The Southwest Early College Campus Mathematics Team

Brief Report

Contents

An Abbreviated Narrative: What we've been doing and how we got here

Dr. Richard Delaware became the first member of the Southwest Mathematics Team in Spring 2008. Although he had attended one of the first meetings at UMKC on the development of Southwest back in Fall 2006, he only actively joined the project in Spring 2008 for mathematics curriculum development. One formative event was his May 27-28, 2008 visit, with others (travel funded by PREP-KC), to the Manhattan Hunter Science Early College school in New York, NY, and the following Woodrow Wilson Foundation (WWF) Convening in Princeton, NJ. It was during those days he saw a working Early College school in action, got to know the Southwest principal Steve Scraggs, began to meet the national group of educators working with WWF on Early College schools, and had the privilege of participating in the restaurant interview of Halley Chapman, at that time teaching middle school in Harlem. Later that summer, he participated again in the interviews of both Gislaine Ngounou and Joe Morse, to complete the trio of Southwest Mathematics teachers for Year 1, 2008-2009. As soon as all three were officially offered their positions, he took everyone to lunch and so began the **first iteration of the Southwest Mathematics Team**.

Although the team met and talked during the Fall 2008 semester, since the school was just getting its feet under itself, most time was spent on getting the program up and running, and less on curriculum work. During a WWF organized national conference call on October 10, 2008 of the newly formed STEM cross-site group, Delaware and Dr. Frank Gardella who was working with the Manhattan Hunter Early College school, came to realize that they had many ideas in common about the teaching of mathematics, including a set of complementary skills and training. On October 23-24, 2008, Delaware and Halley Chapman attended the WWF Convening in Princeton, NJ. There he met Frank, having been introduced by the principal of the Manhattan Hunter school. As the 2008-2009 year progressed, the Southwest Mathematics Team continued to have meetings and Delaware visited the Southwest campus often. His conversations with Frank continued by email and again at the February 25, 2009, Faculty Engagement Seminar sponsored by the WWF in San Francisco, CA, during which they talked at length at dinner and while walking around SF. Out of those conversations came Delaware's invitation to Frank to offer a Middle School Mathematics workshop at Southwest on April 2-3, 2009, funded by the WWF. During those two days, Frank met and was impressed by both Halley and Gislaine. In our discussions, the thought arose that we all might engage in an ambitious, collaborative rewriting and re-sequencing of the mathematics program at Southwest. Frank later got WWF agreement to fund him visiting Kansas City on a regular basis for this curriculum work, and he returned on May 26, 2009 for a full day of planning. On June 27, 2009, Delaware had the local team over to his house for dinner.

That summer, July 6-15, 2009, the entire Southwest Mathematics Team now consisting of Chapman, Ngounou, Delaware, and Gardella (Morse having left the school in May) met in a series of 8 hour-a-day workshops to write daily lesson plans for each of Grades 6 and 7, as well as Algebra I and Geometry, hammering out agreements about what to teach and in what manner, meshing the training and experience of the two teachers with the mathematics education curriculum expertise of Gardella, and the mathematics and teaching expertise of Delaware. By our second Mathematics Team workshop Aug. 13-14, 2009, 7th grade mathematics Teach for America teacher Isao Osuga Chapa had joined us. By the next workshop on Sept. 3-5, 2009, our final teacher, Geometry teacher Ronda Miles had arrived. Meanwhile, in August 2009, the UMKC Department of Mathematics and Statistics, through Delaware's recommendation and the Dean's support, had hired Adjunct Lecturer Shawn Cardwell to teach UMKC College Algebra, Trigonometry, and Analytic Geometry over the 2009-2010 academic year on the Southwest campus. Cardwell filled the position since the district was unable to find a qualified candidate to hire to teach UMKC dual credit mathematics courses at Southwest this year. Now, the **second iteration of the Southwest Mathematics Team** was complete.

On October 22-23, 2009, Delaware and Ngounou attended the WWF Convening in Princeton, NJ, and Frank had both to dinner at his home in New Jersey. Immediately after the October Convening, the Team was contacted by Roberta Matthews, Provost Emerita of Brooklyn College, NY, working with the WWF, asking to interview us for a practice brief she was asked to write on teaching in an Early College School classroom, and navigating the often tricky and turbulent school – university interface. On January 22, 2010, Roberta set up a conference call (from Spain) with Delaware, Chapman, and Ngounou for that interview. Meanwhile, on January 9, 2010, Delaware had the entire team (except Frank, who was not in town) over to his house for dinner. During a luncheon at UMKC on January 28, 2010, held for the University of Missouri System Curators and all four Chancellors, and others, Delaware reported on the progress of the Southwest Mathematics Team. On February 25-26, 2010, Delaware attended the WWF convening in Philadelphia, PA, and during the opening session Rob Baird, Vice-President for School/University Partnerships of WWF, presented some slides from the Southwest Mathematics Team work to the guests, pleasantly surprising both Delaware and Gardella at this recognition of the Team.

Throughout the year the workshops continued, three 8-hour days of work each month, with Gardella flying out each time from New York. In all, during the year from April 2009 through May 2010, the Southwest Mathematics Team accumulated a total of **42 full days of work** on the mathematics curriculum for Southwest. Each workshop usually included a visit to Southwest and mentoring work in classrooms, two or three 8-hour days of curriculum writing and discussion, as well as dinners and lunches together. Of course, throughout the year the teachers had been implementing our lessons and revising them as needed, as we continued to talk about them all year. What follows is a brief approximate tabulation of our work so far. [Although we also completed a set of lessons for Grade 6 mathematics, that information is omitted here since Southwest will unfortunately no longer have that grade in Fall 2010.]

- All **Daily Lessons** are written for a **45 minute period**; two usually being completed in a 90 minute block.
- All Lessons are written with **Hands-on Activities or short Labs** as the central feature.
- All this work is being **archived** on a UMKC Blackboard site open to all Southwest Mathematics teachers.

Southwest Course	# Lessons	# Labs	# Pages
Grade 7 Mathematics	127	All hands-on	140
Algebra I	124	All hands-on	125
Geometry	116	109	197

In Spring semester 2010, due to a generous grant from PREP-KC, the team organized both a Mathematics Peer Tutoring program, as well as a Math Video Shorts project. A few notes on those appear later in this report. Our plans will continue this summer with a long workshop July 8-17, 2010, during which time Frank will be in Kansas city (with the WWF's on-going support), to continue our curriculum work and welcome the new mathematics teachers onto the team, as well as plan for the upcoming year.

The Southwest Mathematics Team

• **Halley Chapman**	Southwest	Grade 6 Mathematics Teacher
• **Isao Osuga Chapa**	Southwest	Grade 7 Mathematics Teacher
• **Gislaine Ngounou**	Southwest	Algebra I Teacher
• **Ronda Miles**	Southwest	Geometry Teacher
• **Shawn Cardwell**	UMKC	Adjunct Lecturer, Mathematics, College Algebra, Trigonometry, Analytic Geometry
• **Dr. Frank Gardella**	Hunter College, NY	Associate Professor, Mathematics Education
• **Dr. Richard Delaware**	UMKC	Associate Clinical Professor, Mathematics

The University Professors on the Team – Relevant Selections from CVs

- **Dr. Frank Gardella**, Mathematics Education, Department of Curriculum and Teaching, Hunter College, New York

  Ed.D. Mathematics Education, MA Mathematics, 16 years at Hunter College, 7 years work with Manhattan Hunter Science Early College school in NY, consultant for 2 other Early College schools in CN and CA, taught middle school mathematics grades 7, 8, 9 for 10 years, 19 years supervisor/director of K-12 mathematics at three different NJ school districts, published 7 books, several grants including an NSF grant for $11 million, Southwest work funded by the Woodrow Wilson Foundation (one of our partners).

- **Dr. Richard Delaware**, Mathematics, Department of Mathematics and Statistics, UMKC

  Ph.D. Mathematics, 26 years at UMKC, 19 years Mathematics & Physics Institute Mathematics Coordinator and later Associate Director (UMKC program for gifted & talented KC area high school seniors; 50 students/year; 3-5 public school districts, met 7-9 am, 5 days a week, Calculus I and II and Physics), recorded entire College Algebra and Calculus I courses on video now posted on YouTube by UMKC, an organizer of and participant in all 20 years of the Kansas City Regional Mathematics Technology EXPO, Dean's Award for Outstanding Teaching, department Mathematics for Teachers coordinator designing and adding 7 new courses to department offerings, 6 years Institute for Urban Education mathematics curriculum designer and candidate interviewer.

Some Guiding Principles of our Mathematics Team work

- Create home-grown lessons and sequence, a grass roots point of view, and innovation from the bottom up.
- Textbooks are sources and references, not bibles, and certainly not a plan for the entire course.
- Southwest mathematics faculty have ownership and buy-in, are "allowed" to be creative. All members of the team respect and nurture each other's individual contributions. Mutual respect has been critical, and each of us came to believe that we had something to learn from as well as to teach to our colleagues.
- One of our earliest influences was reading **Stories of Excellence, Ten Case Studies from a Study of Exemplary Mathematics Programs**, by Mark Driscoll, NCTM, 1987 (A study of 28 exceptional mathematics programs in middle and high school from across 16 states and D.C.). Here are two selections:

  "It is impossible to overstress **the value of teacher collegiality** to the quality of a mathematics program. Teaching mathematics is a profoundly human affair, and, as such, should be steeped in human interaction…Why is collegiality so influential? For one thing it makes the **quest for excellence more visible** because teachers keep talking about it; for another, it **lends consistency to the quest** because teachers are constantly comparing notes. And students, like all learners, respond well to consistency." [p. 2]

  "Teaching styles varied among the teachers we observed in these exemplary programs, but there were themes that cut across the variety. For instance, **consistently minimizing risks and maximizing trust** were almost universal patterns in the scores of classrooms we visited…[we were] deeply impressed by the **respect and dignity** that reigned in the vast majority, while **scorn and sarcasm were scarcely evident**." [p. 3]

- We will address all state CLEs (Course Level Expectations) and national (Common Core, etc.) mathematics standards. But, it is well known that schools can implement each standard on a spectrum from the superficial to the rigorous, and still claim to outside parties to have "met" the standard in question. As an Early College school, **Southwest chooses the high end of the spectrum**. We are keeping in mind the following guidelines:
  - Individual standards are written as <u>broad inclusive statements</u> of an idea or collection of ideas. At Southwest, we will only implement these ideas in a <u>rigorous</u> fashion with college and expert mastery by students as our continuing and daily goal in every grade and every class.
  - Individual standards are written as <u>logical summaries</u> of an idea or collection of ideas. At Southwest, we are sequencing the presentation of these ideas in a developmentally appropriate order, with our eye again on expert mastery, and avoiding student cognitive overload or the confusion that comes from trying to master a subject in the "logical" order of a summary. So, we do not teach every part of any standards statement all at once, but by the end of the year each entire standard will be taught.
- In general, our sequencing of mathematical topics for each grade addresses all the mathematics, but creates a sequence of instruction based on **instructional logic** led by inductive thinking leading to logical thought, not a sequence based on **mathematics discipline logic**. The latter serves well as an organizing principle, but not an as an instructional template.

- We are writing courses with **regular hands-on lab activities** that allow students the chance to experientially explore mathematics, discover apparently true facts and relationships, record those discoveries, and eventually deduce the truth of those facts and relationships, or find examples to contradict them. The approach for the teacher in the classroom from day to day is to engage the students in a story, the (dramatic) conclusion of which is not yet known to those students. We take the class on a journey toward a goal or standard. For instance, we do not begin with reminding them of their weaknesses and deficiencies at the start of this journey by testing them in the first week; we do not sternly warn them that this journey is "hard"; we do not use frightening catchwords they may know from previous mathematics classes to describe the events to come; we do not ask them to start by walking in a small circle 100 times (a dramatic image of what "reviewing last year's work" feels like) before moving ahead on the journey; and so on. We just get on with the journey.

- The benefits of this approach are that students find mathematics an adventure every day, are excited to come to class, enjoy the surprise and take some pride in what they "discover". They can appreciate their progress by listing those mathematical discoveries on the walls of their classroom, as well as possibly recording them in their own cumulative portfolio as the course progresses, and so on. This all supports the development of **a mathematical state of mind and a mathematical approach to discovery and solving problems**. This is the real goal of our mathematics courses at Southwest, and is the primary strength that we in mathematics contribute to the project-based focus of the school. Through all this, we see as essential the memory and mastery of those facts and relationships once they have been discovered, as well as enough practice with them to become fluent in their use as a language. This is what our assessments encourage and measure. But, the initial discovery phase must precede all of this. Science teachers have exactly the same issues and succeed admirably.

- More key ideas: Extensive writing, argumentation and proof, history of mathematics, college point of view, guided by Delaware.

- Our concentration is upon the education of the individual student, on his or her **mastery** and true deep understanding of the content of school mathematics in **the way that experts understand mathematics** so that students are prepared not only to enter college, or a professional program, but also complete it. When we do this job well, the district and school as a natural corollary will benefit from higher MAP test and EOC exam scores. But those tests are not the measure of individual learning for students from a college standpoint. For students, our standard is higher and more rigorous in all grades, and we will not lower that standard in annual shortsighted efforts to simply "teach to these tests". As a college-oriented school, **we believe in more than just minimal standards for all of our students; we believe in optimal standards.**

- **Mathematical applications** are already an imbedded part of our hands-on approach, but will be enhanced by embracing the mathematical modeling (i.e., project) point of view, and using materials from **COMAP** (Consortium for Mathematics and its Applications). Eventually we hope to enter the annual COMAP High School Mathematical Contest in Modeling (HiMCM) each year which "offers students the opportunity to compete in a team setting using mathematics to present solutions to real-world modeling problems".

- Active use of UMKC and WWF partners in every aspect of mathematics teaching at Southwest, not merely as advisors, but as participants and mentors. The UMKC Department of Mathematics and Statistics is more involved with Southwest than it has been with any other pre-college school in its history. We've found that we seem to be acting as a "**sea-anchor**" for the team in the roiling turmoil of the school environment.

- High school students attaining high grades in both high school and college-level mathematics courses is a mark of success for the Southwest program. And, high school grades matter for later college endurance, as the following selections from **Crossing the Finish Line, Completing College at America's Public Universities**, by William G. Bowen, Matthew M. Chingos, Michael S. McPherson, Princeton University Press, 2009, support:
    - "**High school grades** are a far better incremental predictor of [university] graduation rates than are standard SAT/ACT test scores … whatever the high school, the **in-school performance** of the student dominates the effect of the high school itself in predicting [university] graduation rates." [p. 226]
    - "In our view, **high school grades reveal much more than mastery of content**. They reveal qualities of **motivation and perseverance** – as well as the presence of **good study habits and time management skills** – that tell us a great deal about the chances that a student will complete a college program. They are one measure of **coping skills** and **whether a student is likely to 'stay the course'**. They often reflect qualities such as the **ability to accept criticism and benefit from it** and **the capacity to take a reasonably good piece of one's work and reject it as not good enough**. Getting good grades in high school, however demanding (or not) the high school, is evidence that a student **consistently met a certain standard of performance**. It is hardly surprising that doing well on a single standardized test is less likely to predict the myriad qualities a student needs to 'cross the finish line' and graduate from college." [pp. 123-124]

Some Byproducts of the Mathematics Team work so far

- **Mathematics Peer Tutoring grant** (through one our partners, PREP-KC); About thirty 9th and 10th Grade Southwest students are hired to tutor their peers and Grade 6 and 7 students. The hope is that the students tutored improve, the tutors themselves improve, and the college atmosphere of study and persistence improves.
- **Mathematics Video Shorts grant** (PREP-KC); We hope for the creation by students and faculty of 1-5 min. video shorts on mathematical topics, teaching tips, etc. to build a school library of shorts, and again contribute to a school sense of academic improvement and a college atmosphere.
- **First Annual Prep-KC Regional Math Relays** success May 1, 2010; Southwest 9th and 10th graders win **10 events and 22 individual medals**, competing against 9th -12th graders from larger schools with a long history of contest success and years of preparation.
- Woodrow Wilson Foundation **national attention**, continuing monthly visit funding of Dr. Gardella. This is a rare and unusual long-term national collaboration.
- **UMKC dual credit mathematics courses closely monitored with regular visits** by a member of the UMKC Department of Mathematics and Statistics, namely Dr. Delaware. These courses meet or exceed the rigor of the same course offered on the UMKC campus, since UMKC courses often have to meet the needs of a wide variety of students less well-prepared than we are preparing Southwest students.

Plans for continuing work - We're not done

- Plans for summer teaching and curriculum development in the 2010-2011 academic year including grade level teachers reviewing the present curriculum with a view to adjustments, training of new Southwest teachers in the Southwest Mathematics program, grade level coordination of topics especially in Algebra from grades 7 to 8, and the welcoming of those new mathematics teachers into the **third iteration of the Southwest Mathematics Team**.
- More thorough and thoughtful **integration of technology** in our lessons as a working tool to foster the Southwest philosophy of teaching and learning mathematics. For example: Geometer's Sketchpad, Wolfram Demonstrations applets, graphing calculators, Clickers, Math videos, Excel, etc.
- Thorough embedding of **writing** in every mathematics course.
- Continuing rigorous implementation and improvement of dual credit offerings in collaboration with the UMKC Department of Mathematics and Statistics.
- Meet or exceed KCMSD plans for upgrading the mathematics programs of district schools.

What worries us

- Fixed, canned, curricular blocks forced on us; mandated materials; continuation of "mile wide and inch deep" content goals. Lack of focus on the college level course reasoning which is the goal of our grade 7, Algebra I and Geometry curricula. In short, all of our year's hard work being swept away.
- Fixed order of topic presentation forced on us, different from the one we have developed, enforced by Acuity or similar tests that assume one and only one sequence of instruction in mathematics.
- Teachers, in effect, feeling reduced to interchangeable "implementers", rather than originators and creators of work, the perhaps tacit assumption of unprofessional incompetence by the district, and the loss of personal attachment to the work.
- Possible district focus on administrative level and school level goals for student success, meaning using high MAP and EOC scores as primary indicators, but not focusing on what students can actually do and whether they are learning to think and perform with college expectations and with college rigor and intensity.

What we propose in our partnership with the district

- **Let us at Southwest continue with our mathematics plans.** We already include the best parts of the new district initiatives, but allow our implementation of those parts to be consistent with our current plans.
    - Our plans already exceed district plans in both scope and sequence. For example, the study of Algebra at Southwest is a continuous flow from grade 7 onward, not the usual "Pre-Algebra" program which has proven unsuccessful with many students in the past. As a result, **every current Southwest Grade 8 student will take Algebra I in Fall 2010**, three years earlier than the district plan for all Grade 8 students.
    - See **Appendix B**, p. 16: The Southwest Early College Campus Mathematics Team Plan of Courses through Spring 2013.
- **We will share with the district whatever we create** in terms of curriculum sequence and best classroom practices, for the benefit of all KCMSD schools.
- **Do not force us to take the standard district assessment tests.** The Acuity tests in their present form do not match our sequence and therefore do not reflect what we teach. We seek to write our own on-going assessments, timing them to coincide with the Acuity tests (if the district retains those). Let us do so.

Personal Statements from the Southwest Mathematics Team

Dr. Richard Delaware, Department of Mathematics & Statistics, University of Missouri – Kansas City

I've been working closely with Southwest Early College Campus since before it opened its doors two years ago. And, although I have participated in many necessary and important meetings with partners, administrators and consultants, and with the young, energetic and talented principal of Southwest, I am most proud to be a member of the remarkable team of mathematics teachers at Southwest. Like most of the teachers at the school, these teachers have the character to do whatever it takes to create the best classroom teaching they can. The fact that I have come to know them as talented colleagues and friends is a sign of the atmosphere of collaboration this school has allowed to grow between those of us faculty at UMKC and Southwest students and teachers.

One of the most visible indicators of this tight bond is the fact that when you visit Southwest, you will regularly see UMKC professors in the halls, in the classrooms, working with the teachers, and working with the students. How many of you had that experience in your schools growing up? I'm a first generation college graduate myself, and I never did. Southwest students have begun to recognize us; we talk in the halls and within the classrooms; they find us in the hall and corner us into an impromptu tutoring session in the library nearby; or turn to us when we sit in on a class, to wave us over for some help. The pool of talent among these hard-working students, who come from every corner of this district, is deep and often untapped. For them, we are UMKC made flesh. The hope of attending college, or any professional program of study, even if not college, is made real and tangible, by seeing and talking to actual UMKC faculty themselves, right there at Southwest. All this feeds a school culture growing at Southwest among both teachers and students of perseverance, a belief in never giving up in the pursuit of higher education.

Our work as teachers is to make each day of mathematics class a profitable one, using everything we've learned over the last few decades about how to craft daily lessons. I repeat: We are talking about daily lessons, in the actual classroom, where the teachers and students spend all their time day after day; meaning, where the rubber meets the road. The Southwest Mathematics Team is paying close attention to the daily details of how to engage each student (one 9th grade student this year expressed surprise that Algebra I was starting on the first day with new material), and how to keep his or her college goals in mind every day. And we are doing it in Southwest and Kansas City style, indigenous to this region, built from the grass roots, not handed down from on-high.

We have used a "backward design" for curriculum development beginning at the college level in order to think through what students really need to know and do to succeed in college mathematics classes. This has motivated the rewriting and re-sequencing of Southwest mathematics courses discussed in this report. Merely offering students the prospect of earning college credits during high school is not our only objective. The Woodrow Wilson Foundation, one of the Southwest partners, already see this work in mathematics as something innovative and perhaps worth passing on to other schools in their Early College School network. Of course, our first hope is that by doing this work at Southwest, we are allowed to contribute what we learn to the rest of the district. I believe we can be a source for the resurgence of this district in the decades to come.

Finally, what I personally look forward to is not just shaking the hand of this year's Southwest 6th and 7th graders when they graduate from Southwest, but shaking their hands when they graduate from college, or some other professional program. For me, and I think for UMKC, this is a decades-long goal. I'm committed, as are my colleagues at UMKC. In short, we are all in. I hope that is your goal too.

Halley Chapman, Southwest Grade 6 Mathematics Teacher

Writing quality lessons according to state standards and curriculum maps, implementing the lessons, then assessing students in a quality manner is probably the hardest endeavor a teacher encounters in his or her career. Often times, I think teachers who are new to the field become overwhelmed with "starting from scratch" when it comes to developing a curriculum for their grade level(s). The project that Southwest chose to embark on with Frank Gardella of Hunter College and Richard Delaware from UMKC helps aid the process in which teachers develop and implement a quality curriculum, in a specific sequence, in order to prepare students for college in an accelerated manner.

The work that has been developing since the spring of 2009 has helped me immensely in terms of ideas for hands-on approaches to teaching mathematical concepts to my sixth graders. Just having the time to sit down with expert teachers and fellow colleagues to hash out what will be done each quarter and how it will be taught is an opportunity that every teacher should have.

We plan to keep building on our current curriculum and saving our products so that new teachers coming to the school will not feel that they must reinvent the wheel. Our processes and ideas will be ever-evolving and adapting to current technology and pedagogical approaches, as we hope to come up with a sort of library that will be accessible to all teachers for each grade level in the future at Southwest.

I believe developing a quality curriculum is a desire of every teacher. However, I think they need help doing it and structured time given in which to work on it. I hope to continue this project, so that each Fall I feel as prepared to teach my subject matter as I did coming in this year.

Isao Osuga Chapa, Southwest Grade 7 Mathematics Teacher

As the year comes to an end and I start a self reflection of my first year as a teacher, I feel tremendous gratitude towards the math department at SWECC. I still remember how well I was embraced by the "partners" Dr. Delaware and Dr. Gardella and how well they helped me develop the curriculum to implement throughout the school year.

Aside from starting well equipped with lesson plans and a picture of what the sequence of the course was going to be, I also received incredible feedback on classroom observations that enhanced my teaching practices.

I always felt very comfortable every month meeting on Fridays and Saturdays where we would revisit the curriculum and gather more effective ways and strategies to teaching new content.

I was very happy with the support on the professional aspect but also on the mentoring side where I received countless pieces of advice on increasing my effectiveness and becoming more efficient in the classroom.

I am looking forward to the upcoming summer, where we will be getting together again to align the curriculum to fulfill state and district standards and also develop a stronger math sense in our students as an early college campus. I appreciate the fact that, as a first year teacher, I had a voice that was heard and contributed to the discussions. I hope to keep learning from Dr. Delaware and Dr. Gardella as mentors and also count on their support to become a better teacher.

I thank them for the countless hours helping me and ensuring that we best serve our students at SWECC.

Gislaine Ngounou, Southwest Algebra I Teacher

The math curriculum writing experience was one that had several benefits:

- It raised my sense of awareness as an educator about the philosophy of mathematics and how/when it should be taught. Despite my creativity and commitment to design lessons and use instructional strategies that are suitable for each group of students I serve, it is often easy to fall into the status quo of a curriculum sequence or always teaching certain things a given way.
- The continuous discussions among the team gave us time and an avenue to really brainstorm and design ways for students to experience mathematics in a way that would not only be enjoyable but also give them an authentic understanding of math concepts. It was definitely enlightening and exciting to create or learn about innovative activities to facilitate the teaching/learning of math! And to start from day 1!
- As we talk about college readiness standards, it was definitely beneficial to learn from various perspectives (especially from Frank and Richard) about what the acceptable standards for math work are at a college level and to begin putting support systems/structures in place (whether it be tutoring, specific instructional methods, rubrics, etc.) to begin bridging the gap that seems to widen as students move from high school to college.
- The thoroughness of the process, though time-consuming, was particularly helpful as it facilitated the planning process as far as lesson planning was concerned.

Challenges:

- Although I appreciated the experience and understand its relevance, I found it challenging to keep up with the writing process and the cataloging of the daily lessons because it did not only require great amounts of time, it is also a structure that is completely different from my personal organizational/processing thought format.
- The misalignment of our course sequence with the district's sequence/curriculum definitely created some conflict. The expectations to perform (on scheduled district assessments) were still the same for Southwest even though the order in which we taught concepts was completely different. I suggest a clear and honest conversation with district representatives about how much autonomy we will have in designing our own assessments (predictor tests) and/or taking the district tests in an order or at a time that makes more sense for our students. We may need to look at ways we can still create the same types of experiences for students we are trying to provide (with our new curriculum/activities), while still maintaining a great degree of alignment with district/state standards.
- In the future, I also suggest that we be more strategic in how we utilize time, especially our consultant's. We may be able to minimize the visits, establish some action plans with goals that will motivate each one of us to get things done by a certain time and then really capitalize on Frank's time when he is town (instead of bringing him in every month).

Ronda Miles, **Southwest Geometry Teacher**

For a variety of reasons, I have experienced employment by several districts of varied sizes and quality. All of the professional development programs offered by other districts pale in comparison to my experiences at Southwest with respect to the time spent working with Dr. Frank Gardella of Hunter College and Dr. Richard Delaware of UMKC.

We have a plethora of research emphasizing the importance of spending time discussing lessons and teaching practices. My experience has been that very few districts actually afford their teachers much of a chance to spend quality working time together. My most recent teaching assignment prior to coming to Southwest was at one of the most respected districts in metropolitan Kansas City. The professional development I received there was sadly lacking in true educational value. I actually resented the time I was required to spend doing "busy work" so the school could claim a sufficient number of hours for professional development. I spend countless hours reading research and professional journals because I am interested in the "best way" to teach my subject to students and my time would have better spent doing my own personal development.

Time spent developing and discussing lessons with Frank and Richard has been invaluable. They are knowledgeable resources I can question about lesson sequencing and hands-on activities for my classes. As the math department grows next year I hope the teachers we add will have the same access to time with Frank's and Richard's expertise as I have enjoyed. I am looking forward to the time Frank and Richard have scheduled to spend with the current members of the Southwest math department this summer.

Appendix A

A Chronology of Selected Mathematics Events at Southwest Early College Campus

[**Note:** The original version of this chronology was presented at UMKC to a meeting of the Curators and all 4 Chancellors of the University of Missouri System on January 28, 2010]

- **August 2008 – Present:** Develop **personal relationships among the team**. See **Narrative**, pp. 2-3.
- **August 2008 – Present:** We offer the **first UMKC credit courses** as part of the Southwest curriculum.
    - **2008-2009** College Algebra (Math 110)
    - **2009-2010** College Algebra (Math 110), Trigonometry (Math 125), Analytic Geometry (Math 202).

      [The **Trigonometry** course is an experimental **Inquiry-based course**, in which students discover and develop trigonometric concepts themselves, in addition to mastering calculation skills.]
- **Fall 2008:** Southwest Mathematics **web pages** and Southwest mathematics **faculty bio-pages** posted on the UMKC Department of Mathematics and Statistics web site at http://cas.umkc.edu/math/MathSWECC.asp . Also see the **Southwest Mathematics Events** page maintained on the department web site at http://cas.umkc.edu/math/MathSWECCevents.htm .
- **March 2009 – Present:** We provide several volunteer UMKC undergraduate mathematics **student tutors** for **after-school tutoring** at Southwest each semester.
- **April 2009:** Organized a two day **Middle School Mathematics Workshop** featuring Dr. Frank Gardella, Associate Professor of Mathematics Education at Hunter College, NY, who has been the mathematics advisor for the Manhattan Hunter Early College School for several years, funded by the Woodrow Wilson Foundation.
- **May 2009:** Grade 6 **Math Video Shorts** created and first annual Film Festival held. Also, 44 min. video interviewing all Southwest 6th graders created.
- **May 2009:** One **Southwest College Algebra student** gets the highest score (in fact, 100%) on the Common Final Exam among all UMKC or Southwest students taking the exam this Spring semester.
- **May 2009:** In a one day meeting, we initiate a comprehensive mathematics project (see below).
- **July 2009 – Present:** **Curriculum Revision, Re-Sequencing, and Hands-On Activity/Lab Creation Workshops:** 10 days in July, 2 days in August, and 3 days in each month from Sept. 2009 through May 2010. In the three-day workshops, one day is often spent at Southwest on a school day mentoring teachers and observing. The other two (sometimes all three) 8-hour days are spent working on the curriculum, down to the creation of daily lesson plans.

- **August 2009 – Present:** The Department of Mathematics and Statistics provides an **Adjunct Lecturer**, **Shawn Cardwell**, to join the Mathematics Team and teach UMKC College Algebra, Trigonometry, and Analytic Geometry at Southwest this year.

- **Fall 2009 – Present:** The UMKC **Work-study** program provides two mathematics tutor work-study positions located at Southwest. One of them is filled each semester by a student spending 15-20 hours/week at the school.

- **October 3, 2009:** Halley Chapman gives a **"Math Video Shorts" talk** at the Kansas City Regional Mathematics Technology EXPO, held at UMKC, based on our video work in May 2009.

- **December 2009:** **Peer Tutoring Project**, funded by a grant from PREP-KC (one of our partners), begins. About thirty 9th and 10th Grade Southwest students are hired to tutor their peers and Grade 6 and 7 students. The hope is that the students tutored improve, the tutors themselves improve, and the college atmosphere of study and persistence improves.

- **January 2010:** One **Southwest Trigonometry student** (a different one from May 2009!) gets the highest score on the Common Final Exam among all UMKC or Southwest students taking the exam during Fall semester.

- **February 2010:** **Math Video Project,** funded by another grant from PREP-KC, begins. We hope for the creation by students and faculty of 1-5 min. video shorts on mathematical topics, teaching tips, etc. to build a school library of shorts, and again contribute to a school sense of academic improvement and a college atmosphere.

- **May 1, 2010:** Southwest 9th and 10th graders win **10 events and 22 individual medals** at the **First Annual PREP-KC Regional Math Relays**, competing against 9th -12th graders from larger schools with a long history of contest success and years of preparation.

- **May 27, 2010:** All Southwest students enrolled in UMKC dual credit mathematics courses make a field trip to UMKC to take their final exams, and afterward, visit the Rare Book Room of Linda Hall Library to examine historically important mathematics and other books. Once again, one **Southwest College Algebra student** gets the highest score (in fact, 100%) on the Common Final Exam among all UMKC or Southwest students taking the exam this Spring semester.

- **June 2-3, 2010:** 26 Grade 6 **Math Video Shorts,** created with the support of our Math Videos grant, are shown to students and prizes are awarded for the best in each class.

Appendix B

The Southwest Early College Campus Mathematics Team

Plan of Courses through Spring 2013

Southwest Mathematics Courses

SWECC Grade 7 **SWECC Grade 7 Math Lab**	Grade 7; Includes algebra preparation Grade 7, strictly taken as a second mathematics class (perhaps America's Choice Ramp Up to Algebra?) in addition to SWECC Grade 7 Mathematics for students more than 2 years behind grade level
SWECC Algebra I	Grade 8
SWECC Geometry	Grade 9
UMKC College Algebra (Math 110)(3CH)	Grade 10; Covers more than district "Advanced Algebra/Algebra II"
UMKC Trigonometry (Math 125)(2CH), & UMKC Analytic Geometry (Math 202)(3CH)	Grade 11; Covers more than district "Precalculus"; Semester 1 = Trigonometry, Semester 2 = Analytic Geometry
UMKC Calculus I (Math 210)(4CH)	Grade 12
UMKC Calculus II (Math 220), or **UMKC Elementary Statistics (Stat 235), etc.**	Grade 12 options. Calculus II taken on UMKC campus. Elementary Statistics could be taken at SWECC. Other courses are possible. Elementary Statistics could also be offered in Grade 11.

All "SWECC" courses are nearly re-written and re-sequenced, more economical, hands-on, high rigor, standards-based;

Each "Grade X" below will probably have students from several different grade years, as indicated.

Southwest 2010-2011

	Mathematics Courses
Grade 7	**SWECC Grade 7** [Incoming 7th graders, and incoming 8th graders not ready for Algebra I] **SWECC Grade 7 Math Lab [Taken <u>in addition to</u> SWECC Grade 7 Mathematics]** [Incoming 7th graders, and incoming 8th graders more than 2 years behind grade level]
Grade 8	**SWECC Algebra I** [All current SWECC 7th graders, incoming prepared 8th graders, and incoming advanced 7th graders]
Grade 9	**SWECC Algebra I** [Incoming 9th graders, incoming 10th graders not prepared for Geometry, & incoming advanced 8th graders]
Grade 10	**SWECC Geometry** [All current SWECC 9th graders, incoming prepared 10th graders, incoming 11th graders not prepared for UMKC College Algebra, and incoming advanced 9th graders]
Grade 11	**UMKC College Algebra** [All current SWECC 10th graders taking <u>only</u> Geometry, incoming prepared 11th graders, incoming 12th graders not prepared for UMKC Trigonometry & Analytic Geometry, & incoming advanced 10th graders] ---OR--- **UMKC Trigonometry (semester 1) & UMKC Analytic Geometry (semester 2)** [All current SWECC 10th graders taking UMKC College Algebra, incoming prepared 11th graders, incoming 12th graders not prepared for UMKC Calculus I, and some incoming advanced 10th graders] ---OR--- **UMKC Calculus I** [All current SWECC 10th graders taking UMKC Trigonometry & Analytic Geometry, & incoming prepared 11th and 12th graders]
Grade 12	---See Grade 11 offerings--- [<u>NO</u> current SWECC students. Some incoming prepared 12th graders]

Southwest 2011-2012

	Mathematics Courses
Grade 7	**SWECC Grade 7** [Incoming 7th graders, and incoming 8th graders not ready for Algebra I] **SWECC Grade 7 Math Lab [Taken <u>in addition to</u> SWECC Grade 7 Mathematics]** [Incoming 7th graders, and incoming 8th graders more than 2 years behind grade level]
Grade 8	**SWECC Algebra I** [All previous SWECC 7th graders, incoming prepared 8th graders, and incoming advanced 7th graders]
Grade 9	**SWECC Geometry** [Most previous SWECC 8th graders, incoming prepared 9th graders, incoming 10th graders not prepared for UMKC College Algebra, and incoming advanced 8th graders]
Grade 10	**UMKC College Algebra** [Most previous SWECC 9th graders, incoming prepared 10th graders, incoming 11th graders not prepared for UMKC Trigonometry and Analytic Geometry, and incoming advanced 9th graders]
Grade 11	**UMKC Trigonometry (semester 1) & UMKC Analytic Geometry (semester 2)** [Most current SWECC 10th graders, incoming prepared 11th graders, incoming 12th graders not prepared for UMKC Calculus I, and incoming advanced 10th graders]
Grade 12	**UMKC Trigonometry (semester 1) & UMKC Analytic Geometry (semester 2)** [All current SWECC 11th graders taking UMKC College Algebra] ---OR--- **UMKC Calculus I** [All current SWECC 11th graders taking UMKC Trigonometry & Analytic Geometry, incoming prepared 12th graders, and incoming advanced 11th graders] ---OR--- **UMKC Calculus II --OR—UMKC Elementary Statistics –OR—Another UMKC Mathematics option** [All current SWECC 11th graders taking UMKC Calculus I, and incoming prepared 12th graders; Calculus II probably taken on the UMKC campus; Elementary Statistics possibly at SWECC]

Southwest 2012-2013

	Mathematics Courses
Grade 7	**SWECC Grade 7** [Incoming 7th graders, and incoming 8th graders not ready for Algebra I] **SWECC Grade 7 Math Lab [Taken <u>in addition to</u> SWECC Grade 7 Mathematics]** [Incoming 7th graders, and incoming 8th graders more than 2 years behind grade level]
Grade 8	**SWECC Algebra I** [All previous SWECC 7th graders, incoming prepared 8th graders, & incoming advanced 7th graders]
Grade 9	**SWECC Geometry** [Most previous SWECC 8th graders, incoming prepared 9th graders, incoming 10th graders not prepared for UMKC College Algebra, and incoming advanced 8th graders]
Grade 10	**UMKC College Algebra** [Most previous SWECC 9th graders, incoming prepared 10th graders, incoming 11th graders not prepared for UMKC Trigonometry and Analytic Geometry, and incoming advanced 9th graders]
Grade 11	**UMKC Trigonometry (semester 1) & UMKC Analytic Geometry (semester 2)** [Most current SWECC 10th graders, incoming prepared 11th graders, incoming 12th graders not prepared for UMKC Calculus I, and incoming advanced 10th graders]
Grade 12	**UMKC Calculus I** [Most current SWECC 11th graders taking UMKC Trigonometry & Analytic Geometry, incoming prepared 12th graders, and incoming advanced 11th graders] ---OR--- **UMKC Calculus II --OR—UMKC Elementary Statistics –OR—Another UMKC Mathematics option** [All current SWECC 11th graders taking UMKC Calculus I, and incoming prepared 12th graders; Calculus II probably taken on the UMKC campus; Elementary Statistics possibly at SWECC]