

Characteristics of Lead Teachers and Their Roles in the Institutionalization  
of the Rice University Mathematics Leadership Institute on Their Campuses:  
A Case Study

Ann R. McCoy, Ph.D.  
Evaluation and Data Management Services, Inc.

Anne Papakonstantinou, Ed.D.  
Rice University

Richard Parr  
Rice University

Ngozi Kamau, Ph.D.  
Rice University

## **Introduction**

The Rice University Mathematics Leadership Institute (MLI) was an NSF-funded Math-Science Partnership grant that was created in 2003 (EHR 0412072 originally 9/1/2004 to 8/31/2009, extended by a Noyce Supplemental Award, to 8/31/2011). Led by the Rice University School Mathematics Project (RUSMP), MLI united a variety of mathematics professionals from the departments of Computational and Applied Mathematics, Mathematics, and Statistics; mathematics educators; and high school faculty, administrators, and students from the Aldine (AISD) and Houston (HISD) Independent School Districts. MLI developed 80 lead teachers who received intensive professional development in mathematics content and pedagogy as well as in instructional leadership with a focus on providing high-quality learning opportunities in mathematics to diverse student populations. The long-term collaboration between and among RUSMP, AISD, and HISD was central to creating this intervention and reflected a shared philosophy regarding mathematics education for both teachers and their students. Nine of the 80 lead teachers received further support, leadership opportunities, and professional development experiences as Noyce Scholars.

This case study was designed to identify how MLI was institutionalized on two high school campuses and the likelihood that MLI will continue to influence mathematics instruction. Inductive analysis also provided identification of characteristic behaviors that helped to distinguish teacher leaders. Data for the case study were obtained through observations and interviews with MLI lead teachers, their mathematics campus colleagues, and campus administrators who were aware of their work. Case study participants were also asked to complete two career/organizational psychology assessments—the Work Values Inventory (Super, 1970) and the Organizational Citizenship Behavior Scale (OCBS) (Fox, Spector, Goh, Bruursema, & Kessler, 2011). Information obtained from this case study may be useful to RUSMP and others as they continue to identify, select, and develop future teacher-leaders.

The selected lead teachers were positioned to serve as catalysts for long-term change on their campuses as a result of their tenure at their high schools, longevity in teaching, active participation in MLI, development and certification as Texas Master Mathematics Teachers (MMT) in grades 8-12 through MLI (Papakonstantinou, Sack, & Parr, 2009), and further opportunities as Noyce Scholars. Each of the three MLI lead teachers (representing two high schools) participating in this case study had at least 15 years of teaching experience and had been teaching on their campuses at least 10 years.

## **Background**

### *The Rice University School Mathematics Project*

RUSMP, since its inception in 1987, has evolved into a leading mathematics education center with an acknowledged reputation of improving mathematics instruction and conducting educational research. RUSMP was initiated through NSF funding (TEI 86-52030; 4/1/1987 to 9/30/1988 and TEI 9055501; 6/1/1991 to 8/31/1994; The Rice University School Mathematics Project). The initial project involved master teachers providing professional development for individual elementary, middle, and high school teachers. The second grant funded RUSMP to work with teams of teachers and administrators from targeted schools with follow-up programs on their campuses.

At the end of the NSF funding periods, RUSMP successfully expanded with support from participating school districts, state-funded Teacher Quality awards, and foundations. RUSMP's recognized achievement in improving mathematics education ensures its long-term sustainability. Nearly 8,000 teachers and 5,000 students have participated in RUSMP programs, with at least 1,000 new teachers and students added each year. Independent evaluations indicate that teachers who participated in RUSMP programs improved their mathematical knowledge, changed their classroom practice, and changed their beliefs about mathematics teaching (e.g., Brown & Dial, 1994; Dial, 1998; McCoy, 2008; Willis, 2000). Furthermore, their students performed significantly better on standardized tests than comparable students whose teachers had not participated (e.g., Houston Independent School District, 2006; Killion, 2002a, 2002b, 2002c).

### *The Rice University Mathematics Leadership Institute*

MLI was intended to be an extension of the mathematics professional development that RUSMP has been providing since 1987 and is informed by its directors' 30-plus years of experience and the resulting body of research articulating how teachers teach and students learn mathematics (e.g., Cruz, Turner, & Papakonstantinou, 2003; McCoy, Hill, Sack, Papakonstantinou, & Parr, 2007; Parr, Papakonstantinou, Schweingruber, & Cruz, 2004; Sack & Vazquez, 2008; Troutman, 2011; Ward & Troutman, 2012). In addition to focusing on teachers' mathematics content and pedagogical content knowledge, MLI focused on developing leadership skills among participating teachers. By developing and nurturing the leadership skills of participating teachers, the MLI management team expected these teachers to create and sustain professional learning communities with other mathematics teachers on their campuses. MLI participants were expected to also model the best practices for mathematics instruction and serve as content-area resources for their mathematics colleagues.

Over the course of the grant, three cohorts of lead teachers participated in MLI's sequence of courses, seminars, collaborative planning sessions, and leadership experiences designed to (1) strengthen their skills and knowledge in mathematics content and pedagogy, (2) develop strategies to work with diverse populations of students, teachers, and administrators, and (3) prepare them for roles as intellectual leaders in mathematics at their schools. The sequential cohort model allowed for a continuous process of building school-wide leadership. To further increase lead teachers' mathematics content knowledge, improve their knowledge of pedagogy, further develop their leadership knowledge, and enhance their status as intellectual leaders in mathematics education in their school districts, lead teachers were supported to become certified as MMTs in grades 8-12.

The MLI partnership was envisioned as an integral part of the way these districts operate, not a "stand-alone" program. The MLI management team recognized from the beginning that MLI's long-term survival depended on its institutionalization on the campuses of participating teachers.

MLI was intended to initiate systemic change at the grassroots level—from the bottom up. It was believed that as more and more school and district administrators and teachers saw the value of MLI and its positive results, it would affect systemic change. Although MLI was not expected to be a catalyst for immediate change, it was expected that over time, MLI would influence the type and direction of change in the participating districts.

This case study was intended to take a closer look at the teachers who came closest to fulfilling the original goal of MLI, which was to *“develop a cadre of lead teachers in mathematics with experience and expertise*

*in providing content and pedagogical support to their mathematics departments. Lead teachers will serve as the intellectual leaders in mathematics and mathematics advocates on their campuses. They will act as change agents responsible for catalyzing reform in mathematics instruction at their schools.”*

The two schools for this case study, one from each participating district, were selected based on classroom observations of lead teachers and interviews with lead teachers and campus administrators by MLI directors and researchers that indicated that these schools best exemplified the goals of MLI.

## **Campus Profiles**

Brief profiles of the two high schools where the case study participants teach are presented below. These profiles provide a general overview of the contexts in which these MLI lead teachers work. Although separate profiles are presented for each campus, information obtained from case study participants and their colleagues is not organized by high school but by themes explored through the interviews.

High School A, a traditional high school, educates poor Latino and African American students. Through personalized high-quality instruction and real-life applications, High School A’s students are encouraged to become responsible and productive citizens. Since 1993, High School A has participated in a program begun by a former Fortune 500 executive to increase the number of students who graduate from high school and enroll in college. Through partnerships established with local institutions of higher education, students enrolled in High School A may simultaneously earn high school and college credits in both a college setting and on their high school campus. In addition, since 1993, approximately 100 of High School A’s juniors have spent a summer at Cornell University, earning college credits. The 2009-2010 academic year marked the first time in High School A’s history that individual students passed at least three or more Advanced Placement (AP) Examinations and were thereby recognized as AP Scholars.

During the 2010-2011 academic year, 1,614 students were enrolled in High School A. Of these students, 10.3 percent were African American, 3.2 percent were Asian/Pacific Islander, 88.0 percent were Hispanic, 0.1 percent were Native American, and 1.4 percent were White. Approximately, 94.5 percent of students qualified for free or reduced lunches and 14.6 percent of students were identified as limited in their English proficiency. Of High School A’s students, 83.0 percent were identified as “at-risk” of school failure. Approximately 61.1 percent of the students were enrolled in Career and Technology Education classes.

High School A selected three MLI lead teachers (for the first two cohorts) one of whom also served as the school’s Dean of Instruction. In addition, one former lead teacher from another campus was recruited and is currently an assistant principal at High School A. This contingent of MLI participants with their roles in both the classroom and in administration promoted a shared vision of excellence. The leadership development that MLI participants received helped them to work effectively with a wide range of mathematics faculty members including several new teachers recruited each year from Teach for America. Of the three lead teachers at this high school, one furthered her leadership skills by obtaining the MMT (grades 8-12) certification and serving as a master teacher through the NSF Noyce Supplement.

High School B, a traditional high school, is the only high school in its district that is an authorized school for the International Baccalaureate (IB) Diploma Programme (one of only 43 IB Diploma Schools in the state of Texas). High School B’s IB Diploma Programme is open to all district students who exhibit a passion for learning and a strong work ethic. High School B also offers a broad range of Advanced

Placement courses, including chemistry, world history, calculus (AB and BC), macroeconomics, English, Spanish, psychology and art history. Recently, High School B partnered with an organization intended to expand college access for economically disadvantaged students through college preparatory classes, career development services, and information about college selection and financial aid for parents.

During the 2010-2011 academic year, 2,381 students were enrolled in High School B. Of these students, 40.3 percent were African American, 3.2 percent were Asian/Pacific Islander, 54.2 percent were Hispanic, and 1.2 percent were White. Approximately, 73.8 percent of students qualified for free or reduced lunches and 6.1 percent of students were identified as limited in their English proficiency. Of High School B's students, 66.4 percent were identified as "at-risk" of school failure. Approximately 73.2 percent of the students were enrolled in Career and Technology Education classes.

The success of High School B's mathematics program is due in part to teachers and administrators sharing the vision of MLI. They believe in the importance of having content leaders in mathematics to support the school's students and the other mathematics teachers. This high school's administration designated a lead teacher to participate in each of MLI's three cohorts. These lead teachers took advantage of all the opportunities afforded by MLI to develop into intellectual leaders on their campus. They worked to ensure that all students had access to high-quality mathematics instruction. These lead teachers maintained an active role in MLI activities. All three lead teachers succeeded in obtaining the prestigious MMT (grades 8-12) certification. In addition, the lead teachers from the first two cohorts were able, through the NSF Noyce supplement, to further their development as leaders by assuming roles as master teachers outside of the school. This included leading instruction for participants in the third cohort of MLI. These additional leadership opportunities increased their confidence as leaders.

## **Observations**

The observations provided an understanding of the processes that MLI teachers and their colleagues engaged in to promote effective classroom instructional strategies. In the observed planning meetings, lead teachers and their campus colleagues discussed instructional goals and strategies as well as the sequencing of instruction for student learning and assessment. During the observed planning meetings, lead teachers and their colleagues discussed what they learned from using different strategies with their students. One of the lead teachers suggested that her colleagues consider showing students visual representations using GeoGebra software. She also demonstrated for her colleagues how to use the software.

During a faculty meeting, one of the MLI lead teachers discussed the use of movie clips in mathematics lessons and explained how she used them for instructional purposes in her Pre-Calculus course. In addition to this discussion, teachers attending the meeting solved problems in pairs in order to explore questions students might ask about volume and surface area. They also discussed how to modify the problems for use in Algebra II courses.

Another MLI lead teacher led a content area meeting in which she and colleagues created a daily agenda for the following week which included the content, class assignments, and homework assignments. During this meeting, the lead teacher also modeled how to teach a lesson using patty paper and appropriate vocabulary. She also emphasized to her colleagues the importance of pacing the lesson and assessing students' knowledge of the content before extending the concept. In addition, she encouraged her colleagues to use short, graded assessments to help them understand what their students knew. She also

emphasized that these assessments would provide valuable information for their students to monitor their own learning.

## **Interviews**

The interviews with MLI lead teachers, their colleagues in the mathematics department, and their campus administrators served as a means of obtaining information to better characterize lead teachers' roles as teachers, mentors, collaborators, and administrators. Themes explored through the interviews with lead teachers and their colleagues were leadership, mathematics reform, professional learning communities, and institutionalization of MLI. Administrators provided a more global perspective of the role of lead teachers at their schools.

### *Leadership*

According to their colleagues, MLI lead teachers' leadership behaviors included offering suggestions, sharing information, and listening. Their colleagues also noted that lead teachers led by modeling, working behind the scenes, and not making teachers feel inadequate. In addition, lead teachers were described as encouraging the importance of building relationships with students while maintaining a professional distance. Their colleagues also noted that they (MLI lead teachers) participated in activities with their teaching colleagues and invited input from their colleagues during professional development presentations. When asked to describe their leadership behaviors, lead teachers' self-descriptions mirrored those provided by their colleagues. One lead teacher described herself as a "participant-leader."

MLI lead teachers' mathematics colleagues were asked about the intellectual, pedagogical, and mathematics reform-related leadership they provided. Lead teachers' colleagues readily acknowledged their intellectual and pedagogical leadership and described them as "founts of information" whose content knowledge was helpful when sharing and helping teachers understand recommended teaching strategies. According to their colleagues, lead teachers emphasized the importance of helping their colleagues deepen their content knowledge and understanding that the lessons and instruction provided to students were not taught in isolation.

MLI lead teachers were described as incorporating pedagogical guidance in campus professional development sessions. Teachers noted that unlike other professional development they received, lead teachers not only explained what teachers should do in a lesson but also how to do it. Instructional approaches used by lead teachers allowed their colleagues to learn different methods of teaching the same material. This gave teachers more choices regarding how to present lessons and decreased the level of stress some teachers experienced. Teachers also reported that when they had content that they needed to incorporate into a lesson but did not know how to do this, lead teachers would help them structure the lesson. Teachers described their lead teacher colleagues as passionate about mathematics, unafraid of trying new approaches, and regularly sharing websites, activities, and teaching strategies.

### *Mathematics Reform*

According to their colleagues, MLI lead teachers were vocal advocates for increasing students' mathematics skills, insisting that mathematics be treated as a priority, and encouraging teachers to help students become independent learners. For example, after observing a lead teacher, a teacher noted, that the

lead teacher never gave up on her students. This inspired her to try new strategies to reach her own students. She further consulted with the lead teacher who advised her to not only ask students more questions but also to ask questions at higher cognitive levels. The teacher reported that she now encourages her own students to answer questions in class by offering them extra exam points. As a result of the changes she made in her classroom, she noticed that students come to her with more questions and ask more questions in class. As a result of these and other changes, the teacher reported that her students now take more responsibility for their learning, in part, because she has them explain their solutions to the mathematics problems they work in class.

### *Professional Learning Communities*

Both MLI lead teachers and their teaching colleagues were asked to describe the professional learning communities on their campuses. According to their colleagues, lead teachers make teaching exciting in a variety of ways including introducing them to new technology (e.g., interactive white boards and new software programs), helping teachers learn how to incorporate literacy in their mathematics instruction through the use of open-ended questions which require that students explain their answers, and encouraging teachers to learn more mathematics and to attend programs offered by RUSMP and other local professional development providers. Lead teachers' colleagues also reported that in their professional learning communities, they are able to share and compare instructional strategies especially when they work within the same content strand. In addition, their professional learning communities afforded teachers and lead teachers with opportunities to discuss the sequencing of lessons, adapt the curriculum sequence to focus on topics of primary importance, and identify topics that could be incorporated later.

One teacher noted that anytime a mathematics teacher is absent, the MLI lead teacher visits the teacher's classroom to assist the substitute teacher and make sure that the teacher's absence did not result in the loss of an instructional day for students. Since teacher turnover was recognized as a factor that limited the ability of teachers to collaborate and build relationships with colleagues and with their students, the teacher also noted that the lead teacher encouraged teachers to collaborate. The lead teacher reported that she had to help new teachers understand course sequencing so that they could be as effective as possible in teaching their courses. To do this, the week before a concept was introduced, the lead teacher reviewed with teachers the lessons to be taught each day and the activities and supplemental materials that could be used as part of these lessons. After each lesson was taught, the lead teacher debriefed with teachers about the lesson and discussed changes that could improve future instruction.

### *Campus Institutionalization of MLI*

When asked how MLI has been institutionalized in their mathematics departments and how MLI continues to influence mathematics instruction on their campuses, lead teachers identified several changes resulting from their participation in MLI that continue. Lead teachers reported that they would continue to use modeling in their instructional planning meetings, meet with their colleagues in small planning groups, and serve as resources for teachers on their campuses. Lead teachers also planned to continue observing their colleagues and inviting their colleagues to observe them. One of the lead teachers noted that both her MLI and IB professional development contributed to what she did in her classroom and that she would continue to use technology and student projects in her instruction. This lead teacher reported that using projects with her students allowed her to broaden their understanding of mathematics applications and transform mathematics into something different (for example, art or physics). Another lead teacher reported that MLI

helped her to create a more student-centered learning environment which included several opportunities for hands-on learning. She reported that approximately 80 percent of mathematics teachers on the campus now use cooperative learning groups.

### *Administrators' Perspectives*

High school administrators (two assistant principals and one dean of instruction) described MLI lead teachers as part of the foundation of the professional learning communities on these campuses. A theme echoed throughout the interviews with administrators was that lead teachers developed relationships with their mathematics colleagues which helped them to collaborate and maintain a sense of cohesiveness. According to administrators, lead teachers advocated for their colleagues, encouraged administrators to set realistic expectations for teachers, and pointed out the unique needs for mathematics instruction. Administrators also credited lead teachers with supporting and encouraging collaboration among their colleagues. When asked to describe the support provided by lead teachers, administrators reported that lead teachers started meetings by sharing best practices with their colleagues, demonstrated scaffolding for teachers, shared their knowledge about changes in mathematics, and introduced and demonstrated lessons to help new teachers. An administrator described one lead teacher as “the smartest math teacher in the building.”

### **MLI Teachers' Work Values and Organizational Citizenship Behaviors**

Data collected through this case study represented an inductive approach to identifying the characteristics or behaviors of MLI teachers who distinguished themselves during the project and on their campuses. Identifying the work values and behaviors of these teachers may help identify future potential teacher-leaders who share similar values and behaviors. The MLI lead teachers completed the Work Values Inventory and the OCBC.

Work values represent features of the work environment that are important to people. Generally, people seek work environments that are consistent with their work values. When working in environments that are consistent with their work values, people tend to report higher levels of job satisfaction and commitment (Blickle, 2000). Work values may also be considered higher-order goals to the extent that people engage in behaviors that are consistent with their values (Frieze, Olson, Murrell & Selvan, 2006). These values are more openly expressed in the workplace when people have greater discretion, responsibility, or authority. As a result, the work values of individuals in leadership roles are likely to influence the work environment.

In addition to investigating the work values of MLI lead teachers, data were also obtained to measure their organizational citizenship behaviors (OCBs). OCBs represent employee conduct that is not specified in a job description or required by an organization but nevertheless contributes to improved organizational effectiveness and efficiency. These behaviors can be classified as organizational citizenship behaviors that benefit the organization (OCBO) and organizational citizenship behaviors that benefit people within the organization (OCBP).

In order to identify characteristics of these lead teachers related to their work values, they were asked to read 45 value statements (from the Work Values Inventory) and rate how important each was to them in the work that they did. Rating options were (1) Unimportant, (2) Of Little Importance, (3) Moderately Important, (4) Important, or (5) Very Important. Responses to the 45 items were used to determine which

of 15 work values were most important to respondents. The definitions of the 15 work values scales are presented below (Super, 1970):

1. Creativity: work which permits one to invent new things, design new products, or develop new ideas.
2. Management: work which permits one to plan and lay out work for others.
3. Achievement: work which gives one the feeling of accomplishment in doing a job well.
4. Surroundings: work which is carried out under pleasant conditions-not too hot or too cold, noisy, dirty, etc.
5. Supervisory Relationships: work which is carried out under a supervisor who is fair and with whom one can get along.
6. Way of Life: work that permits one to live the kind of life he/she chooses and to be the type of person he/she wishes to be.
7. Security: work which provides one with the certainty of having a job even in hard times.
8. Associates: work which brings one into contact with fellow workers whom you like.
9. Aesthetic: work which permits one to make beautiful things and to contribute beauty to the world.
10. Prestige: work which gives one standing on [sic] the eyes of others and evokes respect.
11. Independence: work which permits one to work in his/her own way, as fast or slow as he/she wishes.
12. Variety: work which provides an opportunity to do different types of tasks.
13. Economic Return: work which pays well and enables one to have the things he/she wants.
14. Altruism: work which enables one to contribute to the welfare of others.
15. Intellectual Stimulation: work which provides opportunity for independent thinking and for learning how and why things work.

Table 1 presents lead teachers' mean ratings for each of the work values scales. The work values that lead teachers rated as "Very Important" were Achievement, Surroundings, Supervisory Relationships, Way of Life, Security, Economic Return, and Altruism. These findings indicate that lead teachers highly valued work that gave them a sense of accomplishment from doing a job well, was conducted in pleasant working conditions, was conducted with supervisors with whom they had good working relationships, was consistent with who they were and the type of lives they wanted to live, provided them the certainty of having a job, paid them well, and allowed them to help others.

Table 1

*Means and Standard Deviations of Lead Teachers Ratings on Work Values Inventory Scales*

Work Value Scales	Mean	Std. Deviation
Economic Return	14.67	0.58
Surroundings	14.33	1.15
Supervisory Relationships	14.33	0.58
Way of Life	14.33	1.15
Security	14.33	0.58
Achievement	14.00	1.00
Altruism	14.00	1.00
Creativity	12.33	0.58
Prestige	12.33	1.15

Intellectual Stimulation	12.33	1.15
Aesthetic	11.67	1.15
Independence	11.67	0.58
Associates	11.00	1.00
Management	10.33	0.58
Variety	10.33	1.15

In order to identify the behaviors lead teachers engaged in on their campuses, they were asked to specify how often they engaged in 20 identified behaviors during the previous academic year. Response options were (1) Never, (2) Once or Twice, (3) Once or Twice per Month, (4) Once or Twice per Week, or (5) Every Day. Table 2 presents lead teachers' mean ratings for the 13 items from the OCBS used to measure OCBO and OCBP. Lead teachers reported that, during the prior academic year, they helped their co-workers learn new skills and listened to their work related problems at least once or twice a week. According to lead teachers, at least once or twice a month, during the previous academic year, they helped orient new employees to the job, listened to their peers' personal problems, improved the work environment and how work was done, encouraged co-workers, and volunteered for additional work assignments.

Table 2  
*Means and Standard Deviations of Lead Teachers Ratings on Organizational Citizenship Behavior Checklist*

Item	Mean	Std. Deviation
OCBO		
Helped co-worker learn new skills or shared job knowledge.	4.00	1.00
Helped new employees get oriented to the job.	3.67	1.15
Offered suggestions to improve how work is done.	3.67	0.58
Offered suggestions for improving the work environment.	3.33	0.58
Said good things about your employer in front of others.	3.33	1.15
Gave up meal and other breaks to complete work.	3.00	0.00
Volunteered for extra work assignments.	2.33	0.58
OCBP		
Lent a compassionate ear when someone had a work problem.	4.33	0.58
Lent a compassionate ear when someone had a personal problem.	3.67	0.58
Went out of the way to give co-worker encouragement or express appreciation.	3.33	0.58
Defended a co-worker who was being "put-down" or spoken ill of by other co-workers or supervisor.	2.67	0.58
Helped a less capable co-worker lift a heavy box or other object.	2.00	1.00
Changed vacation schedule, work days, or shifts to accommodate co-worker's needs.	1.33	0.58

There were very few OCBs that lead teachers did not engage in at least monthly. The behaviors they reported engaging in most frequently are consistent with creating and maintaining positive and effective working environments. It appears that the behaviors lead teachers engaged in on their campuses were consistent with many of the work values they identified as being most important to them—supervisory

relationships, achievement, and altruism. To the extent that lead teachers listened to their colleagues work-related and personal problems, shared their knowledge, and helped employees get oriented to the job, they engaged in behaviors that should foster good supervisory relationships with their campus colleagues. When lead teachers offered suggestions for improving the working environment and work processes on their campuses, this was consistent with the importance they placed on achievement because they could experience feelings of accomplishment when their suggested changes were implemented and had the desired effect. In addition, all of these behaviors lead teachers reported engaging in at least monthly were consistent with the importance they placed on altruism and enabled them to contribute to the well-being of their colleagues and students.

## **Conclusion**

Information obtained through observations and interviews suggest that MLI lead teachers are the campus-level mathematics advocates and experts that their MLI professional development prepared them to become. It appears that lead teachers enjoy the esteem of both their colleagues and administrators on their campuses. They established and nurtured supportive professional relationships with their colleagues. Through these relationships, they encouraged their colleagues to try new instructional strategies and in at least one case, renewed a colleague's commitment to her students. The changes that lead teachers advocated, initiated, and maintained on their campuses bode well for the institutionalization of MLI on these campuses.

Future efforts to identify teachers who may become teacher-leaders similar to those who participated in this case study might begin with either having teachers complete instruments, such as the Work Values Inventory or the OCBC, or having teachers participate in interviews as part of a screening process. A process that gives program administrators in-depth information about applicants would likely remove some uncertainty from the selection process. Although the information presented in this case study is based on a very small sample, it serves as a starting point for specifying the desired personal characteristics of teacher-leaders.

## References

- Blickle, G. (2000). Do work values predict the use of intra-organizational influence strategies? *Journal of Applied Social Psychology*, 30, 196-205.
- Brown, S., & Dial, M. (1994). *Rice University School Mathematics Project Eisenhower Program for Houston-area Teachers evaluation report*. RUSMP DN: 94-02.
- Cruz, P., Turner, S., & Papakonstantinou, A. (2003). *Building confidence in the classroom: The role of the master teacher*. RUSMP DN: 03-01.
- Dial, M. (1998). *Rice University School Mathematics Project Eisenhower Program for Middle and High School Teachers evaluation report*. RUSMP DN: 98-02.
- Fox, S., Spector, P. E., Goh, A., Bruursema, K. and Kessler, S. R. (2011), The deviant citizen: Measuring potential positive relations between counterproductive work behaviour and organizational citizenship behaviour. *Journal of Occupational and Organizational Psychology*. doi: 10.1111/j.2044-8325.2011.02032.x
- Frieze, I. H., Olson, J. E., Murrell, A. J., & Selvan, M. S. (2006). Work values and their effect on work behavior and work outcomes in female and male managers. *Sex Roles*, 54, 83-93.
- Houston Independent School District. (2006). *Title II-A teacher and principal training and recruiting fund 2005-2006*. Houston, TX: Author.
- Killion, J. (2002a). *What works in the elementary school: Results-based staff development*. Oxford, OH: National Staff Development Council.
- Killion, J. (2002b). *What works in the high school: Results-based staff development*. Oxford, OH: National Staff Development Council.
- Killion, J. (2002c). *What works in the middle school: Results-based staff development*. Oxford, OH: National Staff Development Council.
- McCoy, A. (2008). *Rice University School Mathematics Project's Teacher Quality Program for Elementary Teachers evaluation report*. RUSMP DN: 08-01.
- McCoy, A., Hill, A., Sack, J., Papakonstantinou, A., & Parr, R. (2007). Strengthening mathematics teachers' pedagogical content knowledge through collaborative investigations in combinatorics. In T. Lamberg, & L. R. Wiest (Eds.), *Proceedings of the 29th Annual Meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education* (pp. 887-889). Stateline (Lake Tahoe), NV: University of Nevada, Reno.
- Papakonstantinou, A., Sack, J., & Parr, R. (2009). Development of Texas Master Mathematics Teachers through the Rice University Mathematics Leadership Institute. In *Proceedings of the 2009 National Science Foundation Math and Science Partnership (MSP) Learning Network Conference*. Retrieved from [http://hub.mspnet.org/index.cfm/lnc09\\_papakonstantinou/page/index](http://hub.mspnet.org/index.cfm/lnc09_papakonstantinou/page/index)
- Parr, R., Papakonstantinou, A., Schweingruber, H. A., & Cruz, P. (2004). Professional development to support the NCTM *Standards*: Lessons from the Rice University School Mathematics Project's Summer Campus Program. *National Council of Supervisors of Mathematics Journal of Mathematics Education Leadership*, 7(1), 3-12.
- Sack, J., & Vazquez, I. (2008). Three-dimensional visualization: Children's non-conventional verbal representations. In O. Figueras, J. L. Cortina, S. Alatorre, T. Rojano, & A. Sepulveda (Eds.) *Proceedings of the Joint Meeting of PME 32 and PME-NA XXX* (Vol. 4, pp. 217-224). Mexico: Cinvestav-UMSNH.
- Super, D. E. (1970). *Work Values Inventory: Manual*. Boston, MA: Houghton Mifflin.
- Troutman, S. (2011). Promoting the investigation of mathematics in the real world. *The Charter Schools Resource Journal*, 7, 1-13.

- Ward, R. A., & Troutman, S. (2012). If you want to motivate the learning of mathematics - Use the visual arts as a lens to learning. In D. Lapp & B. Moss (Eds.), *Exemplary instruction in the middle grades: Teaching that supports engagement and rigorous learning* (pp. 35-52). New York, NY: The Guilford Press.
- Willis, C. (2000). *Rice University School Mathematics Project Eisenhower Program for Elementary School Teachers evaluation report*. RUSMP DN: 00-05.