The Northeast Ohio Model Schools Project: A Pathway To Scaling Up Reform In Mathematics And Science

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THE NORTHEAST OHIO MODEL SCHOOLS PROJECT: A PATHWAY TO SCALING UP REFORM IN MATHEMATICS AND SCIENCE

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ABSTRACT

The Northeast Ohio Model Schools Institute (NOMSI) provided professional development for school-based leadership teams in standards-based mathematics and science teaching practices and leadership skills. Leadership teams from six local school districts were recruited to attend a two-week summer institute in August 2001, which focused on national standards, principles of effective professional development, an understanding of the conditions necessary for change. One or two faculty from the College of Arts and Sciences at each university also participated in the summer institute. Teams prepared a professional development plan for their school or district and received a mini-grant to implement their plan. Coaches—experts in science or mathematics professional development—are supporting teams with the implementation of their plans throughout 2001/2002 academic year. Factors that facilitated teams’ progress towards reform included the cohesiveness and commitment of the team, and the team members’ previous exposure to inquiry and standards-based teaching. Barriers to reform included: the difficulties of negotiating the bureaucratic procedures of large urban districts and universities; the lack of time both within the school day and after school due to the intensity of pressures exerted by the constant push for immediate results; and the inexperience of the leadership teams in anticipating the barriers. Although this project is only in its infancy, it is already clear that leadership teams will need ongoing support for some time to come in order to make a measurable difference in teaching and learning.
INTRODUCTION

In August of 2001, a two-week leadership institute—the Northeast Ohio Model Schools Initiative (NOMSI)—was held for teams of teachers from schools in the northeast Ohio area to assist them in developing a professional development plan to improve learning in mathematics and science in their school. Schools received mini-grants of $12,000 to implement their plans. The institute focused on national standards, principles of effective professional development, an understanding of the conditions necessary for change. This venture is a partnership between Cleveland State University, John Carroll University and the University of Akron, funded through Ohio Systemic Initiative (OSI)-Discovery, Project SUSTAIN and the Gund Foundation. The purpose of this paper is to examine the factors that are facilitating or inhibiting the school-based leadership teams in implementing their professional development plans.

OSI-Discovery personnel had previous experience with a Model Schools project in 2000/2001, and offered considerable support and guidance in what had been successful and not so successful for them with their first cohort. The selection process for this project began with teams of teachers from a school or small district submitting a preliminary proposal to OSI-Discovery. It was decided to limit the project to only six teams for funding and logistical reasons. By June of 2001, there were only five proposals from the northeast Ohio region, so the institute leaders sought participation from another local school of which one of the leaders had considerable knowledge. With many years of combined professional development experience, the NOMSI leaders were critically aware of the importance of the support of the building principal in the process of change at the building level. This principal appeared to be knowledgeable of reform principles and so a place was offered to a team from this school, which will be known in this paper as Orange Elementary (all names used in the paper are fictitious).

The remaining five teams consisted of three middle schools—Blue, Brown, and Yellow and two elementary schools—Green and Red. The NOMSI leadership team members visited each of the schools to talk with the teams before the end of the 2000/2001 school year to confirm their participation and understanding of the goals of the NOMSI. A two-week summer institute was held in August 2001, with follow-up sessions in September and October. A further follow-up session is planned for June 2002.

The goal of this program was clearly laid out in the documentation sent to school teams before the start of the institute. This was for each team to develop a Professional Development Plan (PDP) for the teachers in their building that would enhance the teaching and learning of standards-based mathematics and science education. This seemed like an achievable goal, and the hope was that teams would have a good start on their PDP by the end of the institute, and could begin implementing it in January. The reality turned out to be very different as will be examined in the remainder of this paper.

In the sections that follow, the background and theoretical framework to the project is presented, followed by a description of the institute activities, background information about each of the sites, features of the initial and final professional development plans submitted by each of the teams, progress each team has made towards the implementation of its plan, and a summary of the factors that have facilitated or inhibited their progress. The paper concludes with suggestions to improve future such efforts.
BACKGROUND AND THEORETICAL FRAMEWORK: OHIO’S SYSTEMIC INITIATIVE

In the early 1990’s, 25 states and the Commonwealth of Puerto Rico received substantial funding from the National Science Foundation to initiate systemic (SSI) reforms in mathematics and science education (National Science Foundation, 2000). Systemic initiatives can be seen as a means of “providing top-down support for bottom-up instructional improvement in classrooms, schools, and districts” (Valencia & Wixson, 2000, p. 911). Ohio was one of the first SSIs funded and was known as Project Discovery. It spawned three Urban Systemic Initiatives (USIs: Cleveland, Columbus and Cincinnati) and part of the Appalachian Rural Systemic Initiative (RSI). Ohio has also had two Comprehensive Partnership for Mathematics and Science Achievement (CPMSA) awards in Dayton and Akron, and currently has two active Local Systemic Change projects in Stark County and Toledo. Although Ohio’s SSI was not funded by NSF for an additional five years, it secured continued state funding and continues to lead reform efforts in the state. In that important sense, the Ohio SSI has truly become systemic (Conway, Goodell, & Carl, in press) with many current reforms located within districts and schools (Kahle & Damnjanovic, 1998; Kahle, Meece, & Damnjanovic, 1999)

Much of Discovery's early focus was on teachers and principals as agents of change. Teachers attended six-week summer institutes where they experienced learning through inquiry and standards-based instruction while strengthening their content knowledge. They were assisted to apply what they learned in their classrooms through extensive follow-up from Discovery personnel, the establishment of peer-support networks, and the provision of classroom materials. Principals and administrators attended institutes that were designed to familiarize them with mathematics and science reform efforts and provide them with suggestions on how they could support these efforts in their school (Kahle & Meece, 2000).

Studies have shown that individual teachers were effective change agents in their own classrooms. Students in classes taught by Discovery-trained teachers outperformed students in comparison classrooms (Kahle, Meece, & Scantlebury, 2000; Kahle & Meece, 2000). Studies also revealed that principal institutes were effective in building administrators understanding of standards-based instruction (Kahle & Damnjanovic, 1998)).

Recent work shows that the greatest improvements in student achievement were evident in schools where greater than 50% of the teachers attended Discovery institutes and where district- and school-level policies were aligned with the focus of the SSI (Kelly & Kahle, 2000, April).

By the end of 1999, Discovery’s reforms in Ohio had taken root. Many parts necessary for systemic reform as outlined by O’Day and Smith (1993) were in place or in progress. These included curriculum frameworks and alignment of national and state education policies. In line with Fullan’s (1993) point that neither centralization nor decentralization works on its own, both top-down and bottom-up strategies are necessary, Discovery realized that the time for teacher-led reform was right. Additional support for teacher-led reform was provided by Schubert (1993) who noted that imposed reforms have often failed because teachers were not taken into account, being often unaware of what was required of them. If teachers are the ones leading the reform, problems of this nature should be avoided.
GUIDING PRINCIPLES FOR THIS INITIATIVE

Inquiry, equity, effective leadership and quality professional development were the guiding principles of the initiative. The National Research Council (NRC) (1996), defined inquiry as:

a multifaceted process that involves making observations, posing questions, examining books and other resources for what is already known, planning investigations, reviewing what is known in light of experimental evidence, using tools to gather, analyze, and interpret data, proposing explanations, making predictions, and communicating results. Inquiry requires identification of assumption, use of critical thinking and consideration of alternative explanations. (p. 23).

Agreeing with the stance of the National Research Council that “Humans are goal-directed individuals who actively seek information” (National Research Council, 1996, p.10), a constructivist epistemology guided the institute. However, instead of building on the radical constructivist concept that knowledge is the individual’s organization of the experiential world (von Glasersfeld, 1984), meaning for the participants in this initiative was constructed on knowledge formed via multiple interactions within a dynamic group (Henriques, 1997). In other words, knowledge formation occurred through a socially negotiated consensus.

Equity is a concept that can have many different interpretations as noted by Fennema (1990). She suggested that equity incorporate not only equitable classroom processes, but also equitable opportunities to learn and equitable outcomes of learning for all students. Guidance on how to achieve equity can be found in Kahle’s (1998) equity metric. Two key indicators in that metric are Instructional Quality, and Quality of Teacher Professional Development, both of which are focal points of this initiative.

Loucks-Horsley, Hewson, Love and Stiles (1998) outlined the principles of effective professional development. These are:

• ensuring equity;
• building a professional culture;
• developing leadership;
• building capacity for professional learning;
• scaling up;
• garnering public support;
• supporting standards and frameworks;
• evaluating professional development; and
• finding time for professional development.

This initiative followed these principles, and insisted that each team’s Professional Development Plan (PDP) would also take account of all of them. The Model Schools initiative adopted the strategy of “Developing Professional Developers” (Loucks-Horsley et al., 1998, p. 151) as the means by which to model successful professional development for the institute participants. This strategy assumes that these local professional developers are highly committed to the success of the program, that they can learn and then successfully use those skills to support
others to change, and that they have a better understanding than people from outside their situation, and thus are better able to adapt programs to fit their needs. The strategy is also a mechanism for scaling up Discovery’s reform beyond the individual teacher isolated in her or his classroom. By building leadership teams within a particular school site, we were also building a professional culture and capacity for professional learning. By scheduling time in the summer with follow-up throughout the year, we were ensuring that the participants had time for this professional development.

EVALUATION PLAN

A comprehensive evaluation is part of this project and was conducted during the institute, and is continuing throughout the implementation and follow-up phases. Using the five levels of evaluation proposed by Guskey (2000) as a framework, an evaluation plan as outlined in Table 1 below is being followed. Because this project is not yet complete, in this paper, we report only the results of levels 1 and 2. As can be seen from Table 1, the evaluation will continue throughout the project.

Table 1: Evaluation plan data types and collection methods

<table>
<thead>
<tr>
<th>Evaluation level</th>
<th>What questions are addressed?</th>
<th>How will information be gathered?</th>
<th>How will the information be used?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level 1</td>
<td><strong>Participants reactions</strong></td>
<td>Institute conditions, usefulness of sessions, enjoyment</td>
<td>Post-institute questionnaire, daily reflective journals, Discovery observers’ impressions, feedback from presenters.</td>
</tr>
<tr>
<td>Level 2</td>
<td><strong>Participants learning</strong></td>
<td>Did the participants acquire the intended knowledge and skills</td>
<td>Team professional development plans, post institute reflections on questionnaire, records of discussions at follow-up meetings, coaches logs of professional contacts, observers notes from attendance at team activities</td>
</tr>
<tr>
<td>Level 3</td>
<td><strong>Organization support and change</strong></td>
<td>What is the impact on the organization of the team’s reform efforts in the school; did it affect the climate and procedures, was it advocated, supported and facilitated, were successes recognized and shared</td>
<td>Field notes of observers not involved with the initial institute, records of discussions held during follow-up meetings, records of web-based communications of participants as recorded on WebCT.</td>
</tr>
</tbody>
</table>
| Level 4          | **Participants’ impact on teaching** | What has been the impact on teaching | Classroom observations and teacher interviews by observers | To document and disseminate the
<table>
<thead>
<tr>
<th>Evaluation level</th>
<th>What questions are addressed?</th>
<th>How will information be gathered?</th>
<th>How will the information be used?</th>
</tr>
</thead>
<tbody>
<tr>
<td>use of new knowledge and skills</td>
<td>practices as a result of the team activities</td>
<td>not involved with the initial institute, pre- and post-intervention questionnaire</td>
<td>impact of the program</td>
</tr>
<tr>
<td>Level 5 Student learning outcomes</td>
<td>What has been the impact on students achievement and attitudes towards mathematics and science confidence as learners</td>
<td>Achievement and attitude tests for students</td>
<td>To document and disseminate the impact of the program.</td>
</tr>
</tbody>
</table>

**AN EVOLVING FRAMEWORK FOR ANALYSIS OF PROFESSIONAL DEVELOPMENT MODELS**

After the institute, each team was assigned a coach, one of the NOMSI leaders, to work with them on designing and revising their professional development plan. Each plan was quite unique to the goals and needs of the building and district, although all had to follow the general guidelines of focusing on inquiry, equity and sustained professional development. In order to compare the features of the plans, the following evolving framework will be used.

An Awareness-Comfort Professional Development Model

The creators of the Awareness-Comfort professional development model express little knowledge of inquiry and problem solving teaching and learning construct and reservation about the change process within their school building. Therefore, the design focuses on self-awareness for the leadership team at the same time as all the teachers in the school are seeking awareness. Because of the newness of the construct and a climate which does not necessarily foster either change in construct or implementation of the construct, much appropriate time is spend on becoming aware of the construct and feeling comfortable with the construct.

Awareness-Comfort-Leadership Professional Development Model

The Awareness—Comfort—Leadership professional development model is best suited for a professional development plan that focuses on the learning of a select number of people within an institution. The individuals who create the Awareness—Comfort—Leadership professional development model express discomfort with the new concept in this case inquiry and problem solving teaching and learning. The team of individuals seeks to see change as series of cyclical events. In other words, the first team trains the second team and so forth. Thus the Awareness—Comfort—Leadership professional development model leads to a creation of experts who once they become experts become leaders within in the school building.
Awareness-Lateral Comfort/Leadership Professional Development Model

Schools that design lateral leadership professional development plans are schools that have an established teacher centered professional development program within the school. Teachers within the school are presently facilitating conversations concerning inquiry learning and teaching. Therefore, the leadership team is describes a need to continue their own personal growth as well as the initiative with their fellow teachers. In other words, the leadership teams facilitate conversations about inquiry teaching and learning and increase their own understanding and practice of inquiry teaching and learning.

INSTITUTE ACTIVITIES AND EVALUATION

The NOMSI summer institute was held over two weeks in August 2001 at the John Carroll University campus, as this was the most centrally located of the three universities involved in this partnership. The institute activities focused on six content areas: Inquiry, reform, change, professional development, technology and equity. (Space does not permit the full description of all of these activities, but the title of each is included to give the flavor of the institute.) Inquiry activities included the cylinder problem, the zesta box activity, the rubber band activity, termites, and a whole-day site visit to the Cuyahoga Valley Environmental Education Center. Reform activities included an overview of the goals of Discovery and the Model Schools initiative, examples of local Model Schools and their activities, viewing and discussing the NCTM video on the new 2000 standards documents and their implementation, a discussion of the characteristics of reforming schools and districts, viewing and discussing the film “A Private Universe”, discussion of the results of the TIMSS and TIMSS-R studies and lesson study as a form of professional development, a discussion of the changes to state proficiency tests and the implications of this for school curriculums, and discussion and investigation of some of the recent NSF-supported reformed curriculum materials such as CMP and Investigations in Number, Space and Data. Professional development activities included three in depth sessions exploring and discussing the models of professional development presented in the Loucks-Horsley et al book (Loucks-Horsley et al., 1998), and two sessions discussing the case studies of professional development presented in the Miller, Moon and Eisko (2000) book Teacher leadership in mathematics and science.

At the end of the institute, a short evaluation survey was given to assess the support, preparation and confidence to implement professional development that the participants were aware of in their school and/or district. It was not possible to administer the survey at the commencement of institute because the institutional review board had not approved the protocol in time (it was the middle of summer vacation and all of the member were on vacation!). There were two parts to the survey. The first part was about the support participants were aware of, and the second part was about the improvement in knowledge or skills and the confidence that participants now felt in dealing with the implementation of their professional development plans.

Part 1: Teacher opinions

Participants were asked to rate the degree of agreement with these statements using a scale of 1—Strongly Disagree to 4—Strongly Agree. Scores were totaled and mean scores calculated. Table 1 shows the statement and mean score.
Table 1

<table>
<thead>
<tr>
<th>Statement</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. I feel supported by my colleagues to try out new ideas.</td>
<td>3.3</td>
</tr>
<tr>
<td>b. I feel supported by my principal to try out new ideas.</td>
<td>3.3</td>
</tr>
<tr>
<td>c. I feel supported by my district or area superintendent to try out new ideas.</td>
<td>2.6</td>
</tr>
<tr>
<td>d. I feel supported by the parents of my students to try out new ideas</td>
<td>2.9</td>
</tr>
<tr>
<td>e. I have adequate access to materials for teaching mathematics and Science.</td>
<td>2.8</td>
</tr>
<tr>
<td>g. I have time during the school day to collaborate with my peers</td>
<td>3.1</td>
</tr>
<tr>
<td>h. Teachers in my school regularly share teaching ideas and resources.</td>
<td>2.9</td>
</tr>
</tbody>
</table>

These data indicate that many participants felt strongly supported by their colleagues and principal, but not by their district superintendent. Access to materials is an issue for some, as is the sharing of resources among colleagues. These results help in the understanding of some of the barriers teams have encountered in the implementation of their plans.

Part II – Knowledge and skills

Participants were asked to rate the improvement in knowledge of or skills in the following areas on a scale of 1–No improvement to 4–Substantial improvement. Table 2 below shows each statement and mean score.

Table 2

<table>
<thead>
<tr>
<th>Statement</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>e. Ensuring equity for our students</td>
<td>3.0</td>
</tr>
<tr>
<td>c. Choosing appropriate strategies for our professional development.</td>
<td>2.9</td>
</tr>
<tr>
<td>a. Writing the professional development plan.</td>
<td>2.8</td>
</tr>
<tr>
<td>g. Being an effective teacher leader in our reform efforts</td>
<td>2.8</td>
</tr>
<tr>
<td>h. Understanding inquiry teaching or teaching for understanding.</td>
<td>2.8</td>
</tr>
<tr>
<td>f. Incorporating national, state, and/or district standards.</td>
<td>2.6</td>
</tr>
<tr>
<td>d. Anticipating barriers to our reform efforts.</td>
<td>2.5</td>
</tr>
<tr>
<td>b. Dealing with resistance to change processes from my colleges.</td>
<td>2.4</td>
</tr>
<tr>
<td>i. Finding ways to ensure a sustained commitment from our teachers.</td>
<td>2.3</td>
</tr>
</tbody>
</table>

These data would seem to indicate that the activities of the institute did improve the knowledge and skills of the participants, particularly in the areas of equity, professional development strategies, and writing the PDP.

Participants were also asked to rate their confidence now in the following areas on a scale of 1–Not at all confident to 4–Very confident. A summary of the results are shown in Table 3 below. These data indicate that participants have a good understanding of almost all of these issues, except for the last one—finding ways to ensure a sustained commitment from their teachers. This issue did not seem to come up in the large group discussions, but clearly it is a problem for some.

Table 3:
Participant confidence to undertake these tasks now

<table>
<thead>
<tr>
<th>Statement</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>q. Understanding inquiry teaching or teaching for understanding</td>
<td>3.4</td>
</tr>
<tr>
<td>p. Being an effective teacher leader in our reform efforts</td>
<td>3.3</td>
</tr>
<tr>
<td>n. Ensuring equity for our students</td>
<td>3.2</td>
</tr>
<tr>
<td>o. Incorporating national, state, and/or district standards.</td>
<td>3.1</td>
</tr>
<tr>
<td>l. choosing appropriate strategies for our professional development.</td>
<td>3.0</td>
</tr>
<tr>
<td>m. Anticipating barriers to our reform efforts.</td>
<td>3.0</td>
</tr>
<tr>
<td>j. writing the professional development plan.</td>
<td>2.9</td>
</tr>
<tr>
<td>k. dealing with resistance to change processes from my colleges.</td>
<td>2.8</td>
</tr>
<tr>
<td>r. Finding ways to ensure a sustained commitment from our teachers.</td>
<td>2.3</td>
</tr>
</tbody>
</table>

BACKGROUND INFORMATION AND FEATURES OF PROFESSIONAL DEVELOPMENT PLANS FOR EACH SITE

Three main features appear in the professional development models of the participating schools. Those components deal with Awareness, Comfort and Leadership. Participants in the specific plan are made aware of the objectives of the plan, participate in a series of professional development strategies to become more comfortable with the objectives and lastly to be leaders. The leaders are one that can take the objectives and begin with a new group of professionals.

There are six leadership teams involved in the NOMSI. Each site will be briefly described and the features of their professional development plans outlined to set the context for the analysis to follow.

Blue Middle School

Blue Middle School is in a large urban district, with a student population of 900 students in sixth, seventh and eighth grade, most of whom receive free or reduced-price lunch. Many of the mathematics and science teachers have had extensive involvement with the NSF systemic initiatives at the state and local level. However, the team from Blue middle school did not initiate their involvement. Instead, the director of their region requested that they participate, nominating herself as well two district-level teacher-support personnel to be part of the leadership team. Having had considerable experience with this district, it was clear to the project leaders that none of these people would actually ever be really involved with the project. Additionally, when one of the NOMSI leaders visited the school, it became clear that the nominated teachers had not read the RFP or the proposal that was submitted in response to this RFP, and consequently had no idea about the goals of the program. Initially they seemed reluctant to give up two weeks of their summer vacation to attend the institute. However, when the program was fully explained to them, they came to realize that the program was much more in line with their thinking, and were eager to participate. They even recruited another teacher, who was very experienced with the activities of the SIs in the region, to participate.

During the institute, the team from Blue Middle School worked very well together, and appeared to get a lot out of the experience. One member even commented in her journal that this was the most worthwhile graduate class she had ever taken (she has a masters degree). However,
the enthusiasm they left with was quickly squashed as they got back to reality in the new school year. Of particular concern to the NOMSI leadership was the apparent misunderstanding of the goals of the Model School initiative by the district area superintendent. There was also another problem at Blue Middle School. They had a new building principal who did not appear to enjoy the support of the area superintendent. The team felt constrained by this lack of support and was unable to implement any of their plans before the Christmas break. Soon after in January, the new principal was replaced with an interim principal, and all hope of implementing any professional development plans disappeared.

However, the problems for Blue Middle School have not subsided. The team coach (also a leader of the NOMSI) has repeatedly contacted the team leader trying to set up a time to meet with them at the school, but for various reasons has not yet been successful. This will hopefully be rectified soon, but it seems unlikely that any professional development will occur this year. They seemed capable of putting together a good plan, and implementing it, but obviously without a supportive principal, it will be impossible to implement. Their team members are the most “Discovery Trained” of all the leadership teams, and one was even a participant in Discovery’s first venture into leadership models, the Resource Teacher Institute which one of the NOMSI leaders facilitated in Summer 1995 (see Schnipper & Tims (Goodell), 1996, for a description of this program).

If the project continues next year, the NOMSI leaders would like Blue Middle School to continue, but it will be contingent upon garnering the support of the new principal, whoever that may be.

**Brown Middle School**

Brown Middle School is one of two middle schools in its district with a current enrollment of 792 students. The district is in a middle class community, which is in the midst of a transition from a farming community to a bedroom community. Many homeowners commute to Cleveland. The enrollment breakdown at Brown is 277 sixth graders, 265 seventh graders, and 250 eighth graders. The district is currently composed of five elementary schools two middle schools and one high school (under construction to expand). The attending district enrollment is 6641 students.

The team at Brown middle appeared on paper in their initial proposal, to be very involved with reform efforts. The “go getter” of the group, the one who had spearheaded the writing of the proposal and provided the intellectual leadership, is a highly committed and involved person, and the team certainly had the full support of their building principal. However, once the institute got underway, it became clear that even the “go getter” had little or no idea of what inquiry-based or standards-based teaching really meant in a classroom. This lead to some degree of frustration on their behalf, as it was clear that the institute leaders had hoped that all participants would be much more aware of these issues. Consequently, the focus of their proposal was to increase the core team’s ability to model and provide professional development within their school and district aimed at improving the delivery of mathematics and science teaching at the middle school level. Instruction based on inquiry, attention to equity issues and continuous professional development are the underpinnings to their plan.
Professional development at Brown Middle “will follow a plan of awareness, building knowledge, translating into practice, and reflection on the teaching process” throughout the building. Thus, the leadership component of the professional development plan is lateral to the awareness-comfort components. The leadership team members at Brown Middle involve themselves in continuing study of inquiry teaching and learning. They also facilitate the learning of inquiry teaching strategies as concurrent participants in study groups, presenters at school and department meetings, and attendees at state and regional mathematics and science teacher meetings.

The school district in which Brown Middle resides has established a mechanism for specific study groups. The leadership team offers a series of study sessions on inquiry and teaching. The first of these sessions is the awareness component of the professional development plan. The awareness component is a combination of discussion about inquiry teaching and learning and a hands-on/minds-on presentation from a non-Brown Middle teacher concerning inquiry teaching. The awareness component is minimal as the school district has been “committed to find better ways to instruct, prepare, and develop student critical thinking skills and problem solving activities in the areas do mathematics an science.”

In order to establish comfort in inquiry teaching and learning, the Brown Middle team will hold a series of study groups. These study groups that are scheduled to meet during times specified by the school district are meetings where inquiry-teaching strategies is the topic. There is a study group that focuses on the use of TI-73 calculators and a study group where another teacher who is not part of the Brown Middle faculty will share ideas concerning inquiry teaching and learning. Monthly staff meetings include leadership-team presentations about inquiry learning and teaching. Mathematics and Science department meetings serve as forums for discussion as well. From the leadership team’s perspective, investigation into inquiry teaching and learning is a systemic endeavor.

Green Elementary School

Green Elementary School is housed in a redesigned high school building a few blocks north of the business district of the city. The student enrollment is 430 students in grade K-6. All of the district’s Pre-K students are housed in this building. The school is 85% white, 12 % African American and 3% other ethnicity. Sixty eight per cent of the students qualify for the free or reduced lunch program. As a school-wide Title 1 building, Green Elementary School offers a comprehensive curriculum that meets all state requirements, including courses in English language arts, mathematics, social studies, science, the arts, health and physical education. The Reading Recovery Program is an additional program. The school also has an extensive special education program with specific programs and inclusion programs, and 25% the student population have been identified as students with disabilities. Since there is a great commitment to inquiry teaching throughout Green Elementary School, the major need is to develop a seamless systemic structure. This structure will include common beliefs, common practice and common language used throughout all levels, resulting in continuity across grade levels. There is also a need to increase proficiency test scores in math and science, especially between fourth grade and sixth grade. Thus the goal for Green’s PDP is to create a common language for inquiry and share common beliefs in math and science inquiry as a means of improving proficiency scores.
The leadership team consists of four fifth/sixth grade teachers and the building principal. Having a team in which all teachers are teaching the same level strengthens the team and allows the team to be models for other faculty in the building as well as for themselves.

Green Elementary School presently is focusing on language arts literacy through out the school. This conversation has been a major project for Green Elementary faculty for the last five years. The leadership team wanted to expand the discussion to include mathematics and science. This will occur through the existing institutional structure, so the discussion will be enlarged to include language arts, mathematics and science. The leadership team at Green Elementary has created a lateral leadership professional development plan. As it is customary within Green Elementary to actively and continuously immerse oneself into the study of inquiry, the leadership team will continue its own discussion concerning inquiry teaching and learning and the implementation of inquiry teaching and inquiry learning by students. Therefore the leadership component is very much the same as the comfort component of the professional development plan. The difference is that the individuals within each component are different.

The awareness component of the Green Elementary professional development plan is a presentation to the entire faculty at a breakfast meeting in which they will announce the opportunity to diversify the conversation concerning inquiry learning and teaching to include science and mathematics. This continues the tradition within Green Elementary that reform is lead, and directed by Green Elementary faculty.

The comfort component strategies will focus on “establishment of a common language for inquiry teaching and learning through the creation of the study groups. The study group consists of faculty members and the leadership team. Many faculty of Green Elementary have already visited inquiry elementary schools, so the focus of the study group will be on class visits rather than continuing to study the theoretical basis of inquiry teaching and learning. The class visits are also a means to develop critical friendships as well as to make a stronger and more direct relationship between theory and practice. Although the leadership team is responsible for structuring and implementing the professional development, it also actively involves itself in learning more about inquiry teaching and learning.

Orange Elementary School

Orange Elementary School is a two-grade level building that hosts the majority of fifth and sixth grade students in the district. Current enrollment is more than 800 students. There are approximately 34 regular classes. Teachers have the choice of teaching in a self-contained classroom or becoming part of a grade level team. Seventy percent of the staff has less than five years teaching experience. Orange Elementary is in an inner ring suburb of Cleveland with a district student population of 6,000 students. A large percentage of the students receive free or reduced-priced lunch. The district has four K-4 buildings, one K-6 mathematics/science magnet school, one 5-6 building, one 7-8 building (1,000 students) and the high school which serves more than 2,000 students in grades 9-12. The most recent report card from the state of Ohio placed this district in the category of Academic Watch. This is an improvement over their previous rating of Academic Emergency. The district has several programs in place to help improve their performance on the state report card. Areas of greatest need for improvement include reading, mathematics and science. At Orange Elementary, the mathematics and science
curriculum are aligned with the outcomes for the Ohio Proficiency Test. Teachers in the district have been working toward the goals of better student achievement and more professional development for teachers. The ultimate goal is to prepare students to be mathematically and scientifically literate as well as strong readers.

The team from Orange Elementary consists of two classroom teachers and the principal. One of the teachers has five years teaching experience and the other has six years experience. The principal has been an administrator in the district for many years, most recently as the principal of the K-6 mathematics and science magnet school. He is currently in his third year as principal of Orange Elementary.

The professional development model for Orange Elementary lacks the leadership component; however, the Orange Elementary leadership team plans to coordinate the implementation of the professional development plan.

The theme of unity and collegiality are guiding principles of the professional development plan. “We want to use this development opportunity to change people’s perceptions, attitudes, and comfort levels in the area of math and science curriculum.” Thus, Orange Elementary’s “initial need … is to assess the need and the desires of the teacher and administrators in the area of science and mathematics”. Therefore the needs assessment is a major part of the awareness stage. Also the awareness stage includes goal setting. Thus, for Orange Elementary, the awareness of self and of science and mathematics education is the first stage.

Upon setting goals, another need is to “address the area of materials and supplies” and the logistics of managing the materials and supplies. Other activities to increase comfort with standards-based science and mathematics are visits to informal science and mathematics education institutions such as a natural history museum, in-service workshops, and sharing and demonstrating lessons with teachers. An important element of increasing comfort levels is to include the greater school community, especially parents, in a “Parent Proficiency Night.”

Red Elementary.

The large, landscaped campus of Red Elementary is located in western part of its city in a quiet residential area. Red Elementary has 23 classrooms, a learning resource center, gymnasium, and facilities for tutoring, counseling and psychological testing. The student enrollment is about 465 students. Ethnically, the enrollment is 98.9% African American and 1.1% white.

Red Elementary offers a comprehensive curriculum that meets all state requirements, including courses in English language arts, mathematics, social studies, science, the arts, health and physical education. In addition, they offer a reading recovery program and have a school-wide Title 1 Program. There is also a child guidance counselor, case manager services, intervention-based assessment team, and gifted and talented program. There is a uniform dress code.

Forty per cent of the teaching staff has a master's degree or equivalent with an average of 5.3 years of experience. The average class size is 20 students. A goal of the Red Elementary
faculty is to improve students’ reading test scores. However, the Red Elementary School improvement plan focuses on both reading and mathematics.

Red Elementary needs to develop a common language within the leadership team, which consists of the principal, two fifth-grade teachers and a Title 1 specialist. The initial focus of their professional development plan is on the fifth-grade teachers; however, the leadership team will work together to improve learning in math and science for all grades. Explorations into inquiry teaching and learning offers the teachers a chance to think about instructional change, understand the relationship between mathematics and science, and the effect cultural values can have on learning mathematics and science.

The team seeks to promote student achievement and social success by offering teachers a “menu” of expanded “learning opportunities” and encouraging students’ efforts to improve their academic achievement in math and science. Therefore, improving science and mathematics learning and instruction through the use of inquiry-based teaching and learning is a major goal of the school improvement plan and this project.

Professional development for the teachers at Red Elementary focuses on a deep understanding of national, state, and local standards-based teaching of mathematics and science through inquiry and problem solving. Because the goal of the school improvement plan is improving mathematics and science learning and teaching through the use of inquiry-based modules, the awareness stage focuses on developing a theoretical knowledge of inquiry teaching and learning and on understanding the national, state, and local standards for mathematics and science.

The comfort component of the professional development plan centers on teachers building on their own classroom experience and expertise, and, in part, by learning from the collected wisdom and experience of other professionals. Therefore using inquiry teaching in the classroom becomes the focus of the comfort component. Activities include developing understanding about questioning and its role in inquiry, best practice methodologies for science inquiry and mathematical problem solving, and visits to other schools who have a commitment to inquiry teaching and learning.

The leadership component of the professional development plan for Red Elementary consists of sharing the process with other members of the school through beginning the professional development cycle again. The first group of participants will create a second generation of study groups. For example, instead of the first group of participants working in each other’s classrooms, the first group members offer to share their learning, questioning and practicing of inquiry teaching and learning with teachers not in the first group. In other words, the Red Elementary professional development plan is a train the trainer model.

Yellow Middle.

Yellow Middle School is a large middle school on the outskirts of its city. While the overall racial makeup of the district state is approximately 49% white and 47% African American, Yellow Middle School’s 800 students are 97% African American and 2.6% white, with 74% receiving free or reduced priced lunch (54% in the district qualify
Like Red elementary, the professional development plan for Yellow Middle consist of developing awareness of national, state and local standards and inquiry teaching and learning in mathematics and science, establishing comfort with these ideas and leading other teachers in exploring inquiry and problem solving as a way of learning and teaching. The awareness component begins with self-selected members of Yellow Middle, and consists of study groups, and visits to other Discovery model schools. The study group focuses on the theory of inquiry and problem solving in teaching and learning. The visits to schools allow members of the study group to see the possibilities for inquiry and problem solving instruction. The awareness component concludes with a field-base inquiry experience.

The comfort component is series of workshops with the teacher explore the meaning of the inquiry experience and to begin to incorporate their experiential knowledge into practice. The workshops include creating inquiry and problem-solving lessons, reading works on inquiry, problem solving and cooperative learning in science and mathematics as well as social studies and language arts. During the comfort component, the team undergoes a field-based inquiry experience that is multidisciplinary. After the team returned from the field-based inquiry experience, workshops focused on continuing the refinement of inquiry concepts.

The leadership component revolves around the demonstration of inquiry and problem solving instruction. The team begins to demonstrate to each other their learning. In a collegial group, the team members evaluate and assess each other’s lessons. Then the team members invite other teachers in Yellow Middle to come into their room to see inquiry and problem solving teaching and learning.

PROGRESS TOWARDS REFORM

The schools that have made the most progress towards the implementation of their plans are Brown Middle and Red Elementary. In the case of Brown Middle, their leadership team was very enthusiastic and had the strong support of their principal, who attended many days of the institute. They also worked very well with their coach and were open to advice. They worked enthusiastically together during the institute and most of the team attended every day. They had a “mover and shaker” who provided strong intellectual leadership, and other team members were highly experienced teachers with many years of classroom experience.

Red Elementary also had an enthusiastic team, although small in number. Their school had a change of principal, which was certainly a hurdle to overcome, but in this case, there was no problem doing so. They also worked closely with their coach, and appeared to greatly benefit from the activities of the institute.

In contrast to the success experienced at Brown Middle and Red Elementary schools, Blue Middle, Orange Middle and Yellow Middle schools have made little or no progress towards their intended reforms. The difficulties at Blue Middle were discussed in detail in an earlier section of this paper. Most of their problems could be attributed to the bureaucratic and structural barriers that seem to abound in large urban districts. Coordinated support from principals and district officials is needed to support the kind of changes the Model School initiative is calling for. At Orange Middle School, the main problem lay with the inexperience of the leadership team. Their PDP plan took a long time to construct and required a large investment of time on
behalf of the coach. Neither of the team members had ever been in a leadership role before, and they had little experience of professional development activities themselves. Despite having a very supportive and knowledgeable principal, without an experienced group of teachers to carry out the plan, implementation is difficult. At Yellow Middle School, political pressures at work within the school and between the initial team members eventuated in a complete communication breakdown between the team members. The original team has been disbanded and a new team is rewriting the PDP. In retrospect, it was clear from the start that the principal should have been much more involved in the process of the team’s recruitment and the development of the PDP plan.

Finally, Green Elementary are somewhere between the success of the first two schools discussed, and the lack of progress of the final two teams. Green only recently submitted its final PDP, and the leadership team is confident that they will be able to implement at least some of it before the end of the year.

CONCLUSION

The Northeast Ohio Model School Initiative has achieved a lot in a short time. Six teams of teachers have begun to make progress in implementing their professional development plans aimed at improving the mathematics and science achievement of their students. However, the rate of progress has been much slower than expected. It has become clear that the task of preparing a PDP and implementing it is much more complex that initially anticipated. Classroom teachers do not, in general, have a broad view of the professional development needs of their colleagues, nor of some of many of the barriers faced so far by teams in this project. Preparing and administering budgets is one area that is proving problematic for most teams. The NOMSI leadership team is all experienced in this area, and did not anticipate this to be so problematic.

The evaluation of this project will continue for at least another two years, as the teams implement their plans and hopefully achieve their goals. The NOMSI leaders have identified some of the structural and political barriers teams are facing, and are working towards helping teams overcome them. Although this project is only in its infancy, it is already clear that leadership teams will need ongoing support for some time to come in order to make a measurable difference in teaching and learning. While this strategy of implementing professional development at the building level seems promising, implementing it is proving harder than we thought.

REFERENCES


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