A Model for Scaling Up a Research-Validated Instructional Intervention: Implications for Leadership in Educational Reform [1, 2]

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Over the past 20 years, an increasingly important emphasis in school reform has been upon identifying research-validated, instructional initiatives that have the potential to improve student achievement. Building upon this, a complementary research literature has begun to address the related issue of identifying the conditions under which effective instructional initiatives can be sustained and expanded. For example, in his study of Chicago schools, Payne (1997; 2001) identified problematic elements which cumulatively undermined the implementation of effective reform initiatives. These included dysfunctional relationships among teachers, school administrators, and central administrators which interfered with actual program implementation - even though all parties were in agreement about goals and means. As others (see Blumenfield, 2000; Coburn, 2003; Elias et al, 2003; Klingner et al, 2003) have noted, the fact that highly effective programs often come and go with little lasting impact is a substantial barrier to advancing systemic school reform.

The purpose of this paper is to report findings emerging from the initial two years of a five-year, IERI/NSF-funded project (REC0228353) designed to develop, study, and refine a multi-phase scale-up model that addresses the issue of concurrently sustaining and expanding a systemic, research-validated, instructional intervention, *Science IDEAS* (Romance & Vitale, 2001; Vitale et al, 2005), in grades 3-5. In doing so, the paper describes (a) the evolution of the multi-phase scale-up model over the past two project years, (b) the operational dynamics used to implement the scale-up model along with the criteria for establishing its effectiveness, and (c) the leadership and organizational factors necessary for sustaining advocacy for the instructional intervention. In doing so, the paper offers perspectives and in a form that are applicable to scaling up any systemic instructional intervention within an ongoing school reform initiative.

Perspectives/Theoretical Framework

Understanding the Science IDEAS model as an implementation focus for scale-up. The issues addressed in this paper follow from an understanding of the *Science IDEAS* intervention for which the present scale-up model was developed. As described by Romance and Vitale (2001), Vitale and Romance (2000), and Vitale et al (2005), *Science IDEAS* is an integrated instructional model for teaching in-depth science understanding in grades 3-5 within which reading comprehension and language arts are integrated. *Science IDEAS* is implemented through daily 2-hour instructional blocks that replace traditional reading/language arts instruction. Across daily 2-hour lessons, teachers involve students in a variety of activities that focus on understanding science concepts (e.g., reading from text and trade books, hands-on activities, constructing concept-oriented propositional concept maps, journaling, and writing). As a highly systemic classroom intervention, *Science IDEAS* provides a stringent test of the project multi-phase scale-up model.

As reported by Romance and Vitale (2001), multi-year research findings showed that *Science IDEAS* students consistently obtained significantly higher achievement than comparable controls in both science and reading comprehension as measured by nationally-normed tests. Across studies, *Science IDEAS* achievement effects were consistent for both average/above average, and low-SES/minority students. Research findings also showed that *Science IDEAS* students displayed a more positive attitude and greater self-esteem in science learning and reading comprehension.

Consistent with the general findings reported by Payne (1997; 2001), virtually all of the involved professionals (e.g., teachers, principals, central administrators) viewed the *Science IDEAS* model as

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effective and considered themselves supportive. Yet, after a researcher-initiated expansion of the model over a 4-year period to over 60 teachers and 1200 students in grades 3-5 came to an end, subsequent use of the model gradually diminished until it was used by few teachers. Within this historical context, the multi-phase scale-up model used in the present IERI/NSF project has been able not only to re-start the *Science IDEAS* intervention; but also to address the requirements the literature (see Blumenfield, 2000; Coburn, 2003; Elias et al, 2003; Klingner et al, 2003) has identified as necessary to transform a research-validated, instructional intervention from being researcher-initiated on a small scale to school-system-adopted on a large scale.

The present *Science IDEAS* IERI/NSF scale-up initiative (which began in 2002) was designed to operate within a leadership and organizational framework that focuses upon two keys recognized as critical for sustained school adoption of any research-based initiative: (a) the adoption of a multi-faceted scale-up process (e.g., Ball & Cohen, 1999; Tyack & Cuban, 1995) and (b) the associated development of the capacity to implement the scale-up process itself (e.g., King & Newmann, 2000; Mussel, 1998). With this in mind, the present scale-up model focuses on feasibly developing the capacity of a district (and district schools) to implement the instructional intervention on a large scale through an evolutionary process. In addition, the present *Science IDEAS* scale up model also addresses the issue of linking the intervention to the institutional value system which provides a continuing framework for district decisions to sustain or expand the intervention.

Key elements of the evolution of the present multi-phase scale up model. The research design (and goal) of the present IERI/NSF scale-up project is to concurrently initiate the successful scale up of the *Science IDEAS* intervention while studying and documenting the evolution of the scale up model from a research perspective. Thus, within the project, the validity of the multi-phase scale-up design must be established by its success in scaling up the *Science IDEAS* intervention. In turn, given the establishment of the validity of the scale-up model itself, the primary goal of the project is to explicate the constituents of the scale-up process in a fashion that allows it to be transportable to other interventions in other settings.

Before overviewing the multi-phase scale up model itself, it is important to recognize that the present *Science IDEAS* scale-up initiative reflects an explicit research and development (R&D) perspective (see Vitale & Romance, 2004). The emphasis of such an instructional systems design perspective (e.g., Dick et al, 2001) is that the successful preparation of any educational product requires two major elements: (a) that the desired outcomes can be obtained consistently under specified implementation conditions, and (b) that the implementation of the product in applied settings is engineered to fall within the capacity of the system that is to utilize it (minimizing capacity development requirements). Within the present context, such an R&D approach provides a framework for approaching the question of how to scale-up research-based initiatives within regular school settings. Thus, in our present research project, our definition of scaling (see Figure 1) is a functional one that establishes as

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success criteria and links together (a) the fidelity of implementation of an intervention and (b) the performance outcomes established through the prior research for the intervention that are to be met as performance standards. Specifically, if fidelity of implementation and the associated outcomes can be maintained at existing sites while the intervention is being expanded to new sites, then scale up can be considered successful.

Within this framework (Vitale & Romance, 2004), we consider scaling from three different perspectives that provide the dynamics for accomplishing the two sets of criteria (fidelity, outcomes) over time. The first perspective (see Figure 2) considers scaling as a multifaceted process that consists of three

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overlapping and interdependent conditional criteria relating to the implementation of an instructional intervention: sustainability, expansion to new sites, and supportive institutional dynamics that are necessary to provide the continuing dynamics for scale up support (and sustainability). The key to all of these is the development of the internal systemic capacity for supporting the expansion of the initial implementation to new sites in a fashion that insures the cumulative sustainability for all. In our multi-

phase scale up design, the establishment of sites as model schools which are able to sustain implementation of an intervention with fidelity and obtain consistent performance outcomes provide the major source of internal systemic capacity for scale up by providing mentoring assistance. The third conditional criteria associated with scaling has to do with the establishment of administrative dynamics in the form of increased student performance expectations that recognize the "added systemic value" provided by the intervention and, therefore, the systemic incentive for sustainability and scale up.

The second perspective of the model (see Figure 3) considers scaling as a transformational

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process whose scope encompasses an ordered evolution from a researcher implementation, to a collaborative implementation with school personnel emphasizing systemic capacity development, to the transfer of the responsibility of the implementation from the researchers to school personnel. This second perspective recognizes that an agent must provide the initial enhanced resource capacity beyond the scope of regular school system operations by operating in a prosthetic fashion to develop the capacity of the school system to sustain and scale up an intervention. In our study, this agent consists of the project staff.

The third perspective (see Figure 4) consists of combining the preceding two perspectives

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together to provide a conceptual framework for representing essential project scale up operations in a form that is transportable to other settings and for framing research on scale up itself.

Overview of Project Methodology

The study is being conducted (this is the second of five years) in two large urban school districts in southeastern Florida. Overall, the grade 3-5 component of the project includes 11 schools, 210 teachers, and 3200 students. A mixed-method design is being used to investigate different aspects of the project. The overall quantitative design assesses academic and affective performance effects of the *Science IDEAS* intervention used a controlled/randomized methodology (i.e., primarily volunteers) to compare participating vs. control schools. Fidelity of implementation is assessed using structured classroom observations on 9-week cycles. Professional development is evaluated through a previously-validated, objective-oriented Likert scale. Within this operational context, the different aspects of the project scale-up model reported here were documented using a qualitatively-oriented data-analysis approach.

Results

Present status of the Science IDEAS multi-phase scale up model. Figure 5 overviews the major framework of the present multi-phase scale up model. As Figure 5 shows, instructional interventions at

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the classroom level are considered to result in student achievement (and affective) outcomes. This implies that as a research-validated intervention, the implementation of the intervention with fidelity results in desired student achievement outcomes. In turn, accomplishing the required degree of implementation fidelity is accomplished by the project system for implementation support (e.g., training, curricular planning assistance). Finally, both the implementation at the classroom level and associated implementation support activities are guided through an implementation management system. Together, theses three scale up elements, with the involvement of project staff as an external agent, provide the means to initiate and implement the intervention effectively.

Within the preceding context, as shown in Figure 5, the two elements of scale up (sustainability, expansion) require two additional components. The first additional element is the development of the capacity of district staff to adopt and support the management and support elements of the project model in a fashion that is sufficient to insure classroom level fidelity. This is a major element of the multi-phase scale up model used in this project. Initially the project staff assumes all responsibility for implementation and, as the project continues, works collaboratively with appropriate levels of district staff (e.g., teachers, principals, curriculum directors, central administrators) until they gain the necessary expertise with regard to all aspects of the instructional management and support system, at which time the project staff is

withdrawn. The second additional element is the establishment of the "value added" to the institution by the intervention itself. This is a critical element for sustainability, because if the intervention is not valued within the structure of the institution, then it will not be sustained. So the implementation of a phasing process that addresses value is a recent addition to the scale up model. Finally, as Figure 5 suggests, the expansion of the intervention to new sites requires the capacity to sustain existing sites as a foundation for any future expansion. However, once the capacity necessary to sustain the intervention is developed and operational, then expansion can be readily accomplished.

Figure 6 overviews the major elements of the multi-phase scale up model using a "workflow" format. At present, as a dissemination tool, the project is developing a project management application (using Microsoft Project) that is intended to serve as an explication of the scale up model itself and as a tool for planning and managing scale up initiatives.

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Operational scale-up/implementation issues addressed during the present project year. In planning the process to add new schools for the present year, the project addressed a number of implementation issues that had implications for scale up. These included (a) adding a formal start-up planning component for new schools to the original scale-up model, (b) limiting new participant schools to those who had no competing instructional initiatives, (c) expanding the role of the project teacher leadership cadre from modeling classroom implementation to active involvement in delivering professional development for new schools, and (d) providing ongoing professional support for teachers that focused on building their in-depth understanding of science concepts along with their mastery of the *Science IDEAS* teaching strategies and on the engagement of all schools in grade level curriculum planning prior to each 9-week instructional unit.

In addition to the above, the project also addressed a number of management and support issues on a priority basis. These included (a) working with schools and teachers to increase implementation fidelity, (b) working with principals to actively involve them in the fidelity monitoring process (a key capacity development scale-up component), (c) developing project "talking points" to enhance principal communication (advocacy), and (d) developing district-level commitment to and advocacy for the project in a form that raises the student performance expectations held by the institution itself (an "added value" issue).

Preliminary project findings. Once spring, 2005, test data are available for integration into the project database in early summer, the project will be able to conduct both comparisons of student achievement on reading and science as measured by state (FCAT Standards) and norm-referenced (SAT, ITBS) tests, compute 3-year achievement trajectories for participating students that are linked to fidelity of implementation, and to assess the degree to which the project management/support systems have been able to accelerate the fidelity and achievement in the first year of new schools relative to the first year of continuing schools. In this regard, data presently available on an interim basis (from project years 1 and 2) are encouraging. These include (a) significantly improved fidelity of implementation trends over the past project year as assessed on a 9-week basis by project staff (the increase in teachers implementing *Science IDEAS* fully (vs. partially) rose from 43 to 65 percent), (b) school-level achievement summaries for 2002-2003 and 2003-2004 showed the average median SAT-9 percentile ranks in grades 3-5 for the project schools in reading were 69 and 70, respectively, while the percent of students in grades 3-5 judged proficient in FCAT reading were 68% and 70% (even though the districts' regular reading/language arts basal reading programs were not used), and (c) the ratings of concurrent summer 2004 (2-week) professional development sessions conducted by Leadership Cadre Teachers for new schools were rated as highly effective by participants (mean of 3.4 on a rank-value 4 3 2 1 scale). The overall effectiveness displayed by the Leadership Cadre Teachers in professional development was a significant project accomplishment with regard to capacity development.

Conclusions

Both the *Science IDEAS* intervention and the project-developed multi-phase scale up model address a significant issue for advancing the potential of school reform initiatives to improve student

achievement. Because the *Science IDEAS* intervention is primarily constraint-oriented rather than prescriptive (i.e., teachers have a great deal of flexibility in how it is implemented operationally), it provides a stringent test of the project scale up model that promises to be highly generalizable across many different types of interventions. By framing the process of scale-up as a series of organizational actions adopted by schools and school systems, this paper is suggestive of the means to enhance the success of school-based implementations of research-validated instructional interventions by capturing their implementation requirements through an instructional systems approach (see Dick et al, 2001). In a related fashion, the elements of the project multi-phase scale up model not only are suggestive of reasons why past scale up initiatives within school reform initiatives may have failed; but also of what actions are necessary to take to insure that scale up is successful. In order for systemic educational reform to progress, providing educational leaders with the means to adopt and successfully scale up research-validated interventions is a logically necessary requirement. In this regard, the multi-phase scale up model presented in this paper is suggestive of how such scale up initiatives should occur if they are to be successful.

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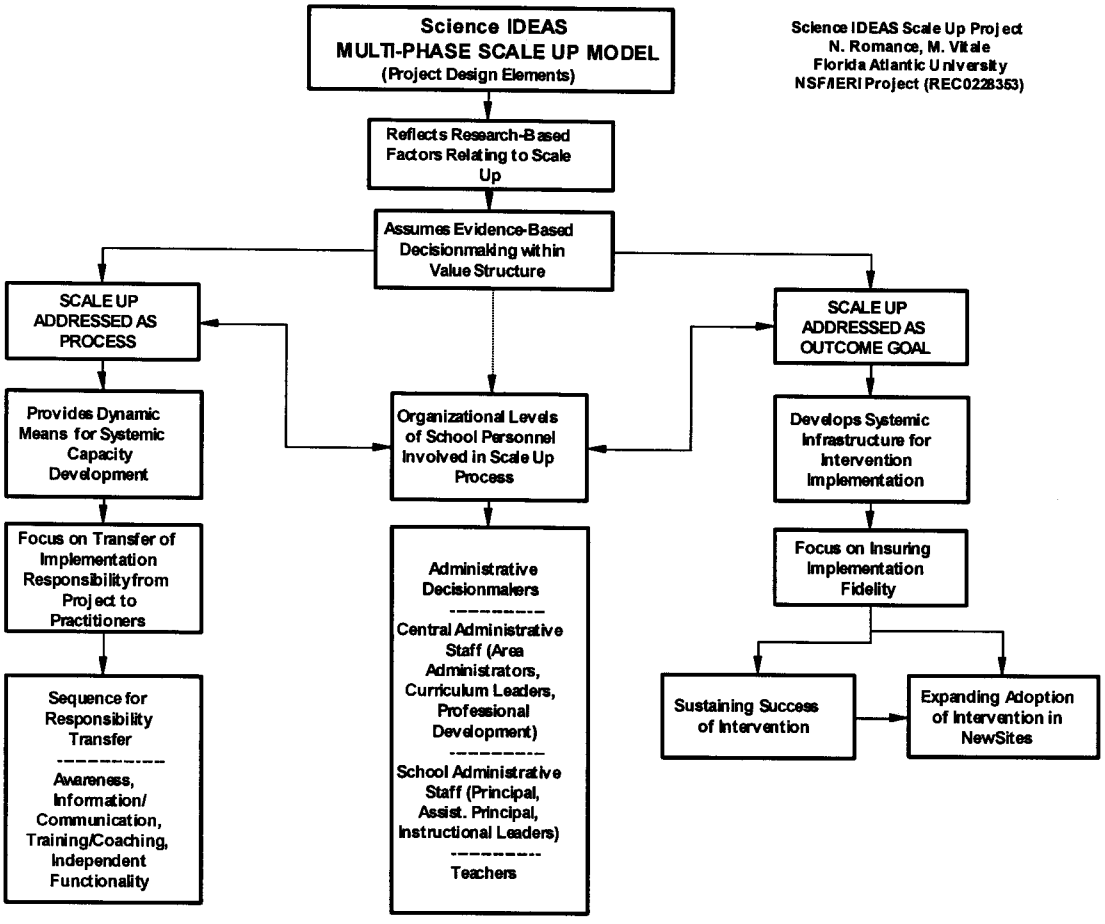

Figure 1. Major elements of scale up in school/district settings.

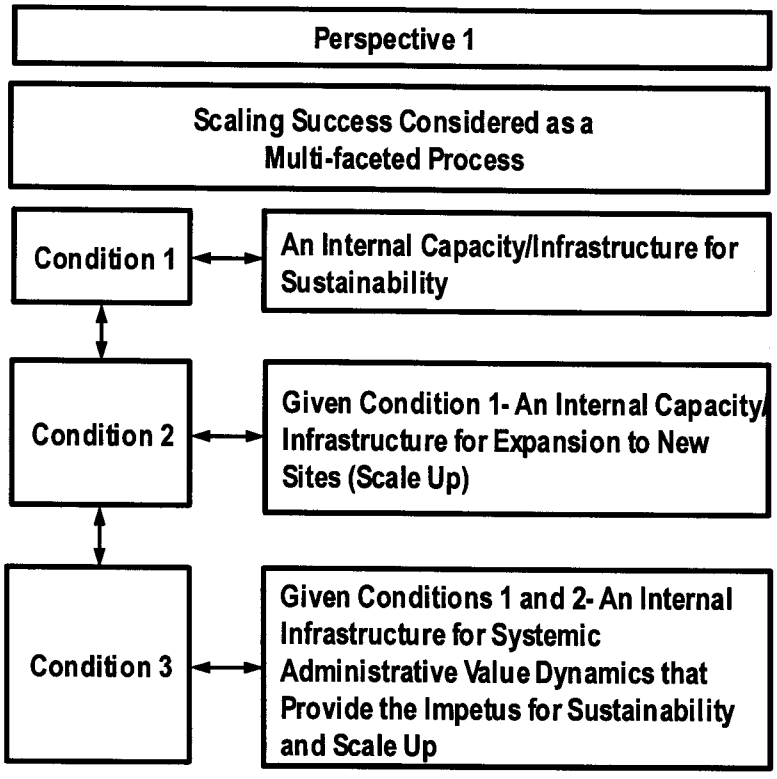

Figure 2. Scaling considered as a multifaceted process.

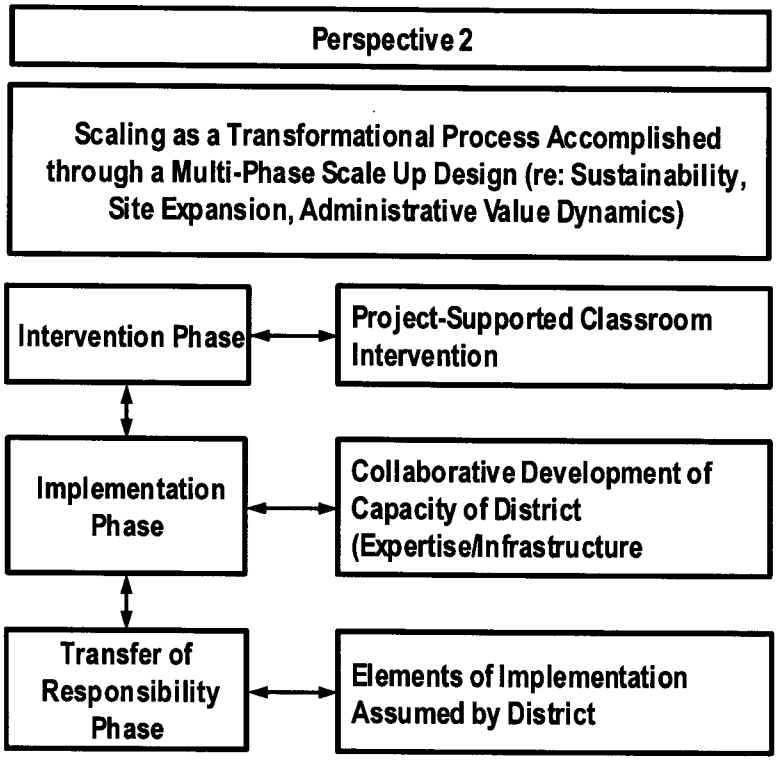

Figure 3. Scaling considered as a transformational process.

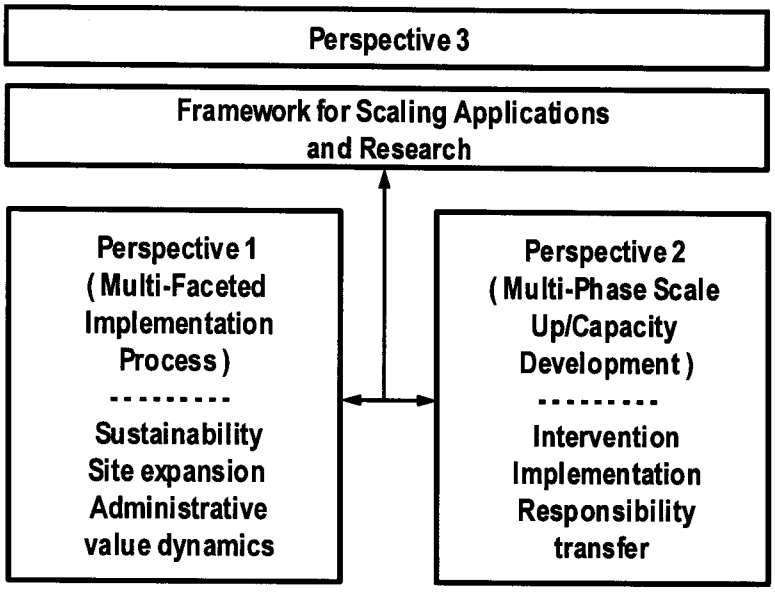

Figure 4. Framework for representing scale up operations and research.

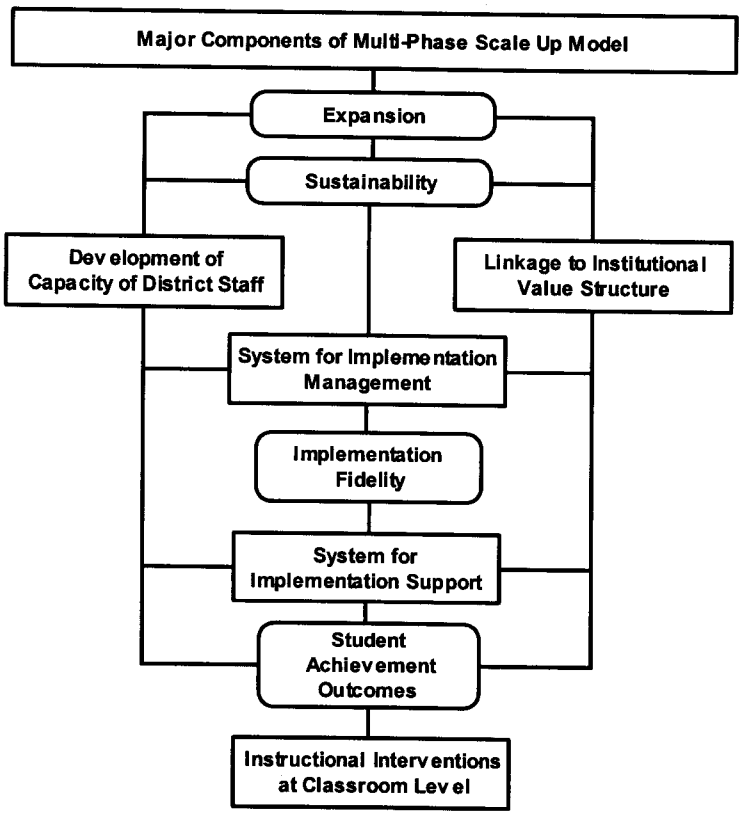

Figure 5. Major components of multi-phase scale up model for the current project. Boxes show major components that comprise the scale up model; ovals represent major forms of criteria that reflect the effectiveness of the scale up model (see text for details).

FIGURE 6 IS SEPARATE- WORKFLOW LAYOUT