Focus on Improving Freshman Achievement in Algebra

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Professional Responsibility: This project has been reviewed by collegial professional peers and has been submitted for online publication before being evaluated by faculty members from Portland State University. I am the author and take full responsibility for the project’s contents and quality. This work serves as a baseline for my professional school counseling skills and demonstrates what I have done to develop and/or assess my actions directed toward serving students and schools. In other words, this is a snapshot of my work at this stage in my career.


Abstract
The purpose of this paper is to present an action research project involving math achievement among high school freshman students in first year Algebra. Our action research involved monitoring high school freshman performance in Algebra and collaborating with school staff to improve achievement.

**Introduction and Review of Literature**

Throughout our lives we experience a continuous flow of transitions, or rites of passage. Two very important transitions take place during adolescence; entering into high school, and leaving high school to begin the journey of adult life. High schools have a responsibility to ensure as smooth a transition as possible at both ends by easing the move from 8th to 9th grade and providing students with the knowledge and tools they need to be successful and take ownership of their high school years as well as their career and life pathways after high school. Cooney and Bottoms (2002) express that “one of our nation’s most challenging tasks is to help students successfully transition from middle to high school with a demanding program of study”, and “if we continue with the present system, too many students will not complete high school or will graduate from high school inadequately prepared for further study or the workplace “ (p. 41).

My district, Urban Public Schools, is a diverse community that includes students from a wide variety of family backgrounds; wealthy, educated families for whom college has always been an expectation, working class families, recent immigrants, and many students living in poverty. Urban High School, where I work as a counselor, is a microcosm of the district as a whole, comprising all of the ethnic and socio-economic backgrounds that exist in our city landscape. In an effort provide all students in Urban City with an education that will adequately prepare them for a successful future, our school district is actively working on
Focus on Improving Freshman Achievement in Algebra

Ways to increase student retention and success while establishing equity within all high schools. It is looking particularly closely at programs geared toward ninth grade academic success and retention. At the district level, this has included the encouragement of smaller learning communities among all district high schools, as well as a more regulated system of articulation between middle and high school teachers, particularly with the math curriculum in efforts to ease the transition from middle to high school. It is vital that high schools do more to help ninth graders successfully make the transition to high school, attempting to reduce any stress and anxiety they might feel. If a student gets off to a rough start in freshman year, it is often difficult to overcome, they feel behind and overwhelmed and thus are at greater risk of dropping out. Studies have shown that students who are discouraged academically are more likely to leave school. “Poor academic performance is the single strongest school-related predictor of dropping out” (Woods, 2004).

While Urban Public Schools has continued to increase standards and graduation requirements in the last few years, high schools are working to develop systems to help students be successful within the changing climate, and ensure students are being supported under the increased demands with the ultimate goal of keeping students in school and increasing graduation rates. My high school is in the process of implementing several programs to help in transitioning our freshman into high school. In fall of 2004 all of our freshmen entered high school as part of an “academy”, which groups ninety students together with three core teachers and a counselor. Several other programs were also put into place in 2004, including a mentoring program in which eighty upperclassmen met with freshmen in small groups on a monthly basis, with the idea of building a connection among freshmen to older students within the building. We also began a program called “Leg Up” for 25 students
identified as ‘at risk’ by their middle school counselors and their RIT test scores, and some ESL students were included as well. Last year forty letters were sent out inviting students to join the program, with twenty students actually participating. This year we are hoping for twenty-five students. “Leg Up” students attend a two-week summer program before entering their freshman year where they get small group instruction around writing and math curriculum. They also receive study skills help and engage in bonding activities so they feel a connection to some students right from the beginning of the year. Counselors are actively involved in all of these programs, which have helped us make an increased connection with our ninth graders.

In addition to the focus on retention and student success, high schools are also under pressure to turn out better-prepared students who will be able to effectively compete in what is becoming an increasingly global economy. High school students need to leave school with the tools to be successful in later life, among which are “the ability to retrieve and organize information; respond orally and in writing to a variety of demands; use algebra, geometry and statistics to solve problems, and understand and use technology effectively” (Cooney and Bottoms, 2002). Urban City Schools is addressing this with more demanding graduation requirements. Beginning with the class of 2009, students will need twenty-four credits to graduate instead of the previously required twenty-two. They will also be required to complete three years of math and science, instead of two. To meet these increased needs and demands, high schools will need to reconsider their inherent structures as large, departmentalized entities and develop ways in which teachers, administrators, and counselors work differently to better serve their students.
Just as smaller learning communities can foster a sense of belonging and mutual purpose in high school students, in order to be successful, high schools must move from being so departmentally separated and learn to work together as more of a community. Data is potentially useful in driving this process. The use of data can assist in establishing a collaborative decision-making process where school staff work together to effect change (Love, 2000 & Lachat, 2001). Used well, while projects using data act as a conduit for knowledge and conversations that can lead to change and improvement in educational practice.

Within the context of a changing school culture, the role of the counselor is changing and shifting as well. While the impact a counselor has on student success can be profound, the call for accountability from all stakeholders in the school structure has had counselors involved in a paradigm shift regarding their place and roles in school. An important change has been the transition of the counselor role from working in isolation to working in greater collaboration with other members in their school and local communities as participatory leaders. The Oregon State Framework for Guidance and Counseling (2003) calls for school counselors to be more involved in systemic change, questioning policies and programs that do not successfully promote student achievement. According to Lewis & Borunda, (2006) counselors working as participatory leaders engage in dialogue with other school personnel, the community, and students themselves in the interest of engaging and advocating for student participation and success. As participatory leaders counselors “provide leadership, responsibility and coordination to move the dialogue beyond the symptoms and toward effective democratic solutions” (p.9).
It is with this new and changing role of counselors in mind that the Urban School District embarked on a collaborative process with the Educational Trust Foundation in 2004. This process has involved all district counselors in action research projects at their school sites, the goal being for counselors to work collaboratively with teachers and administrators on a project geared toward improving student achievement, based on the results of data from the project each school chooses. Following is a description of the project at Urban High School, with a summary of results thus far.

**Project Background**

Urban City Schools is currently working to develop strategies to create equal access to quality education for all students, and to close the achievement gap among its students of diverse racial and socioeconomic backgrounds. School counselors are integral to student success but have not always had data and outcomes to show this. Beginning in 2004, Urban City Schools partnered with the Education Trust organization in Washington D.C. to work with high school counselors in identifying a particular area of need in their schools, and design a project that they could be involved in to help address that need, ideally through working as participatory leaders in their school communities. Through this series of workshops with the Education Trust, counselors have been introduced to the importance of collecting data to show the impact they have on student achievement in school, creating a more visible role for themselves in the midst of current school reform movements. High school counselors collaborate with their curriculum vice-principals to identify a particular area of need in their schools, and then create a project using data to effect change, as well as to measure whether change has occurred. This professional development experience for counselors focuses on the following five themes:
• Working as leaders to promote access and equity for all students
• Using data to change policy and practice
• Advocacy for systemic change
• Taking Action to help all students meet high standards
• Using results to drive next steps

This professional development program is intended to proceed in three stages. In 2004-05, each counseling team, together with an administrator and teacher, identified an area of need in our high school. Our counseling department gathered data that supported a need for intervention in this area. We then began to implement a project, which was highlighted by our counseling department completing a power point presentation in May of 2005. This year, we have continued working on the same project, carrying it further, and presented our results in a power point presentation in a May workshop. Next year will be the final segment where we will take our projects further using data to measure how well our interventions are working, and how they have made an impact with student achievement.

**Project description**

The project my counseling department, together with our vice-principal and one math teacher, chose revolves around student achievement in mathematics, particularly Algebra 1A-1B / 2A-2B (1st year Algebra broken down over two years) and Algebra 1-2, which is considered the grade-level math course for all freshmen. Beginning in the fall of the 2004-05 school year, Portland Public Schools eliminated all math classes lower than Algebra (i.e. Pre-Algebra and Math Foundations) from all of the high schools. This meant that students, no matter what their math background, would be starting in at least Algebra 1A-1B their freshman year. This was a concern to us as counselors because we have seen that not all
students have had, or mastered, pre-algebra in middle school. We did not want this new policy to bring up barriers for students to be able to successfully finish their math requirements in high school.

Incoming freshmen in the 2005-06 academic year (graduating class of 2009) were held to the higher math standards, and in addition were the first class to experience increased graduation requirements being instated by the district. The class of 2009 will need twenty-four credits to graduate instead of the current twenty-two. They will also face an increase in requirements from two years to three years in math and science credits. Our district has a valid reason to require increased math levels for graduation. Having the necessary level of math (second year Algebra) is a gateway to college, since all four-year colleges require this as a minimum level of mathematics for admittance. Increasingly, it is also a gateway to many professions such as contracting, metalworking and aviation technology. Many of these programs at the community college level require applicants to have high school Algebra, Geometry, and increasingly, second-year Algebra for admission. The new math standards will help ensure that all students are getting the curriculum needed for entrance to a 4-year college or trade programs. However, they present additional challenges for those students who have begun high school under-prepared academically. Given the changes in math curriculum and graduation requirements for math, as well as data showing poor math performance at the lowest levels (Algebra 1A/1B) we decided to focus on math achievement for our action research project.

**Year One, 2004-2005**

The premise of our project during the first year (2004-05) was to compile and compare failure/success rates of freshmen in Algebra in the year before the new policy took place (2003-04
academic year) versus after, to see what effect, if any, the new policy had on student success/failure rates in Algebra. We found that there was not a statistically significant change in math achievement in the two years (2003-04 and 2004-05) involving this transition. The data indicated that the district’s decision to stop offering Math below the Algebra level to freshmen did not have the negative impact many people anticipated. However, the number of student failure rates in Algebra, though not worse than the previous year were still unacceptably low.

We began at the end of the first quarter grading period in November (these grades do not appear on the student transcript but are an indication of where the student is mid-way through the semester), by collecting data on how many Algebra students were receiving a C or better. At that point, only 37% of Algebra 1A-1B students were receiving a C or better, while 66% of students in Algebra 1-2 were receiving a C or better. Since quarter grades do not appear on the transcript, we felt we had time to intervene and hopefully use our findings to help students improve learning and grades before the end of the semester. We took our findings to the math department, who met the info with varying degrees of interest. We attempted to brainstorm with them to find ways student achievement could be improved. They decided they would look at their curriculum and add some pre-algebra review and mandatory Thursday morning tutorial attendance for students. They were also going to work with our special projects coordinator to implement an after-school tutoring program. Unfortunately, this latter intervention never got off the ground.

At the semester, we saw some improvement, with the percentage of students receiving a C or better in Algebra 1A up from 37% to 53%, and Algebra 1 from 66% to 74%. These percentages were an improvement, but still unacceptably low. As a counseling department, we went to the administration and math department and advocated strongly for a free, after school credit recovery class so that students who had failed Algebra in the first semester could make up the grade. The
administration and math department agreed. The credit recovery class was announced in the math classes, and the counselors called in students who had failed to encourage them to sign up for the class. Unfortunately, only three students signed up, so the class was not offered after all.

While grades went up marginally from the first quarter to the end of the first semester grading period, that was offset by a dramatic decrease in grades at the end of the second semester. The number of Algebra 1A-1B students with a C or better went from 53% to 40%. For Algebra 1-2 students, the percentage of C or better grades went from 74% to 62%.

At the end of the first year of our project, we felt that the data we had collected illuminated a fundamental problem in the way we were addressing Algebra as a school. With this information, we hoped to address the issue earlier the following year with the math department and administration.

**Year Two, 2005-2006**

With the beginning of the new school year, we met with our vice principal to discuss our goals this year with addressing math achievement. Our goal was to have at least 75% of all freshmen pass Algebra with a C or better. Working with our special projects coordinator and one math teacher, we started a peer-tutoring program early in the semester, where juniors and seniors volunteered during tutorial, after school, or during lunch, to help students who were struggling. A small percentage of students used these tutors regularly, but again, despite publicity on the part of the math teachers and counselors, this program remained largely unused by those students who needed the extra help.

At the end of the first semester our counseling department and vice principal compared grades of all freshmen Algebra students for the fall semester 2004 with those from fall 2005. Even with the intervention of tutoring and some curriculum change by the teachers, the percentage of students receiving a C or better was almost identical between the two years.
As a counseling department we felt very frustrated because we had hoped that by sharing the data we had on failure rates with the math teachers and administrators, we could pull together and work on a solution that would really benefit the students. We felt that what had been put into place was often halfhearted and that the math department’s response was to put all responsibility on the failing students, who either never came to class, or didn’t try hard enough when they were there.

What could we do as counselors to be more hands on and have more impact in this project? We had hoped to work as participatory leaders along with our administrators and math department, but it seemed at times that we were sharing information that no one wanted to hear. We realized at that point that we hadn’t included the most important stakeholders, the students, into our previous discussions and we decided we needed to hear from them directly. We developed a survey to find out the students’ perceptions on why they weren’t doing well in math, and then pulled them out of class in small groups to discuss the surveys, remind them of the resources available, and brainstorm things they thought would be helpful. We walked students over to the room where they could sign up for a peer tutor (on the survey 45% of students said they would like a tutor, yet only 5% had signed up for one). We knew that many of the students failing math had poor attendance or were limited English speakers. What we also found was that almost half of the students said that they had always done poorly in math and had difficulty understanding it. Could that be one of reasons behind their skipping class?

In addition to our survey and meetings with students, our vice principal got involved by having the math teachers make Thursday morning tutorial mandatory for all students with a D or F at any time in the semester. If a student was assigned tutorial and missed, he or she
was assigned detention, and our administrative intern would follow up with a phone call home to parents.

These interventions seemed to have the most effect on student performance for the Algebra 1A-1B students. At the third quarter grading period, 64% of this group had a C or better, up from 53% at the semester. Five more students had signed up for tutoring. The Algebra 1-2 students, on the other hand, actually dropped a percentage point, from 73% to 72% passing with C or better. By June, grades had dropped back down, particularly for the 1A-1B students, but were still slightly better than the previous year.

![Final Data 2006](image)

**Year Three, 2006-2007**

In the 2006-2007 school year, the Portland Public School district will carry the math curriculum change a step further by eliminating all Algebra 1-A/1-B and 2-A/2-B math classes. All freshmen will begin high school in Algebra 1-2. The argument for this change is that raising expectations will encourage students to rise to the challenge and have increased options after graduation. In conjunction with the new curriculum requirement, the district has adopted a new math textbook series that includes a second-year, hands-on Algebra textbook for students who are not successful with Algebra their first year. My counseling department
plans to continue working with all stakeholders to advocate for changes that will increase
student achievement in Algebra.

**Reflection**

This project is currently a work in progress. We have been able to use data to advocate
for some important changes in math access for students, although not to the extent we had
hoped. It has been an enlightening experience regarding the different ways people see, and
choose to address, an systemic problem in a school that has been brought to light by the use of
data.

We had hoped to collaborate with our administration team and math department in
creating a systematic change, not just a few band-aid fixes. We did not anticipate the lack of
desire for change or teamwork we would face from the math department, who did not have
much buy-in to the idea of a need for change.

We realized that we did not include the students early enough in the project. Also, the
surveys and small group meetings, while apparently helpful in the short term, did not seem to
have much long-term effect. We have concluded that next year we should begin with the
surveys and small group meetings earlier in the school year, and check in more frequently
with at-risk students to encourage them to use the resources we are making available to them.

**REFERENCES**


www.ode.state.or.us


http://www.nwrel.org/scpd/c017.html

**Appendix A**

**Freshman Algebra Survey**  
**February, 2006**

Name of Student _____________________    Name of Teacher _______Period_____

Name of Counselor _____________________
First semester you received a ‘D’ or a ‘F’ in your math class. We (your counselors), are seeking information that would help us understand what got in your way for success. Please check all that apply.

**The reason I did not pass my Algebra class is because:**

- [ ] I did not do/turn in my homework.
- [ ] I passed the tests but I did not do my homework.
- [ ] I did not understand it.
- [ ] I don’t get along with my teacher.
- [ ] It is too hard.
- [ ] My attendance affected my grade.
- [ ] I am embarrassed to ask for help.
- [ ] There is no one at home that can help me.
- [ ] I have never done well in math—I am not good at it!
- [ ] I don’t have a math book.
- [ ] Poor Scores on tests

Have you ever gone to the math tutorial? (circle one) **YES**  **NO**

If you went, was it helpful? Why or why not?

Did you know there are student math tutors available to help you? **Yes**  **No**  **Blank**

Have you signed up for one? **Yes**  **No**  **Blank**

Would you like one? **Yes**  **No**  **Blank**

What do you think would help math students to be more successful?