations of the reform process that have not been developed jointly with school, district, and community participants. It can also result from suspicions on the part of school, district, and community participants that the researchers are more committed to their own interests than to the common interest of improving educational achievement by students. These suspicions are often formed when researchers frame their work exclusively in the timeframe of projects that are funded by outside groups. It was agreed that in most cases it takes a long time, of the order of 5 – 10 years, to establish effective collaborations between researchers and school systems, and that during this period there may be a need to re-negotiate and re-commit to goals and strategies developed together whenever there are major changes in leadership or personnel on either side of the partnership.

Effective participant professional development

It was agreed that professional development based on student work and achievement is the heart of systemic reform. For teachers, for administrators, and also for researchers – all must be committed to on-going learning, to critical re-examination of their current practices, to learning from one another and from peers – all to the end of providing the kinds of teaching and educational environments needed for students to learn to higher standards of achievement.

Among the key elements in professional development that have been found to be successful are:

- A focus on student learning; what teachers and other professionals learn should bear on student learning above all;

- A focus on important content in the subject areas of the curriculum. If teachers are to provide better instruction for all students, what they learn about teaching must be related to understanding the conceptual content of the subject areas they teach;
- A respect for teachers as professionals. Professional development should be collaborative and the knowledge and experience of teachers and other participants should be respected; professional development is an aid to growth, not an imposition of what other believe is best practice;
- A model of professional development as a community of practice with diverse distributed expertise; distributed expertise through collaboration implies that roles are re-defined and that a breakdown of traditional roles can be expected. This in turn must be supported with organizational accommodation, where school and district level policies are procedures are responsive and change as needed, rather than being imposed as fixed constraints;
- A model that helps all participants to see professional development as based on mutual self-interest, respect, and trust; and an alignment of interests. Sufficient time and reorganization of workload structures must be undertaken in order to make participation in mutual professional development a regular part of the work of researchers, administrators, and teachers.
- The inclusion, when possible, of analysis and assessment of student learning and of student work in the professional development activities.

A practice-engaged view of research and evaluation

If educational reform *as reflected in classroom practice* is to be informed by research, it must be supported by researcher-educator partnerships and collaborations. The roles of the researchers and their view of their research and evaluation responsibilities and paradigms must also evolve to support the partnerships.

Traditionally education research has existed for its own ends, defined as part of a separate community of researchers, writing mostly for one another, directing their work toward research questions defined as important primarily within the researcher community and by the standards of that community, without the participation of teachers and school and district leaders. Educational research has sought to speak to education "practitioners", but not always to speak from and work from participation in joint communities of researchers and other practitioners (we are all practitioners).

The researchers involved in the projects represented are only beginning to be able to articulate how the paradigms of educational research and evaluation change when researchers function with collaborations and partnerships whose goal is knowledge for the sake of supporting classroom work that leads to increased student learning.

Researchers do not need to wholly abandon their own communities and agendas, but to accept that these communities and agendas are not the only ones that matter in the classroom and thus they are not privileged in relation to the overall project of educational reform. Researchers need to understand the viewpoints and responsibilities of other participants and to come to respect the value of those perspectives as equally intellectually with those of the research community. This requires a basic shift in attitudes and power relationships that have a long established history in both communities, and that have served only to isolate improvement in schooling from its research base.

Practitioners need to develop a keener appetite for research by seeing its relevance to their practice. Collaboration leads them to experience a more comprehensive view of research including the role of frameworks and theory in interpreting results, the need for consistent and systematic data collection, the complexity of interpretation, the value of research in informing practice-based decision-making, and the timeframes and demands associated with research.

A protocol for partnership

Many of these common drivers of successful school-researcher partnerships are reflected in the following set of schema elements (see Figure 1), which can be used to generate the critical questions that prospective partners in a reform program must ask themselves and negotiate solutions to. Conditions of participation need to be negotiated at the front end so misinterpretations and miscommunications can be kept to a minimum. Such a "check list" is useful to reformers in the planning stages.

Sample Schema Elements for Systemic Partnerships
Questions to be asked of any scaling partnership

- Innovation (curriculum, organizational, etc.)
- Theoretical framework (student learning, teacher change, institutional change)
- Milestones
- Evaluation Plan
- Research Plan
- Curriculum Plan
- Assessment Plan
- Economic Plan
  - Teacher time (e.g., release)
- Professional Development Plan
- Management Plan
- Ethnographer or Infomediary
- Communications Plan (internal, and "to the world")
- Sustainability Agenda

Figure 1 Schema Elements

Models Underlying Systemic Research

‘Models-for’ Systemic Reform

Two types of models are applicable in a systemic context. One type comprises models-for *implementing* systemic reform. These ‘models-for’ derive from the system and enhance understanding of the complex system. Genesis of the model-for may be a felt need of those within the system, a hypothesis for resolving a problem, or an exploration of an underlying framework. The model, developed for a particular client, takes the perspective of the client who might be actors within or invested in the system—administrators, teachers, students, parents, and the public. Research in this context is a validation of the model, a mapping of the model to the functioning of the system, and a clarification of the process of change. Research informs the adaptation of the model over time. In the absence of research and reflection, any model-for systemic change is likely to become discrepant and useless. Internal model development and implementation should be data driven with intentional self reflection by those at all levels who are responsible for change.

An example of a ‘model-for’ reform was provided by the work in Union City, where a practitioner used the pressure of the accountability system to forge a coherent approach to literacy built on student-centered learning (See Union City case study). Key components of the model (as described in Honey et. al. 2001) included:

- Classes were extended in most subject areas to 111-minute periods in the elementary and middle schools, and 80-minute periods in the high schools.
- In-service training for teachers was increased from 8 hours a year to 40 hours.
- Buildings were refurbished, windows were replaced, and classrooms and hallways were painted.
- Individual student desks were replaced by cooperative learning tables.
- Textbooks for individual students were replaced with class libraries.

‘Models-of’ Systemic Reform

A second class of models, “models-of,” in a systemic context, is the application of theory and inquiry to structure and analyze systemic change. “Models-of” are those that have been synthesized from research and can be generalized to different systems. Such models are not strictly constrained by local conditions, and they cannot be applied without thought or modification. Models-of the reform process need to be simpler than the thing they model; they must be extrapolated from the more general case to the system at hand. They can work within a given level, for example teachers and students within a school and a TPD program, while still recognizing what is outside the model that impacts the behaviors within that model. They need to define what is exogenous and what is endogenous.

Models-of not only identify the components of the system under study, but also the interactions that generate the behaviors in the system (e.g., a school system gets studied if it is not functioning well or if you want to study what makes it effective). They also question what happens when you go to scale with a model-for at another place (e.g., city, state).

An example of a "model of" was provided by SYRCE (see case study) where the researchers sought to document how student data was used in relation to teacher professional development and how teacher professional development was related to teacher knowledge and community. The ties between these and the schools' implementation of Standards-based curricula were then linked back into student outcomes. Researchers partnered to try to make the model function more coherently while documenting the impediments and facilitators to change in the system.

Different kinds of models-of seem most suited to different audiences and purposes. Some of the models-of involved in efforts to reform educational systems are

- Models of the practice of systemic reform;
- Models of the local system itself;
- Models of learning as they operate at different "levels" in the system (e.g., student, teacher, organization);
- Models of principles of reform that act as an analytic framework;
- Models of implementing reform that apply when working in and with schools;
- Models of readiness for change that detail the entry conditions and help schools and districts assess their capacities and needs;
- Models of the research enterprise.

Implementation Research Models of Reform

The four focus projects for this meeting all shared models of reform which focused on guiding implementation under local conditions and which developed mediating strategies and interrelationships among outside inputs, local curriculum, teaching methods, professional development, student needs, resource capacity, assessment schemes, and overall system change and outputs. Such models have been labeled "implementation research". As described by Confrey et. al. (2000), implementation research "takes a systemic perspective on the strategies and approaches to school-wide reform as measured by student outcomes, and models and documents the interrelationships among system components identifying the catalysts of and impediments to change". This definition highlights the importance of a research approach intimately engaged with the support of daily classroom practice for understanding and advancing education improvement (i.e. reform).

The working groups also found it useful to characterize the models used by the selected projects in terms of what they were *not*. We identified several categories of alternative or

contrasting models for educational reform and sought to identify the reasons why the experience of the projects represented would, in many cases, not argue for the limited effectiveness and sustainability of these other models.

We discussed so-called "bookends" models, or input-output models, which assume a simple causal relationship between, on one hand, single or multiple input factors, such as imposing standardized, high-stakes testing or uniform curriculum or prescribed teaching methods, and on the other single (or even multiple) output measures such as test scores. Such models do not recognize that the ways of implementing any prescription matter as much for its success as the parameters of the model. Prescriptions require either well-coordinated implementation models, or access to time and resources to develop and test such implementations. Without a focus on how teachers adapt the goals of prescriptive models to local conditions, student backgrounds and needs etc. —which call local access to time and resources--such models are not likely to affect the conditions that led to the need for improvement. Nor will they produce long-term, sustained results; they are likely also to have unanticipated negative side-effects that may interfere with academic achievement in different communities and in idiosyncratic ways (a common example is increased prevalence of test-preparation, reducing time for curricular instruction and leading to a singular focus on basic skills). A common failure of these models is the lack of attention to building the capacity of the system to sustain its growth.

Related in some ways to such models are the "pre-packaged" or "franchise" models, which promise a "best practice" to fit all needs and circumstances. These models minimize the need for, and the associated costs of, local adaptation. They do not respect the professionalism of teachers or invest in extended teacher professional development for real-time decision-making about instruction. These models do not grow out of local and negotiated reform commitments and may not have the "buy-in" from communities needed to make their gains sustainable over the long term. They may not produce environmental changes that extend beyond the topics they cover, or the provision of additional curriculum options, and may thus achieve only short-term goals.

There are also "management models" which attempt to reform education in accordance with (often currently fashionable) models for improved corporate business practices, and for the most part pay little attention to the special characteristics and resources of schools. These models assume that the critical limiting factor for educational success is poor management and accountability practices, which may be true in some instances, but is not a plausible solution when the limiting factors are issues such as a need for teacher knowledge and professional development in instructional skills or content understanding, low expectations for student work held by teachers, administrators, and sometimes student and their families, or cultural conflicts and language gaps between students, their home communities, and schools.

What is the relationship between models-of and models-for?

Models-for the implementation of reform guide an implementation of a model-of, in a given cycle of activity (a school year, a teacher PD cohort) and help with reflection and modification when the implementation fails. It is important to build into the model-of specific controls on how to make choices in the model-for, to have a reasonable set of critical components in that model-of (e.g. model-of how a learner develops deep understanding through teachers' instructional strategies revealing the teacher's pedagogical content knowledge, which is included in the model-for)

It is interesting to understand that a "Model-of" evolves into many "models-for" and then cycles back in a very dialectic feedback loop between advances in practice (models-for) and advances in theory (Model-of). In a loop of this type, you can start from either place, though the academy may be attracted to "models-of", while the attraction for practice may be "models-for". Our point is the need to cycle between them in the ways that long-term partnerships allow. This is a case where the whole is more than the sum of the parts. Models-of tend to be viewed by schools as something done to 'us' as cogs in the model, which is hard to accept if there isn't a shared worldview of interacting 'models-of' and 'models-for'. The parts are so interconnected that ignoring their connections almost ensures irrelevance. *In fact, the heart of implementation research might be defined by the dialectic between the model-of and models-for. Further, the lack of such a connection in the contrasting models of reform (bookends, franchise, management) can be plausibly argued as the reason for their limited success and sustainability.*

It would be useful to categorize some of the unique elements in models-for as opposed to models-of, and the unique purposes that they have. If we were to develop concept maps for models-of and models-for, will they have different types of nodes and links? For example, do models-for describe strategies while models-of do not? Models-for seem to include many of details that the models-of do not. Models-of could have very causal type links between nodes, while models-for might have very active links that are implementable in some way. A model-of might say that 'Professional development is a key input into the feedback cycle from student outcomes to teacher knowledge' (as in the SYRCE case); a model-for might say 'Increase in-service training for teachers in whole-language teaching approaches and cooperative learning from 8 hours a year to 40 hours' (as in the Union City case). Such taxonomy of models would be a useful contribution to the field.

Issues with Regard to Model Development

Reformers need to articulate the reasons that led them to believe that a model of reform implementation will or will not have a positive impact on the life course of students. Perhaps more aptly said, *why we believe that the lack of a model of reform implementation will lead to a series of ad-hoc, opportunistic changes and that this in turn will have a negative impact on students' learning and future educational opportunities*.

Models of reform implementation, as conceived by the meeting participants, could be a step in bridging theoretical and practical considerations across partners. A model can

provide a framework to account for variability across implementations in order to predict the outcome of a given action. Also, models can provide more control and coherence to reflection and to documentation as the work proceeds. A model may be critical for successfully scaling up and scaling out fledgling reform effort.

In fact, *efforts to scale an implementation facilitate the development of a model.* We should not consider a model as a fixed input to reform; rather it will often be an outcome of the collaboration between researchers and school practitioners (including administrators).

Implicit components in models

We may need to consider in our models our tacit dependence on unstated model components behind changing practice at the instruction level. For example, mixing technically proficient students and more naive teachers in training groups indicates the underlying importance given to providing students with additional responsibilities in order to change the perception that teachers have of student capacity. Conceived in this way, the idea can be more easily extended to many other activities within the school, and lead to deeper insights into what else can change and how.

Hidden assumptions of what school can and cannot do are often ignored. For example, we seldom treat openly the cost of different components of the model, such as what teachers can get paid for additional responsibilities. When these are brought into the open for analysis, they often lead to consideration of a broader range of options. Issues such as these come up often during work, and explicit attention to creating models allows their integration into the thinking.

Who creates models and who uses them?

The language of models may allow ongoing discussions of local insights among partners to be morphed into a series of generalizable principles. When this is the case, a local model can develop into a sufficient and necessary set of principles and ways of connecting those principles into a testable systemic model of change. Researchers will then be able to generalize across many such models, each with specific features and interactions, a set of general principles. The *local* model will remain owned by the practitioners who developed and tested it, and continue to refine it. The generalizable model will be part of more theoretical conversations across research groups. These conversations will undoubtedly be brought back by researchers to their partners and thus impact the evolution of a local model. *It is clear that without strong partnerships neither practice nor theory will develop in the same robust way*.

In the group discussions, consensus was built around the need to build good intuitions in the area in which you work, to better prioritize the components of local models into a sharable model of reform. The use of heuristics such as ‘work in the small before the large’; ‘bring in and hire people that have done similar work before’, etc. will help, particularly if, as already mentioned, the model is considered both an input and an output of the work itself. A model should not be the only outcome of the research collaboration; analyses of the process itself, and of implementation strategies at different levels of

aggregation, are additional desirable outcomes. These outcomes will be important when reflecting about the local process, and when documenting the work so that it can be communicated to others.

What defines a series of changes as a reform?

What we learn across projects is important to the development of a model that can inform and guide coherent change. But the model is not of use if it cannot be responsive to those that will implement it or to the observers on the side that have a say into practice (such as parents). How the model is to be communicated is not often discussed: are materials, teacher professional development and parent newsletters sufficient? These mechanisms imply that a passive role for the recipients of the information is present in the model. As an example of why materials as the embodiment of strategies may be necessary but not sufficient, the *Jasper Woodbury* project communicated reform to teachers through a set of curriculum materials. When the curriculum changed, the project had to refocus on teacher professional development to emphasize teaching for understanding, regardless of the curriculum used. In terms of a model of change, the lesson is that capacity building at the professional and institutional level should be a component of reform. Once this model component is established, it will inform other activities, and one could then expect that partners will think about capacity building as a component of strategies to approach other topics besides curriculum materials.

In this view, reform is an iterative series of interrelated changes to practice and to the environment in which practice occurs.

Studying the model while studying its implementation

How is the model 'tested'? What experiences in 'fleshing out the model' and "learning by doing" led to changes in model boundaries and categories and their perceived importance? Are all the problems that a site faces equal in magnitude and equally amenable to change by interventions? In what timeframes? A crucial learning across models may be to determine how the choice of priorities at a given site determined what finite number of things the partners there would concentrate on. Models are often difficult to distinguish from sets of beliefs. Making models visible and putting them to the test may help distinguish them from beliefs. it is possible that models for theory development will arise from accumulating, comparing and testing models of practice.

Are there prototypic levels of difficulty that need to be studied? Is a collection of schools that mirror the district demographically the best starting point? A "nearness of fit" model should not lead to a 1:1 fit where every school has its own model, but an average fit to be adopted by all may be a worse starting assumption.

What then does it mean to develop a model in a given environment within a district, and then to adapt it after its initial formulation? The development of a model presumably has different facets, and a stepwise approach as articulated here allows partners to explore what the different components of an initial model are, what are the boundaries between

them, and what is the effect of a different environment on the selection of components and on their boundaries. This approach is similar to a *design experiment on the model of change* under district conditions, where adaptation is seen as 'new development' that fosters buy-in by skeptics.

Critical Elements of Models

Data-validated and practically useful models of how and why reform efforts succeed or fail include documentation and explorations (or analysis) of:

- *Factors* and system components to be included and their relative importance in different local settings
- *Relationships* among factors, including among processes
- *Explanations* for the relationships among factors and processes
- *Types of data* which provide relevant evidence for validating the model for improvement of student learning
- *Conditions* under which the model of improving student learning is valid and the criteria for the range of local variation is consistent with the model of implementation

Practical Considerations

A number of key questions need to be addressed in the formulation of any explanatory or guiding model:

1. How does a model of systemic reform of education relate to more general models of organizational, social, and cultural change as formulated in other disciplines?
2. How should a model of systemic change processes be formulated from a perspective inside the system under change, as collaborative researcher-partners would see it, rather than as has more commonly been done from a perspective external to the system?
3. What are the systematic relationships among teacher education, instructional methods, testing and assessment, curriculum standards, student attitudes, school and district management, educational funding, community development, student achievement in the short and long term, and student and parent satisfaction with schools and with learning?
4. What is the purpose of the model within social efforts at educational improvement: prediction, simulation, explanation, description, guidance for decision-making? Are these functions compatible within a single model or do they require different kinds of models?
5. How does the model integrate smaller and larger scale units of analysis (individuals, classes, schools, districts, city systems, state systems, etc.) and

processes on short and longer timescales of change (lessons, daily schedules, courses, cumulative student learning, teacher professional development, curriculum change, management changes, policy changes, changes in social attitudes, etc.)?

6. Is the model a model of outputs only (and which ones? Test scores, performance measures, student and parental satisfaction, longitudinal academic and career achievement, etc.?) or a model of the full complexity of interaction among all the components of the system which regards all change in all components as salient for the modeling process?
7. To what extent does the model aim for context-independent generalizations or require that it be re-calibrated and significantly adapted for different local conditions?

Further, it is critical to:

- Help newcomers to reform build models informed by current literature when they begin, without needing to study the whole literature.
- Make visible the choices made before the model is built, and the constraints on and assumptions behind those choices (e.g., alternatives you won't consider).

Timescales and Stepwise Structure, Critical Mass and Capacity Building

It was agreed that in most cases it takes a long time, of the order of 5 – 10 years, to establish effective collaborations between researchers and school systems, and that during this period there may be a need to re-negotiate and re-commit to goals and strategies developed together whenever there are major changes in leadership or personnel on either side of the partnership. Given that the development of effective partnerships takes 5-10 years, and the fruits of reform efforts tend to become visible only after 3-5 years, so that any evaluation and tests of scalability require at least a second or third cycle of enlargement or replication of the partnership model, funding and other institutional commitments should be for a minimum of 10 years with periodic review.

To design reform efforts that are maximally adaptive and ready to adapt to changing environmental conditions, researchers ought to set aside a planning year in which the goal is to understand the environment, the context in which the reform will be implemented, and do this in collaboration with the school partners. School partners provide not only the context, but know who the crucial “players, doers and shakers” are in the local policy environment. Funding cycles should include this planning year. Plans need to be flexible so they can be adapted to issues that come to light once the implementation has begun, and include periods of consolidation of gains; these periods will provide a respite to plan for needed changes to adapt the process to issues that come to light once the implementation has begun. In this sense, reform should optimally be viewed as a ‘stepwise’ process, in which advances alternate with such periods of reflection and

consolidation. This stepwise strategy promotes buy-in from skeptics, allows for non-disruptive change and establishes a culture of continuous improvements.

One assumption about the cost of reform that there is a threshold for failure of a venture on a large scale because it requires unacceptable levels of resources or critical mass (e.g., too many PhD's, too much money per student, etc.) In fact, it may be that considering the reform as a stepwise process could render this threshold less significant. For example, there was an interesting phenomenon in the 'failure' of SFT (School For Thought) in scaling up from 6th to 7th grade, as contrasted with the success of the 8th grade cohort in the Union City case, "compelling" ongoing reforms when they moved to 9th grade—a model of using students as necessary and unpaid agents with critical mass in reforms. Do our models provide enough 'window' into the ways in which students are able to partner in the reform as subjects, not only as objects of improvement (in their learning outcomes)? In some cases (see, for example, Alan Peshkin's book on private schools, *Permissible Advantage*) students redefine what counts as 'cool' within the student subculture. If 90% of teachers and superintendents turn over each year, can a student culture provide needed critical mass to sustain reform?

Sustainability and Scaling

Reforms often begin locally and then face the problem of "scaling out", i.e. including more units at the same level of organization (e.g. from a few teachers, or one grade level, to all teachers in a school or all grades), and also of "scaling up", i.e. from small-scale systems (e.g. a small suburban district) to much larger scale systems (e.g. a large urban system or an entire state). As reform scales, it is important to identify and have in place mechanisms for maintaining validity with respect to the fundamental principles of the reform.

Agents of Scale

There can be a number of agents of scale. For example, students can motivate scaling up as they move through a system, carrying the reform "upward" with them. In this type of spread, it is important to have a critical mass of students and a start with a plan for "vertical" growth. Another model of spread is to systematically plan for horizontal growth, or scaling out. In doing so, pressures on the reform implementation can create situations that indicate problems with the model, or its limits of applicability (e.g., whole school models in contexts where there are not sufficient resources to support that model). Scaling is a useful strategy for making the process more robust, and thus more sustainable.

Initiating successful reform requires understanding the school environment in which the reform will occur. This understanding needs to go well beyond simplistic statements such as "The superintendent is key." Although this may be true, having a supportive superintendent is not a fail safe for successful reform. What is necessary is to recognize

that school environments and district contexts vary tremendously from each other and within a district, and from school to school. Indeed, the context within a district may vary from month to month and year to year. What is important is having a process for coming to understand and monitor formal and informal educational structures in the context within which the reform is being attempted. This process needs to start from the assumption that change is a constant. Hence, reform needs to be designed to adapt to changes in context. Scaling based on principles of universality or "one-best-practice-fits-all" is unlikely to be as effective as scaling based on replicating the whole partnership model, including starting from locals needs and conditions and evolving locally specific commitments and strategies.

At the same time, to sustain the reform during adaptations, there need to be criteria for determining whether the adapted reform is "true" to its fundamental principles. This is critical for understanding what it means to replicate the reform in new contexts.

Role of Sustainability in Considerations of Models

Sustainability can be viewed in at least two ways: (1) the demonstration effects that permit the reform to continue at the same magnitude, and (2) the spread of reform practices. Demonstrating the effects of the reform need to be negotiated and agreed upon at the outset of the reform effort. There are open questions about how these agreements are reached and what is agreed about reasonable time scales for "seeing effects." Early successes, even when limited in scope, are desirable, since there will also be changes in expectations on the part of any of the members of the partnership. These changes need to be monitored, and potentially acted upon or reacted to. Sufficiently strong demonstrations of effect of the reform may motivate and drive efforts to spread or scale the reform.

Many reforms are not sustainable once the special conditions that initiated them are withdrawn (e.g. special funding, university participation, highly select personnel, exemptions from standard policies, etc.) Sustainability depends on gaining widespread commitment to goals and practices on the part of professionals and members of the community outside the educational system, including community leaders, politicians, the media, etc.

Sustainability is also threatened by normal process of change in larger-scale systems within which the educational system operates (e.g. changes in political administrations, new superintendents with new policies, changes in state regulations or funding formulas, etc.) Only widespread commitment and a critical mass of practitioners can ensure maintaining gains in achievement can move the community to continuous up-dating of policies and practices needed to sustain reforms while responding to other inevitable social changes.

Even short-term sustainability of developing collaborations and partnerships is threatened by short-term funding commitments or commitments by institutional partners such as districts and universities or research organizations. Given that the development of effective partnerships takes 5-10 years, and the fruits of reform efforts tend to only become visible after 3-5 years, and any tests of scalability require at least a second or third cycle of enlargement or replication of the partnership model, commitments should be for a minimum of 10 years with periodic review.

Establishing a reform, demonstrating effects, and scaling up and scaling out all involve some degree of struggle with conceptual, operational, and political factors for the researchers and as well as those in the schools who are implementing the reform. Struggle that involves grappling with problems that push thinking to deeper levels seems to be an important and valuable part of the reform and change process. However, we need to be able to recognize when struggle is becoming counterproductive. Rather than preventing people from making mistakes, which we cannot do anyway, we need to focus on what supports learning and recovery in the face of mistakes.

Access to and Use of Data

Types of Data

Systemic research focused on classroom practice requires the use many different types of data, over a variety of time scales and at a variety of different resolutions. For example, data required for model building, described above, may be different from data for guiding collaboration and school improvement. In general, longitudinal data will be required for model validation, and qualitative as well as quantitative data are needed. In monitoring the process of continuous improvement, it is critical that data be available in disaggregated form to search for disparate outcomes on different groups and address inequities. In monitoring the progress of a particular reform implementation, data on milestones must be accumulated.

Issues of Data, Assessment, and Validity

Central to the research agenda as well as to educational reform is continuous, reliable monitoring of academic change and improvement. This means it is essential that we establish criteria for the validity and usefulness (not merely the statistical reliability) of measures. Validity must be defined in relation to the goals of assessment and monitoring: usefulness in guiding further efforts toward greater student achievement.

Standardized test scores alone are too narrow a measure to reflect the kinds of school and learning reform and implementation of new content standards which produce changes in test scores. Isolated test administrations do not provide a longitudinal baseline for assessing on-going processes of system change. On the other hand, ignoring

standardized tests is equally problematic as they represent a major factor in schools professional conduct. Standardized tests only measure skills and knowledge that can be demonstrated over the relatively brief time periods of test item administration, whereas new curriculum standards demand that students be able to carry out academic projects that require planning, collaboration, revision, inquiry, discussion, and reporting and which cannot be assessed by most conventional standardized test strategies.

Test scores need to be supplemented by formative assessments and performance evaluations; for research purposes the validity of measures of content understanding also needs to be periodically re-established by expert oral interviews of students around curriculum-relevant tasks. All measures should be compiled as part of longitudinal profiles of students over periods of several years. This is crucial for research purposes, and would work most effectively when coupled with the use of test scores to help teachers assess the learning needs of individual students.

Observational data and video records of classroom instruction are needed for teachers and researchers to assess changes in teacher practices and the content of the actually taught curriculum. Such data should be the result of projects for on-going self-assessment and professional development developed jointly with teachers.

Testing instruments that are suitable for large-scale comparisons and research measures for groups are in general not also valid and reliable instruments for making high-stakes decisions about individual students, for which multiple types of measures over extended periods of time are necessary.

Open Questions

There is a crucial role that politics and policy leaders have. Researchers are not as politically savvy as their role may require, particularly in local matters operative for education. Can researchers be used by local administrators for political support, and if so, when and how? What is the downside of such involvement?

Should research on reform be about *testing* and refining models; or is it sufficient to have a model (set of organized beliefs and principles) that guides a particular design?

Important kinds of data allow researchers to identify the reasons and ways in which reform efforts "fail." But this type of data is not always made accessible. We do not have a sufficient number of examples of how to use data in this way, and of how to communicate the reasons for success in ways that are useful for multiple audiences and stakeholders. How do we write about this work and where do we publish the research findings?

How important is it to be able to attribute success or failure to specific components of the model? Is it possible to make credible attributions based on comparisons across implementation sites?

Can we think of scaffolds and case studies of scaling for those who want to do scaling of reform efforts? Can we develop templates to guide novices through the dialectic between models-of and models-for successfully, by their own efforts? We may need, as a field, to think about mechanisms for 'scaling support services', analogous to 'technical assistance' for the implementation of technology.

There is a pressing need for more longitudinal research to develop data-grounded system models for inflows and outflows and dynamic relationships. How can we support efforts to fund and implement research of this type?

One can conceive of scaling situations either locally in a district or distally across districts and/or states. Do we need to have different conditions specified in the model from the start, or can we include them at a later date, with consequent limitations?

When we stay at a given scale, it may be because we know to succeed at that level. Should we work at that level, or try to take the model to the next level with the attendant high risk. Since taking a model to scale will help learn how to evolve it towards a more robust and successful one, how do we orchestrate scaling across researchers and implementation sites?

What constitutes evidence in this kind of work, and what does it mean to replicate evidence-based argumentation are thorny questions; some researchers in the group were skeptical that you can do the kinds of controlled studies that are needed to make typical knowledge claims. Is it possible that the typical knowledge claims are not needed, as much as comparative studies and ranges of applicability, giving relative and not absolute answers?

What would a developmental theory of implementation research experience look like? How can we help people make their way through a zone of proximal development guided by those who have more experience?

What kinds of guidelines or strategies can be suggested as helpful for new reformers to ground their beginnings? One could conduct demand-type studies of new reformers, illustrating for those who think they don't have models that they do have tacit mental models.

What do expertise in implementation reform and in implementation research look like, and along what key dimensions novices in doing this are different than experts? What are some of the evident novice misconceptions? For instance, possibilities might include:

- If you cannot do collaborative design, it is sufficient to just 'get the designs' (the franchise model!)
- Knowledge of desired outcomes obviates the need to think about how to achieve them.

There is market developing for models: New Jersey has mandated whole-school reform models and the US Department of Education recommended, or at least cited, whole-school models. But the implied assumption is that models are inputs to be duplicated (franchise models), rather than outcomes of the adaptation to different conditions. In contrast, the types of research-practitioner collaborations reported on herein suggest that the models themselves need to be developed collaboratively and be designed to permit, support and value local adaptations while general principles are identified. We believe that the kinds of efforts at creating collaborative-systemic reform models represented, documented and discussed in this workshop represent a first step in such a process. We recognize that these projects have significant implications for redefining the character of research, its methods and course of funding and its relationships to practice, but we are also hopeful that it can lead to models of and for reform of urban schools that can lead to sustainable, scaleable improvement in student outcomes. Clearly, more work and discussion needs to take place, but we invite our colleagues to review our current efforts at summarizing such approaches and to offer reflections, observations and criticisms from their own experiences in school improvement.

References

Blumenfeld, Phyllis, Barry J. Fishman, Joseph Krajcik, Ronald Marx, and Elliot Soloway (2000). Creating Usable Innovations in Systemic Reform: Scaling up Technology-Embedded Project-Based Science in Urban Schools, *Educational Psychologist*, *35* (3), 149-164.

Confrey, J., J. Castro-Filho, and J. Wilhelm (2000). "Implementation Research as a Measure to Link Systemic Reform and Applied Psychology in Mathematics Education." *Educational Psychologist* 35(3): 179-191.

Honey, M., K. McMillan Culp, and F. Carrigg (2001). Perspectives on Technology and Education Research: Lessons from the Past and Present", available at http://www.ed.gov./Technology/TechConf/1999/whitepapers/paper1.html

MODELS WORKSHOP PARTICIPANTS

NAME	ORGANIZATION	EMAIL
ORGANIZERS		
Confrey, Jere	University of Texas, SYRCE	jere@mail.utexas.edu
Lemke, Jay	City University of New York	Jllbc@cunyvm.cuny.edu
Marshall, Jill	University of Texas, SYRCE	marshall@mail.utexas.edu
Sabelli, Nora	National Science Foundation	nsabelli@mail.utexas.edu
REPRESENTATIVES OF CASE STUDY MODELS		
SYRCE		
Bell, Karen	University of Texas, SYRCE	kebell@mail.utexas.edu
Carrejo, David	University of Texas, SYRCE	carrejo@mail.utexas.edu
Drake, Corey	University of Texas	cjdrake@mail.utexas.edu
Petrosino, Tony	University of Texas, SYRCE	ajpetrosino@mail.utexas.edu
SCHOOLS FOR THOUGHT		
Bransford, John	Vanderbilt, Schools for Thought	john.bransford@vanderbilt.edu
Goldman, Susan	U. Illinois, Schools for Thought	sgoldman@uic.edu
Vye, Nancy	Vanderbilt Schools for Thought	nancy.vye@vanderbilt.edu
Williams, Susan	University of Texas	susan.williams@mail.utexas.edu
UNION CITY		
Brunner, Cornelia	Education Development Center	lsanderson@edc.org
Carrigg, Fred	Union City School District, NJ	fcarrigg@union-city.k12.nj.us
Honey, Margaret	Education Development Center	mhoney@edc.org
Sacchettti, Dina	Union City School District, NJ	dscacchetti@union-city.k12.nj.us
LeTUS		
Fishman, Barry	U. Michigan LeTUS	fishman@umich.edu
Gomez, Louis	Northwestern, LeTUS	l-gomez@northwestern.edu
Marx, Ron	U. Michigan LeTUS	ronmarx@umich.edu
REFLECTORS		
Atkins, Dan	University ofMichigan	atkins@umich.edu
King, Sherry	Mamoronek School System	SKing@mamkschools.org
Martinez, Michael	National Science Foundation	mmartine@nsf.gov
Means, Barbara	SRI International	barbara.means@sri.com
Pea, Roy	Stanford University	roypea@stanford.edu
Roberts, Nancy	Lesley University	nroberts@lesley.edu
Slotta, Jim	Univ. of California, Berkeley	slotta@socrates.berkeley.edu
Thorpe, Ron	Rhode Island Foundation	rthorpe@rifoundation.org
Webb, Norman	University of W#isconsin	nlwebb@facstaff.wisc.edu