A Leadership Perspective on Implementing a STEM Initiative

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Purpose, Background, and Context

The purpose of this article is to illuminate leadership perspectives on the implementation of a project-based, interdisciplinary approach to urban high school transformation using a science, technology, engineering, and math (STEM) focus. For several years, Cleveland High School has been one of Washington State's lowest performing high schools. However, recent data suggest that the school is making progress towards overall improvement. In the last year, the attendance has increased from 84.6 percent to 89 percent (over 5 %). On the Measure of Academic Progress (MAP) there has been a 7 percent increase in 9th grade reading and an 11 percent increase in 9th grade math. Further, there has been a 17 percent increase in 10th grade reading.

It is particularly significant to note that, although the national index for school improvement is 1.0, Cleveland High School has achieved a 1.5 index rating in 9th grade math and a 1.4 index rating in 9th grade reading.

As is the case with many schools across the United States, Cleveland High School has attracted significant attention from concerned stakeholders. As a consequence, school staff have initiated and adopted a range of school improvement approaches, with the most comprehensive change occurring in SY 2010-2011. During this time, Cleveland:
- shifted from a neighborhood school to a school drawing students from across the district,
- developed into two schools, each with a unique science, technology, engineering, and math (STEM) focus,
- incorporated a project-based interdisciplinary approach to teaching, and
- integrated the comprehensive use of technology.

This article examines lessons from recent changes, drawing on data from a 90- minute semi-structured interview with one of the school leaders and an author of this article, Assistant Principal Chris Kinsey. Given his permission and the school's, we use Mr. Kinsey's real name.

A semi-structured interview has a formalized, limited set of questions but is flexible, allowing new questions to emerge during the interview as a result of what the interviewee says. As a semi-structured interview, the interviewers had an initial set of questions that were intended to elicit leadership perspectives on transformation to a STEM school.

Methods

Data were collected by two graduate students and a University of Washington professor during a one and one-half hour interview with Chris Kinsey, one of two assistant principals. Each of the assistant principals leads one of the two themed schools at Cleveland. Mr. Kinsey leads "The School of Engineering and Design." The interview questions focused on Mr. Kinsey's experiences with and insights into the school's recent transition process and were divided into three categories. These categories were 1) the experiences of teachers, administrators, and students at Cleveland High School, 2) the school's preparation for the transition to a STEM school, and 3) challenges of school change.

The Broader Research Context

Although this article draws from one data source, the interview questions emerged as part of a broader study of school change focused on the experiences and perspectives of Cleveland High School students, teachers, and administrative leaders. The broader study involved 14 graduate students from the University of Washington-Seattle in cycles of action research. Acting as "participant-observers" and volunteers, graduate students met at Cleveland High School over a 10 week period. On- site participation allowed graduate students to visit classrooms on a regular basis, shadow students through their school day, serve as judges of interdisciplinary projects, convene focus groups of students and teachers, and interview administrative leaders.

These experiences provided the context for graduate students to learn about action research focused on school change in ways that held reciprocal value for the school. In other words, while graduate students had an authentic context within which to practice research methods and study issues of urban school renewal, Cleveland High School had a team of onsite "researchers" and volunteers to assist with their process of ongoing program improvement. For the interview with Mr. Kinsey, graduate students sought to probe more deeply into questions that arose for them as a result of their participation at Cleveland.

Professional Relationships and Theoretical Premises

In addition to providing context regarding the nature of the interview questions, it is also important to note the relationship that had been developed over time between Cleveland High School and the University of Washington.

Briefly, the UW professor had an existing relationship with the school which included assisting the school with developing a theoretical platform for launching and uniting a range of change initiatives. Given some of the historical tensions between on-the-ground educators and researchers from higher education who study the work of schools, these relationships provided a reasonably accessible context for reliable insights.

The relationship between the UW professor who taught the action research course, and who is one of the authors of this article, and Cleveland High School evolved over four years, with three different principals, and two different superintendents. Two years prior to the interview, the professor co-founded The Center for Action, Inquiry, and Motivation (AIM) to provide on-site support for five components of school change that are associated with significant school improvement on multiple indicators of effectiveness, such as test scores, attendance rates, discipline referrals, and so forth. These components are:

- a shared pedagogical language
- multiple approaches to instructional collaboration
- routine use of data to inform instructional decisions
- a strong team of teacher leaders and stakeholder-advocates
- a school identity or signature about which other schools seek to learn.

The school had been working with the professor to develop these five components as a platform for change.

Data Analysis

Data analysis was an iterative process that began with data collection. Notes were made during and at the end of the interviews. These notes included quotes, descriptions, and impressions of the information that Mr. Kinsey shared. Notes helped to shape subsequent interview questions. Although data were not recorded, researchers compared their notes and impressions for accuracy immediately after the interview. Data were then coded to identify recurring themes and concepts. Some codes, such as "preparation" and "challenges" were created prior to the categorizing stage of data analysis based on experiences, relevant literature, and the study's primary research questions. Other codes, such as "a focus on students", "the importance of relationships and transparency," "the importance of reflection", and "new ways of measuring success" emerged from the process of reading and rereading the transcribed interviews.

Notes from the interview, informed by literature on school change (Seashore-Lewis, 2010, Fullan, 2002, Elmore, 2007) were coded, categorized, reviewed and summarized in narrative text to articulate emergent findings. An outline of research questions and raw interview data that address the primary purposes of this interview are provided in "Exhibit 1.1." (These notes were provided courtesy of UW graduate student, Julia Warth). Given the brevity of this article, raw data are provided as an opportunity for readers to engage in sense making related to their own experiences, understanding of literature, and research interests (see Appendix).

Discussion

The analysis we provide is preliminary. However, one broad category of concern has emerged and it has been corroborated by multiple reviewers. It is consistent with research on major change initiatives (Louis & Gordon, 2006; City, et. al, 2009) and it resonates with administrative leaders and teachers. This theme, which we entitle, Identify and Communicate Strategies to Work Effectively with High Levels of Stress, has three primary subcategories: be transparent, maintain the centrality of students' learning needs, and encourage collaboration and reflection.

Identify and Communicate Strategies to Work Effectively with High Levels of Stress

Even under ordinary conditions, the need to effectively manage stress within the school community is a significant aspect of educational leadership (Fullan, 2002; Goldberg, 2006). An everyday responsibility of school based leaders is to simultaneously buffer the ebb and flow of a host of policy impacts on students, families, and members of the broader community. Complex change initiatives such as Cleveland High School's transformation to a STEM school, pose a particular challenge. "How-to" manuals and professional development seminars are often insufficient because local contexts differ and a vision of "success" is a work in progress. At Cleveland High School, stress on *all* stakeholders was exacerbated by pressure to rapidly restructure, responsibility for defining uncharted territory regarding STEM implementation in this particular district and school, accountability for providing evidence of effectiveness that represents *and* encourages student (and teacher) learning and motivation, and need for reliable and predictable resources to support ongoing professional growth and development.

When asked what Mr. Kinsey would like others to understand from this interview, without pausing he stated, "Change is hard!" "Leaders need to make sure that other people understand that a school is changing in the right direction."

Be transparent

A theme that Mr. Kinsey frequently emphasized was transparency. Interview data suggest that transparency relates to communicating expectations and listening well. Yet transparency, alone, can contribute to widespread insecurity and concern. Interview data suggests that lessons regarding transparency include:
- Combine expectations with discussions about resources and support
- Understand that transparency requires two-way listening and communication
- Emphasize aspects of existing and widely agreed upon priorities that will continue.

At Cleveland, when leaders announced that change or closure was inevitable, they simultaneously discussed resources and activities that would assist teachers in

developing the skills needed for project-based learning and technology integration. This was also an approach they used in communication with students. Although many students initially responded, "hell no - more math and going to school longer than anyone else in the district?" they were also intrigued by one to one technology and an education that was considered to be "cutting edge."

Leaders were also clear about the ways in which new skills could be united with the school's existing instructional framework of the 4R's (relationships, relevance, rigor, and results). On several occasions, leaders referenced and demonstrated how project-based learning could be designed, implemented, and improved with the 4R's serving as a pedagogical compass.

Further, leaders openly acknowledged challenges, including the challenges of implementing change that is instructional as well as structural. They consistently engaged with teachers in conversations that led to an understanding that "...in many ways implementation could feel like student-teaching all over again," and "project-based learning would be a major pedagogical shift—teachers would need to move away from being head of all knowledge in the classroom."

Interview data also suggests the need for transparent *two-way* communication. According to Mr. Kinsey, leaders tried "to listen in-depth, by watching people's actions, not just what they said." To respond to teachers' concern that they would need to put in 70-80 hours a week but would not receive fiscal compensation, leaders were vigilant about using time well. During the implementation year, planning time for teachers was protected to encourage collaboration on project development. Upon reflection, Mr. Kinsey noted that while this was essential, there were additional needs that surfaced for which time had not been as clearly brokered. For example, teachers became aware of their need to more fully understand "...how to manage laptop use..." and to teach students to say, "Here is what I need to know." Further, home visits, a valued initiative to enhance communication and cultural competence, were sidelined to make room for significant competing priorities.

Maintain a focus on students

A second prominent theme that presented itself early in the interview and remained constant throughout was the importance of maintaining a focus on students. As previously mentioned, at Cleveland High School this included the need to continuously increase work toward cultural competence—given that "most teachers don't live in the community and struggle in the same way the families do."

To address this, leaders asked teachers to continue work they had been doing over the last two years – setting professional goals in ways that connected to the progress of four very different kinds of learners. At Cleveland, each teacher maintains a sharp focus on student learning and instructional improvement by becoming particularly aware of the lives, interests, and academic strengths of four different learners. At the beginning of the year, leaders work with each teacher to select two low-performing students, as well as a middle- and a high-performing student, each of who could serve as a touchstone for strengthening instructional practice.

According to Mr. Kinsey, "When teachers were asked to pick four students, it forced people to build relationships. Teachers had to look at reasons for struggle, for getting by, and for success to help plan lessons that would help students succeed... It created intentional planning that pushes every student." In many ways following the progress of four students reinforced the connection between professional development and accountability as reciprocal processes. This idea is substantiated by several theorists, among them Richard Elmore. Elmore (1996) reiterates what Mr. Kinsey has learned from experience and has been working with colleagues to confront "...most educational reforms never reach, much less influence, long standing patterns of teaching practice, and are therefore largely pointless if their intention is to improve student learning...when schools seem to be constantly changing, teaching practice changes so little and on so small a scale" (p.6). He adds, "The core of schooling, defined in how teachers relate to students around knowledge, how teachers relate to other teachers in the course of their daily work, how students are grouped for purposed instruction, how content is allocated to time, and how students' work is assessed – changes very little. The changes that do tend to stick are those most distant from the core" (p. 7).

Encourage collaboration and reflective practice among educators

A third theme that is evident through the data is the importance of collaboration and reflection, or collaborative reflection, on the learning process. These practices provide a way for educators to access shared knowledge, reassess assumptions, and ask better questions about improving instruction. At Cleveland High School collaboration had several purposes. It served as a reminder of "... the power of the group coming together." It provided a context to "build the program from within the school and from the ground up." Finally, it allowed teachers to share and vet projects in professional learning communities. This may be one of the reasons that "all teachers are now doing projects," and "...student presentations are announced to all staff to create authentic experiences for kids to present."

Future Research Directions

The analysis of data is preliminary. Further, the themes from a single interview, however rich, require corroboration. In addition to interviews with other educational leaders at Cleveland and beyond, a comprehensive understanding of change requires perspectives from and research partnerships with

teachers, students, family members, district staff, and community partners. Catherine Lewis (2006) refers to this as "local proof." As the co-authoring of this article with Mr. Kinsey suggests, local research partnerships with K-12 educators provide an opportunity to more accurately represent and intellectually probe the real work of committed educators who are doing it.

Appendix

1. How did you get to this point in leadership and work in your career?
   - *This is my 11ᵗʰ or 12ᵗʰ year with the Seattle School District*
   - *Called by district to go to Cleveland High School with Princess Shareef*
     - o *School needed a leadership change*
     - o *This is my 3ʳᵈ year here*
     - o *The first year we focused on instruction and were also placed on the school closure/transformation list*
     - o *The second year was spent planning STEM transition*

2. What would you like to be sure to communicate through this interview?
   - *Change takes time and is hard!*
   - *I want to communicate change is moving in the right direction.*

3. For the past three years, teachers have selected and followed the progress of four students who were touchstones for differentiating curriculum. The sample included two low-performing students, a middle performing student, and an academically advanced student. Describe why you thought the idea of following four students would be a productive way for faculty to learn and how this may influence your current understanding of effective implementation of STEM.

   - *Following 4 students emerged from our home visits. Each teacher was asked to visit the home of 4-5 students.*
   - *Teachers had to look at reasons for struggle, for getting by, and for success to help plan lessons that would help students succeed*
   - *Two students who were struggling were chosen by each teacher because one might drop out*
   - *Another reason home visits were important is because they moved us beyond classroom instruction and required the adults to make themselves vulnerable as well*
   - *When you look at the commonalities between kids who struggle and the struggles of successful students you take into account everyone's strengths*
   - *Creates intentional planning that pushes every student*
   - *Increase cultural competence—teachers don't live in the community and struggle in the same way the families do*

   - *Lesson studies helped—all bringing the perspectives of the four different students*
     - o *Helped with improving practice*
     - o *Created a safe opening to be effective and reflective practitioners*
     - o *More powerful reflection comes out of being in groups*
     - o *Keeps yourself grounded in remembering that these are the kids we are serving—how does professional development impact student learning in addition to adult learning*

4. As you think about products and conversations related to teachers following four students, what is an outstanding example?

   - *We have strengthened common planning time for teachers and are using exit tickets with reflective questions to continue conversations*
     - o *Always thinking about who's struggling and are we pushing the high-achievers*
   - *The higher-achieving kids are not on track to make yearly progress—we need to push everyone*
   - *Reflective writing has been part of the process. It is personal and authentic—the collaboration comes when you share it out*
   - *There have been some amazing portfolios detailing how following four students has changed teachers as educators*

5. When you look back at last year's professional development related to preparing for implementing STEM, what aspects of it were particularly significant? What would you do to ensure even greater support?

   - *We were very transparent—this is where we are going and this is the professional development to go along with it*
   - *The week before school started we focused on "what was it like to be in high school?"*
     - o *It was a week of writing and modeling instructional practices*
     - o *Math, science, and social studies teachers prepared lessons that teachers were "students" in—revealed expertise—powerful that it was teachers themselves, not outsiders coming in to model*
   - *Preparation included not only STEM but full-inclusion—special education kids in general education classes, getting the same curricula, and English learners in general education classes, as well.*
   - *Project-based learning was a major pedagogical shift—Teachers had to move away from being head of all knowledge in the classroom*
   - *We also needed more support for kids who had*

not learned this way before.
- *We had quite a bit of externally imposed professional development because of STEM focus.*

6. What have been some of the greatest challenges to implementing STEM? What have been the greatest successes?

- *It is important to acknowledge the challenges— wanted to walk away, which has never happened before*
- *Selling it to the staff, students, and community was a challenge*
- *We asked staff to completely change the way that they teach and how they are evaluated, but we didn't know what that looked like at the time*
- *When something like this becomes public, you see how much work is needed on cultural competence*
- *Developing the program was a challenge—what does it look like? There is no curriculum out there, built from the ground up*
- *Financing and the master schedule a challenge*
- *Politics—board, district office—school had to act like a buffer, administration shielded teachers from the distractions of politics, but still had to give opportunity to plan and advocate for school*
- *Finding time to coordinate*
- *Implementation year was the hardest, like student teaching all over again*
- *How do you ask someone to put in 70-80 hours a week but not get paid and make the time seem valuable?*

7. Successes

- *Last summer the entire staff went to a week-long institute in Indiana. Taking staff to Indianapolis was a success*
  - *There was power of the group coming together*
- *The number of people that opted in with blindfolds on—really wanted this to happen*
  - *Building program from within the school and from the ground up*
- *All teachers doing projects now (math is primarily problem-based rather than project-based)*
  - *We share projects in professional learning community, get together and plan—would like to see teachers vet projects more, but trust them to use the time for what is most effective for them*
  - *Student presentations are announced to all staff to create authentic experiences for kids to present*

8. When implementing STEM, what was the response among 1) teachers, 2) students, and 3) the community?

- *The initial teacher response: We gathered all the teachers in the auditorium before the board meeting to tell them what will be happening— either closing or transform*
- *Rollercoaster for teachers—allowed leaders to listen in-depth, by watching people's actions, not just what they said*
- *Student response: hell no, more math and going to school longer than anyone else in the district*
- *Started to sell to students—one to one technology, yes we'll have more school, but education is cutting edge*
- *Community response: Another change? Want to do it all again?*
  - *When the new Cleveland was built, was designed to have four small academies—didn't work, how will this be different?*
  - *Make an opportunity for kids in the South end, not for North end kids who can't get into another prestigious high school.*
  - *Community invited to be involved in planning—parents and partners*
- *Still a disconnect between what the industry wants from the high school and what colleges want—part of professional development*
- *Cleveland is an option school, not a neighborhood school*
  - *Had to sell the school at every middle school PTA meeting*
  - *No one was assigned to the school, kids had to choose to enroll*

9. What numeric evidence or qualitative anecdotal evidence do you have to show that the teaching and learning are improving? What kind of evidence would you like to collect in the future?

- *9th grade attendance rate is higher*
- *Anecdotal success—kids/culture, doing projects, working in halls*
- *MAP scores—need to push higher achieving kids more, but doing well with lower-achieving kids*
- *Would like kids to keep bi-monthly reflections/journal*
- *State tests keep changing*
  - *Need 74 and 70 students to pass writing and reading, respectively, to meet improvement goals*
- *District climate survey at the end of the year— want one for the beginning and the middle of the year*
- *Go back to home visits—need more hard questions, attendance, grades, not just open-ended*
- *Vision and mission for school/STEM is more clear*
- *Get staff and students to write a personal*

manifesto related to the vision and mission at the beginning of the year and at the end

- *Measure kids by presentations—afraid to speak at the beginning of the year, now can't get them to stop at the time limit. The documentation and comments of project judges from the broader community provide evidence of students' strong performance and learning.*
- *We have insights from community members who help us be transparent and reflective – who to come to Cleveland and see what we are doing*
- *Getting more real*
  - *Business and industry: here is what you are learning and how we use it out in the real world*
  - *Same with higher education*
  - *How to collaborate, think critically*
  - *Show teachers and students how this is applied*

10. If you could alter one thing about the way in which STEM was implemented at Cleveland, or were giving advice on STEM implementation for a future school, what would it be?

- *Be authentic!*
  - *Create meaningful change for community and staff*
- *Keep students at forefront of planning*
- *Regarding Change-*
  - *Would have liked to have started at just 9th grade and rolled up*
  - *Should we have rolled it out throughout the year?*
  - *We were exhausted by winter break*
  - *Admin consistently asks, How could we have better supported implementation?*
  - *Need to evaluate initiative support*
- *Did not anticipate the need for some professional development*
  - *How do you manage laptop use?*
  - *How do we scaffold adult learning?*
  - *How do you teach a kid to say, "Here is what I need to know"?*

11. Are there any other thoughts you would like to share?

- *Would like the acronym to be STEAM, the arts are taking a hit with the focus on STEM (With this in mind, Dr. Ginsberg would like us to be STEM – Significant Teaching for Equity and Motivation).*
  - *Studies show that arts students are college-bound, need to help them too*
- *We need to continue our emphasis on the four Rs - Relationships, Relevant, Rigor, and Results - and ensure that equity is a core value in what we do here*
  - *The 4R's may not come up in every conversation, but teachers will be able to talk about in every lesson plan*
  - *Personally, I ask: How can I find things that are refreshing and revitalizing?*

- *Want to be with kids, not in the office*
- *Have to surround yourself with the very best, we have done that*
- *Lucky to have a great group of kids—they chose to come here*

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