# Journal of Mathematics Education at Teachers College

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A Century of Leadership in Mathematics and its Teaching

# TABLE OF CONTENTS

## Preface

## Articles

# TABLE OF CONTENTS

## LEADERSHIP NOTES FROM THE FIELD

## Other

# LEADERSHIP NOTES FROM THE FIELD

Mathematics department faculty have prior experience and outside interests that enliven and enrich the instruction they deliver in the classroom. They often take leadership roles, and the scholarly environment at Teachers College is uniquely supportive of their reflection on the character and meaning of leadership.

In the following section, *Leadership Notes from the Field*, authors present the stories of projects of special importance to them. Three articles discuss the building of schools. Stuyvesant has arguably the strongest mathematics program of any public high school in New York City. Stuart Weinberg and Maryann Ferrara chronicle the development of that mathematics department, which they chaired in turn over many years. The HELP Primary school in Uganda and the Nambale Magnet School in Kenya are at the opposite end of the economic spectrum, but they too teach mathematics to youngsters. Peter Garrity and Nicole Fletcher discuss their assistance to the development of the school in Masese, Uganda. Similarly, Phil and Loretta Smith participated with the Nambale school's founding, and they write of the complex project of funding and building a new school in a developing country.

Among the common threads to these articles—the power of mathematics education to lift the less fortunate, the personal rewards of serving others, the time and effort it takes to build a school—the most pertinent to our leadership theme is *collaboration*. At Stuyvesant leadership is spread across the faculty and the levels of the organization, "shared leadership." For the Nambale school a charismatic priest sparked the work and contributions of many individuals and groups, "distributed leadership." The Mathematics department at Teachers College is itself a highly collaborative environment. It is fitting that we close the Journal's leadership issue with personal observations by department faculty regarding the collaborative nature of leadership.

also introduced activities that required use of an abundant resource in every class—children. An example of this was the human graph, where the class is polled on a particular question, such as favorite color, and then the children line up according to their answer. This was used to introduce the concept of comparing quantities and related vocabulary such as more, less, same, and difference. This was also used to introduce fractions with older children.

The Ugandan school system requires students to demonstrate sufficient mastery of grade-level material in order to move ahead. Children take nationally-administered exams every year starting in P1 and cannot move to the next grade level until they have passed the examination. A consequence of this requirement is large enrollments in P1 and P2 due to low passing rates. A challenge of the workshops was trying to help teachers implement the new strategies when some had upwards of 90 students of varying ages in a class. Though the idea of dividing such a large number of students into groups was daunting and a break from their traditional teaching methods, the teachers realized that implementing group work could immediately increase the level of engagement in their classrooms. During the workshop, teachers were able to see that by implementing group work, all students were now able to actively participate in discussion around collectively solved problems and present their work to the class, creating opportunities for peer-to-peer learning and again increasing engagement in the classroom.

We went to Uganda as a humanitarian venture to teach, inspire leadership in teachers, and improve the quality of mathematics teaching in the school. We understood very quickly that students cannot be attentive and learn if they are hungry. Since the establishment of the school, we now provide lunch and breakfast each school day as well as lunch during the school breaks for all students and staff. Prior to the establishment of the school food program, children generally ate every third day, as that was all the parents could manage.

So we return to the initial question, "What do you need?" Today, the answer from the teachers of Masese is: another school building to accommodate students through the secondary level, more well-qualified teachers, more professional development, textbooks, furniture for the school, decent sanitation facilities, and a security fence. The list of needs has grown, along with the ambition of these dedicated teachers to provide a higher quality of education to their burgeoning student body. Our goal is to clothe, heal, feed, and educate *every* child in Masese. We have indeed begun steps to achieve that goal.

# Faculty Attitudes Toward the Cultivation of Student Leaders

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This paper discusses how the faculty at an urban public middle/high school prioritized the identification and cultivation of student leaders in order to improve equity, classroom management, and student learning. Faculty identified student leaders, piloted steps to develop them, and shared a rubric to assess leadership performance. The paper illustrates a promising case of faculty collaboration, but also the limitations of a relatively inexperienced group in a challenging demographic and institutional setting. A focus on student leaders may help teachers advance the mathematical practices prioritized by the Common Core mathematics standards.

*Keywords*: student leadership, Common Core State Standards, student-centered classroom, mathematical practices, faculty attitudes

## Introduction

During the first six months of the 2012–2013 school year student leadership emerged as a topic of faculty and administration discussion at the school where I teach. Initially our interest was a reaction to the observation that most faculty efforts were spent on misbehaving students or those with weak academic performance. It seemed unfair; it also seemed unwise. A consensus formed that influencing a relatively small number of leading students might be an efficient way to improve the overall classroom learning environment as well as promote higher-level academic behavior. In particular we wanted students to be more self-reliant, to work hard at problems, and to articulate their reasoning in discussion with other students. The faculty spent several meetings identifying student leaders and developing ideas to cultivate the leadership behaviors we desired. The project is ongoing.

I suggest that the spontaneous local action taken by the faculty at this school should be viewed from the perspective of three research contexts. First, the high-level academic behaviors the faculty targeted are the *mathematical practices* the mathematics education establishment has required in the *Common Core State Standards for Mathematics* (CCSSM) (National Governors Association Center for Best Practices & Council of Chief State School Officers [NGA & CCSSO],

2010). In particular the first and third CCSSM practices are to "Make sense of problems and persevere in solving them," and "Construct viable arguments and critique the reasoning of others" (p. 6). Major NCTM (2000) and International Baccalaureate documents set similar priorities. (The school is an International Baccalaureate candidate school.) In our faculty's opinion, too often students passively wait for a procedure to be demonstrated, which they then expect to practice until it is rote. If a problem's method of solution is not obvious then it is not being taught properly. Students do not expect to explain or debate in mathematics class. The faculty set out to change these student attitudes through leadership development. Compared to the mathematics content standards, much less is understood about how to "teach" the mathematics practices standards. Thus it is interesting that the faculty at this school believe the key is for leading students to model the desired behavior.

Second, emphasis was placed on the group instead of the individual. To "construct viable arguments and critique the reasoning of others" (NGA & CCSSO, 2010, p. 6), by its nature, only exists within a group discussion. The classroom should function as a mathematics community with students learning to speak as mathematicians speak to each other (Siegel, Borasi, & Fonzi, 1998). The faculty's desire to affect the collective behavior of the whole class, the focus on the leading students as the key to group dynamics, and the prioritization of mathematical communication as the desired high-level academic behavior therefore follow in the tradition of emphasizing the importance of social context in education.

Third is the pragmatic approach. The history of mathematics reform movements is one of ambitious policy initiatives failing in real world settings (David & Cuban, 2010). It is noteworthy that the undertaking described in this article rose from the ground up. Struggling with classroom management and a lack of student engagement, the teachers collectively arrived at a strategy to leverage student leaders that is consistent with the CCSSM, but was not driven by it. Moreover, the challenges and constraints these teachers face illustrate the types of conditions under which the CCSSM reforms must be implemented.

While this paper (and our faculty) dwells on the positive, (We follow a *potential* model rather than a *deficit* model. Walker, 2012) it cannot be said that the leadership project has yet achieved its goals, nor is it even clear that the efforts of the faculty are on the right track. One goal of this paper is to highlight the messy details of faculty attempts to use student leadership (Simonsen et al., 2008).

### Research on Student Leadership

The faculty reviewed research on student leadership in meetings devoted to the project. Schneider, Ehrhart, and Ehrhart (2002) studied high school students identified as leaders. They found that faculty and peers tend to identify the same students as leaders and that the trait was consistent over a two year time frame. Surprisingly, popularity and student friendships were found to be distinct from leadership. Grade point average was positively correlated with leadership. The Myers-Briggs personality dimension *judging-perceiving* was also correlated with leadership: student leaders tend to seek concrete results and closure (the judging/sensing end of the spectrum) versus taking a flexible process orientation yielding open-ended results.

Kouzes and Posner developed an instrument to identify and measure student leadership at the college level: the Student Leadership Practices Inventory (1998; updated by Posner, 2004). They labeled five categories of leadership behaviors as "Modeling the Way, Inspiring a Shared Vision, Challenging the Process, Enabling Others to Act, and Encouraging the Heart" (Posner, 2004, p. 444). "Enabling" and "Encouraging" (p. 452) were found to be the most common leadership behaviors. The finding that leaders have impact by motivating others to act supports the decision by the faculty in this study to focus on lead students in order to influence the practices of the whole class.

### Discussion

Under the direction of the principal and department chair I took an active role in the leadership project. I conducted over 20 interviews with the principal, mathematics teachers, other teachers, and school administrators over a period of three months. (There are 16 high school faculty, including three mathematics teachers. Three middle school mathematics teachers were also interviewed.) An online survey gathered faculty opinions.

Based on these interviews and discussions some faculty opinions are clear. Focusing on student leadership is popular among teachers. Among priorities for professional development it ranked second of six topics according to the faculty survey. It continues to be a consistent topic at our faculty meetings. The impetus comes from the faculty; unlike much of the teachers' project work, it is not mandated from the top.

Identifying student leaders is not difficult for teachers. We took only a few minutes working in groups to identify 15 of the 75 sophomores as potential leaders, for example. We recognized the importance of taking the students' point of view: these are leaders that the *other students* look up to, not necessarily those who teachers found admirable. Furthermore, we found a plentiful supply of student leaders even in the least disciplined or academically successful classes. There is no shortage of students with leadership potential.

Methods to develop these students need to be refined. We shared methods from our classrooms: designating a student to head each group during group work, soliciting their opinions on student matters, and putting them in charge of classroom functions. We have attempted to be more rigorous, for example drafting a rubric to evaluate the group leader (and sharing that feedback with him or her), but it seems that even the most experienced of us are following an ad hoc approach. We put a high priority on one-on-one faculty attention. A teacher was designated to mentor each identified student (the same is done for at-risk students); however, we did not tell the students that they had been designated as leaders.

A student-centered classroom is more suitable for developing student leaders and benefiting from them. This may seem obvious, but the more the teacher cedes the center stage the more students go to the board to work problems, remember to hand out and collect the homework, and take a turn explaining a concept. In our classrooms, several individuals or pairs may be working problems at the front while the teacher walks around the back of the classroom, whispering suggestions for a student to speak up regarding a key point, or quietly checking a student's answer to give him or her the confidence to risk putting it on the board.

Our emphasis on student leaders seems to be bearing fruit. Reflecting on the performance of a class observed during a recent third-party quality review, we marveled at their progress. The reviewer praised their engagement and candid discussion. A student, selected as a potential leader but also once a troublemaker with a poor disciplinary record, is now commonly at the board explaining mathematics to his peers and encouraging others to do so.

Our work has only begun, particularly with respect to how to develop the students' leadership behaviors, but the project seems to have gained commitment from the faculty and administration, and it may be a key to promoting mathematical practices among all of our students.

## References

David, J. L., & Cuban, L. (2010). *Cutting through the hype: The essential guide to school reform. Revised, expanded*. Cambridge, MA: Harvard Education Press.

Kouzes J., & Posner, B. (1998). *Student leadership practices inventory*. San Francisco: Jossey-Bass.

National Council of Teachers of Mathematics (NCTM). (2000). *Principles and Standards for School Mathematics*. Reston, VA: Author.

National Governors Association Center for Best Practices & Council of Chief State School Officers. (2010). *Common Core State Standards for Mathematics*. Washington, DC: Author.

Posner, B. Z. (2004). A Leadership Development Instrument for Students: Updated. *Journal of College Student Development 45*(4), 443–456. The Johns Hopkins University Press. Retrieved January 5, 2013, from Project MUSE database.

Schneider, B., Ehrhart, K. H., & Ehrhart, M. G. (2002). Understanding high school student leaders: II. Peer nominations of leaders and their correlates. *The Leadership Quarterly, 13*(3), 275–299.

Siegel, M., Borasi, R., & Fonzi, J. (1998). Supporting students' mathematical inquiries through reading. *Journal for Research in Mathematics Education, 29*(4), 378–413.

Simonsen, B., Fairbanks, S., Briesch, A., Myers, D., & Sugai, G. (2008). Evidence-based practices in classroom management: Considerations for research to practice. *Education and Treatment of Children, 31*(3), 351–380.

Walker, E. N. (2012). *Building mathematics learning communities: Improving outcomes in urban high schools*. New York, NY: Teachers College Press.