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Math Teacher Perceptions of Professional Development and Student Mathematics Performance

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COLLEGE OF EDUCATION

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Abstract

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Abstract

The standardized math test scores at a Tennessee high school have trended below the state and national averages. One strategy to improve math performance is a pedagogical structure that facilitates peer interaction and discovery learning. A program of professional development (PD) designed to foster such interactive learning was delivered to 9th grade math teachers, but no assessment had been undertaken to determine the program's effectiveness. Guided by Vygotsky's social development theory, which states that student learning is affected by the interactions and instructional activities within the classroom, this concurrent mixed method study investigated math teachers' perceptions of the PD and its effectiveness in raising student scores on the end-of-course exams (EOC). Qualitative data were gathered from 4 teachers in order to explore deeper understandings of the PD effectiveness. These data were open coded and thematically analyzed. Findings revealed teacher perceptions that the PD was not effective, along with many insights for improvement of PD. The quantitative research question determined if there was a statistically significant difference between test scores of non-PD and PD students. The analysis used the independent samples *t* test to compare student EOC scores before the PD (n = 112) with the scores that were earned after the PD took place (n = 187*).* There was no statistically significant difference between the test scores in the first and second year (p = .06). These findings informed the creation of an improved plan for Math PD, including components contributed by teachers. The implications for positive social change from this study include a better understanding of math PD and student achievement at the local site, along with stronger preparation for students and the school community to succeed on EOC testing.

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Dedication

To my family and friends whose continued support and understanding helped me stay focused on accomplishing this lifelong goal, and to my colleagues who provided positive words of encouragement during overwhelming times.

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Introduction

Public educational stakeholders seek to redefine best practices, accountability, and learning environments. Professional development is needed to restructure public education (Carpenter & Sherretz, 2012; Guskey, 2005; Hyslop-Margiso, & Sears, 2010; Sappington, Pacha, Baker, & Gardner, 2012). Public educational institutions have invested substantial amounts of time and money into professional development only to observe implementation at a minimal level, a lack of teacher understanding when attempting to change classroom pedagogy, and inauthentic professional development (Bryk, Sebring, Allensworth, Luppescu, & Easton, 2010; Elmore, 2008; Fullan, Hill, & Crevola, 2006; Guskey, 2005; Payne, 2008; Sappington et al., 2012). Professional development focused around structured activities may assist educators with narrowing the achievement gap on standardized assessments, which is a factor in determining the success of a school and development of school improvement plans (Rieckhoff & Larsen, 2012; Rubel & Chu, 2011; Sappington et al., 2012).

Professional development partnerships provide a structure to guide research-based teacher instructional practices around transferring new learning into practice around targeted school-wide goals for improvement (Brodie & Shalem, 2011; Foreman, 2010; Killion, 2013; Rieckhoff & Larsen, 2012; Vaill & Testori, 2012). Professional development institutions have strove to improve staff development through multiple site visits during a school year; but, successful practices that change teacher instruction occur from day-to-day support from on-site staff and personnel (Martin & Taylor, 2009;

Tournaki, Lyublinskaya, & Carolan, 2011). Accordingly, on-site professional development supported by central office staff, administrative teams, and colleagues assists with eliminating teacher isolation practices and improving collaborative team efforts for student growth (Ness, Gorge, Turner, & Bolgatz, 2010; Tournaki et al., 2011).

Professional development that changes teacher practices, behaviors, and beliefs must not include a one-size-fits-all model for districts, schools, and curriculum departments (DuFour, 2007; Elmore, 2007; Musanti & Pence, 2010). Professional developers must focus on student improvement and how growth hinges on continuous teacher development (Hargreaves, 2007; Hyslop-Margiso & Sears, 2010). Providing opportunities for teachers to grow in the art of teaching is a "critical component of education reform" (Schachter, 2011, p. 1). Professional development must be intertwined with best practices to improve the quality of instruction and increase student improvement (Dufour, 2007; Elmore, 2002; Tournaki et al., 2011; Vaill & Testori, 2012).

Local Problem

Student performance in secondary mathematics classrooms underscores the need for continuous effective professional development. Despite the local school district's efforts to provide ongoing professional development for secondary mathematics teachers, the district's standardized mathematics test scores continue to fall below the national average. The amount of time and money invested into teacher professional development has only been observed at minimal implementation levels in the classroom (Bryk, Sebring, Allensworth, Luppescu, & Easton, 2010; Sappington et al., 2012).

The inconsistency of implementation has negatively influenced ninth grade students' Algebra I end-of-course exam scores due to increased standards and teacher accountability based on Race to the Top grants through Obama's policy of 2010. Evaluating the "real needs of our district-based partners, research-based best practices, and adherence to socially just, democratic principles" (Reed & Llanes, 2010, p. 393) should be the focal point for negotiating change on educational campuses. Educational stakeholders must assess professional development programs based on data about their district's or school's performance and not on results produced by the developers of the program.

Public education is required for every child; therefore, educational leaders need to excel in meeting the educational needs of each student. The educational leader must establish systematic processes to enhance student learning and unite teachers, parents, students, community members, and other educational stakeholders towards a common goal (Kurland, Peretz, & Hertz-Lazarowitz, 2010). Public educators are charged with the task of educating all children, regardless of race, ethnicity, gender, socioeconomic class, and immigrant status; diverse educational leaders must establish a quality education through purposeful professional development.

The local school district's population for the 2012-2013 school year was approximately 42,000 students, which was composed of approximately 12,000 high school students (Hamilton County Department of Education, 2012). There were 12 high schools in the local school district composed of various campuses: area high schools, magnet schools, inner city schools, and county schools. The 2012-2013 ethnic make-up

of the district included 61% European American, 33% African American, 4.1% Hispanic American, 1.8% Asian American, and 0.2% Native American. Correspondingly, the high school population was approximately 850 students, and the ethnic make-up included 63% European American, 26% African American, 6% Hispanic American, 4% Asian American, and 1% Native American (Hamilton County Department of Education, 2012). At the high school, approximately 48% of students qualified for free/reduced lunch. A small number of students were considered English language learners (ELL); specifically, the 2012-2013 Hispanic American population included 53 students, and 11 of those students received ELL services.

Like the local site, at the district level, many students are underperforming as indicated on the state end-of-course assessment in Algebra I. The Algebra I mathematics teachers working with ninth grade students have to find common ground for best classroom practices in and making the transition to help students reach levels of mastery. Professional development is needed to refine classroom practices and give teachers the opportunity to learn new skills or knowledge, apply skills, reflect, and receive feedback. Professional development provides teachers the opportunity to refine the art of teaching.

Rationale

The local high school must align with the school district's vision that all teachers will use best practices for student success (Scales, 2007). The state application for Race to the Top funding set achievement goals for increasing proficiency in math and reading, decreasing the achievement gap and increasing high school graduation rates. These goals may be more attainable if appropriate teaching strategies were in place (United States

Department of Education, 2010). The Tennessee State Department of Education (2012) indicated that Tennessee's Algebra I scores on state assessments are behind the national average. Additionally, the high school Algebra I scores are behind the local school districts' average on state assessments (Tennessee Department of Education, 2012). The assessments scores highlight the need for teacher refinement of classroom pedagogy. Teacher professional development will provide opportunities to improve teacher practice, but it must be consistently implemented at the classroom level.

Investigating the number of classroom teachers who have been exposed to mathematics professional development training may assist in providing a better understanding of teacher pedagogy in adequately preparing students to pass the state end-of-course assessment. If the professional development is associated with improved performance on the student state Algebra I end-of-course exam, then the local district superintendent may implement this training for all teachers. This project study was a guide for implementing future professional development.

In this study, I described the impact of the professional development activities provided to the teachers, instructional coaches, and administrators responsible for monitoring student achievement. The examination of quantitative analysis utilized an independent sample *t* test with the end-of-course assessment data and the examination of analysis from teacher perspectives provided a detailed description of changes in the school and guided the implementation for future professional development. The qualitative approach provided me with the opportunity to describe what changes have

occurred, how the changes occurred, and what changes have worked for the teachers in relation to the implemented mathematics professional development.

Definition of Terms

Best practice: The decision-making process used for activities that have been shown to meet specific criteria for support (Spencer, Detrick, & Slocum, 2012).

Cut score: An estimate of the number of items that the student would be expected to answer correctly to achieve levels of proficiency (Tennessee Department of Education, 2012).

End-of-course assessment: Criterion-referenced assessments developed to measure student achievement upon completion of the Algebra I, Algebra II, geometry, English I, English II, English III, Chemistry I, Biology I, physics, or U.S. History courses (Tennessee Department of Education, 2012).

Highly qualified: Teacher holds an apprentice, professional, out-of-state, or alternative license to teach in state and demonstrates competency in the core academic area assigned to teach from one of the following: passed the Praxis teacher licensure exam, an academic major in the core subject area, coursework equivalent of an academic major (24 semester hours), or a graduate degree in core subject area (Seivers, 2005).

High stakes assessment: An exit exam at the end of the class term, which must be passed to earn a high school diploma (Giambo, 2010).

Mathematical habits of interaction: Classroom practices that allow students to explain, engage, and share mathematical ideas derived from personal discourse as

opposed to the adoption of the teacher's mathematical explanation (Gellert & Steinbring, 2012).

Mathematical habits of mind: Classroom environments that promote higher mental functions for meaningful mathematical conversations with increasing problem-solving and decision-making skills rooted in reflection and experimentation (Gordon, 2011).

Professional development: The process and steps taken by educational leaders to improve job-related knowledge, skills, and attitudes of educators (Shumack & Forde, 2011).

Public record: A public representation to display student thinking that may be revised as students' thought process changes (Windschitl, Thompson, Braaten, & Stroupe, 2012).

Significance of the Problem

Public education is required for every child; therefore, educational leaders need to excel in meeting the educational needs of each student. A *Nation at Risk* report (as cited in Thornburg & Mungai, 2011) addressed the perception that the U.S. educational institutions were falling short of properly educating students on a global scale. In 2010, President Obama indicated that millions of U.S. students were dropping out of public school, resulting in federal supports for school reform (Zeleny, 2010). School reform committees began to invest time and money into teachers' professional development opportunities (Desimone, 2009; Thornburg & Mangai, 2011). School reform initiatives were created to review elements that may impede student achievement and the

corresponding impact of teacher professional development (Thornburg & Mangai, 2011). Professional development is a component of school reform and best practices, although implementation is a complex procedure not yet mastered by educational stakeholders (Brodie & Shalem, 2011).

Despite the amount of professional development required for teachers, change in educational standards has had little impact on what is being taught and how students retain knowledge (Brodie & Shalem, 2011; Camargo et al., 2007; Yarema, 2010). Teachers are attempting to adapt teaching practices effectively and efficiently to meet the educational needs of children, but continue to run into barriers that prevent change (Agudelo-Valderrama, Clark, & Bishop, 2007; Brodie & Shalem, 2011). The social-emotional needs of children continue to be more complex as educators share responsibility in the development of children; as a result, professional development is a way to directly impact children (Killion & Hirsh, 2011). Education must be more than testing student understanding for basic recall and factual information; in essence, educational institutions must improve student communication, collaboration, and critical thinking skills (Broadley, 2012; Wagner, 2008; Yarema, 2010). Wagner (Laureate Education, Inc., 2009) discussed the need for improving international achievement; in particular, the deficits between skill sets required for high school, college, and as a citizen of the United States. Education should be valued by students because employers seek to find the best fit individual for employment.

Federal grant programs assist with the funding for teacher professional development, which requires more student and teacher data from high stakes assessments

(Headden & Silva, 2011; Pella, 2012; Yarema, 2010). The use of data to identify areas of improvement, misconceptions, and common errors may help improve student performance on high stakes assessments. Developing common language and effective teaching strategies may assist with improving students' conceptual understanding beyond mathematical computations (Headden & Silva, 2011; White & Anderson, 2012). Accountability for student growth and school success has been rooted in the results of these high stakes assessments for the past decade (Giambo, 2010; Pella, 2012; Yarema, 2010). Educational stakeholders must decide whether they should continue to invest time and money into professional development based on student gains on high stakes assessments. The data collected throughout this study were used to suggest how the professional development activities and supports might be improved in the future.

Research Questions

The purpose of this study investigated math teachers' perceptions of the PD and its effectiveness in raising student scores on the end-of-course exams (EOC). I examined teacher perceptions of the instructional techniques used in the classroom as a result of the professional development.

The following question was used for the quantitative analysis.

1. Is there a significant difference between the EOC test scores between the first and second year?

   H_0: There is no significant difference between the EOC test scores between the first and second year.

H_1: There is a significant difference between the EOC test scores between the first and second year.

In this project study's observations, findings, and data analysis, I described the perceptions of teachers and the practices used to improve student scores on the EOC. I also described the appropriateness of using a *t* test to determine if there is a significant difference between the test scores of the two years.

Review of the Literature

Search Strategy

Saturation for the literature review consisted of researching databases by topic in the field of education; human services; and policy, administration, and security. The databases searched included ERIC, Educational Research Complete, Education from SAGE, and ProQuest Central. Boolean search terms included, but not limited to the following: *high stakes assessment, educational reform, common core, No Child Left Behind, American Recovery and Reinvestment Act, constructivism, social development, Elementary and Secondary Education Act, professional development, Race to the Top, highly qualified teacher, educational accountability, standardize assessment, educational pedagogy,* and *educational efficacy*.

Theoretical Framework

The two theories that formed the framework for this project study were the social development theory and the theory of constructivism. The art of teaching and learning revolves around student-centered learning and engagement concepts that result in learning experiences for students that go beyond the traditional lecture (Hubbard, 2012). The theory of constructivism emerged from Vygotsky's social development theory (McQueen, 2010). Consequently, the theories provide the tools for educational leaders to enhance the learning environment for teachers and students in improving the mathematics scores. According to the social development theory, social interaction paves the way for higher cognitive functions, the more knowledgeable other (MKO), and the zone of proximal development (ZPD) for optimal student performance and growth (Beliavsky,

2006; McQueen, 2009). The social development theorists believe that learning occurs as a result of human interactions, which is a different view from learning at predetermined stages established by the age of the child.

People learn through interacting with others at all stages of life. The acquisition of language is developed within the social interactions as "simple gestures become differentiated into tools for acting on the outside world and symbols which acts on the mind itself…and of course tool and symbol use must itself be mediated socio-interactionally" (Guk & Kellog, 2007, p. 286). Children who have developed social skills learn tools to communicate with others and as a result tend to be successful in school curricula. A child's ability to socialize helps the child "think better, pay attention, and remember what they have experienced" (Petty, 2009, p. 81).

The MKO refers to any individual who obtains a deeper understand of the school subject curriculum than the student who is receiving the instruction. Schwieter (2010) referred to the MKO as the expert who assists other learners within his/her realm of understanding the material. The MKO is working in collaboration with the student to build understanding; the MKO is not limited to the teacher and includes parents, classmates, and siblings (Beliavsky, 2006). The MKO is an individual who provide assistance to a student in the teaching-learning process that leads to student growth in the content area.

The ZPD defines is defined as the zone in which the child can independently solve problems compared to the level of potential the child demonstrates when solving problems with the assistance of another intellectual partner or peer (Beliavsky, 2006;

Gredler, 2011; Petty, 2009; Schwieter, 2010). A child can be assisted in different ways, including assisting performance and guided participation (Petty, 2009) and "teacher-led mediation and learner-to-learner interaction" (Guk & Kellog, 2007, p. 287). The teacher's role shifts from that of a presenter of information to a facilitator of information. Facilitating student learning revolves around the concept that the student is capable of functioning socially in the classroom; subsequently, the child will be able to communicate with the teacher and peers.

Constructivism incorporates the interests of the student and his/her interaction with the world (Gordon, 2009; Kruckeberg, 2006). Authentic learning occurs when students take public information from school curricula and intertwine it with personal relevance (Kretschmer, Wang, & Hartman, 2010). Constructivism argues that students construct new meaning and discovery from current and prior knowledge (Barma & Bader, 2013; Glassman, 2004; Kruckeberg, 2006). Dewey stated, "ascertain what the student experiences, and teach accordingly" (as cited in Kruckeberg, 2006, p. 2). Constructivists ask students to experience disequilibrium as an individual builds his or her own knowledge (Gordon, 2009; Lamanauskas, 2010; Splitter, 2008). The social constructivist model has origins in the concept of social interactions to build and create new information within the mind of the learner. Each learner relies on existing knowledge as a platform to integrate new knowledge (Keaton & Bodie, 2011; Lamanauskas, 2010; Splitter, 2008). The teacher must create a classroom culture that is supportive of the creative exploration of learning.

The constructivist approach to learning was built on the paradigm that knowledge is not an external miracle given to the student, but that knowledge is obtained from an individual interpretation from synthesis of personalized understanding and growth (Hubbard, 2012; Powell & Kalina, 2009). Constructivism fused student prior knowledge with new information, thus advancing the student from a stage of disequilibrium to a platform of new learning (Denton, 2012; Gordon, 2009; Keaton & Bodie, 2011; Lamanauskas, 2010; Powell & Kalina, 2009). The constructivist approach to teaching did not provide a one-size-fits-all solution to teaching and learning, but a lens to examine teacher pedagogical practices to increase student engagement (Garbett, 2011; Musanti & Pence, 2010; Splitter 2008). Vygotsky's social aspect and constructivist theory provided a venue for interaction to occur, thus strengthening the process of synthesis and authentic learning known as social constructivism (Hubbard, 2012; Potter & Rockinson-Szapkiw, 2012; Powell & Kalina, 2009).

Background

Educational theory has been supported by the federal government in an effort to make connections between theory, law, and pedagogy in strengthening the educational system. The Elementary and Secondary Education (1965) Act is considered the nation's most influential educational laws. This act sanctioned the No Child Left Behind (Bernstein, 2013; Islas, 2010; NCLB, 2001). No Child Left Behind (NCLB) focused on the improvement of the educational system around accountability, work based in scientific research, more parental options, and growth and flexibility in local control (Bernstein, 2013; Johnson, Zhang, & Kahle, 2012; Lamb, 2007; Turnbull et al., 2011).

NCLB requires state testing in core subject areas and identifies student success on those exams based on the categories below basic, basic, proficient, or advanced, which is as a measuring device for accountability and success for that school, district, and state (Jacobson, Holian, & Regional Educational Laboratory Appalachia, 2010; Turnbull et al., 2011). NCLB initiatives were created to improve the alignment between curricula standards and state assessment questions to validate the student success categories; but, the alignment initially lacked depth of knowledge to infer achievement growth for corresponding student success categories (Ferrara, Svetina, Skucha, & Davidson, 2011; Turnbull et al., 2011). Test developers continued to align assessment questions around content standards to validate inferences about student achievement growth and projected success of schools, districts, and states (Gorin, 2006).

NCLB outlined that teachers must be highly qualified to teach core content areas (English, economics, government, mathematics, history, science, foreign languages, arts, and civics) and defined highly qualified based on years of experience, educational background, and professional credentials (Howell, 2011; Judson, 2010). NCLB mandated that by the end of the 2005 -2006 school year, all teachers must meet highly qualified status, but allowed states to set dictated criteria for highly qualified status (Karelitz, Fields, Levy, Martinez-Gudapakkam, & Jablonski, 2011). The minimum criteria that teachers must have obtained to gain highly qualified status included bachelor's degree, state certification, and competency in taught subject matter (Amobi, 2006; Karelitz et al., 2011; Phillips, 2010).

States have applied to the United States Department of Education for waivers from NCLB in an effort to develop plans for increased preparedness for college and career readiness, improved support for teachers and leadership, and intervention programs for underachieving students (Riddle & Center on Education, 2012; Tienken, 2012; U.S. Department of Education, 2013). Granted waivers from NCLB guidelines require states to develop teacher and administrator evaluation systems that link student achievement on state assessment to develop evaluation systems (Kober, Riddle, & Center on Education, 2012; Tienken, 2012). The NCLB waiver provides opportunities for states to align accountability systems to Common Core State Standards (CCSS) and corresponding assessments (Kober et al., 2012; Riddle & Center on Education, 2012). Most states that applied for waivers supplemented the NCLB goal of 100% of student proficiency levels by 2014 on standardized state assessments with other measurable performance goals, like targeted annual objectives to reduce achievement gaps, increased college and career readiness, teacher and administrator evaluation measurements, and improved climate on school campuses (Kober et al., 2012; Riddle & Center on Education, 2012).

NCLB focused on increased accountability, but lacked direction on teacher capacity building for delivery of high quality instruction (Pepper, 2010). The reauthorization of the Elementary and Secondary Education Act (ESEA) of 2010 and the Improving America's Schools Act of 1994 supported NCLB with laws focused on improving teacher capacity with intensive and sustained teacher professional

development (Islas, 2010; McLaughlin, 2010). The reauthorization of ESEA had five tenets of reform:

1. College- and career-ready students
2. Great teachers and leaders in every school
3. Equity and opportunity for all students
4. Raise the bar and reward excellence
5. Promote innovation and continuous improvement (Morrell, 2010, p. 146)

The reform efforts opened the door for more federal funding to support growth in the public education (Islas, 2010; Morrell, 2010). States are directed to evaluate teachers and principals based on evaluation systems, student growth on standardized assessments, and other school factors, such as, high school graduation rates (Pepper, 2010).

The American Recovery and Reinvestment Act of 2009 (ARRA) established a funding source for economic stimulus as the re-authorization of ESEA waited in the political cycle for approval (Hurlburt, Therriault, Floch, & National Center for Education Evaluation and Regional Assistance, 2012; Islas, 2010). The majority of the funding from ARRA was directed toward education and introduced a new program, Race to the Top (RTTT), which allowed for states to apply for School Improvement Grants (SIG) to assist with reform efforts for low-performing schools (Islas, 2010). SIG was a program adopted under Title 1 of the Elementary and Secondary Education Act and funded from the ARRA which awarded federal funding to states based on a formula identifying low-performing schools (Hurlburt et al., 2012). ARRA also provided funding for the

unemployed and the underemployed to take advantage of job opportunities in other markets. For example, the American Association of Community Colleges (AACC) launched a virtual career network for healthcare that provided a platform for job training in the health care field with monies from the ARRA (Murray, 2011). Community colleges received pell grant funding for students, an initiative funded to increase the number of college completers and continued support for effective educational reform practices (Violino, 2012).

The RTTT grant program provided opportunities for educational systems to reform under the umbrella of six guidelines (Johnson & Stephens, 2012):

1. Comprehensive approach to education
2. Emphasis on Science, Technology, Engineering, and Mathematics (STEM)
3. Improvement in early education
4. Expansion and adaptation of state longitudinal data
5. Vertical and horizontal alignment of early education through postsecondary
6. School level reform, innovation, and learning

Skeptics believe that RTTT guidelines were "based more on ideology than on sound educational research" (Mathis, 2011, p. 2). Educational stakeholders were concerned that the RTTT guidelines may direct teacher educational practices and teacher evaluation based on student scores and not authentic student learning (Martin & Lazaro, 2011). RTTT grant provided $4.35 billion for states and school districts to improve teacher

quality and close achievement gaps; however, redefined instruments must be in place to determine teacher effectiveness and student growth (Hershberg & Robertson-Kraft, 2010; Onosko, 2011). States had to meet four critical areas of educational reform in order to apply for RTTT funding; which included, adopting internationally benchmarked standards and assessments for career and college readiness; implement systematic procedures to recruit, develop, retain, and reward effective teachers and administrators; incorporate data systems that measure student success and guide teacher and administrator practice; and turn around the low performing schools (Islas, 2010; Martin & Lazaro, 2011).

Assessments

High stakes assessment data factored into the success of a school and/or district because the data was contingent upon making adequate yearly progress (AYP) in accordance with NCLB (Judson, 2010; Maleyko & Gawlik, 2011; Tienken, 2012). There were several areas of concern with AYP as to the accuracy of the instrument measuring growth; particularly, state development of standards, test score proficiency categories, and the statistical analysis formula (Maleyko & Gawlik, 2011). States were in various alignments with educational measurement standards of success, so the United States may have had 50 different instruments that attempted to justify AYP for the state and school district (Judson, 2010; Maleyko & Gawlik, 2011). Individual states had the flexibility to determine subgroup populations held accountable, confidence intervals for proficiency targets, and projected proficiency rates which may have given a false sense of

improvement in accordance with NCLB guidelines (Giambo, 2010; Judson, 2010; Maleyko & Gawlik, 2011).

Panelists determined the number of questions that a student must answer correctly to demonstrate understanding of the content and referenced that number as a *cut score* (Ferrara et al., 2011). NCLB magnified accountability in an area of assessment with better alignment of assessment questions and content standards based on judgments in determining student performance levels (e.g., below basic, basic, proficient, advanced) and corresponding cut scores to determine each level (Engelhard, 2011). Assessment questions indicated on a test score scale that demonstrated levels of student knowledge and skill expected within each student performance level (Engelhard, 2011; Ferrara et al., 2011). Panelists reviewed assessment questions in correlation with state standards and ranked questions based on difficulty. The assessment questions above and below the cut score defined the level of student mastery necessary to determine student proficiency levels.

High stakes state assessments were developed to measure state mandated objectives in corresponding content areas; but, the development of teacher pedagogy to meet the objectives was left up to school districts (Johnson, Zhang, & Kahle, 2012; Vega & Travis, 2011). There were positive and negative aspects with high stakes state assessments used to determine student growth, teacher effectiveness, and school success. Parke and Lane (2008) and Hershberg and Robertson-Kraft (2010) discussed curriculum enhancement, focused instruction, increased complexity in problem solving, improved motivation, and higher learning as positive aspects; on the other hand, narrowed

curriculum, instruction focused on assessment standards, and unethical assessment practices were negative aspects to high stakes state assessments. Successful mathematics curricula reform depended on improved mathematics discussions around real world problems between teachers and students (Vega & Travis, 2011).

Standards

The CCSS released in 2010 established universal curricula expectations for students K-12 in the areas of mathematics and English language arts from the collaborative efforts of the National Governors Association Center for Best Practices and the Council of Chief State School Officers (Anderson, Harrison, Lewis, & Regional Educational Laboratory Southeast, 2012; Conley, 2011; Rothman, 2012; Rust, 2012; Tienken, 2011). The standards-based educational reform efforts were voluntarily adopted by states and supported the RTTT application for funding from the federal government (Mathis, 2011). CCSS defined what students should know and be able to do upon graduation of high school transitioning into college or workforce training programs (Rothman, 2012; Rust, 2012). CCSS were evidence-based derived from scientific research that allowed data driven decisions to be made by educational leaders (Tienken, 2012).

The RTTT initiative awarded millions to assessment groups, such as the Smarter Balanced Assessment Consortium (SBAC) and the Partnership for Assessment of Readiness for College and Careers (PARCC), to create and implement national assessments aligned to common core standards (Braun, 2011; Conley, 2011; Onosko, 2011). The high stakes assessments created from CCSS included assessment “items

designed to capture evidence of deeper, more complex learning" (Conley, 2011, p. 17) through online assessment, constructed response assessments, and performance tasks. The PARCC and SBAC assessments indicated whether students are college and career ready after graduation from high school (Rothman, 2012). The change in state standards with common core, assessments aligned to standards from PARCC and SBAC, adjusted evaluation systems, increased accountability, and data-based decisions provided the right combination of changes to improve academic achievement for all students in K-12 education (Braun, 2011).

Educational stakeholders may all agree that improved accountability should be a goal for improvement in the educational system. Educational stakeholders were concerned about the use of one high stakes assessment to determine the outcomes of multiple aspects of education, for example, student graduation, teacher effectiveness, and administrator evaluation (Brown & Conley, 2007; Lamb, 2007; Ryan, Ryan, Arbuthnot, & Samuels, 2007; Solorzano, 2008). Teachers and administrators were under pressure to demonstrate student achievement and growth which caused some individuals' to make inappropriate decisions not typically practiced in the field of education.

> In the case of high-stakes testing, when measuring an outcome (e.g., school quality) with an indicator (e.g., test scores) and instituting a negative consequence (e.g., state takeover) or reward (e.g., a salary increase) as a result of the indicator, this can only lead to the corruption of the measurement system (e.g., high-stakes testing) and people (e.g., teachers and administrators) who work within the system. (Amerine-Beardsley, Berliner, & Rideau, 2010, p. 5)

The students' ability to perform at levels of proficiency on the high stakes assessments depended on multiple facets, which included 21st schools, well prepared teachers, high expectations, system wide support, and quality instructional programs (Lamb, 2007; Solorzano, 2008).

According to Brown and Conley (2007), high stakes assessments also extended beyond the postsecondary level as many higher learning institutions established entry-level courses based on the results, although the extent of this process needs further investigation and documentation. Changing student experiences in the classroom at the secondary level may assist in improved curricular experiences at the post-secondary level as high stakes assessments (e.g., AP courses, SAT/ACT scores) characterize one element of higher learning institutions contributed factors for success (Roksa & Arum, 2011). Achievement at the high school level may be measured by successfully transitioning students to post-secondary institutions and serve as a catalyst for high expectations, high stakes assessments aligned with curricula standards, and educational accountability (Lowe & Tanner, 2012). Some higher educational institutions have replaced oral entrance exams with standardized assessment to objectively measure student readiness (Drummond & Gabrscek, 2012). There were multiple levels of educational accountability and change in the effort to create educational reform at every stage of education.

The increased accountability implemented from NCLB placed a magnifying glass on improving mathematical understanding and student performance on high stakes assessments, which was used in determine AYP for a school (Bouch, Kulkarni, & Johnson, 2011; Nese, Park, Alonzo, & Tindal, 2011). The pressure to perform at a high

level in mathematics classes with mandatory, high stakes state assessments has educators searching for research based curricular programs that validate and support ways to effectively educate students (Springer, Pugalee, & Algozzine, 2007). Mathematical curriculum developers and educational stakeholders' have disputed between the implementation of traditional style curriculum and standards-based curriculum to meet the needs of students.

Pedagogy

Traditional style pedagogy may be identified by teacher lecturing and providing steps for students to understand mathematical procedures (Bouch et al., 2011; Yow, 2011); while standards-based pedagogy may be identified by student-centered endeavors around problem solving and mathematical depth of understanding (Bouch et al., 2011). Traditional educational practices considered "an oppressive practice…focused on memorization and mechanical learning because the belief exists that students are incapable of deep understanding" (Yow, 2011, p. 84). Bouch et al. (2011) indicated that higher achievement for students in classrooms with standards-based curricula focus. The National Council of Teachers of Mathematics (NCTM) supported standards-based practices concentrating on conceptual understanding that extended beyond computational student knowledge (Brown, 2012; Jamar & Pitts, 2005). According to Chinn (2009), approximately 50% of the adult population was incapable of mathematical reasoning and computation beyond that which was expected from an 11 year old.

States that adopted the CCSS emphasized pedagogical practices that move beyond software programs that taught test taking strategies, low level worksheets, and

memorization activities in the classroom toward a curriculum rooted in cognitive strategies that demanded high student engagement (Conley, 2011; Jung & Latchem, 2011). School districts that devoted time to increased teacher development focused on planning and preparation for learning, classroom management, delivery of instruction, monitoring student progress, and improved communication between teacher and parent to aid in retention of curricula content (Ediger, 2011; Loris, 2010). CCSS raised the expectation for teacher preparedness and student readiness. Essentially, classroom practices increased student cognitive demand to work with more complex texts in curricula content (Loris, 2010; Rothman, 2012). Learning new information through memorization of systematic procedures was similar to a computer storing files in a database, which resulted in students not making rich, meaningful, and complex connections in the knowledge acquisition process (Conley, 2011).

Mathematical success in the classroom and on high stakes assessments may be influenced by individual student perception of his/her ability in the content area, specifically aspects of motivation, cognitive development, personal beliefs and affect were obstacles in growth and understanding (Ryan, Ryan, Arbuthnot, & Samuels, 2007). Mathematical anxiety may have impacted elementary students, high school students, and college students with feelings of sickness, inability to focus, and nervousness when faced with taking a high stakes assessment (Woodard, 2004). High-achieving students used effective strategies that improved retention and depth of understanding in preparation for high stakes assessments, specifically compare and contrast notes with textbook, self-

assessments, and an organized effort to reason deductively from reading text (Hong, Sas, & Sas, 2006).

The pressure to perform on state assessments impacted all levels of an educational hierarchy, which caused teachers to impose a sense of urgency upon students. Teachers attempted to motivate students by communicating the significance of the assessment and the implications of the results, which compounded the level of fear and anxiety for some students (Putwain & Symes, 2011). Nyross and Wiklund-Hornqvist (2011) discussed unfavorable circumstances that may have been counter-productive in a high-stress testing environment; for example, "high motivation in combination with high anxiety produced almost the same levels of performance as low motivation in combination with low anxiety" (p. 998). Chinn (2009) surveyed over 2000 students in England and revealed that approximately 4% of student participants discussed feelings of anxiety when taking assessments, although the questionnaire results may not accurately have reflected exact levels of anxiety for each student. Mons (2009) assessed a standardized review in Europe and revealed that there was no theoretical basis that accurately demonstrated how assessment enhanced learning; therefore, the benefits of standardized assessment lacked consensus.

Educational policy makers, administrators, and teachers may never come to consensus when the topic centers on standardized assessments. Educators should focus on relevant areas to assist all students. Self-regulated learning (SRL) provided teachers a framework to understand better student motivation or lack thereof; in essence, a student has to consider the importance of the task, personal interest of the task, functionality of

task in relation to the future, and any negative aspects that may occur if he/she participated (Cifarelli, Goodson-Espy, & Chae, 2010; Kitsantas, Cheema, & Ware, 2011; Metallidou & Vlachou, 2010). Teacher and student self-efficacy also helped students be more successful on high-stakes assessments because student confidence improved in the content area as teacher beliefs were communicated on a consistent basis (Bates, Latham, & Kim, 2011; Briley, 2012; Kitsantas et al., 2011).

Teacher-efficacy in relation to teaching the content standards and attitude toward student content knowledge may have closed the gap in student performance on assessments (Brown, 2012; Evans, 2011). Students functioned at a higher level of understanding, comprehension, and problem solving when content knowledge or math literacy was optimal (Ozgen & Bindak, 2011). Teacher efficacy may lead to better instructional strategies and classroom management, which resulted in a higher engagement of students and more time spent on task (Brown, 2012). Students with a high level of self-efficacy experienced a prominent self-concept level, which improved their direct experiences with the content standards and daily activities in the classroom (Zientek & Thompson, 2010).

Professional Development

New legislation, increased accountability, and complex social conditions were aspects that have changed the role of educational leaders. For example, the principals' role 10 years ago focused on organization and management of school resources for teachers (Musanti & Pence, 2010; Rieckhoff & Larsen, 2012). The principal of the 21st century focused on teacher development and student achievement, which provided

quality professional development opportunities that built teacher capacity and enhanced learning to support school goals (Gaytan & McEwen, 2010; Potter & Roskinson-Szapkiw, 2012). Professional development may be used for a variety of school wide improvement efforts, but quality professional development focused on authentic student learning and improvement rooted in classroom instructional practices (Rivera, Manning, & Krupp, 2013; Shumack & Forde, 2011).

The district supported the local high school hiring a mathematics consultant group, Teacher Development Group, which assisted with developing teacher pedagogy. The consultant group worked with the local school five times during the school year. The consultant stayed for 3 days each visit, referred to as a studio cycle, and worked with the principal, curriculum coach, and mathematics teachers. The consultant planed the professional development for the 3 days around hands-on practices with the studio teacher as a platform for growing other mathematics teachers.

The consultant worked with the principal, curriculum coach, and studio teacher on Day 1 of each visit were the day started with visiting mathematics classrooms completing data snaps for each mathematics teacher. The data snap was a record of factual, descriptive data only about student conversations or written work, classroom environment, that is, student grouping, evidence of student reflection, public records, and genuine questions about student interactions with mathematical work. The consultant reflected with the principal and curriculum coach about the data snap before visiting the next classroom. Upon completion of the data snaps, the consultant had meet with the

studio teacher, curriculum coach, and principal to plan a model lesson taught by the studio teacher.

Professional development on the second day required all mathematics teachers to participate in a morning workshop. The consultant discussed best practices around habits of mind and habits of interaction and specifically targeted an area of improvement based on Day 1 data snaps. For example, the consultant trained mathematics teachers on appropriately using public records in the classroom. The mathematics teachers then observed the studio classroom and collected data on the planned model lesson. The mathematics teachers, curriculum coach, principal, and consultant debriefed the model lesson. There were goals set by each mathematics teacher to be completed before the next professional development cycle. The mathematics teachers practiced the strategies taught by the consultant before the next cycle and discussed any issues that may have occurred with the implementation of new strategies.

Professional development on the third day allowed the principal, curriculum coach, and consultant to visit mathematics classrooms. The consultant worked side-by-side with the teacher coaching during a class period. The afternoon was set aside for a debriefing between the consultant, principal, and curriculum coach about the professional development cycle. Appropriate dates were finalized for the next visit and the consultant discussed supports that may be necessary, strengthens of strategies, and direction for the next professional development cycle. Teachers were asked to complete an on-line survey a week before the next visit. An on-line blog allowed teachers to communicate with the consultant and each other about learned strategies.

Social Change

Marzano (Laureate Education, Inc., 2009) discussed several factors that are common in successful schools, which included leadership at the school level, viable curriculum, goals and feedback, parent and community involvement, safety and order, and collegiality and professionalism. Most schools had some level of these factors in place; but, the depth of implementation may have determined the level of student success. Students may be better suited to master skills when other extraneous variables, outside the control of the student, were at a high level of proficiency or functionality (Killion & Hirsh, 2011). Murphy (Laureate Education, Inc., 2009) reviewed external societal elements that successful schools addressed for students, which included support provided for the students mental, physical, and emotional status. Leadership was a key to improved educational campuses that fostered student growth (Inoguchi & Fujii, 2009; Musanti & Pence, 2010). There were multiple facets that defined successful leadership. McClure, Yonezawa, and Jones (2010) indicated personalization and connections between young people and the staff may have demonstrated improved academic achievement. "Personalization matters because young people who are engaged emotionally, cognitively, and behaviorally in their education are less likely to show signs of alienation and more likely to be connected to school" (McClure et al., 2010, p. 3).

The Joint Board of Teacher Education (JBTE) focused on training college graduates to effectively deal with some social aspects of teaching; specifically, the certification aspects of qualified teachers to determine if certification standards correlate with highly qualified teaching practices (Rose, 2010). Shakman et al. (2012) reported on

performance based teacher evaluation systems that incorporated performance-based standards, but did not examine the social element impacting educational campuses. Teacher evaluation systems focused on a variety of different approaches to measure effectiveness, such as value-added scores, professionalism, classroom management, planning, and assessments (Looney, 2011). The question remained of how teacher evaluations systems should be used to measure the social aspect of a classroom teacher. There may be a conflict of interest between professional values and personal values around classroom practices that highlighted an area to strengthen in educational classrooms (Tormey & Henchy, 2008).

The Internet has provided an avenue to send and retrieve information faster, while connecting individuals across the globe. Richardson (2012) viewed globalization as interwoven connections for world culture, socialization, and the economies. Marx (Laureate Education, Inc., 2009) discussed educational systems as the backbone structure to provide outlets for student connections to the forces that impact society, in particular, staying in touch with future needs based on current trends globally, nationally, and locally. The exponential growth of social networking cities generated concern among school leaders and the impact of education; in essence, educational leaders and communities must teach children socially appropriate ways to interact in a virtual environment (Ostashewski, Moisey, & Reid, 2011). For example, there were different standards of expectations for interactions in a virtual environment from social media cites, such as Facebook, which were inappropriate in a virtual environment focused on higher education or business (Ostashewski, Moisey, & Reid, 2011). Students started to

socially interact in school in the same manner of social interaction on media cites, but this was counter-productive when the expectations were not set and modeled. The concept of appropriate social interaction did not "foster interculturality in order to develop cultural interaction in the spirit of building bridges among peoples" (Wulf, 2010, p. 34), which may become an issue for established culture in a school or classroom. Established appropriate social norms may be the first foundation that should be established before classroom foster authentic student learning (Richardson, 2012).

Implications

Educational leaders are under increased pressure to demonstrate growth in alignment with school improvement goals, provide every student with an educational pathway for advanced learning, and produce assessment results documenting these elements (Rieckhoff & Larsen, 2012). Professional development focused on targeted school improvement goals builds teacher capacity for long-term sustainable school wide changes over time (Rieckhoff & Larsen, 2012; Shumack & Forde, 2011). Professional development builds teacher capacity in a variety of areas dependent on the needs of the school; for example, topics may include areas of curriculum and instruction, cultural diversity, relationship building, and/or technology (Gaytan & McEwen, 2010; Potter & Rockinson-Szapkiw, 2012).

The study was limited to one high school in the district that participated in the professional development; but, the outcomes of the research provided a guide for the district to implement in other high schools. As the district moves toward full implementation of the common core standards at the start of the 2013-2014 school year,

the results of this study may influence the ongoing and future professional development that supports the mathematics curricula throughout the district. The increased accountability hinging on student assessment results highlights the importance of professional development that yields tangible outcomes in student achievement.

Implications for the project study provided a guide for schools to build teacher capacity in alignment with school improvement goals. The research project enhanced teacher pedagogy in areas of the following:

1. Improved teacher feedback on student work
2. Increased student engagement and time-on-task in the classroom
3. Increased depth of student mathematical understanding
4. Improved lesson planning around higher-order concepts

This research study produced results identifying areas why teachers struggle with successful implementation of instructional techniques from professional development workshops. The professional development improved teacher pedagogy resulting in authentic student learning. A collection of this data on a larger scale may be helpful in determining the transferability of the project study findings.

Summary

The engine that drives education has consistently changed since the 1900's as educational stakeholders adapt to the changing of generations, technology, curricula, national and state mandates, accountability, and diversity in an effort to provide quality instruction. The NCLB initiative of 2001 is an engine that forced improved accountability with a lens on high stakes state assessments. NCLB envisioned alignment between

standards and assessments to validate accountability measurements for school districts. NCLB outlined teachers must be highly qualified to teach specific content areas, but left the specific guidelines up to individual states. The timeline for students, teachers, and school districts to measure up to NCLB guidelines were inconsistent from state to state and lead to some states applying for waivers as the reauthorization of ESEA took place at the federal level.

The states applying for waivers from NCLB implemented new evaluation systems for teachers and administrators, adopted new national wide standards, and refocused on teacher improvement to align with RTTT guidelines for federal funding under the umbrella of school improvement grants. The funding source for the reauthorization of ESEA was provided from the ARRA. The new adopted nationwide standards, Common Core, required fewer standards for content areas, but more depth and student mastery of each standard. The adoption of common core standards transitioned to new assessment measurements developed by PARCC and SBAC that focused on student online assessment, constructed response assessments, and performance tasks.

Successful districts, schools, teachers, and students were measured by the results of the high stakes assessments, so continued investigation into best practices derived from the increased demand on accountability. Educational institutions searched for the right combination of curriculum, assessment, evaluation, and professional development that yields the highest possible measurable student results. Teachers committed to on-going professional development workshops, seminars, and the pursuit to improve their practice and the environment of the school in a collaborative effort provided the

opportunity for students to engage in highly structured, engaging learning activities each day. The times of closing the door and teaching what is comfortable for the teacher is no longer applicable with the increased accountability standards of the 21st Century.

The methodology section is a description of the evaluation design, justification for the design, a strategy for data collection and analysis, and an approach to interpret the collected data. The project study assisted educational stakeholders in enhancing teacher pedagogy as the common core standards was implemented during the 2014-2015 academic school year. Data collection started during the spring of 2014 after Walden University Institutional Review Board (IRB) approval. Appropriate steps were taken in contacting the superintendent of the school district, principal of the participating school, and participating teachers pending IRB approval to obtain signatures for consent forms, letters of cooperation, and the data usage agreement.

Section 2: The Methodology

Mixed Method Research Design and Approach

For this study, a mixed methodology was used to investigate the possible effectiveness of mathematics staff development in relationship to the high stakes state Algebra I end-of-course assessment. I used a survey to gather qualitative data about the perceptions and beliefs of the teachers participating in the professional development (Creswell, 2012; Lodico, Spaulding, & Voegtle, 2010). I describe the appropriateness of using a *t* test to determine whether reject or to fail to reject the null hypothesis. The reviewed student end-of-course historical assessment data added clarity to the perceptions of the teachers. Transcribed survey data, with the end-of-course data, allowed for some inferences to be made about the progress of teacher pedagogy and suggestions for moving forward with the improvement of the mathematics development. I reviewed the qualitative survey data and quantitative test scores to determine what the school was doing before the professional development was implemented, the changes made during the implementation of the professional development, and recommendations for moving forward. Figure 1 is a visual description of the planned approach.

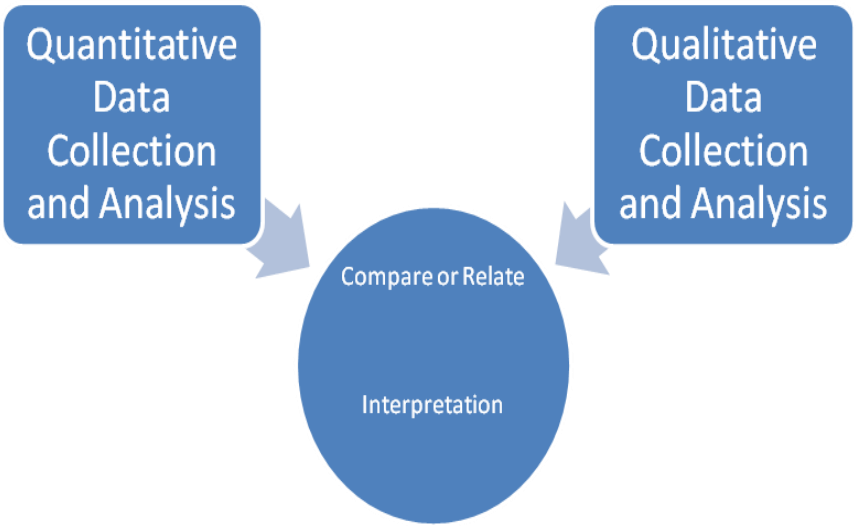


Figure 1. Convergent parallel design is showing how to simultaneously collect both qualitative and quantitative data, which results in collecting strengths of one form of data to offset the weakness of the other form of data (Creswell, 2012).

A concurrent mixed methods design allowed qualitative survey data and quantitative test data to be collected simultaneously (Creswell, 2012). The qualitative survey data were used to define what the teachers were doing before the professional development in comparison to what the teachers were doing after the professional development. A survey for participating teachers was used to clarify what changes occurred, how the changes occurred, and what actually worked in the classroom to move students toward mastery of the content based on the implemented professional development. I used the results of the quantitative test data to support or contradict the qualitative data and allow for inferences to be made for moving forward with best practices (Creswell, 2012). Figure 2 provides a general guide to assist a researcher with the stages of conducting a mixed method study.

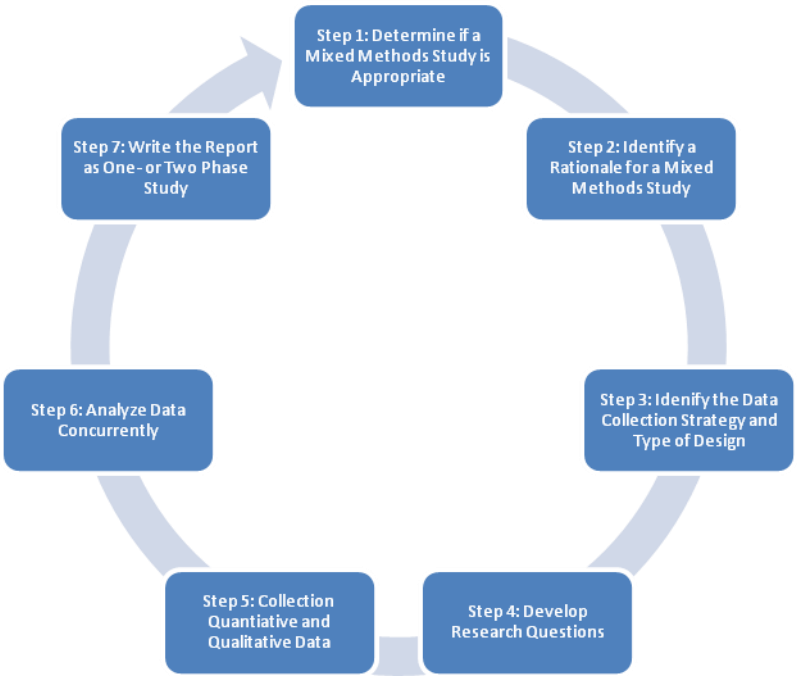


Figure 2. Steps in the process of conducting a mixed methods study is a general guide to help a researcher get started (Creswell, 2012).

The data collection and analysis for the concurrent design was a difficult process. Collecting qualitative survey data and transcribing the survey data in the form of a discussion allowed for some themes to emerge that could be supported or refuted based on the inferential statistical analysis of the student EOC data (Creswell, 2012). The analysis of the survey data helped clarify teacher confidence levels of adequately preparing students for passing the state end-of-course assessment, which may or may not have been validated by the statistical analysis of student test results. Organizing the survey data, categorizing any emerging themes, and making comparisons with the test dataset provided a better understanding of the implemented professional development. The concurrent design analysis includes a combination of the qualitative and quantitative

data to identify any new variables that may be further explored with additional testing (Creswell, 2012).

The concurrent analysis design was beneficial because it did not disrupt the routine of the classroom, school, or district. The mixed method concurrent design allows for the best of the qualitative and quantitative research (Creswell, 2012). The quantitative inferential *t* test data analysis offered an opportunity to collect data from a large number of students, while the qualitative survey data provided an insight from a small number of teachers to provide understanding about the professional development (Creswell, 2012). The investigation of classroom teachers exposed to professional development training provided the school and district with information about staff development, the changes that were made at the school, how the changes were made, and what items implemented successfully worked for the teachers. Interviewing, direct observations, and focus groups with teachers were avoided so that intimidation factors did not impact teachers.

The survey consisted of open-ended questions that requested teacher perspective on instructional strategies, classroom practices, end-of-course assessments, teacher preparedness, teacher attitude, and social change. Each category had open-ended questions that provided additional clarity around the implemented professional development. The survey was distributed during a faculty meeting at the school to participants; I asked participants to place the survey in my mailbox upon completion. Quantitative test data were formally requested from the superintendent. Data collection did not take place until after IRB approval in spring of 2014; data collection started thereafter. The data were collected simultaneously in an effort to identify themes and

changes to pedagogical practices from a range of variables, which included teacher confidence, differences between teachers, years of teaching, years of teaching at the school, and other variables to support or deny best practices. Furthermore, analysis conducted with scaled score data helped demonstrate whether the Figure 3 provides an example of the type of data that was be collected for quantitative and qualitative research.

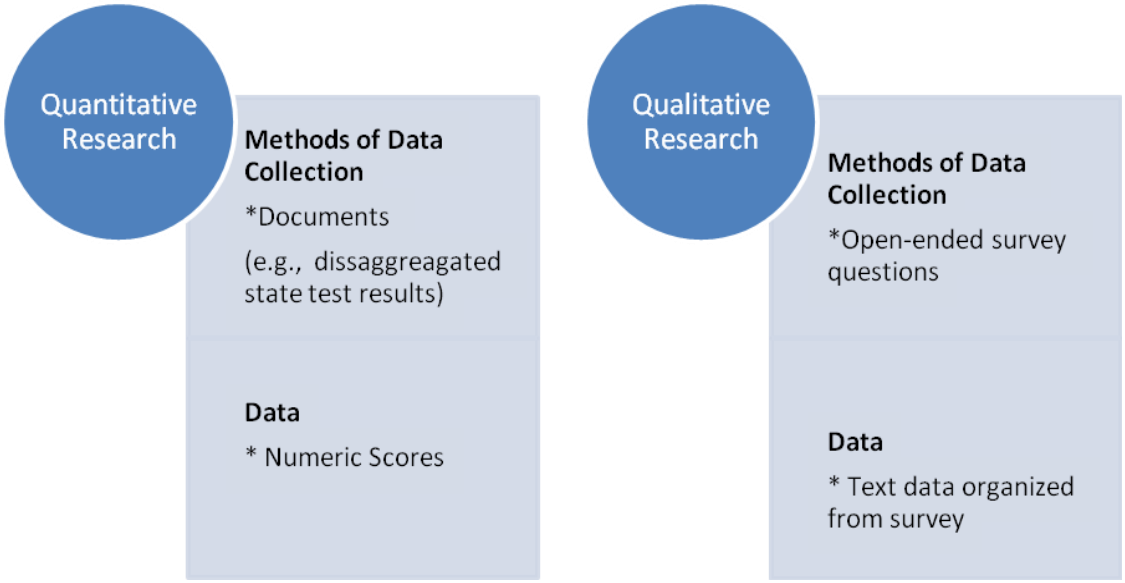


Figure 3. Quantitative and qualitative methods of data collection and types of data is showing a visualization of the design, method of data collection, and examples of collected data to help organize the researcher (Creswell, 2012).

Setting and Sample

For this study, a convenience sample was appropriate based on the availability of first-year students enrolled in year-long Algebra I mathematics class. The site of the study was one local community high school in a large school district in the state of Tennessee. The high school enrollment was approximately 850 students, which was one of the average size high schools in the district. The first-year class consisted of

approximately 250 students. The sample size was approximately 250 first-year students. The study eligibility criteria for participants consisted of students who were enrolled in the ninth grade for the first time and who were registered for a year-long Algebra I mathematics class.

The school had three Algebra I teachers each with three sections of year-long Algebra I classes for a total of nine Algebra I classes. The district's testing and accountability director provided requested historical data. Data included student gender, grade level, first-time test taker, ethnicity, economically disadvantaged, Algebra I end-of course assessment score and proficiency level**,** teacher's number of years teaching experience, number of years teaching at current assignment, and highest educational degree. A formal written letter of request for data was submitted to the superintendent for approval and release of data during the 2011-2012 and 2012-2013 school years. The end-of-course Algebra I exam followed specific test security guidelines set by the Tennessee state department of education testing listed in the testing administration manual (2013) including, but not limited to the following:

1. Establish security guidelines to ensure the integrity of the testing process.
2. Implement safeguards to ensure test content security.
3. Reporting any testing irregularities, breach of testing security and medical exemptions.
4. Conduct random visits during testing to ensure test security and consistency of administration.
5. Release student-specific test data to only authorized personnel.

See Appendix F for specific Tennessee code annotated law, state test security measures, and state test security guidelines copyrighted by the Tennessee State Department of Education 2013.

Quantitative Sequence Design

The state end-of-course (EOC) assessment in Algebra I mathematics was the instrument used for the posttest assessment in the quantitative portion of the study. The state EOC assessment was a standard based assessment tool which measured grade specific skills in mathematics. Every student was required to take the state assessment as part of graduation requirements. Students tested and percentage of students scoring was disaggregated by the following categories: below basic, basic, proficient, or advanced (Table 1). The quantitative EOC data were analyzed via descriptive and inferential statistics. In order to know for sure that the population variances came from the population, an independent samples *t* test was conducted. The significance level was set at $\alpha = .05$ ran at the 95% significance level. Furthermore, a Cohen's d report was done to check the effect size between year 1 and year 2 results. The calculation of effect size will quantify the strength of the difference between two means (Creswell, 2012). Disaggregation of student category percentages by subgroups included age, gender, grade level, first-time test taker, pass/fail Algebra I class, ethnicity, and economically disadvantaged. All student test data were requested from the superintendent. The districts testing and accountability supervisor formally provided all student achievement data variables listed in appendices.

Table 1

2012 End of Course (EOC) Cut Score Ranges for Scale Scores

Below Basic	Basic	Proficient	Advanced
500 – 656	657 – 711	712 – 751	752 – 900

Source: Tennessee Department of Education (2012). The table above lists the scale score ranges that identify students as below basic, basic, proficient, and advanced as reported by the Reporting Categories Performance Index (RCPI).

Table 2

2012 End of Course (EOC) Cut Score Ranges for Raw Scores

Below Basic	Basic	Proficient	Advanced
0 – 20	21 – 30	31 – 40	41 – 55

Source: Tennessee Department of Education (2012). The table above lists the raw score ranges that identify students as below basic, basic, proficient, and advanced as reported by the Reporting Categories Performance Index (RCPI).

The end-of-course exam for the state of Tennessee has determined the raw and scale score ranges that identified students as below basic, basic, proficient, and advanced. The raw score ranges and corresponding scale score ranges listed in tables 1 and 2 applied for the state end-of-course assessment in 2012 for Algebra I (Tennessee Department of Education, 2012). The cut scores are listed by Reporting Categories Performance Index (RCPI), which was the estimated of the number of questions student would expect to answer correctly if 100 items were questioned in the corresponding category (Tennessee Department of Education, 2012).

The EOC assessment for Algebra I developed by the state of Tennessee Department of Education confirmed the reliability and validity of the instrument. The Tennessee Department of Education required all students take the EOC assessment to

meet state graduation requirements (Tennessee Department of Education, 2014). The EOC assessment has used this test for at least the last 4 years. In 2008-2009 the state of Tennessee administered gateway tests, which changed to EOC assessments in 2009-2010 to be aligned with the new standards and mathematical curriculum framework for Algebra I (Tennessee Department of Education, 2009). The state department of education required training for all district and site test coordinators to maintain safe and secure testing environments when the assessment was proctored. Tennessee code annotated 49-1-607 (Tennessee Department of Education, 2012) stated,

> Any person found not to have followed security guidelines for administration of the Tennessee Comprehensive Assessment Program (TCAP) test may result in immediate suspension, grounds for dismissal, and/or revocation of state license.

The quantitative data was summarized in the form of descriptive statistics. Gender, grade level, ethnicity, first time test taker, and proficiency levels was examined using frequency distributions, and central tendency measures. The frequency distributions, measures of variability, and central tendency measures assisted in the description of student performance.

Qualitative Sequence Design

The anonymous survey described the changes that occurred in the classroom as a result of the professional development. Teachers, curriculum coach, and the principal were not interviewed, observed, or ask to voluntarily participate in any focus groups during this process to prevent stress and intimidation from occurring during the data collection. Establishing a research-participant working relationship was not necessary for

the survey to be completed. The survey was administered to the mathematics department that consisted of eight teachers who directly participated in the implementation of the professional development.

The survey assisted with providing a clear description of the professional development around context for change, process and corresponding frequency, interactions, and attitudes. The survey data were organized and categorized for teachers to review and confirm any themes around change, attitude, and teacher perception. The teacher survey data, end-of-course assessment data, and confirmed teacher perception around categorized survey data provided triangulation of data to aid in the understanding of teacher confidence in adequately preparing students for the Algebra I state end-of course assessment after the implemented professional development.

Data Collection and Analysis

The quantitative data collected from the state end-of-course were reliable as the exam has been administered for the last 4 years to measure student proficiency based on identified state standards for Algebra I (Tennessee Department of Education, 2012). The standards are going to change as the state adopted Common Core standards in 2010 and will begin to assess the common core standards from PARCC assessments in the fall semester of 2014 (Tennessee Department of Education, 2014). The triangulation of data assisted in determining the validity of the results for this project study. All data was formally requested from the director of testing and accountability in the districts central office department.

A survey provided qualitative data on the implementation of the professional development. The survey data incorporated data from the teacher perspective on the professional development context for instructional strategies/tools, classroom practices, end of course assessment, teacher preparedness, teacher attitude, and social change. The survey provided data to aid in the understanding of improvement efforts. The survey was distributed to project study participants during a scheduled faculty meeting. The survey included open-ended response questions to help provide a greater depth of understanding from practitioners participating in the professional development (Creswell, 2012). A letter of cooperation was obtained from the administration of the school and district data agreement form. The qualitative research provided an in-depth understanding of teacher perceptions (Lodico et al., 2010). Open-ended questions on surveys were organized to allow themes to be identified (Creswell, 2012). The organization process initially looked for broad, overarching themes to be identified. The data were used to help identify a framework to help deepen the understanding of the professional development.

Quantitative Data Collection and Analysis

The historical data from the Algebra I state EOC assessment that were used for this study are listed in Tables 3 and 4. The breakdown of Algebra I end-of-course state exam was formally requested from the districts' superintendent. Data collection and aggregation of results included the following variables: grade level, first-time test takers, pass/fail of Algebra I class, age of student, gender, socioeconomic status, ethnicity, and students' with/without disabilities. A breakdown of the percentages of listed variables along with students' proficiency levels was disaggregated to assist with description and

data validation. The individual names and corresponding scores for students was kept confidential. Examining variable combinations with proficiency levels clarified the impact of the professional development; for example, examining the central tendencies for each subgroup by ethnicity and gender helped describe the overall all performance of students.

The first-year student population in 2012-2013 represented approximately 30% of the school total population. The population consisted of students who were enrolled in the ninth grade for the first time and registered for the year-long Algebra I mathematics class. There were 190 students were enrolled in the yearlong Algebra I mathematics class taught by three teachers. The gender makeup for the first-year class had a total enrollment of 91 women and 99 men. The ethnicity makeup from the ninth grade taking the Algebra I mathematics class consisted of approximately 65% European American, 25% African American, 8% Hispanic American, 1% Asian American, and < 1% Native American. The socioeconomic status for the ninth grade class was approximately 57% of the total ninth grade population who qualified for free and reduced lunch. Disaggregated data by teacher class for each category is listed in appendices.

Table 3 shows that approximately 49% of students scored proficient or advanced on the 2013 EOC Algebra I state exam, of which, 44% were men and 54% were women. Approximately 22% of the students scored below proficient; of which, 25% were men and 19% were women. The student body consisted of a majority of European American students; in this case, there were three times as many European American students as African American and twice as many of all other ethnic groups combined. Fifty percent

of the European American students scored proficient of advanced, while 40% of the African American students scored proficient or advanced on the EOC. Forty-six percent of the subgroup that made up the economically disadvantaged students scored proficient or advanced. The central tendencies of the 2012-2013 test scores, indicated in Table 4, resulted in the following: median score of 710 resulted in basic level of proficiency, mode score of 500 resulted in below basic level of proficiency, and mean score of 684 resulted in basic level of proficiency.

Table 3

2012 -2013 Descriptive Statistics Algebra I EOC Proficiency Levels

	Below Basic 500-656	Basic 657-711	Proficient 712-751	Advanced 752-900
		Students Enrolled		
	22.1	27.4	37.5	11.5
		Gender		
Men	25.3	28.3	34.3	10.1
Women	18.7	26.4	40.6	13.2
		Ethnicity		
European American	21.8	26.6	37.1	12.9
African American	27.7	29.8	31.9	8.5
Hispanic American	12.5	25.0	56.3	6.2
Indian American	0.0	0.0	0.0	100.0
Asian American	0.0	0.0	50.0	50.0
		Socioeconomic Status		
ED	24.1	29.6	38.9	7.4
Non-ED	19.5	24.4	36.6	17.1

Source: Hamilton County Department of Education (2012). The table above lists the disaggregated data derived from the raw score data from accountability and testing coordinator. All numerical values above indicated percentage of students. Economically disadvantaged (ED) and Noneconomically disadvantaged (Non-ED) represented above.

The first-year student population in 2011-2012 represented approximately 33% of the school total population. There were 243 students enrolled in the yearlong Algebra I mathematics class taught by three teachers. The gender makeup for the ninth grade class had a total enrollment of 108 men and 135 women. The ethnicity makeup from the ninth grade taking the Algebra I mathematics class consisted of approximately 59% European American, 29% African American, 8% Hispanic American, 2% Asian American, and

< 1% Indian American. The socioeconomic status for the ninth grade class was approximately 58% of the total first-year population that qualified for free and reduced lunch. Disaggregated data by teacher class for each category is listed in appendices.

Table 4

2011-2012 Descriptive Statistics Algebra I EOC Proficiency Levels

	Below Basic 500-656	Basic 657-711	Proficient 712-751	Advanced 752-900
		Students Enrolled		
	14.0	35.8	30.0	18.1
		Gender		
Men	19.3	34.1	23.7	22.2
Women	7.4	38.0	38.0	12.9
		Ethnicity		
European American	6.9	30.6	34.7	25.0
African American	28.2	42.2	25.4	2.8
Hispanic American	10.0	50.0	30.0	10.0
Indian American	0.0	0.0	0.0	100.0
Asian American	33.3	33.3	0.0	33.3
		Socioeconomic Status		
ED	17.1	40.0	30.0	10.0
Non-ED	9.7	29.1	31.1	29.1

Source: Hamilton County Department of Education (2012). The table above lists the disaggregated data derived from the raw score data from accountability and testing coordinator. All numerical values above indicated percentage of students. Economically disadvantaged (ED) and Non-economically disadvantaged (Non-ED) represented above.

Table 4 indicated that approximately 48% of students scored proficient or advanced on the 2012 EOC Algebra I state exam, of which, 46% were men and 51% were women. Approximately 14% of the students scored below proficient; of which, 19%

were men and 7% were women. The student body consisted of a majority of European American students; in this case, there were twice as many European American students as African American students. The data indicated that 60% of the European American students scored proficient or advanced, while 28% of the African American students scored proficient or advanced on the EOC. Forty percent of the subgroup that made up the economically disadvantaged students scored proficient or advanced. Data indicated a relationship between socioeconomic groups and ethnic identity in comparing standardized test scores of European Americans with other ethnic groups, in essence, European Americans had a higher socioeconomic status and scored better on the standardized exam. The central tendencies of the 2011-2012 test scores, indicated in Table 5, resulted in a basic level of proficiency with a median score of 711, a proficient level of proficiency for the mode with a score of 724, and basic level of proficiency for the mean score of 701.

Table 5

Central Tendencies for Algebra I Historical Test Data

Test Year	Median	Mode	Mean
2011 – 2012	711	724	701
2012 – 2013	710	500	684

Source: Hamilton County Department of Education (2012). The table above lists the disaggregated data derived from the raw score data from accountability and testing coordinator.

The historical data from 2011-2012 indicated an average score of 701, which fell in the basic proficiency range. The 2012-2013 data indicated a drop in the mean score, but still fell in the basic proficiency range. The proficiency range on the state exam was

712-751; accordingly, the median score for students in the 2011-2012 and 2012-2013 were one to two points away from scoring proficient. The majority of students in 2011-2012 scored proficient, but a drop occurred in 2012-2013 as the majority of students scored below basic.

Table 6

Teacher Demographic Information

2011 – 2012 School Year	Number of Years Teaching Experience	Number of Years at Current Placement	Highest Educational Degree
Teacher A	25	22	Bachelor
Teacher B	3	3	Bachelor
Teacher C	3	3	Bachelor
2012 – 2013 School Year	Number of Years Teaching Experience	Number of Years at Current Placement	Highest Educational Degree
Teacher A	26	23	Bachelor
Teacher B	0	0	Bachelor
Teacher C	0	0	Bachelor

Source: Hamilton County Department of Education (2012). The table above lists the teacher demographic information referencing teaching experience and educational level.

The Algebra I mathematic department in for the high school all have completed a bachelor's program to meeting state requirements for teaching high school mathematics. The main shift indicated by the data from 2011-2012 to 2012-2013 was the teaching experience. The 2011-2012 Algebra I mathematics team indicated one veteran teacher with over 20 years of experience and two teachers with 3 years of experience all at the same high school. The 2012-2013 Algebra I mathematics team indicated one veteran

teacher with over 20 years of experience and two teachers with no teaching experience that were new to the high school.

Table 7

Group Statistics

Group Statistics

	Groups	N	Mean	Std. Deviation	Std. Error Mean
ScaleScore2011-13	1.0	112	697.143	65.9955	6.2360
	2.0	187	684.460	77.5293	5.6695

Table 8

Independent Sample t test

Independent Samples Test

		Levene's Test for Equality of Variances		*t* test for Equality of Means						
		F	Sig.	*t*	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
ScaleScore2011-13	Equal variances assumed	3.460	.064	1.446	297	.149	12.6830	8.7738	-4.5836	29.9496
	Equal variances not assumed			1.505	263.074	.134	12.6830	8.4280	-3.9119	29.2778

The research question addressed if there was a difference between the first and second year EOC scores. Based on the results of the t test, the null hypothesis is not rejected. Therefore, there was no statistically significant difference between the two years

of EOC scores, (at the $\alpha = .05$ level of significance). In conclusion, there was no statistical difference between the first and second EOC testing years. However, the test scores in year 2 were observably lower as demonstrated in Table 8. The second test score year indicated that the mean scored dropped by 12 points. However, it was not statistically significant different.

The Levene Equality of Means test indicated that the *t* test for equality of means was the appropriate test to perform, assuming equal variances. The *F* value listed in table 8 is 3.46. The level of significance of $\alpha = .05$, called the critical region of a normal bell curve for a two-tailed test of significance, in which, the data would fall at the ends of the normal distribution curve thus rejecting the null hypothesis (Creswell, 2012). In this case, the data does not fall inside the critical region, thus fail to reject the null hypothesis.

The effect size, Levene's Equality of Means, is a way to determine the strength of the conclusions from two groups in a quantitative study, therefore, indicating how different the test scores are supporting the decision to determine significance (Creswell, 2012). The effect size indicates the probability that any person selected at random from the treatment group will have higher scores from a randomly selected person from the control group (Rusico & Mullen, 2012). In this study, Cohen d report would indicate the probability that a random student from the second testing year would score higher than a random testing student from the first testing year. Cohen's d report indicated an effect size of 0.176, which infers there was not a strong relationship between the two testing years as indicated by a small effect size.

Summary of Quantitative Results

The first-year population represented approximately one-third of the student population in 2011-2012 and 2012-2013. The student body consisted of a majority of European American students; in this case, there were three times as many European American students as African American and twice as many of all other ethnic groups combined. Approximately 49% of students scored proficient or advanced on the 2013 Algebra I EOC; of which, 44% were men and 54% were women. Approximately 48% of students scored proficient or advanced on the 2012 Algebra I EOC of which, 46% were men and 51% were women. There was an 8% increase of students that scored below proficient from the 2012 to the 2013 testing year; but, the number of women who scored below proficient dropped by 12%. There was a 10% increase of European American students who scored proficient or advanced from the 2012 to the 2013 testing year. An area of concern that the high school would want to address would be the subgroup of African American men. Data indicated a relationship between socioeconomic groups and ethnic identity in comparing standardized test scores of European Americans with other ethnic groups, in essence, European Americans had a higher socioeconomic status and scored better on standardized exams. The majority of students in 2011-2012 scored proficient, but a drop occurred in 2012-2013 as the majority of students scored below basic.

Qualitative Data Collection and Analysis

The qualitative survey data listed in Tables 7-11 were anonymous data from teachers who participated in the professional development. The analysis of the qualitative

data provided a clear description of what changes occurred in the school, how those changes impacted classroom practices, and what may impact student test scores. The qualitative survey analysis was organized and categorized to identify themes around change, attitude, and teacher perception. The data were summarized and reviewed by research participants to find consensus on questions. Validating the qualitative research was justified from triangulation of data for this research project. The process of "corroborating evidence from different individuals, types of data, or methods of data collection" (Creswell, 2012, p. 259) produced or increased the accuracy of the results. Collection of various types of data took time and involvement for effective data collection and triangulation. An additional step in validating data included member checking, which allowed myself to correspond with participants in reviewing the accuracy of the data report (Creswell, 2012).

The qualitative survey data were anonymous data from teachers participating in the professional development. Using the survey, I investigated teacher perceptions around the topics of instructional strategies, classroom practices, end-of-course assessment, teacher preparedness, teacher attitude, and social change. The analysis of the qualitative data provided a clear description of what changes occurred in the school, how those changes impacted classroom practices, and what may impact student test scores. The qualitative survey analysis was organized and categorized around identified themes around change, attitude, and teacher perception. Fifty percent of the surveys given out were returned for analysis by the researcher. I categorized the survey results based on the teacher's responses and the percentages denoted in Tables 7-11.

The qualitative survey information was categorized around themes to better understand instructional tools implemented to better prepare students on the end-of-course state assessment. The instructional tools listed in Tables 7-11 provided clarity around the changes that occurred in teacher's classrooms as a result of participating in the professional development. The data that listed in Tables 7-11 indicated changes in pedagogy, teacher experiences, and social change.

Instructional Strategies/Tools

Table 9

Instructional Strategies Implemented in the Classroom

Instructional Strategy	Least Beneficial	Beneficial	Most Beneficial
Public Record	0	0	100
Math Talk	0	0	100
Individual Conferencing	50	50	0
Group Conferencing	75	25	0
Selecting and Sequencing	0	25	75
Wait Time	0	25	75
Questioning	25	50	25
Team Lesson Planning	0	25	75
Turn and Talk	0	75	25
Private Think Time	0	50	50

Source: The information was obtained from the researcher's analysis of returned teacher surveys. Table 7 lists the percentage of teacher's and their perception of implemented instructional strategies as a result of the professional development.

One-hundred percent of the participating mathematics teachers indicated that structured math talk and public records were the most beneficial instructional strategies in improving student understanding of content. Seventy-five percent of the participating mathematics teachers noted the instructional strategy that was least beneficial was pulling students out to complete small group conferencing.

Table 10

Difficulty With Instructional Strategy Implementation

Instructional Strategy	Most Difficult	Neutral	Difficult
Public Record	100	0	0
Math Talk	0	0	100
Individual Conferencing	0	50	50
Group Conferencing	0	0	100
Selecting and Sequencing	50	25	25
Wait Time	100	0	0
Questioning	0	25	75
Team Lesson Planning	100	0	0
Turn and Talk	100	0	0
Private Think Time	100	0	0

Source: The information was obtained from the researcher's analysis of returned teacher surveys. Table 8 lists the percentage of teacher's and their perception of how difficult it was to implement instructional strategies as a result of the professional development.

End-of-Course Assessment

Table 11

Instructional Strategies Beneficial for the EOC

Instructional Strategy	Not Beneficial	Neutral	Beneficial
Public Record	25	0	75
Math Talk	25	0	75
Individual Conferencing	75	25	0
Group Conferencing	75	25	0
Selecting and Sequencing	25	0	75
Wait Time	25	0	75
Questioning	25	0	75
Team Lesson Planning	0	0	100
Turn and Talk	25	0	75
Private Think Time	25	0	75

Source: The information was obtained from the researcher's analysis of returned teacher surveys. Table 9 lists the percentage of teacher's and their perception of how implemented instructional strategies would improve student success on the end-of-course state assessment as a result of the professional development.

Seventy-five percent of the mathematics teachers that participated felt the strategies built student confidence, mental toughness, and enhanced competence for sense making around for tackling tough problems on the state assessment. The instructional practices around small group discussions assisted students in thinking mathematically; but, 75% of teachers felt that extended time spent on small group discussions did not lend itself toward best practice to prepare students to find a right answer on the multiple choice style assessment. One-fourth of the mathematics department felt that more time

needed to be spent on test taking strategies for the current multiple choice format style of assessment on the state assessment.

Table 12

Teacher Attitude

Instructional Strategy	Not Confident	Neutral	Confident
Public Record	0	25	75
Math Talk	50	25	25
Individual Conferencing	50	50	0
Group Conferencing	50	50	0
Selecting and Sequencing	0	50	50
Wait Time	0	25	75
Questioning	25	25	50
Team Lesson Planning	0	50	50
Turn and Talk	0	25	75
Private Think Time	0	25	75

Source: The information was obtained from the researcher's analysis of returned teacher surveys. Table 10 lists the percentage of teacher's and their confidence level with implementing instructional strategies learned from the professional development.

The mathematics team felt confident with implementing different instructional strategies learned from the professional development. Fifty percent of the teachers felt confident with implemented questioning techniques and probing questions around whole group discussions, while others felt confident with sequencing content and standards around planning. Fifty percent of the mathematics team did not feel confident with implementing structured math talk in the classroom; specifically, teachers discussed struggles with time management and student engagement when implementing structured

math talk. Seventy-five percent of the participating teachers felt confident with the use of public record, wait time, turn and talk, and private think time.

Table 13

Social Change Components

Relationship	No Improvement	Neutral	Improvement
Student/Teacher	25	50	25
Teacher/Parent	100	0	0
Teacher Moral	0	25	75
Classroom Culture	0	25	75
Student Confidence	0	0	100
Student Peer Trust	0	0	100
Trust in Department	0	0	100

Source: The information was obtained from the researcher's analysis of returned teacher surveys. Table 11 lists the percentage of teacher's and their perception of social change as a result of the professional development.

Social climate is the way people feel towards each other in a classroom. Social climate impacts the attitudes and opinions people in a classroom or school. The social climate in the classroom and school influenced the way individuals shared thoughts, feelings, and beliefs. Professional development provided the opportunity for people to be vulnerable. The professional development improved the social climate in the classroom according to 75% of participating mathematics teachers. One hundred percent of the participating teachers indicated the students earned the trust of classmates, improved student confidence, and improved the trust within the mathematics department as a result of the professional development.

Summary of Qualitative Results

There was a transition in pedagogy as lecture style and skill-and-drill practice was replaced with student generated public records and structured math talk. The teachers used private think time, wait time, and turn and talk strategies during everyday practice. The instructional tools that were challenging to implement had a range of responses; specifically, implementing structured math talk and developing appropriate questions were at the top of the list. The experiences that participants indicated improved teacher pedagogy involved collaboration practices with an instructional leader. Specifically, 100% of the participating mathematics teachers marked in-class coaching sessions and lesson planning were practices that improved their art of teaching. At least 50% of the participating mathematics teachers listed peer-observations and reflective practices improved their art-of-teaching. One-hundred percent of the participating teachers would like more time spent dedicated to planning personalized lesson plans, as opposed to, sitting through model lessons and debriefing practices. Seventy-five percent of the mathematics teachers denoted too much time was spent watching modeled lessons. Overall, the strategies were useful, but some were better to use than others mainly due to time constraints during the school day.

Mixed Methods Results

This concurrent mixed methods project study combined the strengths of qualitative and quantitative data to explore instructional pedagogy used in the classroom as a result of participating in the mathematics professional development. The data collected did not interfere with the daily operations for the campus. The qualitative

survey data discussed in Section 2 were anonymous data from teachers who participated in the professional development. The quantitative historical data listed in Section 2 were provided by the districts' testing and accountability coordinator. The information assisted with the development of the project study in Appendix A. The information assisted in the development of instructional themes that impacted classroom learning, which included planning methods for units and daily lessons, classroom interaction strategies, classroom engagement strategies, questioning techniques, and peer observation systems.

Findings

The teacher demographic information listed in Table 6 indicated a shift in teachers from the 2011-2012 to the 2012-2013 school year. The 2011-2012 staff had three teachers with a minimum of 3 years of experience and one veteran teacher with over 20 years of experience. The 2012-2013 staff had two teachers with no teaching experience with one veteran teacher with over 20 years of experience. The shift in the department with two new staff members may have attributed to the increase in students that scored below proficient for the 2012-2013 year along with a declined proficiency levels in some subgroups. There was an increase in male students scoring below proficient in the 2012-2013 year, specifically men in the African American subgroup.

The professional development provided structure and accountability to the mathematics department. Several teachers noted how improved lesson planning assisted with asking more open-ended questions that improved the discussions in small groups or with partners. The entire mathematics team that participated indicated that adding public record to their teacher toolkit was easy, while a participant noted it was simple to

understand and a natural process for effective classroom practice. The structured math talk created student disequilibrium, which forced students to collaborate with their peers. This collaboration assisted with individual growth in understanding content material. All of the teacher participants indicated that the professional development did not improve student teacher relationships or teacher parent relationships.

Evidence of Quality

Validated information resulted of the corroborative evidence from historical test data and qualitative survey information synthesized to reach consensus by participants. According to Creswell (2012), triangulation of data works best when a variety of individuals, data, and data collection are used to produce better accuracy of results, which assisted with participating members checking the synthesis of information for accuracy. The information was organized and categorized to identify themes around change, attitude, and teacher perception. The data were summarized and reviewed by research participants to find consensus on results. The teachers were allowed the opportunity to review data and make any suggestions for corrections. The transcript was agreed upon by teacher participants.

Outcomes

The analysis of the qualitative data provided a clear description of what changes occurred in teacher classrooms. There was an increase in the use of engagement strategies and a decline in the use of group and individual conferencing strategies. The data also indicated that there was not a major shift in the cultural components, which included relationship themes between teacher/student, teacher/parent, and teacher moral. This may

have attributed to the lack of teaching experience by the shift in math teachers starting the 2012-2013 year. One hundred percent of the participating teachers indicated there was not a shift in teacher/parent relationships, while 75% of the participating teachers indicated there was no shift in student/teacher relationships.

Implementing the structured math talk built student confidence when offering generalizations and making conjectures with the entire class. Structuring math talk was very time consuming, but allowed the classroom to transition from teacher centered instruction to student centered discussion. The use of public record in conjunction with structured math talk strategies provided a venue for students to see their thinking and correct any misconceptions. The allotted time during the day did not lend itself toward consistently completing small group conferencing especially with multiple teachers. The mathematics department had to adjust the classroom culture to create a safe atmosphere for students to make mistakes, as many students, hesitated to discuss any educational thought process that they felt to be incorrect.

Teacher classroom practices changed in 100% of the participating teachers classrooms as a result of the professional development; teachers have physically rearranged classroom seating arrangements from traditional rows to pods or small groups. The change provided better opportunities for student engagement on multiple levels, which included improved peer collaboration, student ownership of learning, and higher levels of deliberation to include conjectures and generalizations. Previous classroom practices did not always allot time for students to demonstrate understanding beyond traditional worksheet or textbook assignments. Teachers revealed that working in small

groups had to be planned out weeks in advance and involved levels of anxiety that lead to frustration, as opposed to, incorporating practices that occur on a daily basis. Initially, planning was the foundation for changes to occur with support from administration, colleagues, and staff development consultants.

The instructional strategies learned will benefit students during the transition to common core assessments; specifically, incorporating mathematical habits of mind and mathematical habit of interaction to get students to think as mathematicians. The instructional strategies helped meet various learning styles to better prepare for the state end-of-course assessment. The collaborative efforts provided opportunities for teachers to review student work and discuss areas of concern and areas of areas of growth. The mathematics team had five professional development cycles during the school year and each cycle was 3 days long, which teachers felt was too much time.

The teachers valued participating in the professional development; particularly, the time an instructional leader was observed in the class and provided immediate, focused feedback on areas of strength and areas to strengthen. The students accepted that mistakes are a part of the learning process and empowered students to take ownership of their own learning and responsibility for helping classmates. There was a social change in the mathematics department as the professional development bonded teachers and lifted moral. According to 100% of the participating teachers, the mathematics department was more willing to share areas of concern in an effort to improve as a team.

Assumptions, Limitations, Scope and Delimitations

Algebra I teachers must be highly qualified to be eligible to teach the class in accordance with state certification regulations, so the assumption that each teacher has equitable levels of content knowledge. The professional development was limited by the one full year implementation for the pilot in accordance with the school improvement grant. The study happened in one local high school, which may not be a true representation of each high school in the district. The data collected were bounded by first-year high school students enrolled in a year-long Algebra I course.

I was an assistant principal at the local high school. I did not have any supervisory responsibilities for the Algebra I teachers participating in the professional development, which included observations, evaluations, and any teaching duties that may reflect job performance as a teacher. I did not participate in the implementation of the professional development program.

Confidentiality

The three basic principles that govern the IRB include "beneficence of treatment of participants, respect for participants, and justice" (Creswell, 2012, p. 22). The data collection process and analysis started after appropriate steps were taken to obtain confidentiality, informed consent, and IRB approval. Obtaining a letter of consent assisted with sound, ethical practices and provided each participant the opportunity to opt out of the project study at any time. I did not have any direct supervision and/or evaluation of each research participant. Appropriate district and building level approval was obtained from the superintendent and principal to maintain confidentiality. Sound

ethical practices were implemented to protect the rights of research participants (Creswell, 2012).

Data collected were entirely confidential and was not provided to anyone outside of the researcher's supervising faculty. The information obtained in the survey was not used for any purposes outside of this project study. Teacher and student names were not used to identify where the data originated from for this study. The principal of the participating school approved the collection of survey data by signing a letter of cooperation. The survey information was kept on file in a locked and secured area. The information was kept entirely confidential, which allowed honest responses from volunteer participants' in the project study.

Conclusion

I used a concurrent parallel design that helped identify best practices and teacher confidence in preparing students for the state of Tennessee end-of-course Algebra I assessment. Quantitative historical student assessment data from the state assessment helped validate the qualitative survey data about teacher perceptions and student preparedness for the state EOC. The analysis of data helped identify any emerging themes around the implementation of the professional development and assisted with developing steps for moving forward with teacher pedagogy to improve student learning. The project study helped assist educational stakeholders in determining best practices for teacher pedagogy as the common core standards will be fully implemented in 2014-2015 academic school year.

The quantitative data indicated less than half of the students taking the Algebra I EOC scored proficient or advanced during the 2011-2012 and 2012-2013 school years. The scores indicated a slight percentage increase from the 2011-2012 to the 2012-2013 school year in students scoring below proficient. There was a slight decline in the percentage of students scoring advanced from the 2011-2012 to the 2012-2013 school year. The subcategories indicated similar scoring in some areas, growth in others, and a decline as well. There was not a particular area that denoted significant growth or lack thereof. For example, students in the subcategory of economically disadvantaged during the 2011-2012 school year had 40% of students scored proficient or advanced, while the 2012-2013 school year had 46% of students scored proficient or advanced. The African American subgroup in 2011-2012 indicated 28% proficient or advanced with 3% of the students advanced, while the 2012-2013 indicated 40% proficient or advanced with 9% of the students advanced.

The qualitative data provided a better picture around the success and struggles for the mathematics team. The implementation of the professional development yielded several instructional strategies that were new and challenging to mathematics teachers. The mathematics team appreciated having an instructional leader in the classroom that provided timely feedback focused around ways to improve quality instructional techniques. The teams struggled with implementing some instructional strategies, but were optimistic about the growth of the students and the growth as individual teachers. The mathematics team appreciated the positive support of the principal, curriculum coach, instructional leaders, and colleagues during the implementation of the professional

development. The team felt that too much time was spent around peer observations and not enough time around planning with individual subject level content areas. The team did feel confident in being prepared to assist students during the implementation of common core standards. The teacher must set the stage on a daily basis with the students in his/her classroom and must be supported by administrative teams and instructional leaders. The instructional support must be for all teachers and not just those that are new to the profession or new to the building.

Summary

The majority of first-year students in 2011-2012 scored proficient; but, a drop occurred in 2012-2013 as the majority of fist-year students scored below basic. This may be a reflection of the change in years of experience with the teachers during 2012-2013. Two-thirds of the Algebra I mathematics teachers started their educational careers at the high school with no prior teaching experience at other schools. The administrative team may want to consider not shifting teachers into other content areas on a regular basis to see if the professional development impacted student achievement growth.

The drop in student proficiency levels for the 2012-2013 school year prompted school leaders to take a closer look at classroom pedagogy. I looked at practices that were learned from professional development and determine what practices the teachers felt were beneficial. Identifying the practices that were beneficial would assist in continued professional development activities that were sustainable for the school. A review of literature, best practices, skills, and activities that worked best during the mathematics professional development is in Section 3. The goal of this project was to learn what

teachers felt about the professional development and whether or not it helped them prepare students for the Algebra I EOC.

Section 3: The Project

Introduction

Educational stakeholders, researchers, and practitioners attempt to ask questions that produce results that may change the process of public education. Public education continues to experience budget restraints that force public school districts to make tough educational decisions. Educational stakeholders are asked to stretch the U.S. dollar for efficient and effective results. Superintendents and educational leaders are re-evaluating and redefining best practices for students, teachers, and other educational partners.

The foundation of public education relies on the growth of students; consequently, public school districts must develop about best practices that demonstrate growth for students and teachers. As a result of what I observed in the mathematics teachers' classrooms and on their surveys, a review of best practices is included in this section. Those skills and activities that appeared to work best according to the teachers are provided in detail within the project located in Appendix A. All of the worksheets and activities are provided based on research and literature as presented below.

The goal of this project was to learn what teachers felt about the professional development and whether or not it helped them prepare students for the Algebra I EOC. The project provided teachers with instructional tools to create daily lesson plans and units of study, instructional strategies that develop a common language for teachers to develop vertically across a content area, student engagement strategies that focused on student-driven classroom practices, teacher questioning techniques, and peer observation protocols for teachers and administrative teams. The project provided teachers with the

tools to shift from traditional lecture style teaching to a classroom that facilitates student growth.

Based on the surveys and mixed methods data collection, I learned that the teachers were not comfortable with group and individual conferencing with students due to the time constraints. Teachers indicated that questioning and math talk was difficult to implement as a part of the daily practices. As a result, in this project I proposed to change and update the identified areas that teachers were not confident in or indicated as not beneficial for the overall student's growth. The project in Appendix A streamlines the instructional practices that the teacher's identified from the data collected and findings identified in Section 2.

Review of the Literature

Search Strategy

Saturation for the literature review consisted of researching databases of peer-reviewed papers by topic in the field of education, human services, and policy, administration, and security. The databases searched included ERIC, Educational Research Complete, Education from SAGE, and ProQuest Central. Boolean search terms included, but not limited tom the following: *teaching mathematics, best practices in mathematics, secondary mathematics, social learning, writing in mathematics, emotional learning, self-efficacy, reflective practice, teacher attitude and beliefs,* and *teacher pedagogy.*

Learning Strategies

Educational institutions must continue to expand the opportunities for students to learn and engage with mathematical content. Bullock and Russell (2010) claimed that public education and current educators may have difficulties changing educational practices.

> The cultural routines and patterns associated with schools, teaching, and learning are firmly embedded in our culture from a very young age and thus highly resistant to change. Simply put, every adult knows what teaching and learning should look like because he or she has spent thousands of hours as a student in school. (p. 93)

Teachers entered the career of public education with a sense of how to teach, but run into road blocks because current education practices must not mirror traditional practices (Nolan, 2012; Steele & Rogers, 2012; Towers, 2010; Unal, 2011). Teacher professional development should provide tools that support best practices in the classroom and impact student learning (Musanti & Pence, 2010). Implementing a 1 or 2 day workshop may not change classroom practices; therefore, professional development that promotes "radical change in teacher beliefs about the roles of everyday knowledge and the roles of mathematics in problem solving" (Peled, 2010, p. 108) may be successful with on-going professional development (Signer, 2008).

Professional development that changes the mindset of a teacher involves scrutiny and reflection, thus changing the nature of argumentation as the role of a facilitator (Elmore, 2002; Males, Otten, & Herbel-Eisenmann, 2010; McGraw, Lynch, Koc, Budak,

& Brown, 2007). Changes in practices take 3 to 5 years for a teacher to demonstrate mastery at a highly efficient and effective level (Bengtson, Airola, Peer, & Davis, 2012). The traditional lecture style teaching practices are not adequate for facilitating student learning; as a result, being a facilitator of learning "requires a far greater number of responses from the child" (Ewing, 2011, p. 66). Mastering the art of becoming a teacher that facilitates classroom learning may be difficult for traditional teachers to implement in the classroom, so providing professional development is a key for supporting classroom teachers.

If the teacher's role is to facilitate appropriate interactions in the classroom, then providing appropriate professional development to improve the teacher strategies is acceptable. Professional development should be focused on providing tools that reach beyond educational practices of rote memorization and recall (Brown, 2012; Lau, Singh, & Hwa, 2009; Sheppard, 2011). Radford and Roth (2011) stated, "Higher-order psychological function is considered to have its root in the societal-historical means and processes" (p. 228), highlighting the connections between Vygotsky's social development theory and constructivism (Bridge, Day, & Hurrell, 2012). Skeptics have attempted to disprove social interactions as a key for improving learning and refocus on software programs to teach core content. According to Hadjerrouit (2011), software tools have not shown significant growth in student learning, but provide point and click navigational functions supporting interaction around rote memorization and recall. Computer programs designed to assist student learning is similar to a teacher handing out worksheets for students to complete. There is a lack of social interaction on both

accounts, so stakeholders should be cautious about sitting a child in front of computer to learn and a teacher handing out independent practice worksheets. Those types of activities do not provide opportunities for student growth, but support rote memorization and recall teaching methods.

Increasing student interactions in the classroom as a result of learning activities from teacher professional development should start with a framework. Lord (1994) pointed out several topics that supported the change process for a learning community from interaction, which included

1. Disequilibrium, self-reflection, dialogue, and critique
2. Willingness to change based on sound arguments generating new ideas
3. Compassion for colleagues current level in the art of teaching
4. Communication to develop skill set
5. Comfort levels with ambiguity and the unknown

These five points continue to be explored and expanded upon in an effort to create frameworks for learning and change, particularly when the professional development needs to "push individuals or a group to think more deeply about an idea or a particular practice" (Males et al., 2010, p. 461).

The five points are applicable for teacher professional development and student interactions in the classroom to improve learning. Developing an interactive classroom may provide a "productive opportunity for developing joint reflection…and analysis of the students' mathematical interactions" (Nuhrenborger & Steinbring, 2009, p. 112), supporting the constructivist approach that students construct new knowledge through

interactions with others (Anderson & Dron, 2011; Beswick, 2012; Lamanauskas, 2010; Nuhrenborger & Steinbring, 2009). If learning hinges on high student engagement, then creating a learning environment that encourages social interaction, active learning, and intrinsic motivation has a foundation rooted in a collaborative process for learning and development of best practices.

Instructional Pedagogy

Students need be managed by educational leaders who understand the complexities of relationships, specifically, individuals who possess a professional inventory of pedagogical practices ingrained around content that may be amended to the needs of individual students (Beswick, 2012; Thompson et al., 2009; Unal, 2011; Windschitl, Thompson, Braaten, & Stroupe, 2012). Most students have fallen into the role of a passive learner, and that practice does not lend itself toward high student engagement. The passive learner redirects teacher practice to that of a highly driven classroom led by the teacher, which is a common practice in high school mathematics classrooms (Beswick, 2012; Nolan, 2011). This practice must not continue as it only leads to students continuing to not take ownership of their own learning. Teachers must shape their instruction to support student ownership of learning. Teachers who are teaching the way they were taught are not conducting lesson for learning, but lessons for telling (Artzt, Sultan, Curcio, & Gurl, 2012; Piccolo, Harbaugh, Carter, Capraro, & Capraro, 2008).

Educational leaders faced the challenge of incorporating instructional strategies that foster a “learning environment for students who lack self-awareness, have little

experience with higher level thinking, approach learning as passive recipients, and experience the traditional college academic environment as foreign to their lifestyle" (Lynch, 2011, p. 3). Educational leaders must continue to provide exposure to quality instructional practices that allow students to take ownership in learning (Donahoe, 2013; Laughlin, Nelson, & Donaldon, 2011; Sheppard, 2011; Smith, 2012). Quality instructional practices may be identified as best practices that have been defined and generalized from evidence-based practices, which advocated a set of instructional strategies that have demonstrated growth in student learning outcomes (Hlebowitsh, 2012; Sheppard, 2011). Teachers with mathematics anxiety typically used traditional lecture style step-by-step instructional delivery, which has a high correlation between teacher ineffectiveness and lecturing (Beswick, 2012; Vasquez Mireles, 2010). Educational leaders must support teacher growth around content knowledge as it is vital for improved student mathematical understanding, reasoning, and overall skill (Unal, 2011; Vale, 2010).

Planning

Thompson, Windschitl, and Braaten (2009) developed the “big idea” of units in a fundamental process necessary to engage students with complex topics. Teachers have a difficult time developing the big idea in ways that connect the learners with meaningful tasks around the curriculum. The big idea aids in student understanding that allowed for relationships to develop around standards, which the student can articulate, justify, and make inferences about real-life scenarios (Windschitl et al., 2012). For example, a big idea may be generalized for all numbers or situations to work around a determined rule,

which may be represented on graphs, tables, and the equation (Bridge, Day, & Hurrell, 2012). The development of the big idea in the planning process thwarts lessons from being too focused on underdeveloped topics from traditional curriculum standards (Thompson et al., 2009).

Planning processes were strengthened when the practitioner took the time personally to complete the tasks assigned to students, then being reflective about the accomplishments of the lesson or lack thereof (Bridge et al., 2012; Jones, Jones, & Vermette, 2011; Lupinski et al., 2012). Figure 4 pictorially represented the three aspects of classroom practices that are dependent on each other working in harmony for student growth and mastery of content. The teacher must develop in detail the planning process outlining the big idea of the unit, the mathematics tasks that clearly demonstrate understanding of the big idea, and the classroom pedagogical practices that will be completed by the students to connect the tasks back to the big idea (Bridge et al., 2012; Jones et al., 2012). Teaching must incorporate appropriate planning around classroom activities that balance conceptual knowledge, which may be a mini lesson, with procedural knowledge through meaningful classroom activities that are high in student engagement and thoughtful processes for students to think deeply about content (Jones et al., 2011). Figure 4 indicates the three components of effective classroom teaching and the interdependence of each component necessary for student understanding of content.

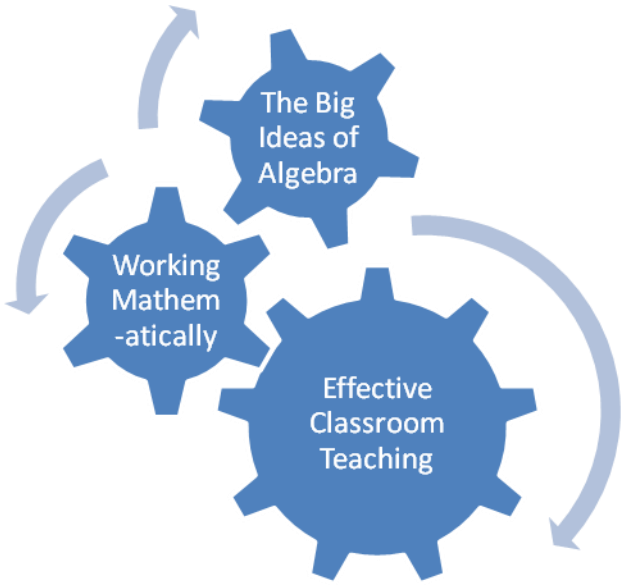


Figure 4. Effective Classroom Teaching: Demonstrated the three aspects of classroom practices that are dependent on each other working in harmony for student growth and mastery of content (Bridge et al., 2012).

Instructional Process

Bengston, Airola, Peer, and Davis (2012) discussed *knowing in action* and *reflection in action* from the lens of effective leaders. Knowing in action referred to prior knowledge obtained from textbooks or formal workshops, while reflection in action referred to knowledge gained from on the job practices. Teachers may have a vast set of skills learned from formal educational practices, but limited set of knowledge with day-to-day practices (Cavanagh & Prescott, 2010; Gainsburg, 2008). Truly effective educational practitioners used a combination of knowing in action and reflection in action to bring out the best in themselves and their students (Bengston et al., 2012). There were many instructional processes that made students proactive learners in the classroom; for

example, turn and talk required students simply to turn to peer and share what they are thinking about the topic (Maloch, Zapata, & Roser, 2012).

Educators must have an understanding of instructional processes that helped facilitate interaction between students (Vale, McAndrew, & Krishnan, 2011). Windschitl, Thompson, Braaten, and Stroupe (2012) discussed instructional methods, labeled *face-to-face tools* that assisted students with explaining their understanding to the big idea. For instance, public record was a pictorial representation that showed sequential stages of a theory or concept. Additional face-to-face tools included sentence starters, thought-trackers, and back-pocket questions represented in Figure 5 (Windschitl et al., 2012). Other examples of an instructional process included wait time, redirecting questions, listening skills, gallery walks, and feedback (Jones, Jones, & Vermette, 2011; Wilson, & Arendale, 2011).

Focused instructional processes should be used to enhance student understanding in the classroom as they move from concrete to abstract thinking; for example, conducting a gallery walk may be used to allow students to denote observations and make connections to prior knowledge (Jones, Jones, & Vermette, 2011). Acquisition of mathematical knowledge increased with students when the teacher used a variety of an instructional process in a systematic way (Beswick, 2012; Blair, Knipe, & Gamson, 2008; Sadler, 2009). These instructional processes allowed students to justify understanding and provided evidence to the teacher that learning has taken place (Beswick, 2012; Unal, 2011; Vale, McAndrew, & Krishnan, 2011). Planning classroom activities around problems that contained an abundance of information allowed more connections with

prior knowledge and improved the relevance of current practices (Gasser, 2011; Gainsburg, 2008).

Instructional processes generalized to the masses and stamped as best practices based on evidence-based research may not be without its flaws. Educational leaders must understand the complexities that emanated across and within educational campuses and classrooms, highlighting the difficulties for some teachers to align best practices around scripted instructional practices (Hlebowitsh, 2012). Educational leaders found it damaging when effective teachers did not have the professional autonomy to make educational decisions about classroom practices. Educational leaders must be cautious about implementing scripted curriculum practices that have been tagged as best practices in one size fit all package. Figure 5 shows several instructional tools that increase student engagement in the classroom.

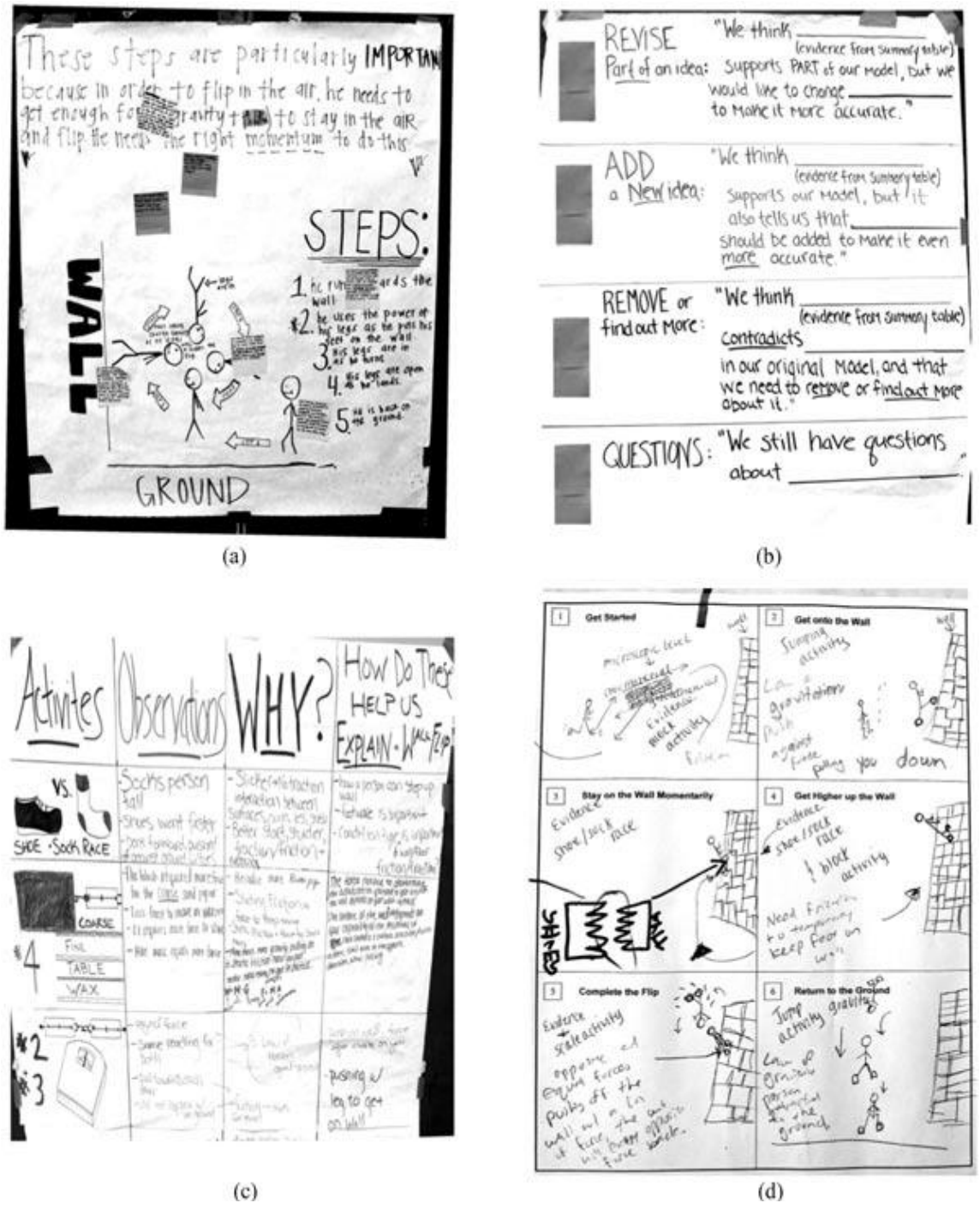


Figure 5. Face-to-Face Instructional Tools: (a) Public record, (b) Sentence starters in a scaffolding model, (c) Student evidence of back pocket questions, and (d) Thought tracker was used to increase student engagement in the classroom (Windschilt et al., 2012).

Small Groups

Artzt, Sultan, Curcio, and Gurl (2012) discussed the benefits of student learning around planned activities with small groups, which allowed the students to present lessons to their peers, increase mathematical connections to real-world situations, create safe learning environments, and the teacher facilitated the learning activities. Small groups provided opportunities for students to talk about a topic in a setting that felt like a comfortable conversation amongst friends, which allowed students to construct and clarify their own meaning (Breslow, 2010; Bridge et al., 2012; Jones et al., 2012; Parisi & Graziano-King, 2011). The teacher must not stand by ideally watching students conform to practices that do not lend itself toward discussion and interaction with peers, but advocate against sitting silently and model appropriate tools to promote dialogue (Sheppard, 2011).

Jones et al. (2011) discussed the effectiveness of small groups in conjunction with other meaningful tasks, such as a gallery walk, strategically facilitated by the teacher to increase student engagement and ownership in learning. The usage of white boards provided additional opportunities for students to share work with the entire class, but the teacher must facilitate roles for group members to make sure all students are active participants in small groups (Artzt, Sultan, Curcio, & Gurl, 2012; Breslow, 2010). Students needed training on how to effectively work in small groups to prevent all the work being completed by a few students, which may lead to inefficiency in the overall effectiveness of the small group concept (Breslow, 2010; Jones et al., 2012).

Effective Feedback

Educational leaders must be reflective practitioners in order to step back from the situation, process the learning conditions, and provide feedback to those that are experiencing disequilibrium or have a misconception (Bengtson, Airola, Peer, & Davis, 2012; Cavanagh & Prescott, 2011; Cavanagh & Prescott, 2010; Vale, McAndrew, & Krishnan, 2011; Wagenknecht, 2011). Effective feedback was a process skill that a teacher used to facilitate student engagement in a whole group, small group, or one-on-one setting; coupled with, wait time and active listening enhanced the depth and dynamics of student learning opportunities (Wilson & Arendale, 2011). Teachers provided students with feedback based on the focal point of the lesson. Teachers must be mindful to provide feedback only on the focus of the lesson and not on other identified areas of misunderstandings on behalf of the students (Jones et al., 2011; Signer, 2008). Opening up feedback opportunities that did not align with the focus of the lesson wasted valuable time as the teacher got pulled in too many directions, which end up causing additional misconceptions and increased levels of disequilibrium about the lesson focus (Jones et al., 2011).

Questioning

The Internet has changed the way information is accessed, knowledge is disseminated, and personal interpretation of a situation occurred, which resulted in the classroom teacher no longer dangling the keys of facts and figures as information has become public record (Illingworth, 2012). The concept that information was democratic in nature required teachers to have a keen sense of asking not only questions, but the right

questions to allow students the opportunity to share how a situation is interpreted by the individual. Questioning must be open-ended to afford students with avenues to share and teacher's pathways to understand the student's thought process, reasoning, and logic (Cavanagh & Prescott, 2010; Vale, McAndrew, & Krishnan, 2011). The foundation for obtaining information has changed and "the purpose of schools can no longer be to impart knowledge" (Illingworth, 2012, p. 181).

Mathematicians need to be able to make sense of the problem at hand, which may be accomplished through a variety of ways. A mathematician may ask questions about the problem to begin to identify mathematical concepts appropriate for justification of a possible solution (Peled, 2010). The process of asking questions was one form of interaction that provided avenues for development around construction of knowledge in various settings (Nuhrenborger & Steinbring, 2009; Spencer, Detrick, & Slocum, 2012). For example, when a student asked a question for clarity the teacher may have reacted "by stating his or her immediate thoughts….these thoughts will likely focus on the teacher's thinking" (Forrest, 2008, p. 24). The teacher response may have been appropriate, but was likely a restatement of earlier lecture notes; therefore, highlighting familiar teaching practices that shifted to students "thinking about thinking that will build their capacity to understand their own learning processes and difficulties" (O'Shea, 2009, p. 23). Teachers had difficulty juggling the state mandated curricula while providing a classroom atmosphere inundated with thought provoking questions (Piccolo, Harbaugh, Carter, Capraro, & Capararo, 2008).

The change from asking a student for a correct mathematical answer to probing a student to understand his/her mathematical reasoning required the teacher to understanding the role of a facilitator in the classroom (Donahoe, 2013; Gasser, 2011; Piccolo et al., 2008). The change was necessary for teachers to master, which resulted in a style of questioning that increased student's ability to reason through difficult problems making mathematical reasoning the center of correct solutions (Gasser, 2011; Piccolo et al., 2008). The teacher must also facilitate the ability for students to ask appropriate questions to clarify their understanding of the content, which included redirecting questions (Wilson & Arendale, 2011). Students asking higher order functioning questions tapped into meta-cognitive strategies that moved the center of instructional practice to the student; as a result, the student began to change from passive to a proactive learner (Blair, Knipe, & Gamson, 2008; Piccolo et al., 2008; Vale, 2010).

Student Discourse

Vygotsky (1978) referred to the concept of ZPD to understand the range of student capacity for learning without peer conversation compared to with peer conversation. The students conversations must be planned beyond the teacher asking closed-ended questions that require little to no significant thought. Student discourse must be connected to specific learning outcomes that foster mathematical understanding around truth and real life situations (Maloch, Zapata, & Roser, 2012; Piccolo et al., 2008; Sheppard, 2011). The quality of student discourse diminished drastically when the learners did not have a sense of trust and mutual respect for other learners (Maloch et al., 2012). Student discussion should evolve as the teacher masters the art of teaching. For

example, students expressing ideas should lead to students justifying those ideas around mathematical reasoning, which allowed for the skillful teacher to engage students in meaningful reflection, and higher order thought process around content (Bridge, Day, & Hurrell, 2012; Sadler, 2009; Windschitl et al., 2012).

The aspect of creating classrooms supported by student discussions directed toward mathematical thinking and construction of knowledge from mathematical content from student interaction is not the practices of most mathematic classrooms (Forrest, 2008; Windschitl et al., 2012). Reframing standard textbook questions to engage students in deep meaningful conversations is a challenge for most teachers, yet necessary evil to generate student interactions (Bridge et al., 2012; Jones et al., 2011). Communication increased opportunities to develop student thinking, build on prior knowledge, and expand mental representations; particularly, when the classroom was framed around interaction that challenged students beliefs and assumptions (Kaisari & Patronis, 2010; Lau, Singh, & Hwa, 2009; Slavit & Nelson, 2009). The opportunity for authentic student learning through teacher facilitated student dialogue, orderly thinking, and student justification from mathematical analysis enriched that classroom environment (Bridge et al., 2012; Jones et al., Vermette, 2011; Piccolo et al., 2008; Signer, 2008).

Authentic learning provided opportunities for "meaningful and proactive instructional conversations" (Colby & Atkinson, 2004, p.352) in which the student dialogue occurred "through the use of exploratory talk" (Guk & Kellogg, 2007, p. 284) that enhanced the development of the learning. Novice teachers had an understanding of how to begin student conversations around a topic. Novice and veteran educators

experienced challenges of maintaining thought provoking conversation due to poor planning, unclear expectations, lack of common a language, or an imprecise framework to engage students in purposeful discourse (Windschitl et al., 2012). Teachers had to take the time to process a typical textbook lesson from the lens of a student; in essence, purposefully answer questions, decide upon solutions, and student products that justify mastery of content (Bridge et al., 2012; Sadler, 2009).

Student Conferencing

There were numerous moving parts that one may observe during a school day that impacted student learning in the art of teaching, but at its core were the student-teacher interactions (Danielson, 2012). Student conferencing was an excellent opportunity to engage students in higher-order thinking; but, the teacher must possess the tools to structure the learning environment that allowed for observations of students engaged in constructive work (Danielson, 2012; Fluckiger, Vigil, Pasco, & Danielson, 2010). Student conferencing allowed students to evaluate personal understanding and growth at their current level of proficiency (Fluckiger et al., 2010). Active listening was a tool to that enhanced student conferencing and allowed a student or teacher to revoice or restate a student response (Wilson & Arendale, 2011). Effective conferencing should be specific to the individual and descriptive in nature to simplify any misconceptions (Fluckiger et al., 2010; Stiggins, 2008).

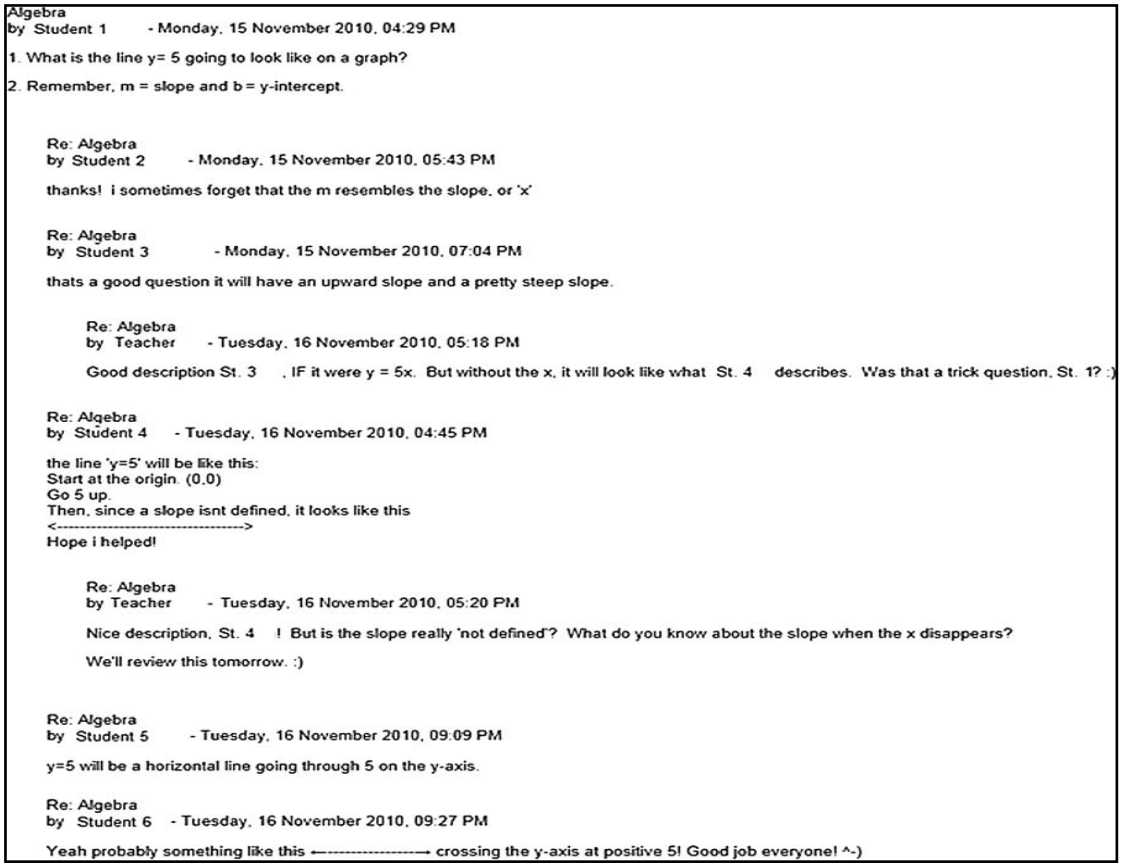
Writing in the Classroom

The impact of quality journal writing went way beyond the time spent reading student responses. Journal writing provided opportunities for students to justify

understandings and teachers to be aware of misconceptions (Artzt et al., 2012; Cooper, 2012). The simple concept of journal writing paved the way to for students to capture big ideas, solidify connections, and denote shifts in understanding before, during, and after each lesson (Maloch et al., 2012; Parisi & Graziano-King, 2011). Journal writing was a tool that allowed student reflection to take place in the classroom. Journal writing has a profound impact on the growth of students when used to address classroom occurrences, synthesizing information from the lesson, and items beyond scribing a laundry list of notes (Cooper, 2012; Lupinski, Jenkins, Beard, & Jones, 2012). The teacher must not be overwhelmed with a students' lack of ability procedurally to work a problem that incorporated writing to clarify ideas and strengthen comprehension (Cooper, 2012; Jones et al., 2012).

Writing for comprehension may be enhanced with incorporating technology, which can be accomplished from classroom blogs, chat websites, and Internet forums that lend itself toward appropriate classroom interactions; for example, Figure 6 is a sample writing forum component for a mathematics classroom that allowed student expression of content (Cooper, 2012; McLoughlin & Lee, 2008; Pearson, 2010). Student usage of smart phones, I-pads, tablets, laptops, and personal computers accounted for a significant role in the lives of youth; therefore, educational leaders must find appropriate venues for writing in education in this digital age (Cooper, 2012; McLoughlin & Lee, 2008). Writing blogs or forums allowed teachers to incorporate another element of writing that is familiar with the digital age of teens, while learning targets were accomplished around

specific standards (Cooper, 2012; Cuhadar & Kuzu, 2010; Pearson, 2010). Figure 6 shows how writing and technology can increase student engagement in the classroom.



Algebra
by Student 1 - Monday, 15 November 2010, 04:29 PM

1. What is the line y= 5 going to look like on a graph?

2. Remember, m = slope and b = y-intercept.

Re: Algebra
by Student 2 - Monday, 15 November 2010, 05:43 PM

thanks! i sometimes forget that the m resembles the slope, or 'x'

Re: Algebra
by Student 3 - Monday, 15 November 2010, 07:04 PM

thats a good question it will have an upward slope and a pretty steep slope.

Re: Algebra
by Teacher - Tuesday, 16 November 2010, 05:18 PM

Good description St. 3 , IF it were y = 5x. But without the x, it will look like what St. 4 describes. Was that a trick question, St. 1? :)

Re: Algebra
by Student 4 - Tuesday, 16 November 2010, 04:45 PM

the line 'y=5' will be like this:
Start at the origin. (0,0)
Go 5 up.
Then, since a slope isnt defined, it looks like this
<---------->
Hope i helped!

Re: Algebra
by Teacher - Tuesday, 16 November 2010, 05:20 PM

Nice description, St. 4 ! But is the slope really 'not defined'? What do you know about the slope when the x disappears?

We'll review this tomorrow. :)

Re: Algebra
by Student 5 - Tuesday, 16 November 2010, 09:09 PM

y=5 will be a horizontal line going through 5 on the y-axis.

Re: Algebra
by Student 6 - Tuesday, 16 November 2010, 09:27 PM

Yeah probably something like this ←----------→ crossing the y-axis at positive 5! Good job everyone! ^-)

Figure 6. Mathematics Writing Forum with Technology discussed topics that allowed student peer interaction to take place in Algebra I mathematics classroom (Cooper, 2012).

Social Elements

The educational classroom of the 21st century is a setting that is socially complex (Christianakis, 2010; Gainsburg, 2008; Spencer, Detrick, & Slocum, 2012). The social tools that children possess have an impact on the way interaction occurred in the classroom (Trent, 2012). Emotionally developed students differ in every classroom at each stage of education, which each educational leader must be mindful of when introducing new learning environments to a classroom, school, or district (Donahoe, 2013; Lynch, 2011; Wagenknecht, 2011). The social atmosphere for quality learning conditions is such that children feel safe to make mistakes and understand that a mistake looked at from the right perspective leads to new learning (Cavanagh & Prescott, 2011; Musanti & Pence, 2010; Turk, 2012). Students were prone to turn to the Internet for clarity in understanding difficult material when social tension was prevalent in the classroom (Gencturk, Akbas, & Kaymakci, 2012; Smith, 2012).

Social interactions helped to shape student identities, which influenced how the student viewed himself or herself as well as how they were acknowledged by others in their peer group (Gainsburg, 2008; Gencturk et al., 2012; Musanti & Pence, 2010; Phan, 2012). Expanding the window of communication that supported social interactions and personalized student understanding to the point that "conversationalists created and modified their individual interpretations of their social world" (Stamp, Vangelists, & Knapp, 1994, p. 194). A social interaction that inspired appropriate social justice deteriorated feelings of exclusion and isolation; therefore, rooted in learning was the belief that acceptance from peers helped to develop a positive learning environment,

meaningful culture, and relationships built around trust in the classroom, school, and community (Phan, 2012; Turk, 2012). An engine that assisted with driving the social culture of the classroom was not be learned from institutions of higher education, but from a teacher's personality and passion that shaped the identity of the classroom's social culture (Gencturk et al., 2012; Sheppard, 2011; Trent, 2012).

Baghdadi (2011) discussed the concepts around best practices, which were not defined in a way that was accepted universally by educational stakeholders. Professional development should not be viewed as a one and done style of implementation, but an ongoing, embedded practice for teachers (Zambo & Zambo, 2008). Professional development must move teachers beyond the role of an audience member to that of an active participant building on vital elements that improved quality instruction and engagement practices (Gaytan & McEwen, 2010; Ingvarson, Meiers, & Beavis, 2005). Teacher growth around instructional practices should be built into the schedule as teachers lacked knowledge in understanding the bigger picture around curriculum and instruction (Carreker, Joshi, & Boulware-Gooden, 2010). There was a gap between instructional research and teacher instructional practice that continued to exist in public education and must not continue to widen at the expense of students (Richards & Skolits, 2009; Sheppard, 2011). Teacher leaders used professional judgment in understanding and implementing classroom practices that helped children learn how to learn, enhance communication skills, and socially adjust to adverse situations in and outside of the classroom (Illingworth, 2012; Spencer et al., 2012).

Implementation

The administrative group works with the department throughout the school year. The administrative team, curriculum coach, and department head collaborate on identifying peer observation days and in-house workshops on teacher planning periods through learning teams. Learning teams are professional development opportunities during the school day for departments to collaborate on common planning periods. The team will explore hands-on practices for growing teacher pedagogy within the department. The administrative team, curriculum coach, and department head will conduct data snaps for each teacher within the department at the start of the school year. The information collected will be used to develop the professional development workshop activities in learning teams. The data snap is a record of factual, descriptive data only about student conversations or written work, classroom environment, that is, student grouping, evidence of student reflection, public records, and genuine questions about student interactions with mathematical work. Upon completion of the data snaps, the team will collaborate to plan workshops for monthly learning team professional development sessions.

After the data snaps, the curriculum coach and administrative team will host learning teams to focus on specific areas around habits of mind and habits of interaction. The team will specifically target an area of improvement based on day one data snaps; for example, the curriculum coach may train mathematics teachers on appropriately using public records in the classroom. The administrative team, curriculum coach, and department head will collect data snaps on the teacher's within the department once a

month to determine the focal point of the learning teams for the following month. The mathematics teachers practice the strategies taught by the curriculum coach before the learning team cycle to discuss any issues that may occur with implementation of new strategies. After the learning team cycle, the curriculum coach is able to work side-by-side with the teacher coaching during a class period. This will allow the curriculum coach to discuss and support teacher pedagogy.

Evaluation

To evaluate the project study participating teachers will complete a learning team evaluation form each month, located in Appendix A, to examine the effectiveness of the professional development learning teams. Learning teams will occur on a monthly basis, so the evaluation form will provide information for future learning team workshops. The growth of teachers providing quality instruction to students may be justified on students' state mandated end-of-course exam scores to be reviewed at the end of the academic year. The evaluation will assist in providing information for professional development workshops though learning teams that supports teacher growth in classroom pedagogy. Key stakeholders would include participating teachers, curriculum coach, and the administrative team.

Project Implications

Social change implications of the project in Appendix A may improve teacher moral, classroom culture, collaboration within the mathematics department, trust among peer groups, and student ownership of learning. The improvement of teacher moral within a school building reduces the teacher turnover rate in a school building. This also

creates a culture that draws other quality teachers to the building. This generates a snowball effect that impacts the school, students, and the community. Parents want their children to attend a school that offers the best quality education for their children. The ripple effect of quality education draws business to the area, which may have an impact on the community. The social change implications extend beyond what is taking place inside the walls of the school building.

The goal of this project is to provide teachers with the tools necessary to create a structure for implementing professional growth allowing students to demonstrate mastery of grade level content. The development of structured learning team professional development activities will provide the administrative team with factual data that can be used to improve teacher pedagogy. The team will have year-long support from instructional leaders of the building. I seek to improve teacher's daily classroom practices and develop systematic planning tools, common language, and instructional strategies for teachers.

Conclusion

A review of literature, best practices, skills, and activities that worked best during the mathematics professional development highlights the section. The goal of the project study was to provide teachers with the tools necessary to demonstrate mastery of grade level content. Instructional tools were implemented that developed common language for teachers vertically across the content area, student engagement strategies that focused on student driven classroom practices, teacher questioning techniques, and peer observation protocols for teachers and administrative teams. Based on the surveys and mixed method

data collection I learned what instructional strategies were beneficial to impact student achievement. The information was used to streamline building level professional development that the teachers identified as beneficial for student growth.

I identified learned practices that created environments conducive for teacher and student growth. The project study provided educational stakeholders with a road map for implementing in-house professional development. The guide focused on collaboration, peer observations, common planning, and opportunities for teachers to learn during the school day. Educational leaders that listen to staff members and are reflective practitioners gain information that allows decisions to be made that benefit the culture of the school. There is no one answer that will meet all the educational needs of a building, but empowering teachers' and providing focused professional development activities is a step in the right direction.

Section 4: Reflections and Conclusions

Introduction

Through the project study, I redefined learned practices, accountability, and learning environments to create a personable space for students and teachers to grow. The project study created opportunities for educational stakeholders to embrace the concept of becoming a life-long learner. This section is a review of the project strengths and limitations that educational campuses may have to address for their school. I discuss implementation, which may have to be adjusted based on the resources available at a different school. Educational leaders need to personalize the project based on the needs of the school. The challenges that educational campus face may be similar, but the ways that educational leaders work with teachers, students, and families are different.

Project Strengths

The project study will restructure professional development activities for teachers to take place during the school day, while providing teachers with in-house supports throughout the academic year. The learning team professional development activities may strengthen the culture of the mathematics department though on-going collaboration, peer observations, and common planning. The project study creates opportunities for teachers to learn from each other and build trust within the department. The department will be afforded the opportunities to step outside of their comfort zone and implement new instructional practices.

The limitations of the project study included not having a curriculum coach to help facilitate the monthly learning team sessions. The school will have to make

adjustments to the master schedule to allow common planning for departments. The current schedule does not afford common planning for the entire departments. This professional development is on-going throughout the school year. An initial meeting would take place at the beginning of the school year during in-service hours to allow for administrative team, curriculum coach, and department head to schedule times for the initial round of data snaps to be collected. The teachers have to take responsibility for holding each other accountable to planning, peer observations, and implementation of the instructional strategies. The administrative team and curriculum coach have to commit to being a support system for teachers throughout the school year.

Recommendations

The implementation of the learning team professional development workshops will have to be conducted by members in-house with support from the central office staff, administrative team, and instructional coaches in the district. The instructional team meets with the department at the end of the school year to review assessment data and reflect upon the effectiveness of the learning team professional development sessions. The administrative team, curriculum coach, and department head must commit time to monthly collection of data snaps from teachers within the department. The administrative team should advocate for members from the central office staff to join in on as many data snap collections as possible during the school year. The administrative team must differentiate between conducting observations for support and evaluation purposes to allow for optimal support on behalf of the department.

Project Analysis

The project study will refine teachers' pedagogy and deepen their understanding of being a reflective practitioner. The learning team professional development meetings will assist in shifting daily instruction from being teacher-directed to student-centered, which will increase the amount of time that the students are thinking for themselves about content. The teachers will be more in-tune with the needs of the learner, pointing out strengths and offering specific information to guide student improvement. The administrative team will be more aware of the ways to support teachers with meaningful activities that are hands-on. There will be more opportunities for authentic learning to take place on behalf of the students and staff and time built within the day to address partial understandings of material. Each student will spend more time on mathematical reasoning from comparing and contrasting, justification, debating, inferring, and analysis. The use of mathematical reasoning on an everyday basis can shift traditional classroom practices of lecturing, worksheets, and assigned homework practice.

The foundations of the project hinges on teachers' opportunities to meet collaborate, learn, and practice new knowledge on a consistent basis. The structure of the support from coaching, small group discourse, and learning connected to everyday practice will help keep teacher moral high around the value of the project. The teachers will be more engaged in the learning process and have a vested interest in the decision-making process to best practices.

The administrative team that is supporting the implementation of professional development through monthly learning teams must be engaged early in the process to

ensure teacher participation. The administrative support provides teachers another layer of support. If the administrative team is going to hold teachers accountable for instructional strategies, then the administrative team should have a clear understanding of what is being discussed during learning teams. District level support may provide additional in-sight that would help define the program components and assist with any teacher challenges.

Self-Analysis

As a scholar, the process required many hours of time spent reading, analyzing, and synthesizing information around a variety of educational venues. The scholarly, peer-reviewed articles brought an additional insight to the project study, which attributed to the many revisions to the final project study. There were many sacrifices made during the years spent learning and mastering how to write effectively and communicate with clarity for the reader. I improved my organizational skills, time management practices, intrapersonal skill set, and the ability to prioritize tasks. The development of the project study was difficult, time consuming, frustrating at times, but beneficial to understanding processes to implement educational changes based on research-based strategies. Being a self-directed learner may assist in bridging the gaps that exist in public education. Readiness to assist others is a characteristic that may help motivate others who may be struggling with the art of teaching.

As a practitioner, I better understand the commonalities and differences in the art of teaching children and adults. There is a difference between developing teachers to make educational decisions for children and the development of teachers to make

educational decisions for the growth of the school. The skill set needed to prepare students for life skills necessary to thrive in the 21st century requires a collaborative effort from all members of a faculty. The ability to grow as a faculty does not always have to be led by an outside agency entering the building for a limited time frame with a hefty price tag for services rendered. The tools needed to bring out the best of each staff member lies within each of those staff members, so facilitating the growth of individual teachers, shared leadership vertically in a building, and implementing structures that are sustainable are keys to longevity.

The study improved my knowledge around effective professional development activities that demonstrate effective teacher development, enhanced strategies for student engagement and assessment, and on-going professional discourse around curriculum standards. The investigation and mastery of these items will allow me to excel in making sound educational decisions for the success of students. Clarity has been provided around structuring professional development activities that are on-going, supports that need to be in place for teachers, and monitoring the progress of the professional development with fidelity. The growth as an educational leader to facilitate teacher development around best practices has been priceless. The growth as a leader was highlighted by the improvement in facilitating a group of individuals to collaborate about school wide goals, assess the needs of a department, and develop an action plan to meet identified needs as a team. The ability to make changes within a school does not have to be mandated by state regulations, but implemented around collaborative efforts from the educational leaders of

the building. A leader sees untapped potential in staff members and nurtures that potential to bring about positive change.

Reflections

Educational leaders need to personalize programs based on the needs of the school. The challenges that educational campus face may be similar, but the ways that educational leaders work with teachers, students, and families react to those challenges are different. Social skills, family traditions, and personal values have a hand in shaping the way individuals react to challenges. The ability to understand where an individual obtains knowledge to make decisions may be beneficial in selecting professional development programs that will truly impact student growth. A leader of a school building must listen to his or her staff and make a conscious effort to involve teachers when making educational decisions that will impact the entire culture of the school. There is no one answer that will fix all of the educational challenges; collaborative efforts will drastically improve the educational environment for children.

The leader of the building must be a reflective practitioner. Reflecting on what is appropriate and sustainable based on the cost and needs analysis of the school is critical to implementing professional development. The leader of the building must involve other educational stakeholders in the development of school improvement plans, support others in leading the implementation of those plans, and communicate the steps along with way with all stakeholders. One must not forget to take constructive feedback from other team members and make adjustments that the team feels is best for the growth of the school. All school based decisions that may impact all of the components of a school culture

should always boil down to what is best for the students. The project study provides a platform to address and/or improve teamwork and collaborative learning environments.

Social Impact

The family unit functioning as the main form of communicating for modeling appropriate behavior continues to take a back seat to other forms of external factors; specifically, children may turn to the Internet, public social media, television, music, movies, and magazines to clarify appropriate behaviors in public. School populations are becoming more diverse, and our teachers are becoming less diverse. The ability to provide professional development on a range of social growth topics for students and teachers may be a bridge to help close the gap. Educational leaders are seeking ways to harness best practices to improve social skills necessary to understand diversity beyond ethnic labels and socioeconomic status, while teaching basic concepts that help everyone understand how interdependent we are for survival. The learning team profession development activities will improve teacher confidence in communicating to children that mistakes are okay regardless of any demographic backgrounds, current levels of understandings, and misconceptions around content. The project study will call for shared leadership in making educational decisions for the school. The teacher and students have been empowered to take ownership of learning. The ability to interact appropriately with peers in a classroom setting has increased student trust, which opened the door students to engage in a non-threatening manner. Teachers and students feel comfortable to share ideas about what works without the anxiety of individual status in the building and/or classroom being impacted in a negative light.

Recommendations for Future Research

This project study has several applications for future research. After implementation of learning teams for a year, it would be interesting to see the growth of teacher pedagogy. The results would not only demonstrate how classroom practice has shifted from a traditional style, stand and deliver practice, to one that is focused on shared leadership, increase accountability, and high student engagement in the classroom. After each learn team cycle, the team completes a learn team evaluation form. The evaluation form provides teachers the opportunity to share components of each meeting that were valuable and invaluable. The review of the evaluations may provide a new set of learning objectives and school wide goals that need to be developed for the growth of the school, particularly as the school begins to implement best practices to meet the demands of common core standards.

Conclusion

A leader of a school building must listen to his or her staff and make a conscious effort to involve teachers when making educational decisions that will impact the entire culture of the school. There is no one answer that will fix all of the educational challenges; collaborative efforts will drastically improve the educational environment for children. Administrative teams should support the classroom teacher by attending professional development activities with staff members, provide prompt, meaningful feedback to staff members, and address challenges as a team. An educational leader that leads through the lens of developed personable power will be followed by staff members.

The leader of the building must be a reflective practitioner. Reflecting on what is appropriate and sustainable based on the cost and needs analysis of the school is critical to implementing professional development. The leader of the building must involve other educational stakeholders in the development of school improvement plans, support others in leading the implementation of those plans, and communicate the steps along with way with all stakeholders.

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performance. *Research in the Schools, 17*(1), 1-11. Retrieved from http://www.msera.org/rits.htm

Appendix A: The Project

The Art of Teaching: Guide to Improve Mathematics

By

Michael Edward Smith

Submitted to the

Faculty of Walden University

Proposal Submitted in Partial Fulfillment of

The Requirements for the Degree of

Doctor of Education

Administrator Leadership for Teaching and Learning

Walden University

October 2014

Table of Contents

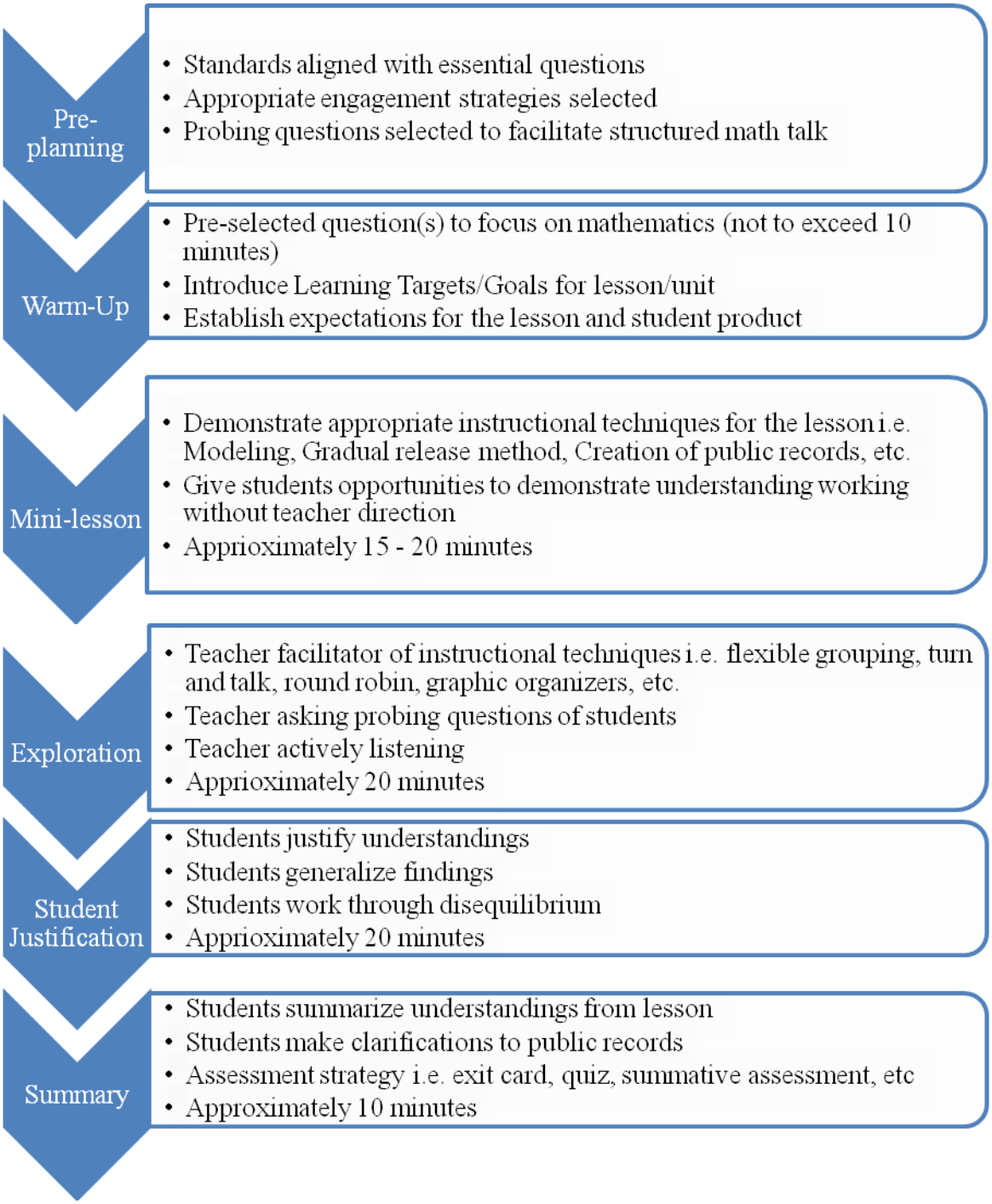
Introduction

The framework for The Art of Teaching: Guide to Improve Mathematics provides teachers and instructional leaders with several tools and processes to establish a culture of learning. The guide promotes instructional improvements to develop teachers and students into thinkers, communicators, and reflective learners. The guide provides teachers with a roadmap for teaching, unit planning, daily planning, student engagement and interaction strategies, teacher questions to enhance student engagement, and teacher collaboration. The guide will provide teachers with a common language to use in mathematics classrooms. The goal of this guide is to increase student engagement in the classroom while establishing a classroom and school culture focused on opportunities for authentic learning.

National Council of Teacher Mathematics (NCTM) prompts five standards to improve alignment of classroom practices to standards that promotes mathematical competency; in particular, problem-solving, reasoning and proof, communication, connections, and representation stand atop of the list (Deal & Wismer, 2010). The following guide provides a school with instructional strategies focusing on the NCTM's five process standards to enhance student growth in the classroom. Educational stakeholders may shift a school culture into one that embraces a growth mindset for teachers and students. The ability to allow opportunities for students to explore various mathematical concepts, communicate their understanding of mathematical thinking, and clarify their mathematical connections through writing and representations will assist

with the implementation of the Common Core Standards for Mathematical Practice. The guide also provides a structure for teachers to request time to complete peer observations from peers. Initially, teachers must have a firm grasp on the importance of planning to begin; therefore, the guide provides a structure for teachers to plan curriculum units and daily lesson plans that support student-driven classrooms.

Planning Model



The planning model will assist teachers with facilitating a classroom lesson. The times are set on a 4 x 4 block schedule; accordingly, times may be adjusted to fit the school schedule. The teacher should plan on going through the following activities on a daily basis. The majority of the class time should be dedicated to students engaged with the material while the majority of the teacher's time around being a facilitator (Bridge, Day, & Hurrell, 2012).

Planning Template(s)

Unit Template

<table>
<tr><td colspan="2">Unit Title: List the unit title that is in alignment with standards.</td></tr>
<tr><td colspan="2">Standards: List standards out the state standards.</td></tr>
<tr><td>Big Ideas: Students will understand that… (this should be in alignment with standards) .</td><td>Essential Question(s): The essential questions should help provide student clarity to the Big Ideas. This may be in student friendly language.</td></tr>
<tr><td>Student Understanding(s): What prior knowledge, vocabulary, etc. should the students know in order to be successful?</td><td>Student Product: What skills will the students need to be able to master the standards?</td></tr>
<tr><td>Performance Task: What will the students have completed to demonstrate mastery of standards? This performance task should include a rubric.</td><td>Evidence: This will be interim assessments to check for student understanding i.e. quizzes, tests, self-assessments, etc.</td></tr>
<tr><td colspan="2">Reflections: Teacher must be a reflective in his/her practice in order to determine:
Where the class is headed?
What worked and what needs tuned up?
What tools do the students need to experience success?
Did I evaluate student understanding?
Did I engage all students in learning?</td></tr>
</table>

Daily Lesson Planning Template

Date: **Class/Subject**:
State Standards: List the state standards addressed in the lesson.
Lesson Goal(s)/Big Idea(s): What mathematical understandings should the students leave with after the completion of the lesson?
Mathematical Practices: What mathematical practices will be used in the lesson? For example, small group work in set of two, three, or four; structured math talk, etc.
Trouble Shoot: What anticipated problems do you see the students having with the assignment?
Hook/Launch: How will you introduce the lesson?
Engagement: What is taking place during the heart of the lesson that is demonstrating high student engagement? What probing questions are in place to assess student understanding? What are you doing for accountability?
Closure/Reflection: What task is in place to review concepts covered for the day? How will the students summarize understandings?
Assessments: What assessment(s) will be used to demonstrate student understanding?

Mathematical Habits of Interaction

Classroom practices that allow students to explain, engage, and share mathematical ideas derived from personal discourse as opposed to adoption of teacher mathematical explanation (Gellert & Steinbring, 2012). The habits of interaction and habit of mind provide a common language for teachers and students to engage in mathematical learning (Foreman, 2010).

Private Think Time: Students are honoring classmates' time to sit quietly to allow everyone to think and reason about individual mathematical understandings. This is done before the entire class begins to share out. Complimenting Engagement Strategies: Wait Time 1 & 2
Explain: Students are explaining thinking and mathematical reasoning. Teacher does not criticize for an incorrect thought process, but celebrates students sharing thinking. Complimenting Engagement Strategies: White Boards, Graphic Organizers, Round Robin, Turn and Talk
Listen to Understand: Students are listening to classmates' mathematical reasoning and explanations about mathematical problems. Complimenting Engagement Strategies: Graphic Organizers, I wonder statements, Journal Writing
Genuine Questions: Students are asking genuine questions to classmates' about their mathematical reasoning and explanations. A genuine question should be to help the student asking the question clarify his/her understanding of the mathematical concepts of the lesson. Complimenting Engagement Strategies: I wonder statements, Graphic Organizers, Parking Lot
Explore Multiple Pathways: Did the students find more than one way to solve the problem? Explore student reasoning and justification for solving the mathematics problem with the entire class. Complimenting Engagement Strategies: Group Records, Gallery Walks, Public Records
Compare Logic & Ideas: Use the students work to compare student understandings behind the multiple ways to solving the problem. Discover the mathematical process behind each students work. Discover and discuss the similarities and differences.

Complimenting Engagement Strategies: Group Records, Gallery Walks, Public Records
Critique & Debate: Students should question the mathematical logic behind student peer mathematical reasoning on a solution to the problem. Complimenting Engagement Strategies: Graphic Organizer, Quality Questioning
Math Reasoning is Authority: Students should use mathematical concepts, laws, and rules as the final stage in determining what does or does not make sense mathematically. Complimenting Engagement Strategies: Turn and Talk, Graphic Organizer, Cornell Note Taking

Mathematical Habits of Mind

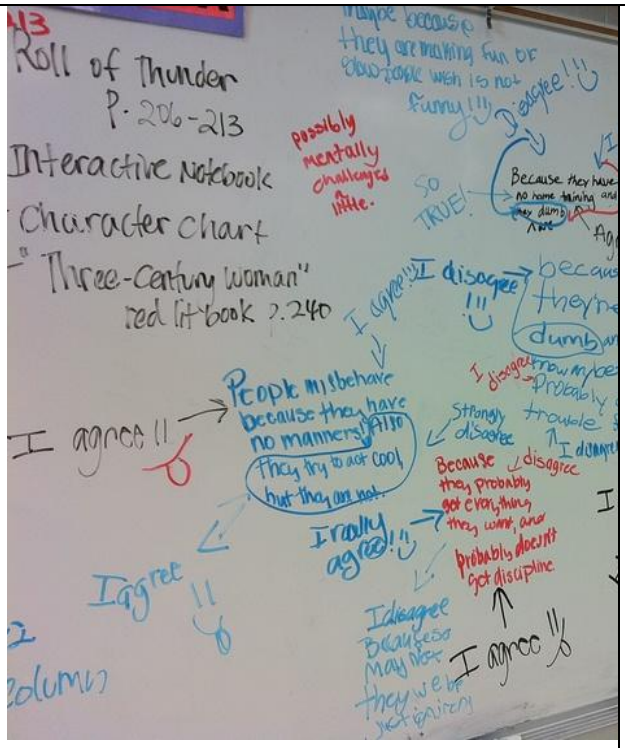
Classroom environments that promote higher mental functions for meaningful mathematical conversations with depth may result in increased problem-solving and decision-making skills for students rooted in reflection and experimentation (Gordon, 2011). The teacher is a facilitator of learning. Teacher must be proficient in using mathematical habits of interaction and appropriate questioning to generate authentic student learning opportunities (Foreman, 2010). The following engagement strategies on page 118 should be used to support the habits of interaction and habit of mind.

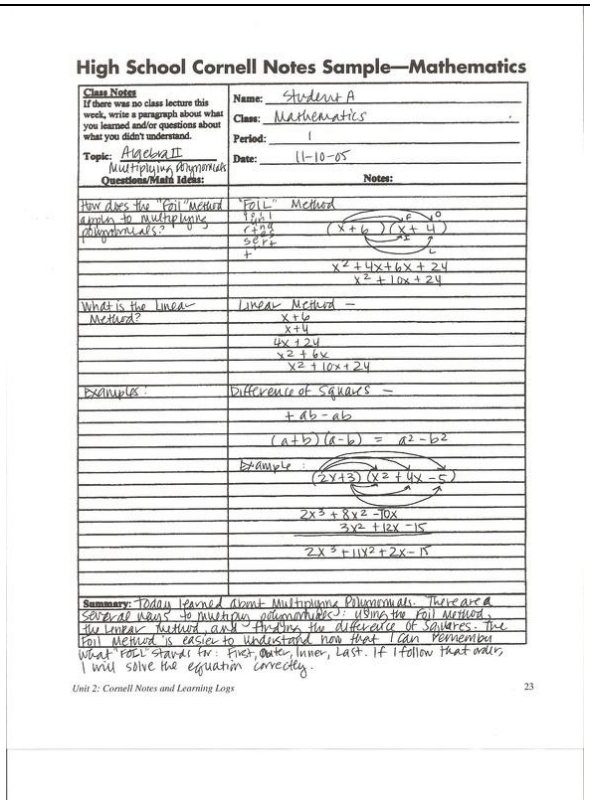
Self-Understanding: Each student is making sense of ideas and problems. Each student is looking for patterns, pictorial, table, and graphical representations, connections, and other prior knowledge around mathematical content. Students maybe reflective and understand mistakes are okay and apart of the learning process.
Justification: Students are using patterns, pictorial, table, and graphic representations to justify why the ideas are always, sometimes, or never true.
Generalize: Students use patterns of regularity to make conjectures about mathematical ideas in an effort to create generalizations. Students must justify why conjectures are valid.
Math Déjà Vu: Students are noticing patterns about mathematical reasoning, problem solving, mathematical properties, and definitions. The "light switch" may turn on for a student and disequilibrium begins to have clarification.

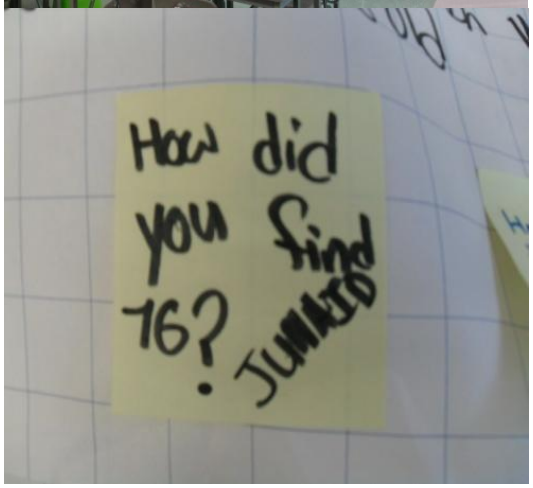
Mathematical Pictorials: Students can create, connect, and reason around various mathematical representations. Students clearly see how a graph is connected to a table that may be used to generate an equation. Visual models may be used to clarify connections.
Connections: Students begin to notice and reason about connections around mathematical representations, other mathematical ideas, and real-life situations.
Blooper & Blunders: Students explore mistakes that were made and authentic learning begins to take place for students.
Reflection: Students reflect on how they view or comprehend mathematical ideas. Students may compare their thought process to those of other students in an effort to solidify understanding.
Enrichment: Students continue to seek more mathematical connections around higher order concepts.

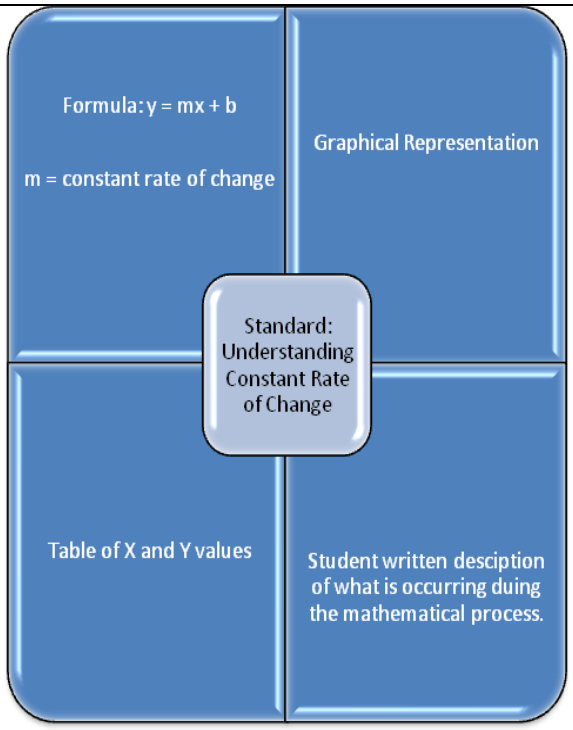
Engagement Strategies

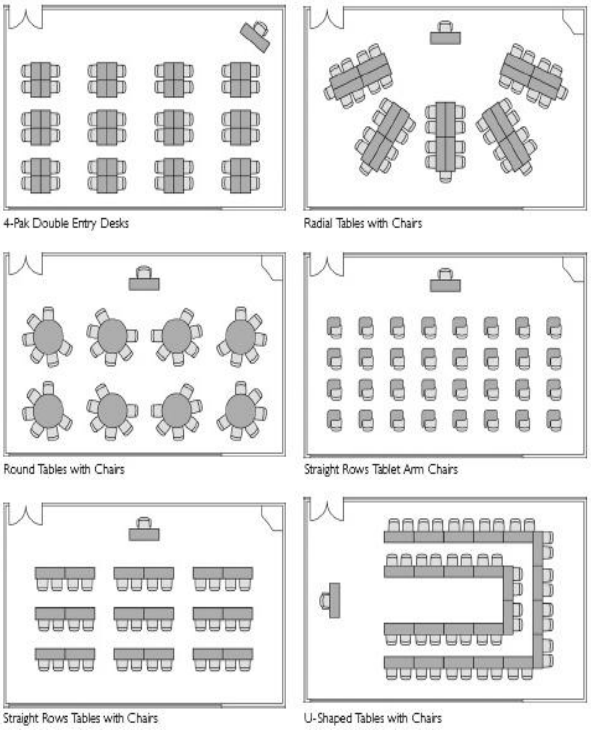
Chalk Talk	The activity is a silent way to do reflection, generate ideas, check on learning, and develop or problem solve. Time: Time can be varied from 5 minutes to an hour. Material: Butcher paper attached to wall and markers Process: The activity is a silent activity. No one may talk, but anyone can add comments to the chalk talk a needed. One can comment on other ideas by simply drawing a connection line. The facilitator writes a question in the center of the butcher paper and allows everyone to comment on the relevant question. For example: What did you learn today? The facilitator may interact by writing additional questions, adding his/her own reflections and ideas, connect interesting comments, or just stand back and observe (National School Reform, 2014).	Why use this strategy? -Increase student participation in class without having to respond orally. -Allow students to read comments of others and write their own thoughts or feelings about situation. -Capture student perceptions of an experience, while allowing connections to be made between students. -Excellent tool for student reflection. -If students are extremely talkative, then this will help refocus students on content, increase engagement, and help silence the classroom.

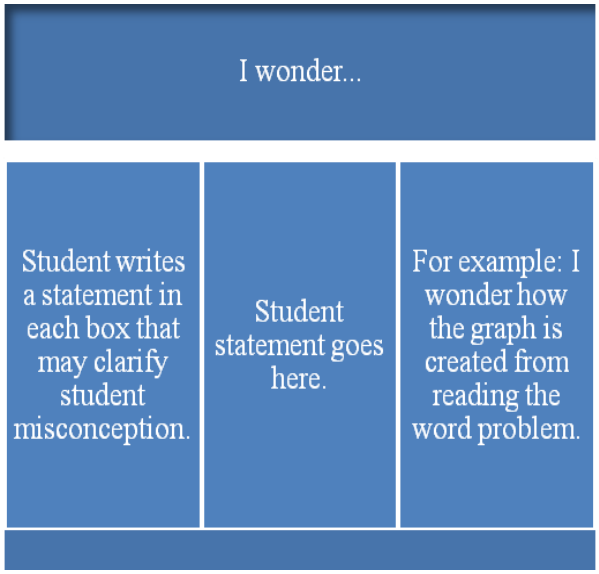
		
Cornell Notes	Time: Time can be varied dependent on the class. Material: Graphic organizer and pencil The usage of a Cornell notes offers some structure and organization for students. On the left side of the paper the student writes down the main idea or question. The right side provides space for the student to take notes or demonstrate student understanding of main idea or topic (Tsai-Fu, & Yongan, 2010).	Why use this strategy? -Increase written responses in mathematics. -Teacher will be able see where student misconceptions take place in understanding topic. -Forces students to make connections and understanding why the mathematical procedure is taking place.

	 **High School Cornell Notes Sample—Mathematics** **Class Notes** If there was no class lecture this week, write a paragraph about what you learned and/or questions about what you didn't understand. Topic: Algebra II Multiplying Polynomials Questions/Main Ideas: Name: Student A Class: Mathematics Period: 1 Date: 11-10-05 Notes: How does the "Foil" Method apply to multiplying polynomials? "FOIL" Method First Outside Inside Last $(x+6)(x+4)$ $x^2+4x+6x+24$ $x^2+10x+24$ What is the Linear Method? Linear Method – $x+6$ $x+4$ $4x+24$ x^2+6x $x^2+10x+24$ Examples: Difference of Squares – $+ab-ab$ $(a+b)(a-b) = a^2-b^2$ Example: $(2x+3)(x^2+4x-5)$ $2x^3+8x^2-10x$ $3x^2+12x-15$ $2x^3+11x^2+2x-15$ Summary: Today I learned about Multiplying Polynomials. There are several ways to multiply polynomials: using the Foil Method, the Linear Method, and finding the difference of Squares. The Foil Method is easier to understand now that I can remember what FOIL stands for: First, Outer, Inner, Last. If I follow that order, I will solve the equation correctly. Unit 2: Cornell Notes and Learning Logs 23	-Great tool for student self- reflection.
Gallery Walk	Time: Can be varied dependent on the class. Material: Room to display student work. This activity allows the class to see others thought processes about a particular mathematical concept. The creation of student	Why use this strategy? -Allows students to question other students work, procedures, and thought processes without the

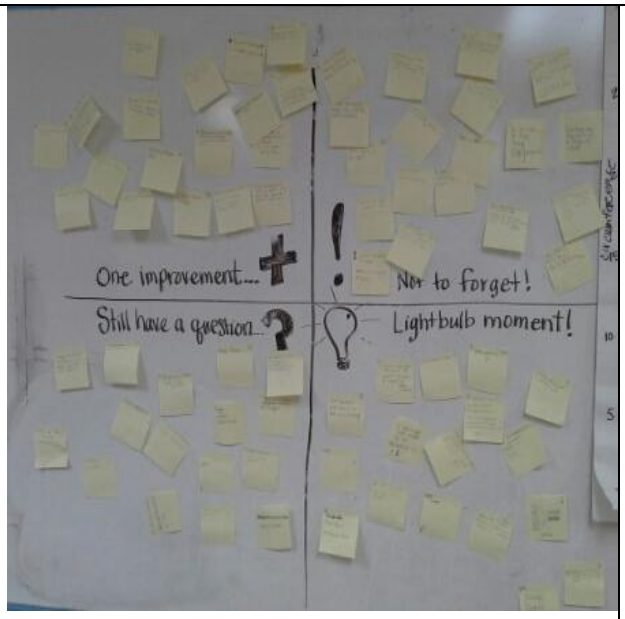
	work is best done in small groups. Each group generates a public record based on the topic. This allows each group to walk around the classroom and see each groups work. This can be adjusted to best suit the needs of the learners in the classroom. The teacher may give each group sticky notes have each student write a question or a comment to post on other groups public records during the gallery walk (Jones, Jones, & Vermette, 2011; Wilson, & Arendale, 2011).   	embarrassment that a student may feel from asking a question in front of the entire class. -Increases mathematical thinking around a topic by allowing more students to contribute to the topic. -Teacher would use this strategy when student group conversations are minimal and student engagement is low.

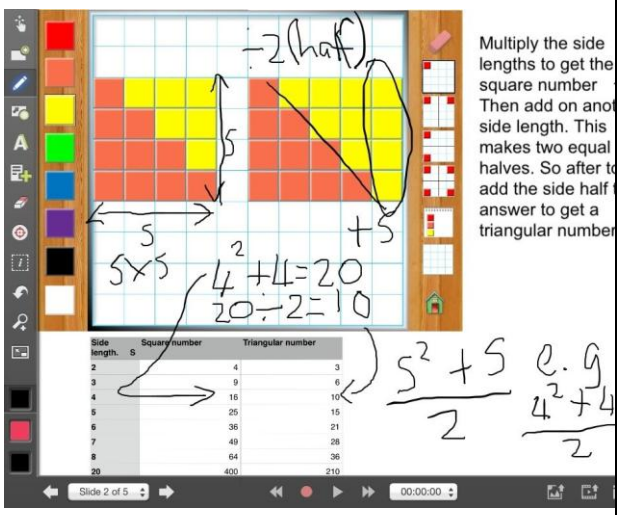
Graphic Organizers	Time: Can be varied dependent on the class. Material: Graphic organizer and pencil There are numerous graphic organizers on the internet for teachers to use in mathematics classes. The teacher must be thoughtful in selecting a graphic organizer around topics to help students organize their thought process, understand relationships, develop hierarchy of concepts, etc. The students would fill in each box with the appropriate information related to the standard (Shaw, Nihalani, Mayrath, & Robinson, 2012). For example: 	Why use this strategy? -When students are struggling to organize thoughts or make connections between concepts, then use a graphic organizer to help to improve connections. -Graphic organizers will help students that have difficulties writing. -Graphic organizers may help teachers understanding where student misconceptions reside, which will assist the teacher in planning future lessons. -Teacher would use a version to allow students to grapple with higher order connections. -Graphic organizers will assist students with language barriers leading to learning difficulties.

Grouping	The teacher may assign groups on a number of different ways. For example, teachers may use data to generate small groups. Additionally, the teacher may use the birthday month of students, colors of clothing for the day, shoe size or color, etc. Grouping should be dependent on the activity that is taking place for the day, but continued mixing of the groups assists with building culture in the classroom. The teacher must decide on appropriate ways to reorganize the classroom setting to accommodate grouping (Jones, Vermette, & Jones, 2012).  4-Pak Double Entry Desks Radial Tables with Chairs Round Tables with Chairs Straight Rows Tablet Arm Chairs Straight Rows Tables with Chairs U-Shaped Tables with Chairs	Why use this strategy? -Assists the teacher in group students who struggle with understanding particular standards or concepts, which will allow the teacher to enhance differentiated instruction in the classroom. -Assists the teacher in strategically placing students that may be potential behavioral problems in class. -Teacher may strategically place students with diverse learning styles together to enhance instruction. -Teacher may group students when peer tutoring is required. -Teacher may group students for team games and health competition around learning the content. -Teacher may break

		into groups when using a variety of instructional learning techniques not mentioned here i.e. jig-sawing.
"I wonder…"	Time: Time can be varied dependent on the class. Material: Graphic organizer and pencil  (Shaw, Nihalani, Mayrath, & Robinson, 2012).	Why use this strategy? - This will help teachers understanding where student misconceptions reside, which will assist the teacher in planning future lessons.
Journal Writing	Time: Time can be varied dependent on the class. Material: Journal notebook and pencil Journal writing can be a great reflective practice. The teacher must set the appropriate classroom culture for journal writing to be	Why use this strategy? -Journal writing will help improve student mathematics thought process and communication.

	successful. The teacher must also take time to respond to student responses in the journal or the students may not take the journal writing seriously. Journal writing can be time consuming, but provides a great way capture student understanding (Artzt, Sultan, Curcio, & Gurl, 2012).	-Help students justify why something is correct or occurring in that manner. -Teacher would use journal writing to follow up on a specific learning target, learning goal, or essential question.
Parking Lot	Time: Time can be varied dependent on the class. Material: Posted notes and pencil The "parking lot" allows for the teacher to stay on topic when students begin to ask questions that may tend to go off on a tangent. The student writes the question down on a sticky note and posts the sticky note to a designated area of the classroom (National School Reform Faculty, 2014). .	Why use this strategy? -Teacher will use this when students are asking questions that is disrupting the flow of the lesson. -Teacher will use when wanted to capture students thoughts, ideas, concerns, etc. -This is an excellent tool to use to understand how many students relate to a topic or what topics students have not mastered. -This strategy will help struggling teachers with classroom management. -This will improve

		culture of the classroom because all students' opinions are valued.
Public Records	Time: Time can be varied dependent on the class. Material: Something to record student responses, which could be pencil paper, white boards, or some form of technology. Public record is a recording of student understandings around mathematical concepts. The public record is displayed in the classroom for students to refer back to as needed during the unit. Public records are not	Why use this strategy? -Teacher may capture students' thoughts around challenging content. -This will help students make connections to higher order concepts.

	set in stone and may be changed as the students discover meaning that may be different from their original thought processes (Windschitl, Thompson, Braaten, & Stroupe (2012). 	-This allows the students to visually see thought process, while providing opportunities to change thought process and understandings. -Teacher will use this to increase student engagement in whole group and small group instruction.
Round Robin	Time: Time can be varied from 5 minutes to half an hour. Material: Something to record student responses, which could be pencil paper, white boards, or some form of technology. The activity is a way for each student to	Why use this strategy? -Teacher would use this when one or two students may dominate a classroom conversation.

	comment about a problem. The teacher is a facilitator during this activity. The facilitator may put a pattern or problem on the board and pose a question to the students. For example, What strikes you about this pattern? The facilitator asks for a volunteer to start and the responses goes around the room until everyone has had the opportunity to respond. Each response may not be a new observation, but should be an observation observed by the student. The facilitator may go as many rounds as necessary and then give a final call for anyone to make any final observations not stated during the round robin. The facilitator should capture the student responses. This may be adjusted to work in a small group setting (Fair, & Combs, 2011).	-This allows for all students to be share ideas equitably. -This strategy will improve classroom culture because it demonstrates to the students that each student's ideas are valuable to the learning environment. -Teacher would use this strategy when student group conversations are minimal and student engagement is low.
Turn and Talk	Time: Time can be varied from 5 minutes to half an hour. Material: No specific materials needed to complete the activity	Why use this strategy? --Teacher would use this strategy when student group conversations are

	The activity is a way for each student to discuss his/her understanding of the topic with a partner. The teacher posses a questions and asks the student to turn to his/her partner and explain his/her thought processes. The other partner listens to what his/her partner is explaining. The roles then reverse. The idea is to build student confidence in answering questions or sharing ideas. This simple move builds culture in the classroom (Maloch, Zapata, & Roser, 2012). 	minimal and student engagement is low. -This will allow processing time for students, while building confidence with mastery of content. -Teacher would use this strategy when students are struggling to verbally communicate connections to problem.
Student	There are numerous simple items that a	Why use this strategy?

Participation	teacher can use to randomly call on students to increase the accountability in a classroom. A simple idea is to have popsicle sticks with individuals names listed on them in a central location. The teacher draws out a popsicle stick and that student responds to the question. When a teacher is struggling to find volunteers or wants to make sure all students have equitable chances to participate, then the use of the popsicle sticks assists with facilitating classroom instruction (Jones, Vermette, & Jones, 2012).  	-Teacher needs to increase student participation in the classroom. -Teacher may use this when some students are drifting off in class and not staying on task.
Wait Time 1 & 2	Time: 1 second for Wait time 1 and 3 to 4 seconds for Wait time 2. Material: No materials needed This strategy is used after the teacher poses a question and after a student responds to a question. Wait time 1 refers to the teacher pausing after posing a question to allow students to think about the question before responding. It forces all students to think about the question. If you have a student that responds immediately after the question, then others do not have to think about the mathematics. Wait time 2 refers to everyone waiting three or four seconds after a student has responded to allow everyone to think about the response as mathematicians	Why use this strategy? -This strategy should be used when students are shouting out answers before classmates have an opportunity to think about the problem. -This should be used to allow student's time to process the content before responding.

	(Maloch, Zapata, & Roser, 2012).	
White Boards	Time: Can be varied dependent on the class. Material: Individual white boards, dry erase markers, and eraser. The activity can be used in a variety of ways to engage students in the classroom. It may be used for students to practice problems, temporarily capture partners' thoughts, formative assessments, etc. (Artzt, Sultan, Curcio, & Gurl, 2012). 	Why use this strategy? -This is a formative assessment tool for the teacher to gauge student progress or understanding around a topic. -Teacher may hold all students accountable for participating in class work.

Teacher Questioning

Teacher Planning Questions:

What is the purpose of my question?
Do students understand the question being asked of them?
At what cognitive level are students responding to the questions?
What are the next steps to have an impact on the students?
What improvement ideas would you push on the most with the class?
What are the non-negotiable items of the classroom?
How do you call on students when asking questions? Is it random? Same students?

Teacher Probing Questions for Students:

How did you get started on this activity?
Tell my why you …? How do you …? Why is the …? What is the problem?
Can you think of another situation …? What other options can we use …?
How are you using the word (----)?
What other representations can we use to solve …?
What evidence can you offer to support …?
How is (----) and (----) similar? How are they different?
Why will using (----) give us the answer?
Can we solve the problem in a different way? How?
Can we create a rule for solving (----)?
In your own words, tell me how to …?
What does it mean when someone says …?
Why do you think …? Why would I want you to do that?
Can you tell me what you mean when you say (----)?
Can you give me an example of (----)?
You told me how they are different; can you tell me how they are similar?
Why do you think that is true? What is the idea behind that?
Can you be more specific? Can you say your answer in different words?

Teacher Reflection Questions:
What part of the lesson stood out as successful? Why?
How do you remember who was engaged in the lesson?
Why were they engaged?
How could you design the lesson differently to increase student engagement?
What strategies did you feel were most effective?
What parts of the lesson were you professionally stretched?
Did I provide all students an opportunity to respond?
When do I call upon a student to answer, before or after posing the question?

Classroom Math Talk

The talk moves listed below may support the mathematical thinking of students in a classroom environment (Chapin, O'Conner, & Anderson, 2009; Chapin, O'Conner, & Canavan, 2003). The use of the talk moves will improve the culture of the classroom, increase student engagement, build confidence in students, and increase the higher-order conversations around content. The use of talk moves allows more opportunities for all students to share regardless of their current status or to understanding around content. The talk moves clear up any verbal miscommunications that may occur when multiple students are discussing a topic or a teacher is facilitating whole group discussion.

Talk Move	Concept	Teacher Prompts
Re-voicing	Teacher attempts to repeat what the student has said when explaining his/her reasoning to a problem. The teacher asks the students if the re-voicing is correct.	Okay. Let me make sure that I understand you correctly. You are saying that…
Restating	Teacher asks classmate to restate what another student just said in his/her own words. Teacher may call on a specific student or wait for a volunteer to answer.	Can anyone repeat what Joe just said in his or her own words?
Agree/Disagree	A student has shared his/her idea about a topic. The teacher facilitates appropriate time for class to ponder on the ideas shared and prompts other students to add to the topic of conversation.	Do you agree or disagree with what he/she said? Why?
Add On	This move prompts students to for a deeper conversation. The teacher may have to use re-voicing to make sure student ideas are clear.	Who can add an idea to what he/she said?

Peer Observation Template

Observer:	Teacher Observed:	
Date:	Class Period:	Subject:
What teaching methods did you observe? (lecture, small group, independent work, etc.)		
1)	2)	3)
4)	5)	6)
What did you observe that the teacher was doing very well?		
What strategies or activities would you share with the department?		
How did the teacher socially interact with students?		
What did you see the students doing during the observation?		
What questions do you have for the teacher that you observed?		
What did you observe that you could take back and implement in your classroom?		

(National School Reform Faculty, 2014).

Peer to Peer Observation Request for Classroom Coverage

Name:		
Date Submitted:		
Please provide coverage on the following date and time below		
Date (month/day/year)	Time	Teacher Observing
Please adhere to the following bullets below if you need classroom coverage		

- Submit your request no later than **three days prior** to the intended observation time if you need classroom coverage.
- Do not leave your classroom unsupervised until your coverage arrives. If there are any problems, then contract your grade level administrator.

Administrative Approval for Classroom Coverage:

Date: _____

Teacher providing coverage: _____

Please provide coverage for the above mentioned teacher at the requested time.

Thank you for your assistance,

X_____

Grade level Administrator Signature

(National School Reform Faculty, 2014).

Learning Team Evaluation Form

Topic	
Presenter	
Date of Workshop	

1. Please circle YES or NO to the following questions below:

Question	**Answer**	**Comments**
A) Did you find the workshop worthwhile?	YES / NO	
B) Did the workshop meet your needs?	YES / NO	
C) Did you find the workshop too extensive for the time allocated?	YES / NO	
D) Were the learning team sessions too long?	YES / NO	
E) Was the information too technical?	YES / NO	
F) Did you find the facilitator satisfactory?	YES / NO	
G) Did you find on-going sessions beneficial suitable for the year?	YES / NO	

2. Which aspects of the workshop have you found most useful?

3. Which aspects of the workshop did you find least useful?

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Appendix B: Letter of Cooperation

Appendix B

Letter of Cooperation

Hixson High School
5705 Middle Valley Rd
Hixson, TN 37343

April 28, 2014

Dear Michael E. Smith,

Based on my review of your research proposal, I give permission for you to conduct the study entitled The Art of Teaching: Professional Development to Improve Mathematics within the Hixson High School. As part of this study, I authorize you to distribute survey to mathematics department, formally request test scores for Algebra I, and disseminate all results. Individuals' participation will be voluntary and at their own discretion.

The letter of cooperation will be distributed at a faculty meeting. The participating teachers will be instructed to place completed survey inside provided envelope and place the envelope in researcher mailbox. The participants will not complete the survey during the faculty meeting, but outside the faculty meeting to provide sufficient time for consideration and completion of the survey.

I confirm that I am authorized to approve research in this setting.

I understand that the data collected will remain entirely confidential and may not be provided to anyone outside of the research team without permission from the Walden University IRB.

Sincerely,

Lee Sims-Principal
Hixson High School
5705 Middle Valley Rd
Hixson, TN 37343
Phone: 423-847-4800
Email: sims_l@hcde.org

Walden University policy on electronic signatures: An electronic signature is just as valid as a written signature as long as both parties have agreed to conduct the transaction electronically. Electronic signatures are regulated by the Uniform Electronic Transactions Act. Electronic signatures are only valid when the signer is either (a) the sender of the email, or (b) copied on the email containing the signed document. Legally an "electronic signature" can be the person's typed name, their email address, or any other identifying marker. Walden University staff verify any electronic signatures that do not originate from a password-protected source (i.e., an email address officially on file with Walden).

Appendix C: Survey Cover Letter

April 28, 2014

Dear Participant:

My name is Michael E. Smith and I am a graduate student at Walden University. For my final project, I am examining the participant's experiences and changes that occurred in classroom practices in relation to the mathematics professional development training. Because you participated in the professional development by the Teacher Development Group, I am inviting you to participate in this research study by completing the attached survey.

The following survey will require approximately 30 minutes of your time to complete. There is no compensation for responding nor is there any known risk. In order to ensure that all information will remain confidential, please do not include your name. If you choose to participate in this project, please answer all questions as honestly as possible and return the completed survey promptly to the interoffice mailbox located in the main office. Participation is strictly voluntary and you may refuse to participate at any time.

Thank you for taking the time to assist me in my educational endeavors. The data collected will provide useful information regarding the strategies that impacted student achievement.

Data collected will remain entirely confidential and may not be provided to anyone outside of the student's supervising faculty/staff without permission from the Walden University IRB. The researcher's course instructor is Dr. Marilyn Cook. You may ask any questions you have now. Or if you have questions later, you may contact the researcher via email michael.smith6@waldenu.edu or the instructor at marilyn.cook@waldenu.edu. If you want to talk privately about your rights as a participant, you can call Dr. Leilani Endicott. She is the Director of the Research Center at Walden University. Her phone number is 1-800-925-3368, extension 1210.

Sincerely,

Michael E. Smith

Appendix D: Teacher Survey

Teacher Perceptions of Professional Development

Instructional Strategies/Tools

1. What instructional strategies/tools did you find to be most beneficial? Why?

2. What instructional strategies/tools did you find to be the least beneficial? Why?

3. What instructional strategies/tools did you learn from participating in the professional development?

4. What instructional strategies/tools did you use before participating in the mathematics professional development?

5. What instructional strategies/tools do you feel benefited the students in your classroom? Why?

6. What instructional strategies/tools do you feel least benefited the student in your classroom? Why?

7. What instructional strategies/tools were most difficult to implement? Why?

8. What instructional strategies/tools were least difficult to implement? Why?

Classroom Practices

1. Has your classroom practices changed as a result of participating in the professional development? How?

2. What classroom practices were you using before participating in the mathematics professional development?

3. If your classroom practice changed, how did you go about making the changes?

End of Course Assessment

1. What instructional strategies/tools do you believe are best to prepare the students for the end of course assessment? How so?
2.
3. What instructional strategies/tools do you believe are the least beneficial for preparing students for the end of course assessment? How so?

Teacher Preparedness

1. What experiences made you a better teacher? How?

2. What experiences were useful for classroom implementation?

3. How were you engaged in the professional development?

4. What experiences did not meet your needs for improving classroom practice?

Teacher Attitude

1. At the end of the professional development, what areas do you feel confident in your ability to implement the instructional strategies/tools?

2. At the end of the professional development, what areas do you feel doubtful in your ability to implement the instructional strategies/tools?

3. What do you consider valuable after participating in the professional development?

4. What do you consider a waist or your time after participating in the professional development?

Social Change

1. Did your experiences improve student/teacher relationships in the classroom? How?

2. Did your experiences improve teacher moral within the mathematics department? How?

3. Did your experiences provide you with tools to build relationships with students and parents? How?

4. How did the culture of your classroom/department change?

Instructional Strategies Implemented in the Classroom

Instructional Strategy	Least Beneficial	Beneficial	Most Beneficial
Public Record	0	0	100
Math Talk	0	0	100
Individual	50	50	0
Group Conferencing	75	25	0
Selecting and	0	25	75
Wait Time	0	25	75
Questioning	25	50	25
Team Lesson Planning	0	25	75
Turn and Talk	0	75	25
Private Think Time	0	50	50

Difficulty with Instructional Strategy Implementation

Instructional Strategy	Not Difficult	Neutral	Difficult
Public Record	100	0	0
Math Talk	0	0	100
Individual	0	50	50
Group Conferencing	0	0	100
Selecting and	50	25	25
Wait Time	100	0	0
Questioning	0	25	75
Team Lesson Planning	100	0	0
Turn and Talk	100	0	0
Private Think Time	100	0	0

Professional Development Impacting Classroom Practices

	No	Neutral	Yes
Has your classroom practice changed as a result of participating in the professional	0	0	100
Has the student engagement increased as a result of participating in the professional	0	0	100
Has the arrangement of your physical classroom changed as a result of participating in the professional development?	0	0	100

Teacher Engagement during the Professional Development

Activity	Not Beneficial	Neutral	Beneficial
Peer-Observations	25	0	75
Coaching Sessions	0	0	100
Lesson Planning	0	0	100
Reflective Practices	25	25	50
Modeling Lessons	75	25	0

Instructional Strategies Beneficial for the End of Course Assessment

Instructional Strategy	Not Beneficial	Neutral	Beneficial
Public Record	25	0	75
Math Talk	25	0	75
Individual	75	25	0
Group Conferencing	75	25	0
Selecting and	25	0	75
Wait Time	25	0	75
Questioning	25	0	75
Team Lesson Planning	0	0	100
Turn and Talk	25	0	75
Private Think Time	25	0	75

Teacher Confidence with Implementation

Instructional Strategy	Not Confident	Neutral	Confident
Public Record	0	25	75
Math Talk	50	25	25
Individual	50	50	0
Group Conferencing	50	50	0
Selecting and	0	50	50
Wait Time	0	25	75
Questioning	25	25	50
Team Lesson Planning	0	50	50
Turn and Talk	0	25	75
Private Think Time	0	25	75

Social Change Components

Relationship	No Improvement	Neutral	Improvement
Student/Teacher	25	50	25
Teacher/Parent	100	0	0
Teacher Moral	0	25	75
Classroom Culture	0	25	75
Student Confidence	0	0	100
Student Peer Trust	0	0	100
Trust in Department	0	0	100

Appendix E: Consent Form

You are invited to take part in an anonymous research survey of perceptions and experiences of teachers regarding the mathematics professional development training. You are invited to participate because of participation in the mathematics professional development activities for Hixson High School. Please read this form and ask any questions you have before agreeing to be part of the anonymous research survey.

This survey is being conducted by a researcher named Michael E. Smith, who is a doctoral student at Walden University. Michael E. Smith is also an Assistant Principal at Hixson High School. The researcher is already known to the participant, so declining or discontinuing participating in the survey will not negatively impact the participant's relationship with the researcher. This study is separate from Michael E. Smith's role as an assistant principal within the school.

Background Information:
The purpose of this survey is to better understand the participant's experiences and changes that occurred in classroom practices in relation to the mathematics professional development training.

Procedures:
If you agree, you will be asked to complete an anonymous survey directly after a staff faculty meeting, and return the survey to appropriate envelope. The envelope will be sealed by secretary of the school and picked up by the researcher. Researcher will not be present during the completion of the survey. The following survey will require approximately 30 minutes of your time to complete.

Voluntary Nature of the Interview:
Your participation in this survey is voluntary. This means that everyone will respect your decision of whether or not you want to complete the survey. No one at Hixson High School will treat you differently if you decide not to complete the survey. If you decide to complete the survey now, you can still change your mind later. If you feel stressed during the survey, you may stop at any time. You may skip any questions that you feel are too personal.

Risks and Benefits of Completing the Survey:
There is the minimal risk of psychological stress during this survey. If you feel stressed during the survey, you may stop at any time. There are no benefits to you from participating in this survey. The examination of quantitative analysis from the end-of-course assessment data and the examination of analysis from teacher perspective will provide a detailed description of changes in the school and guide implementation for future professional development. The results of the project study may socially unite the

teachers, parents, and community, which may reduce the teacher turnover rate, increase student attendance rate, reduce the high school drop-out rate, and allow students to sharpen tools needed to transition into college or the workforce.

Compensation:
There is no compensation for completing the survey.

Confidentiality:
Any information you provide will be kept confidential. The researcher will not use your information for any purposes outside of this project study. Also, the researcher will not include your name or anything else that could identify you in any reports of the survey.

Contacts and Questions:
The researcher's name is Michael E. Smith. The researcher's course instructor is Dr. Marilyn Cook. You may ask any questions you have now. Or if you have questions later, you may contact the researcher via phone [redacted] or e-mail michael.smith6@waldenu.edu or the instructor at marilyn.cook@waldenu.edu. If you want to talk privately about your rights as a participant, you can call Dr. Leilani Endicott. She is the Director of the Research Center at Walden University. Her phone number is 1-800-925-3368, extension 3121210.

The participant may keep this form.

Appendix F: State of Tennessee Test Security Law

Tennessee Code Annotated (T.C.A.) 49-1-607 states:

Any person found to have not followed security guidelines for administration of the TCAP test, or successor
test, including making or distributing unauthorized copies of the test, altering a grade or answer sheet, providing copies of answers or test questions, or otherwise compromising the integrity of the testing process,
shall be placed on immediate suspension, and such actions will be grounds for dismissal, including dismissal
of tenured employees. Such actions shall be grounds for revocation of state license. [Acts 1992, ch. 535, 4.]

State Test Security Measures

The State will:

- Establish security guidelines to ensure the integrity of the testing process.
- Implement safeguards to ensure test content security.
- Communicate through the System Testing Coordinator matters concerning security, material orders, and shipping verifications.
- Provide Distribution and Shipping Logs to ensure accurate inventory of test materials at the system and school levels.
- Conduct random visits during testing to ensure test security and consistency of administration.
- Provide Breach of Testing Security Report forms to document local test security concerns.
- Review submitted Breach of Testing Security Report forms and follow up as needed.
- Release student-specific test data only to authorized personnel.

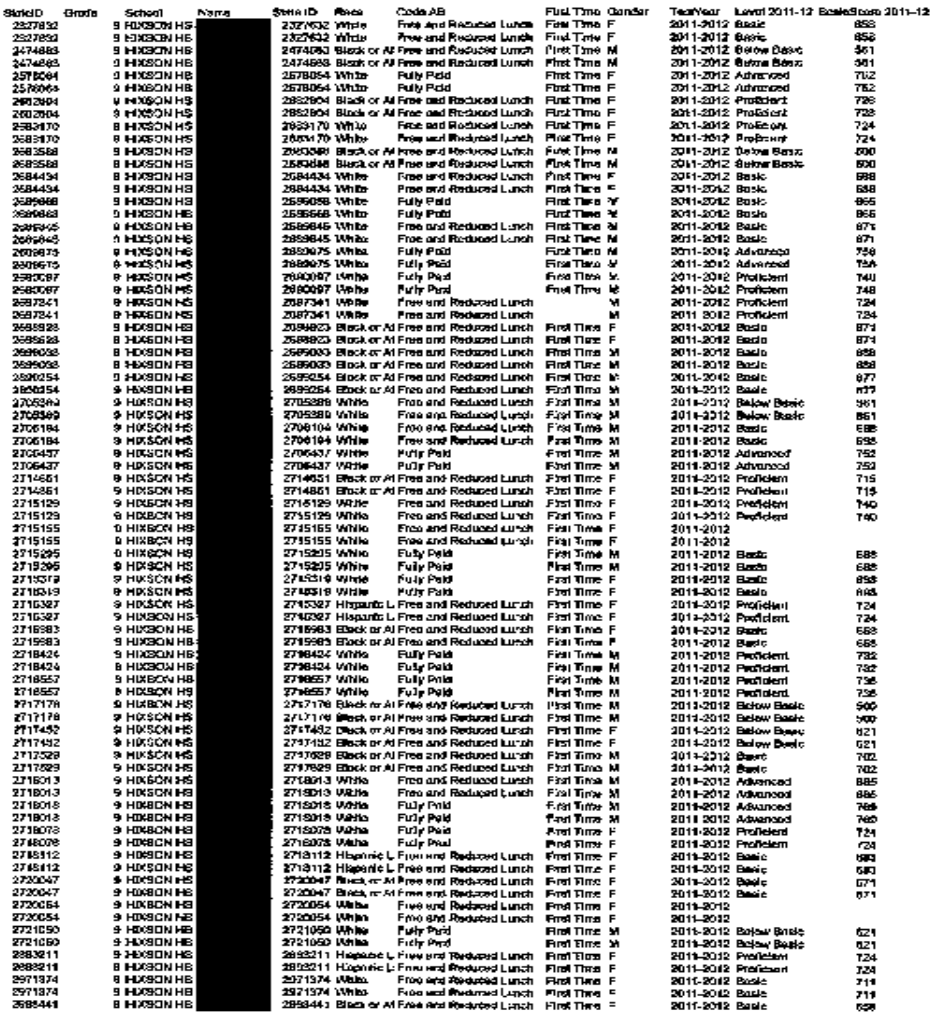
State Test Security Guidelines

The Public School Systems, State Special, and Non-public Schools MUST:

1. Adopt a locally monitored test security policy that incorporates, at a minimum, these State Test Security Guidelines. This policy should include a Testing Code of Ethics for personnel to sign and leave at the district office for documentation.
2. Train all personnel involved in the testing process on State Test Security Law, Security Guidelines, local policy, and test administration procedures; retain training documentation for system records.
3. Implement check-in, check-out, and quantity verification procedures for all test materials at the system level, at the school level, and for each test session.
4. Restrict handling of test materials to authorized personnel at all times.
5. Implement policies and procedures to prohibit all personnel from obtaining knowledge of test items or passage content before, during, and after testing. Discussion of the test content or specific test items with students, parents, or professional colleagues is prohibited, to protect the validity of the test.

6. Return test materials immediately after each test session and when the entire administration is completed. Store test materials in a centrally located, locked room that is inaccessible to unauthorized persons.
7. Create a secure, yet positive, environment for testing. Place appropriate signage outside of test setting to limit interruptions (e.g., Do Not Disturb—Testing in Progress).
8. Conceal or remove all instructional or reference materials in the test setting that are related to the content area being assessed, such as maps, posters, student samples, bulletin board items, familiar study aids such as graphic organizers, models, or number lines that relate to subject content.
9. Turn off all electronic communication devices (cell phones, pagers, PDAs, etc.) in the test setting.
10. Ensure proper calculator use as outlined in the *Test Administration Manual*, making sure that calculators are cleared before and after administration of each test.
11. Confirm each student is the person named on the answer document for every testing session. A photo ID may be required if administrators are not responsible for normal classroom instruction.
12. Require Test Administrators and Proctors to carefully adhere to all test administration and accommodation instructions, following appropriate schedules and time limits, outlined in all test directions.
13. Require Test Administrators and Proctors to remain with the students and be observant and nondisruptive throughout the testing session.
14. Prohibit coaching students in any way during State assessments. Ensure students respond to test items without assistance from anyone.
15. Prohibit reading test items and passages by anyone other than the students being tested, unless indicated in test instructions or accommodations. Secure assessment materials (including pilot or field test materials) shall not be read, reviewed, or analyzed at any time before, during, or after test administration.
16. Ensure that test items are not reproduced, duplicated, or paraphrased in any way, for any reason, by any person. Standard copyright laws must be maintained at all times. Test materials shall not be copied, filed, or used directly in instructional activities. Specific excerpts from the test or paraphrased portions of the test may not be used to create study guides or classroom resources.
17. Maintain confidentiality of student-specific accountability demographic information and test results at all times.
18. Document test security concerns, including missing materials, on the Breach of Testing Security Report form.
19. Make sure to report any breach of security. Failure to report a breach of security compromises the integrity of the testing process and should be treated as a breach of testing security.

Appendix G: Historical Algebra I End of Course Test Data



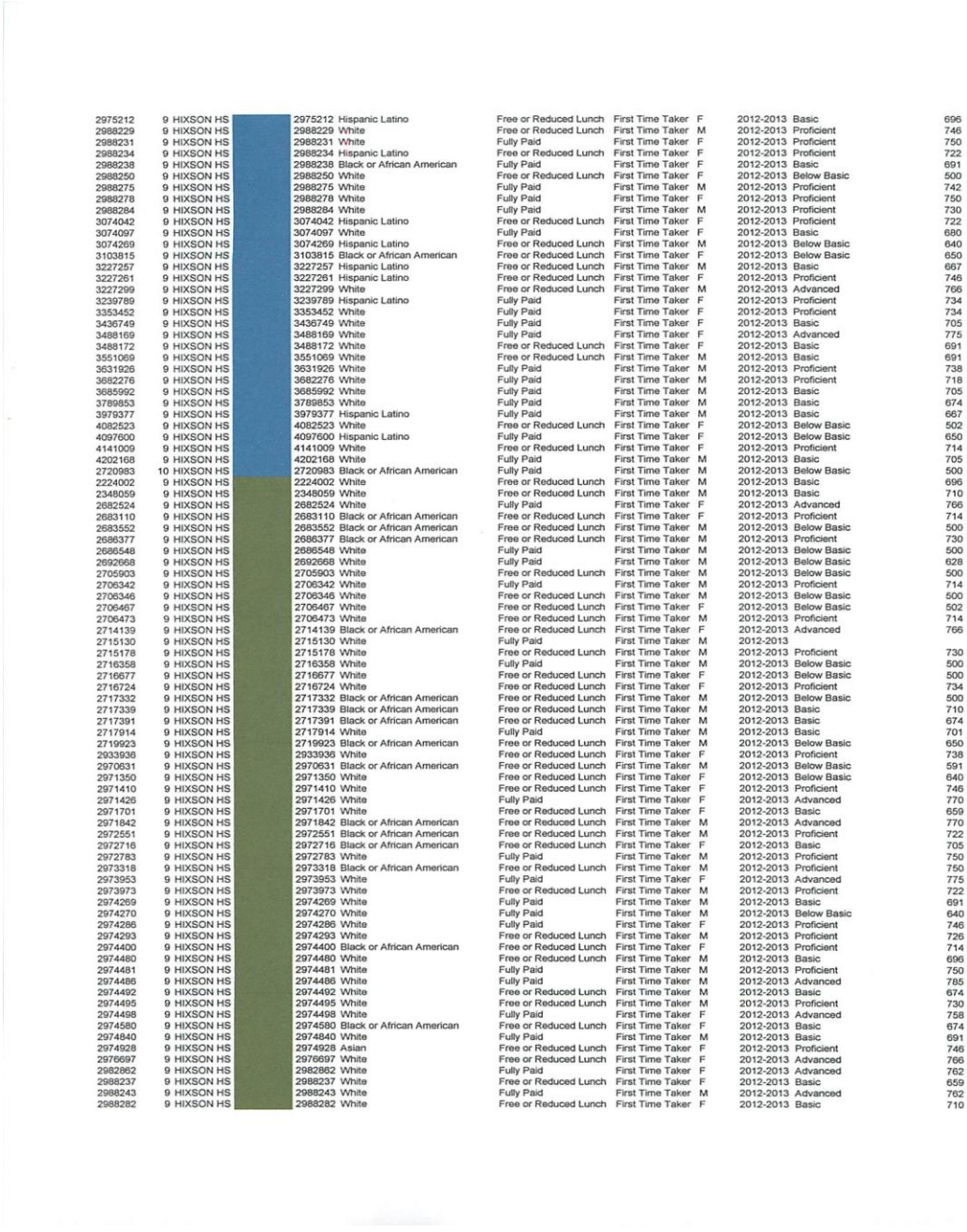
StateID	Grade	School	Name	StateID	Race	CodeAB	FirstTime	Gender	TestYear	Level 2011-12	EOCScore 2011-12
2327832		9 HIXSON HS	[redacted]	2327832	White	Free and Reduced Lunch	First Time	F	2011-2012	Basic	658
2327832		9 HIXSON HS		2327832	White	Free and Reduced Lunch	First Time	F	2011-2012	Basic	658
2474883		9 HIXSON HS		2474883	Black or Af	Free and Reduced Lunch	First Time	M	2011-2012	Below Basic	561
2474883		9 HIXSON HS		2474883	Black or Af	Free and Reduced Lunch	First Time	M	2011-2012	Below Basic	561
2578064		9 HIXSON HS		2578064	White	Fully Paid	First Time	F	2011-2012	Advanced	782
2578064		9 HIXSON HS		2578064	White	Fully Paid	First Time	F	2011-2012	Advanced	782
2852804		9 HIXSON HS		2852804	Black or Af	Free and Reduced Lunch	First Time	F	2011-2012	Proficient	726
2852804		9 HIXSON HS		2852804	Black or Af	Free and Reduced Lunch	First Time	F	2011-2012	Proficient	726
2583170		8 HIXSON HS		2583170	White	Free and Reduced Lunch	First Time	F	2011-2012	Proficient	724
2583170		8 HIXSON HS		2583170	White	Free and Reduced Lunch	First Time	F	2011-2012	Proficient	724
2583588		9 HIXSON HS		2583588	Black or Af	Free and Reduced Lunch	First Time	M	2011-2012	Below Basic	500
2583588		8 HIXSON HS		2583588	Black or Af	Free and Reduced Lunch	First Time	M	2011-2012	Below Basic	500
2584434		8 HIXSON HS		2584434	White	Free and Reduced Lunch	First Time	F	2011-2012	Basic	688
2584434		9 HIXSON HS		2584434	White	Free and Reduced Lunch	First Time	F	2011-2012	Basic	688
2585868		9 HIXSON HS		2585868	White	Fully Paid	First Time	W	2011-2012	Basic	666
2585868		9 HIXSON HS		2585868	White	Fully Paid	First Time	W	2011-2012	Basic	666
2585945		9 HIXSON HS		2585945	White	Free and Reduced Lunch	First Time	M	2011-2012	Basic	671
2585945		9 HIXSON HS		2585945	White	Free and Reduced Lunch	First Time	M	2011-2012	Basic	671
2585975		9 HIXSON HS		2585975	White	Fully Paid	First Time	M	2011-2012	Advanced	758
2585975		8 HIXSON HS		2585975	White	Fully Paid	First Time	M	2011-2012	Advanced	758
2580097		8 HIXSON HS		2580097	White	Fully Paid	First Time	M	2011-2012	Proficient	740
2580097		8 HIXSON HS		2580097	White	Fully Paid	First Time	M	2011-2012	Proficient	740
2587341		8 HIXSON HS		2587341	White	Free and Reduced Lunch		M	2011-2012	Proficient	734
2587341		8 HIXSON HS		2587341	White	Free and Reduced Lunch		M	2011-2012	Proficient	734
2588823		9 HIXSON HS		2588823	Black or Af	Free and Reduced Lunch	First Time	F	2011-2012	Basic	674
2588823		8 HIXSON HS		2588823	Black or Af	Free and Reduced Lunch	First Time	F	2011-2012	Basic	674
2589083		8 HIXSON HS		2589083	Black or Af	Free and Reduced Lunch	First Time	M	2011-2012	Basic	658
2589083		8 HIXSON HS		2589083	Black or Af	Free and Reduced Lunch	First Time	M	2011-2012	Basic	658
2595254		8 HIXSON HS		2595254	Black or Af	Free and Reduced Lunch	First Time	M	2011-2012	Basic	677
2595254		9 HIXSON HS		2595254	Black or Af	Free and Reduced Lunch	First Time	M	2011-2012	Basic	677
2705389		9 HIXSON HS		2705389	White	Free and Reduced Lunch	First Time	M	2011-2012	Below Basic	561
2705389		9 HIXSON HS		2705389	White	Free and Reduced Lunch	First Time	M	2011-2012	Below Basic	561
2706184		9 HIXSON HS		2706184	White	Free and Reduced Lunch	First Time	M	2011-2012	Basic	685
2706184		9 HIXSON HS		2706184	White	Free and Reduced Lunch	First Time	M	2011-2012	Basic	685
2706437		9 HIXSON HS		2706437	White	Fully Paid	First Time	M	2011-2012	Advanced	752
2706437		8 HIXSON HS		2706437	White	Fully Paid	First Time	M	2011-2012	Advanced	752
2714851		9 HIXSON HS		2714851	Black or Af	Free and Reduced Lunch	First Time	F	2011-2012	Proficient	715
2714851		9 HIXSON HS		2714851	Black or Af	Free and Reduced Lunch	First Time	F	2011-2012	Proficient	715
2715129		9 HIXSON HS		2715129	White	Free and Reduced Lunch	First Time	F	2011-2012	Proficient	740
2715129		9 HIXSON HS		2715129	White	Free and Reduced Lunch	First Time	F	2011-2012	Proficient	740
2715155		9 HIXSON HS		2715155	White	Free and Reduced Lunch	First Time	F	2011-2012		
2715155		9 HIXSON HS		2715155	White	Free and Reduced Lunch	First Time	F	2011-2012		
2715295		9 HIXSON HS		2715295	White	Fully Paid	First Time	M	2011-2012	Basic	685
2715295		9 HIXSON HS		2715295	White	Fully Paid	First Time	M	2011-2012	Basic	685
2715319		9 HIXSON HS		2715319	White	Fully Paid	First Time	F	2011-2012	Basic	693
2715319		9 HIXSON HS		2715319	White	Fully Paid	First Time	F	2011-2012	Basic	693
2715327		9 HIXSON HS		2715327	Hispanic L	Free and Reduced Lunch	First Time	F	2011-2012	Proficient	724
2715327		9 HIXSON HS		2715327	Hispanic L	Free and Reduced Lunch	First Time	F	2011-2012	Proficient	724
2715983		9 HIXSON HS		2715983	Black or Af	Free and Reduced Lunch	First Time	F	2011-2012	Basic	668
2715983		9 HIXSON HS		2715983	Black or Af	Free and Reduced Lunch	First Time	F	2011-2012	Basic	668
2718424		9 HIXSON HS		2718424	White	Fully Paid	First Time	M	2011-2012	Proficient	732
2718424		8 HIXSON HS		2718424	White	Fully Paid	First Time	M	2011-2012	Proficient	732
2718557		9 HIXSON HS		2718557	White	Fully Paid	First Time	M	2011-2012	Proficient	735
2718557		8 HIXSON HS		2718557	White	Fully Paid	First Time	M	2011-2012	Proficient	735
2717178		9 HIXSON HS		2717178	Black or Af	Free and Reduced Lunch	First Time	M	2011-2012	Below Basic	500
2717178		9 HIXSON HS		2717178	Black or Af	Free and Reduced Lunch	First Time	M	2011-2012	Below Basic	500
2717432		9 HIXSON HS		2717432	Black or Af	Free and Reduced Lunch	First Time	F	2011-2012	Below Basic	621
2717432		9 HIXSON HS		2717432	Black or Af	Free and Reduced Lunch	First Time	F	2011-2012	Below Basic	621
2717529		9 HIXSON HS		2717529	Black or Af	Free and Reduced Lunch	First Time	M	2011-2012	Basic	702
2717529		9 HIXSON HS		2717529	Black or Af	Free and Reduced Lunch	First Time	M	2011-2012	Basic	702
2718013		9 HIXSON HS		2718013	White	Free and Reduced Lunch	First Time	M	2011-2012	Advanced	885
2718013		9 HIXSON HS		2718013	White	Free and Reduced Lunch	First Time	M	2011-2012	Advanced	885
2718018		9 HIXSON HS		2718018	White	Fully Paid	First Time	M	2011-2012	Advanced	765
2718018		9 HIXSON HS		2718018	White	Fully Paid	First Time	M	2011-2012	Advanced	765
2718078		9 HIXSON HS		2718078	White	Fully Paid	First Time	F	2011-2012	Proficient	724
2718078		9 HIXSON HS		2718078	White	Fully Paid	First Time	F	2011-2012	Proficient	724
2718112		9 HIXSON HS		2718112	Hispanic L	Free and Reduced Lunch	First Time	F	2011-2012	Basic	680
2718112		9 HIXSON HS		2718112	Hispanic L	Free and Reduced Lunch	First Time	F	2011-2012	Basic	680
2720047		8 HIXSON HS		2720047	Black or Af	Free and Reduced Lunch	First Time	F	2011-2012	Basic	671
2720047		9 HIXSON HS		2720047	Black or Af	Free and Reduced Lunch	First Time	F	2011-2012	Basic	671
2720054		9 HIXSON HS		2720054	White	Free and Reduced Lunch	First Time	F	2011-2012		
2720054		9 HIXSON HS		2720054	White	Free and Reduced Lunch	First Time	F	2011-2012		
2721050		9 HIXSON HS		2721050	White	Fully Paid	First Time	M	2011-2012	Below Basic	621
2721050		9 HIXSON HS		2721050	White	Fully Paid	First Time	M	2011-2012	Below Basic	621
2883211		9 HIXSON HS		2883211	Hispanic L	Free and Reduced Lunch	First Time	F	2011-2012	Proficient	724
2883211		8 HIXSON HS		2883211	Hispanic L	Free and Reduced Lunch	First Time	F	2011-2012	Proficient	724
2971374		8 HIXSON HS		2971374	White	Free and Reduced Lunch	First Time	F	2011-2012	Basic	719
2971374		9 HIXSON HS		2971374	White	Free and Reduced Lunch	First Time	F	2011-2012	Basic	719
2983441		8 HIXSON HS		2983441	Black or Af	Free and Reduced Lunch	First Time	F	2011-2012	Basic	658

2998441	9	HIXSON HS	2998441	Black or Af	Free and Reduced Lunch	First Time	F	2011-2012	Basic	658
3073594	9	HIXSON HS	3073594	White	Fully Paid	First Time	M	2011-2012	Advanced	756
3073594	9	HIXSON HS	3073594	White	Fully Paid	First Time	M	2011-2012	Advanced	756
3147458	9	HIXSON HS	3147458	Black or Af	Free and Reduced Lunch	First Time	M	2011-2012	Advanced	756
3147458	9	HIXSON HS	3147458	Black or Af	Free and Reduced Lunch	First Time	M	2011-2012	Advanced	756
3226852	9	HIXSON HS	3226852	White	Fully Paid	First Time	F	2011-2012	Proficient	736
3226852	9	HIXSON HS	3226852	White	Fully Paid	First Time	F	2011-2012	Proficient	736
3227251	9	HIXSON HS	3227251	Black or Af	Fully Paid	First Time	M	2011-2012	Proficient	740
3227251	9	HIXSON HS	3227251	Black or Af	Fully Paid	First Time	M	2011-2012	Proficient	740
3327931	9	HIXSON HS	3327931	White	Free and Reduced Lunch	First Time	M	2011-2012	Basic	702
3327931	9	HIXSON HS	3327931	White	Free and Reduced Lunch	First Time	M	2011-2012	Basic	702
3437751	9	HIXSON HS	3437751	Black or Af	Fully Paid	First Time	M	2011-2012	Basic	711
3437751	9	HIXSON HS	3437751	Black or Af	Fully Paid	First Time	M	2011-2012	Basic	711
3640861	9	HIXSON HS	3640861	White	Fully Paid	First Time	F	2011-2012	Proficient	748
3640861	9	HIXSON HS	3640861	White	Fully Paid	First Time	F	2011-2012	Proficient	748
3685634	9	HIXSON HS	3685634	Black or Af	Free and Reduced Lunch	First Time	F	2011-2012	Basic	658
3685634	9	HIXSON HS	3685634	Black or Af	Free and Reduced Lunch	First Time	F	2011-2012	Basic	658
3726395	9	HIXSON HS	3726395	White	Free and Reduced Lunch	First Time	F	2011-2012	Advanced	764
3726395	9	HIXSON HS	3726395	White	Free and Reduced Lunch	First Time	F	2011-2012	Advanced	764
3737233	9	HIXSON HS	3737233	Black or Af	Free and Reduced Lunch	First Time	M	2011-2012	Below Basic	561
3737233	9	HIXSON HS	3737233	Black or Af	Free and Reduced Lunch	First Time	M	2011-2012	Below Basic	561
3745982	9	HIXSON HS	3745982	Black or Af	Free and Reduced Lunch	First Time	M	2011-2012	Basic	677
3745982	9	HIXSON HS	3745982	Black or Af	Free and Reduced Lunch	First Time	M	2011-2012	Basic	677
3755346	9	HIXSON HS	3755346	Black or Af	Free and Reduced Lunch	First Time	M	2011-2012	Basic	707
3755346	9	HIXSON HS	3755346	Black or Af	Free and Reduced Lunch	First Time	M	2011-2012	Basic	707
3982814	9	HIXSON HS	3982814	White	Fully Paid	First Time	M	2011-2012	Advanced	760
3982814	9	HIXSON HS	3982814	White	Fully Paid	First Time	M	2011-2012	Advanced	760
3984976	9	HIXSON HS	3984976	White	Fully Paid	First Time	F	2011-2012	Proficient	715
3984976	9	HIXSON HS	3984976	White	Fully Paid	First Time	F	2011-2012	Proficient	715
4022932	9	HIXSON HS	4022932	Native Hav	Fully Paid	First Time	M	2011-2012	Advanced	779
4022932	9	HIXSON HS	4022932	Native Hav	Fully Paid	First Time	M	2011-2012	Advanced	779
4022934	9	HIXSON HS	4022934	Hispanic L	Free and Reduced Lunch	First Time	M	2011-2012	Basic	665
4022934	9	HIXSON HS	4022934	Hispanic L	Free and Reduced Lunch	First Time	M	2011-2012	Basic	665
4022936	9	HIXSON HS	4022936	Hispanic L	Free and Reduced Lunch	First Time	F	2011-2012	Proficient	736
4022936	9	HIXSON HS	4022936	Hispanic L	Free and Reduced Lunch	First Time	F	2011-2012	Proficient	736
4071925	9	HIXSON HS	4071925	White	Fully Paid	First Time	F	2011-2012	Basic	707
4071925	9	HIXSON HS	4071925	White	Fully Paid	First Time	F	2011-2012	Basic	707
1818661	9	HIXSON HS	1818661	White	Free and Reduced Lunch	First Time	F	2011-2012	Proficient	728
1818661	9	HIXSON HS	1818661	White	Free and Reduced Lunch	First Time	F	2011-2012	Proficient	728
2152862	9	HIXSON HS	2152862	White	Fully Paid	First Time	M	2011-2012	Basic	702
2152862	9	HIXSON HS	2152862	White	Fully Paid	First Time	M	2011-2012	Basic	702
2476885	9	HIXSON HS	2476885	Black or Af	Free and Reduced Lunch	First Time	M	2011-2012	Proficient	728
2476885	9	HIXSON HS	2476885	Black or Af	Free and Reduced Lunch	First Time	M	2011-2012	Proficient	728
2588293	9	HIXSON HS	2588293	Black or Af	Free and Reduced Lunch	First Time	M	2011-2012	Proficient	715
2588293	9	HIXSON HS	2588293	Black or Af	Free and Reduced Lunch	First Time	M	2011-2012	Proficient	715
2678939	9	HIXSON HS	2678939	Black or Af	Free and Reduced Lunch	First Time	M	2011-2012	Below Basic	589
2678939	9	HIXSON HS	2678939	Black or Af	Free and Reduced Lunch	First Time	M	2011-2012	Below Basic	589
2683202	9	HIXSON HS	2683202	Black or Af	Free and Reduced Lunch	First Time	F	2011-2012	Basic	698
2683202	9	HIXSON HS	2683202	Black or Af	Free and Reduced Lunch	First Time	F	2011-2012	Basic	698
2686385	9	HIXSON HS	2686385	Black or Af	Fully Paid	First Time	M	2011-2012	Below Basic	642
2686385	9	HIXSON HS	2686385	Black or Af	Fully Paid	First Time	M	2011-2012	Below Basic	642
2689850	9	HIXSON HS	2689850	White	Fully Paid	First Time	M	2011-2012	Advanced	752
2689850	9	HIXSON HS	2689850	White	Fully Paid	First Time	M	2011-2012	Advanced	752
2689902	9	HIXSON HS	2689902	White	Fully Paid	First Time	M	2011-2012	Below Basic	633
2689902	9	HIXSON HS	2689902	White	Fully Paid	First Time	M	2011-2012	Below Basic	633
2690102	9	HIXSON HS	2690102	White	Fully Paid	First Time	M	2011-2012	Advanced	760
2690102	9	HIXSON HS	2690102	White	Fully Paid	First Time	M	2011-2012	Advanced	760
2690103	9	HIXSON HS	2690103	White	Fully Paid	First Time	M	2011-2012	Basic	702
2690103	9	HIXSON HS	2690103	White	Fully Paid	First Time	M	2011-2012	Basic	702
2690110	9	HIXSON HS	2690110	White	Fully Paid	First Time	F	2011-2012	Advanced	774
2690110	9	HIXSON HS	2690110	White	Fully Paid	First Time	F	2011-2012	Advanced	774
2690154	9	HIXSON HS	2690154	White	Fully Paid	First Time	M	2011-2012	Basic	683
2690154	9	HIXSON HS	2690154	White	Fully Paid	First Time	M	2011-2012	Basic	683
2697521	9	HIXSON HS	2697521	White	Free and Reduced Lunch	First Time	M	2011-2012	Advanced	774
2697521	9	HIXSON HS	2697521	White	Free and Reduced Lunch	First Time	M	2011-2012	Advanced	774
2698726	9	HIXSON HS	2698726	White	Fully Paid	First Time	M	2011-2012	Proficient	744
2698726	9	HIXSON HS	2698726	White	Fully Paid	First Time	M	2011-2012	Proficient	744
2705927	9	HIXSON HS	2705927	White	Free and Reduced Lunch	First Time	F	2011-2012	Proficient	744
2705927	9	HIXSON HS	2705927	White	Free and Reduced Lunch	First Time	F	2011-2012	Proficient	744
2706104	9	HIXSON HS	2706104	White	Fully Paid	First Time	F	2011-2012	Basic	671
2706104	9	HIXSON HS	2706104	White	Fully Paid	First Time	F	2011-2012	Basic	671
2706157	9	HIXSON HS	2706157	Black or Af	Free and Reduced Lunch	First Time	M	2011-2012	Proficient	728
2706157	9	HIXSON HS	2706157	Black or Af	Free and Reduced Lunch	First Time	M	2011-2012	Proficient	728
2706278	9	HIXSON HS	2706278	White	Free and Reduced Lunch	First Time	F	2011-2012	Proficient	744
2706278	9	HIXSON HS	2706278	White	Free and Reduced Lunch	First Time	F	2011-2012	Proficient	744
2706740	9	HIXSON HS	2706740	Black or Af	Free and Reduced Lunch	First Time	F	2011-2012	Proficient	728
2706740	9	HIXSON HS	2706740	Black or Af	Free and Reduced Lunch	First Time	F	2011-2012	Proficient	728
2715177	9	HIXSON HS	2715177	White	Fully Paid	First Time	F	2011-2012	Basic	707
2715177	9	HIXSON HS	2715177	White	Fully Paid	First Time	F	2011-2012	Basic	707
2715179	9	HIXSON HS	2715179	White	Fully Paid	First Time	M	2011-2012	Basic	688

2715179	9	HIXSON HS	2715179	White	Fully Paid	First Time	M	2011-2012	Basic	688
2715259	9	HIXSON HS	2715259	Hispanic L	Free and Reduced Lunch	First Time	F	2011-2012	Advanced	756
2715259	9	HIXSON HS	2715259	Hispanic L	Free and Reduced Lunch	First Time	F	2011-2012	Advanced	756
2715311	9	HIXSON HS	2715311	White	Free and Reduced Lunch	First Time	F	2011-2012	Proficient	724
2715311	9	HIXSON HS	2715311	White	Free and Reduced Lunch	First Time	F	2011-2012	Proficient	724
2716513	9	HIXSON HS	2716513	White	Free and Reduced Lunch	First Time	M	2011-2012	Basic	702
2716513	9	HIXSON HS	2716513	White	Free and Reduced Lunch	First Time	M	2011-2012	Basic	702
2716639	9	HIXSON HS	2716639	White	Fully Paid	First Time	F	2011-2012	Proficient	736
2716639	9	HIXSON HS	2716639	White	Fully Paid	First Time	F	2011-2012	Proficient	736
2716682	9	HIXSON HS	2716682	White	Fully Paid	First Time	M	2011-2012	Advanced	760
2716682	9	HIXSON HS	2716682	White	Fully Paid	First Time	M	2011-2012	Advanced	760
2717539	9	HIXSON HS	2717539	Black or Af	Free and Reduced Lunch	First Time	F	2011-2012	Below Basic	500
2717539	9	HIXSON HS	2717539	Black or Af	Free and Reduced Lunch	First Time	F	2011-2012	Below Basic	500
2717881	9	HIXSON HS	2717881	Hispanic L	Free and Reduced Lunch	First Time	F	2011-2012	Basic	693
2717881	9	HIXSON HS	2717881	Hispanic L	Free and Reduced Lunch	First Time	F	2011-2012	Basic	693
2717883	9	HIXSON HS	2717883	White	Fully Paid	First Time	F	2011-2012	Advanced	764
2717883	9	HIXSON HS	2717883	White	Fully Paid	First Time	F	2011-2012	Advanced	764
2717884	9	HIXSON HS	2717884	Hispanic L	Free and Reduced Lunch	First Time	F	2011-2012	Basic	707
2717884	9	HIXSON HS	2717884	Hispanic L	Free and Reduced Lunch	First Time	F	2011-2012	Basic	707
2717915	9	HIXSON HS	2717915	White	Free and Reduced Lunch	First Time	M	2011-2012	Below Basic	633
2717915	9	HIXSON HS	2717915	White	Free and Reduced Lunch	First Time	M	2011-2012	Below Basic	633
2717970	9	HIXSON HS	2717970	White	Free and Reduced Lunch	First Time	F	2011-2012	Proficient	724
2717970	9	HIXSON HS	2717970	White	Free and Reduced Lunch	First Time	F	2011-2012	Proficient	724
2718057	9	HIXSON HS	2718057	White	Fully Paid	First Time	M	2011-2012	Proficient	744
2718057	9	HIXSON HS	2718057	White	Fully Paid	First Time	M	2011-2012	Proficient	744
2718516	9	HIXSON HS	2718516	Black or Af	Fully Paid	First Time	F	2011-2012	Basic	698
2718516	9	HIXSON HS	2718516	Black or Af	Fully Paid	First Time	F	2011-2012	Basic	698
2719369	9	HIXSON HS	2719369	Black or Af	Free and Reduced Lunch	First Time	M	2011-2012	Basic	707
2719369	9	HIXSON HS	2719369	Black or Af	Free and Reduced Lunch	First Time	M	2011-2012	Basic	707
2719444	9	HIXSON HS	2719444	White	Fully Paid	First Time	F	2011-2012	Basic	688
2719444	9	HIXSON HS	2719444	White	Fully Paid	First Time	F	2011-2012	Basic	688
2720284	9	HIXSON HS	2720284	White	Free and Reduced Lunch	First Time	F	2011-2012	Proficient	732
2720284	9	HIXSON HS	2720284	White	Free and Reduced Lunch	First Time	F	2011-2012	Proficient	732
2882067	9	HIXSON HS	2882067	White	Free and Reduced Lunch	First Time	M	2011-2012	Advanced	785
2882067	9	HIXSON HS	2882067	White	Free and Reduced Lunch	First Time	M	2011-2012	Advanced	785
2974328	9	HIXSON HS	2974328	White	Fully Paid	First Time	F	2011-2012	Proficient	736
2974328	9	HIXSON HS	2974328	White	Fully Paid	First Time	F	2011-2012	Proficient	736
2988333	9	HIXSON HS	2988333	White	Fully Paid	First Time	F	2011-2012	Proficient	732
2988333	9	HIXSON HS	2988333	White	Fully Paid	First Time	F	2011-2012	Proficient	732
3195141	9	HIXSON HS	3195141	Black or Af	Free and Reduced Lunch	First Time	M	2011-2012	Proficient	720
3195141	9	HIXSON HS	3195141	Black or Af	Free and Reduced Lunch	First Time	M	2011-2012	Proficient	720
3195654	9	HIXSON HS	3195654	White	Free and Reduced Lunch	First Time	M	2011-2012	Basic	698
3195654	9	HIXSON HS	3195654	White	Free and Reduced Lunch	First Time	M	2011-2012	Basic	698
3199195	9	HIXSON HS	3199195	Hispanic L	Free and Reduced Lunch	First Time	M	2011-2012	Basic	683
3199195	9	HIXSON HS	3199195	Hispanic L	Free and Reduced Lunch	First Time	M	2011-2012	Basic	683
3327930	9	HIXSON HS	3327930	White	Free and Reduced Lunch	First Time	M	2011-2012	Proficient	724
3327930	9	HIXSON HS	3327930	White	Free and Reduced Lunch	First Time	M	2011-2012	Proficient	724
3357060	9	HIXSON HS	3357060	White	Fully Paid	First Time	M	2011-2012	Proficient	744
3357060	9	HIXSON HS	3357060	White	Fully Paid	First Time	M	2011-2012	Proficient	744
3551993	9	HIXSON HS	3551993	White	Free and Reduced Lunch	First Time	M	2011-2012	Basic	688
3551993	9	HIXSON HS	3551993	White	Free and Reduced Lunch	First Time	M	2011-2012	Basic	688
3938133	9	HIXSON HS	3938133	White	Fully Paid	First Time	M	2011-2012	Advanced	808
3938133	9	HIXSON HS	3938133	White	Fully Paid	First Time	M	2011-2012	Advanced	808
4022933	10	HIXSON HS	4022933	Asian	Fully Paid	First Time	F	2011-2012	Advanced	756
4022933	10	HIXSON HS	4022933	Asian	Fully Paid	First Time	F	2011-2012	Advanced	756
4088452	9	HIXSON HS	4088452	White	Free and Reduced Lunch	First Time	M	2011-2012	Basic	698
4088452	9	HIXSON HS	4088452	White	Free and Reduced Lunch	First Time	M	2011-2012	Basic	698
2382958	9	HIXSON HS	2382958	Black or Af	Fully Paid	First Time	M	2011-2012		
2456287	9	HIXSON HS	2456287	White	Free or Reduced Lunch	First Time	M	2011-2012	Below Basic	642
2456287	9	HIXSON HS	2456287	White	Free or Reduced Lunch	First Time	M	2011-2012	Below Basic	642
2540583	9	HIXSON HS	2540583	White	Fully Paid	Repeat Tal	M	2011-2012	Below Basic	607
2540583	9	HIXSON HS	2540583	White	Fully Paid	Repeat Tal	M	2011-2012	Below Basic	607
2683872	9	HIXSON HS	2683872	Black or Af	Fully Paid	First Time	M	2011-2012	Proficient	736
2683872	9	HIXSON HS	2683872	Black or Af	Fully Paid	First Time	M	2011-2012	Proficient	736
2686119	9	HIXSON HS	2686119	Black or Af	Free or Reduced Lunch	Repeat Tal	M	2011-2012		
2686119	9	HIXSON HS	2686119	Black or Af	Free or Reduced Lunch	Repeat Tal	M	2011-2012		
2690170	9	HIXSON HS	2690170	White	Free or Reduced Lunch	First Time	M	2011-2012	Advanced	752
2690170	9	HIXSON HS	2690170	White	Free or Reduced Lunch	First Time	M	2011-2012	Advanced	752
2705832	9	HIXSON HS	2705832	White	Fully Paid	First Time	M	2011-2012	Proficient	744
2705832	9	HIXSON HS	2705832	White	Fully Paid	First Time	M	2011-2012	Proficient	744
2715659	9	HIXSON HS	2715659	Black or Af	Free or Reduced Lunch	First Time	F	2011-2012	Basic	698
2715659	9	HIXSON HS	2715659	Black or Af	Free or Reduced Lunch	First Time	F	2011-2012	Basic	698
2717309	9	HIXSON HS	2717309	Black or Af	Free or Reduced Lunch	First Time	F	2011-2012	Below Basic	500
2717309	9	HIXSON HS	2717309	Black or Af	Free or Reduced Lunch	First Time	F	2011-2012	Below Basic	500
2718116	9	HIXSON HS	2718116	Hispanic L	Free or Reduced Lunch	First Time	F	2011-2012	Below Basic	621
2718116	9	HIXSON HS	2718116	Hispanic L	Free or Reduced Lunch	First Time	F	2011-2012	Below Basic	621
2988316	9	HIXSON HS	2988316	White	Fully Paid	First Time	M	2011-2012	Basic	702
2988316	9	HIXSON HS	2988316	White	Fully Paid	First Time	M	2011-2012	Basic	702
3858670	9	HIXSON HS	3858670	Asian	Fully Paid	First Time	F	2011-2012	Basic	693
3858670	9	HIXSON HS	3858670	Asian	Fully Paid	First Time	F	2011-2012	Basic	693

3875934	9	HIXSON HS	3875934	Black or Af	Fully Paid	First Time	M	2011-2012	Below Basic	500
3875934	9	HIXSON HS	3875934	Black or Af	Fully Paid	First Time	M	2011-2012	Below Basic	500
4022930	9	HIXSON HS	4022930	White	Free or Reduced Lunch	First Time	M	2011-2012	Proficient	736
4022930	9	HIXSON HS	4022930	White	Free or Reduced Lunch	First Time	M	2011-2012	Proficient	736
4029766	9	HIXSON HS	4029766	White	Fully Paid	First Time	F	2011-2012	Advanced	764
4029766	9	HIXSON HS	4029766	White	Fully Paid	First Time	F	2011-2012	Advanced	764
2467488	10	HIXSON HS	2467488	Hispanic L	Fully Paid	Repeat Tal	F	2011-2012	Basic	683
2467488	10	HIXSON HS	2467488	Hispanic L	Fully Paid	Repeat Tal	F	2011-2012	Basic	683
2475477	10	HIXSON HS	2475477	Black or Af	Free or Reduced Lunch	Repeat Tal	M	2011-2012		
2685148	10	HIXSON HS	2685148	White	Fully Paid	Repeat Tal	F	2011-2012		
2715149	10	HIXSON HS	2715149	Black or Af	Fully Paid	Repeat Tal	M	2011-2012		
2715171	10	HIXSON HS	2715171	Asian	Free or Reduced Lunch	First Time	M	2011-2012	Below Basic	642
2715171	10	HIXSON HS	2715171	Asian	Free or Reduced Lunch	First Time	M	2011-2012	Below Basic	642
2715251	10	HIXSON HS	2715251	White	Free or Reduced Lunch	First Time	F	2011-2012		
2715386	10	HIXSON HS	2715386	White	Free or Reduced Lunch	Repeat Tal	F	2011-2012		
2716866	10	HIXSON HS	2716866	Black or Af	Free or Reduced Lunch	Repeat Tal	M	2011-2012		
2717871	10	HIXSON HS	2717871	White	Fully Paid	Repeat Tal	F	2011-2012		
2720041	10	HIXSON HS	2720041	Black or Af	Free or Reduced Lunch	Repeat Tal	M	2011-2012		
2974964	10	HIXSON HS	2974964	Black or Af	Free or Reduced Lunch	Repeat Tal	M	2011-2012		
3034515	10	HIXSON HS	3034515	White	Fully Paid	Repeat Tal	F	2011-2012		
3125019	10	HIXSON HS	3125019	Hispanic L	Free or Reduced Lunch	Repeat Tal	M	2011-2012		
3227474	10	HIXSON HS	3227474	Black or Af	Fully Paid	Repeat Tal	M	2011-2012	Below Basic	561
3227474	10	HIXSON HS	3227474	Black or Af	Fully Paid	Repeat Tal	M	2011-2012	Below Basic	561
3615290	10	HIXSON HS	3615290	Hispanic L	Fully Paid	Repeat Tal	M	2011-2012		
3802737	10	HIXSON HS	3802737	Hispanic L	Fully Paid	Repeat Tal	F	2011-2012		
2686306	11	HIXSON HS	2686306	Black or Af	Free or Reduced Lunch	Repeat Tal	F	2011-2012		
2689780	11	HIXSON HS	2689780	White	Fully Paid	Repeat Tal	M	2011-2012		

StateID	Grade	School	Teacher	State ID	Race	Code AB	Taker	Gender	Test Year	Level 2012-20	ScaleScore 2012-13
2540522	9	HIXSON HS		2540522	White	Free or Reduced Lunch	First Time Taker	M	2012-2013	Below Basic	502
2683383	9	HIXSON HS		2683383	White	Fully Paid	First Time Taker	M	2012-2013	Basic	696
2684609	9	HIXSON HS		2684609	White	Fully Paid	First Time Taker	F	2012-2013		
2698924	9	HIXSON HS		2698924	White	Free or Reduced Lunch	First Time Taker	M	2012-2013	Below Basic	500
2706394	9	HIXSON HS		2706394	White	Fully Paid	First Time Taker	M	2012-2013	Proficient	750
2706598	9	HIXSON HS		2706598	White	Fully Paid	First Time Taker	F	2012-2013	Basic	667
2717547	9	HIXSON HS		2717547	Black or African American	Free or Reduced Lunch	First Time Taker	M	2012-2013	Proficient	722
2719244	9	HIXSON HS		2719244	White	Fully Paid	First Time Taker	F	2012-2013	Basic	674
2967410	9	HIXSON HS		2967410	White	Fully Paid	First Time Taker	M	2012-2013	Proficient	714
2971854	9	HIXSON HS		2971854	White	Free or Reduced Lunch	First Time Taker	F	2012-2013	Basic	680
2971954	9	HIXSON HS		2971954	White	Fully Paid	First Time Taker	M	2012-2013	Below Basic	500
2972448	9	HIXSON HS		2972448	Black or African American	Free or Reduced Lunch	First Time Taker	M	2012-2013	Basic	674
2972692	9	HIXSON HS		2972692	Black or African American	Free or Reduced Lunch	First Time Taker	F	2012-2013	Basic	667
2973362	9	HIXSON HS		2973362	Black or African American	Free or Reduced Lunch	First Time Taker	M	2012-2013	Advanced	758
2973502	9	HIXSON HS		2973502	White	Fully Paid	First Time Taker	F	2012-2013	Advanced	766
2973530	9	HIXSON HS		2973530	White	Fully Paid	First Time Taker	M	2012-2013	Advanced	762
2973555	9	HIXSON HS		2973555	Black or African American	Free or Reduced Lunch	First Time Taker	M	2012-2013	Basic	659
2973610	9	HIXSON HS		2973610	White	Fully Paid	First Time Taker	M	2012-2013	Basic	705
2973628	9	HIXSON HS		2973628	White	Free or Reduced Lunch	First Time Taker	F	2012-2013	Advanced	758
2973969	9	HIXSON HS		2973969	White	Fully Paid	First Time Taker	M	2012-2013	Below Basic	650
2974274	9	HIXSON HS		2974274	White	Fully Paid	First Time Taker	M	2012-2013	Advanced	762
2974318	9	HIXSON HS		2974318	Black or African American	Free or Reduced Lunch	First Time Taker	M	2012-2013	Basic	696
2974911	9	HIXSON HS		2974911	White	Free or Reduced Lunch	First Time Taker	M	2012-2013	Proficient	730
2974976	9	HIXSON HS		2974976	Black or African American	Free or Reduced Lunch	First Time Taker	F	2012-2013	Proficient	750
2988313	9	HIXSON HS		2988313	White	Fully Paid	First Time Taker	F	2012-2013	Proficient	742
3074100	9	HIXSON HS		3074100	White	Fully Paid	First Time Taker	F	2012-2013	Proficient	738
3074124	9	HIXSON HS		3074124	Black or African American	Free or Reduced Lunch	First Time Taker	F	2012-2013	Below Basic	612
3075149	9	HIXSON HS		3075149	White	Free or Reduced Lunch	First Time Taker	F	2012-2013	Below Basic	561
3103777	9	HIXSON HS		3103777	White	Fully Paid	First Time Taker	M	2012-2013	Proficient	746
3158994	9	HIXSON HS		3158994	Black or African American	Free or Reduced Lunch	First Time Taker	F	2012-2013	Proficient	718
3195138	9	HIXSON HS		3195138	Black or African American	Free or Reduced Lunch	First Time Taker	M	2012-2013	Below Basic	612
3226296	9	HIXSON HS		3226296	White	Fully Paid	First Time Taker	M	2012-2013	Proficient	734
3227478	9	HIXSON HS		3227478	White	Free or Reduced Lunch	First Time Taker	F	2012-2013	Proficient	742
3350932	9	HIXSON HS		3350932	White	Free or Reduced Lunch	First Time Taker	M	2012-2013	Basic	705
3682479	9	HIXSON HS		3682479	White	Fully Paid	First Time Taker	M	2012-2013	Below Basic	561
3745978	9	HIXSON HS		3745978	Black or African American	Free or Reduced Lunch	First Time Taker	M	2012-2013	Basic	680
3753557	9	HIXSON HS		3753557	White	Fully Paid	First Time Taker	F	2012-2013	Proficient	718
3762243	9	HIXSON HS		3762243	Hispanic Latino	Fully Paid	First Time Taker	M	2012-2013	Proficient	718
3789854	9	HIXSON HS		3789854	White	Fully Paid	First Time Taker	F	2012-2013	Proficient	722
3803043	9	HIXSON HS		3803043	White	Fully Paid	First Time Taker	F	2012-2013	Basic	667
3938136	9	HIXSON HS		3938136	White	Free or Reduced Lunch	First Time Taker	M	2012-2013	Basic	680
3938214	9	HIXSON HS		3938214	Hispanic Latino	Free or Reduced Lunch	First Time Taker	M	2012-2013	Proficient	726
3979347	9	HIXSON HS		3979347	White	Free or Reduced Lunch	First Time Taker	F	2012-2013	Below Basic	500
4050685	9	HIXSON HS		4050685	Black or African American	Fully Paid	First Time Taker	M	2012-2013	Below Basic	591
4086301	9	HIXSON HS		4086301	White	Fully Paid	First Time Taker	F	2012-2013	Proficient	726
4151086	9	HIXSON HS		4151086	White	Fully Paid	First Time Taker	M	2012-2013	Proficient	738
2685040	9	HIXSON HS		2685040	White	Free or Reduced Lunch	First Time Taker	M	2012-2013	Basic	686
2686047	9	HIXSON HS		2686047	Black or African American	Free or Reduced Lunch	First Time Taker	M	2012-2013	Below Basic	500
2688687	9	HIXSON HS		2688687	White	Free or Reduced Lunch	First Time Taker	M	2012-2013	Below Basic	500
2689980	9	HIXSON HS		2689980	White	Fully Paid	First Time Taker	M	2012-2013	Below Basic	500
2706392	9	HIXSON HS		2706392	White	Free or Reduced Lunch	First Time Taker	M	2012-2013	Basic	705
2706556	9	HIXSON HS		2706556	American Indian Alsaska Native	Fully Paid	First Time Taker	F	2012-2013	Advanced	775
2715375	9	HIXSON HS		2715375	White	Free or Reduced Lunch	First Time Taker	F	2012-2013	Below Basic	612
2716473	9	HIXSON HS		2716473	White	Fully Paid	First Time Taker	F	2012-2013	Below Basic	561
2717056	9	HIXSON HS		2717056	Black or African American	Free or Reduced Lunch	First Time Taker	F	2012-2013	Below Basic	640
2718014	9	HIXSON HS		2718014	White	Free or Reduced Lunch	First Time Taker	M	2012-2013	Proficient	718
2720957	9	HIXSON HS		2720957	Hispanic Latino	Free or Reduced Lunch	First Time Taker	M	2012-2013	Proficient	750
2882189	9	HIXSON HS		2882189	White	Fully Paid	First Time Taker	M	2012-2013	Proficient	722
2922280	9	HIXSON HS		2922280	White	Free or Reduced Lunch	First Time Taker	F	2012-2013	Proficient	734
2960597	9	HIXSON HS		2960597	Black or African American	Free or Reduced Lunch	First Time Taker	F	2012-2013	Proficient	714
2971963	9	HIXSON HS		2971963	Black or African American	Free or Reduced Lunch	First Time Taker	M	2012-2013		
2972141	9	HIXSON HS		2972141	White	Free or Reduced Lunch	First Time Taker	F	2012-2013	Proficient	726
2972173	9	HIXSON HS		2972173	Black or African American	Free or Reduced Lunch	First Time Taker	F	2012-2013	Basic	691
2973331	9	HIXSON HS		2973331	Black or African American	Free or Reduced Lunch	First Time Taker	M	2012-2013	Basic	659
2973392	9	HIXSON HS		2973392	White	Fully Paid	First Time Taker	F	2012-2013	Proficient	726
2973960	9	HIXSON HS		2973960	White	Fully Paid	First Time Taker	F	2012-2013	Proficient	714
2973999	9	HIXSON HS		2973999	White	Free or Reduced Lunch	First Time Taker	F	2012-2013	Basic	710
2974039	9	HIXSON HS		2974039	Black or African American	Free or Reduced Lunch	First Time Taker	F	2012-2013	Proficient	718
2974231	9	HIXSON HS		2974231	White	Free or Reduced Lunch	First Time Taker	M	2012-2013	Proficient	714
2974294	9	HIXSON HS		2974294	Hispanic Latino	Free or Reduced Lunch	First Time Taker	F	2012-2013	Basic	659
2974300	9	HIXSON HS		2974300	White	Free or Reduced Lunch	First Time Taker	M	2012-2013	Below Basic	561
2974312	9	HIXSON HS		2974312	White	Fully Paid	First Time Taker	F	2012-2013	Basic	686
2974317	9	HIXSON HS		2974317	White	Free or Reduced Lunch	First Time Taker	F	2012-2013	Proficient	734
2974331	9	HIXSON HS		2974331	White	Fully Paid	First Time Taker	F	2012-2013	Below Basic	628
2974441	9	HIXSON HS		2974441	Black or African American	Free or Reduced Lunch	First Time Taker	F	2012-2013	Below Basic	502
2974465	9	HIXSON HS		2974465	Black or African American	Fully Paid	First Time Taker	M	2012-2013	Proficient	718
2974472	9	HIXSON HS		2974472	White	Fully Paid	First Time Taker	M	2012-2013	Basic	710
2974483	9	HIXSON HS		2974483	White	Free or Reduced Lunch	First Time Taker	F	2012-2013	Proficient	750
2974499	9	HIXSON HS		2974499	White	Fully Paid	First Time Taker	M	2012-2013	Advanced	770
2974502	9	HIXSON HS		2974502	White	Free or Reduced Lunch	First Time Taker	F	2012-2013	Proficient	722
2974516	9	HIXSON HS		2974516	White	Free or Reduced Lunch	First Time Taker	F	2012-2013	Basic	674
2974518	9	HIXSON HS		2974518	White	Fully Paid	First Time Taker	M	2012-2013	Proficient	718
2974532	9	HIXSON HS		2974532	Hispanic Latino	Free or Reduced Lunch	First Time Taker	F	2012-2013	Proficient	746
2974584	9	HIXSON HS		2974584	Black or African American	Fully Paid	First Time Taker	M	2012-2013	Below Basic	502
2974585	9	HIXSON HS		2974585	Black or African American	Free or Reduced Lunch	First Time Taker	M	2012-2013	Proficient	722
2974987	9	HIXSON HS		2974987	Black or African American	Free or Reduced Lunch	First Time Taker	M	2012-2013	Proficient	714
2975131	9	HIXSON HS		2975131	White	Fully Paid	First Time Taker	M	2012-2013	Proficient	722



2975212	9	HIXSON HS	2975212	Hispanic Latino	Free or Reduced Lunch	First Time Taker	F	2012-2013	Basic	696
2988229	9	HIXSON HS	2988229	White	Free or Reduced Lunch	First Time Taker	M	2012-2013	Proficient	746
2988231	9	HIXSON HS	2988231	White	Fully Paid	First Time Taker	F	2012-2013	Proficient	750
2988234	9	HIXSON HS	2988234	Hispanic Latino	Free or Reduced Lunch	First Time Taker	F	2012-2013	Proficient	722
2988238	9	HIXSON HS	2988238	Black or African American	Fully Paid	First Time Taker	F	2012-2013	Basic	691
2988250	9	HIXSON HS	2988250	White	Free or Reduced Lunch	First Time Taker	F	2012-2013	Below Basic	500
2988275	9	HIXSON HS	2988275	White	Fully Paid	First Time Taker	M	2012-2013	Proficient	742
2988278	9	HIXSON HS	2988278	White	Fully Paid	First Time Taker	F	2012-2013	Proficient	750
2988284	9	HIXSON HS	2988284	White	Fully Paid	First Time Taker	M	2012-2013	Proficient	730
3074042	9	HIXSON HS	3074042	Hispanic Latino	Free or Reduced Lunch	First Time Taker	F	2012-2013	Proficient	722
3074097	9	HIXSON HS	3074097	White	Fully Paid	First Time Taker	F	2012-2013	Basic	680
3074269	9	HIXSON HS	3074269	Hispanic Latino	Free or Reduced Lunch	First Time Taker	M	2012-2013	Below Basic	640
3103815	9	HIXSON HS	3103815	Black or African American	Free or Reduced Lunch	First Time Taker	F	2012-2013	Below Basic	650
3227257	9	HIXSON HS	3227257	Hispanic Latino	Free or Reduced Lunch	First Time Taker	M	2012-2013	Basic	667
3227261	9	HIXSON HS	3227261	Hispanic Latino	Free or Reduced Lunch	First Time Taker	F	2012-2013	Proficient	746
3227299	9	HIXSON HS	3227299	White	Free or Reduced Lunch	First Time Taker	M	2012-2013	Advanced	766
3239789	9	HIXSON HS	3239789	Hispanic Latino	Fully Paid	First Time Taker	F	2012-2013	Proficient	734
3353452	9	HIXSON HS	3353452	White	Fully Paid	First Time Taker	F	2012-2013	Proficient	734
3436749	9	HIXSON HS	3436749	White	Fully Paid	First Time Taker	F	2012-2013	Basic	705
3488169	9	HIXSON HS	3488169	White	Fully Paid	First Time Taker	F	2012-2013	Advanced	775
3488172	9	HIXSON HS	3488172	White	Free or Reduced Lunch	First Time Taker	F	2012-2013	Basic	691
3551069	9	HIXSON HS	3551069	White	Free or Reduced Lunch	First Time Taker	M	2012-2013	Basic	691
3631926	9	HIXSON HS	3631926	White	Fully Paid	First Time Taker	M	2012-2013	Proficient	738
3682276	9	HIXSON HS	3682276	White	Fully Paid	First Time Taker	M	2012-2013	Proficient	718
3685992	9	HIXSON HS	3685992	White	Fully Paid	First Time Taker	M	2012-2013	Basic	705
3789853	9	HIXSON HS	3789853	White	Fully Paid	First Time Taker	M	2012-2013	Basic	674
3979377	9	HIXSON HS	3979377	Hispanic Latino	Fully Paid	First Time Taker	M	2012-2013	Basic	667
4082523	9	HIXSON HS	4082523	White	Free or Reduced Lunch	First Time Taker	F	2012-2013	Below Basic	502
4097600	9	HIXSON HS	4097600	Hispanic Latino	Fully Paid	First Time Taker	F	2012-2013	Below Basic	650
4141009	9	HIXSON HS	4141009	White	Free or Reduced Lunch	First Time Taker	F	2012-2013	Proficient	714
4202168	9	HIXSON HS	4202168	White	Fully Paid	First Time Taker	M	2012-2013	Basic	705
2720983	10	HIXSON HS	2720983	Black or African American	Fully Paid	First Time Taker	M	2012-2013	Below Basic	500
2224002	9	HIXSON HS	2224002	White	Free or Reduced Lunch	First Time Taker	M	2012-2013	Basic	696
2348059	9	HIXSON HS	2348059	White	Free or Reduced Lunch	First Time Taker	M	2012-2013	Basic	710
2682524	9	HIXSON HS	2682524	White	Fully Paid	First Time Taker	F	2012-2013	Advanced	766
2683110	9	HIXSON HS	2683110	Black or African American	Free or Reduced Lunch	First Time Taker	F	2012-2013	Proficient	714
2683552	9	HIXSON HS	2683552	Black or African American	Free or Reduced Lunch	First Time Taker	M	2012-2013	Below Basic	500
2686377	9	HIXSON HS	2686377	Black or African American	Free or Reduced Lunch	First Time Taker	M	2012-2013	Proficient	730
2686548	9	HIXSON HS	2686548	White	Fully Paid	First Time Taker	M	2012-2013	Below Basic	500
2692668	9	HIXSON HS	2692668	White	Fully Paid	First Time Taker	M	2012-2013	Below Basic	628
2705903	9	HIXSON HS	2705903	White	Free or Reduced Lunch	First Time Taker	M	2012-2013	Below Basic	500
2706342	9	HIXSON HS	2706342	White	Fully Paid	First Time Taker	M	2012-2013	Proficient	714
2706346	9	HIXSON HS	2706346	White	Free or Reduced Lunch	First Time Taker	M	2012-2013	Below Basic	500
2706467	9	HIXSON HS	2706467	White	Free or Reduced Lunch	First Time Taker	F	2012-2013	Below Basic	502
2706473	9	HIXSON HS	2706473	White	Free or Reduced Lunch	First Time Taker	M	2012-2013	Proficient	714
2714139	9	HIXSON HS	2714139	Black or African American	Free or Reduced Lunch	First Time Taker	F	2012-2013	Advanced	766
2715130	9	HIXSON HS	2715130	White	Fully Paid	First Time Taker	M	2012-2013		
2715178	9	HIXSON HS	2715178	White	Free or Reduced Lunch	First Time Taker	M	2012-2013	Proficient	730
2716358	9	HIXSON HS	2716358	White	Fully Paid	First Time Taker	M	2012-2013	Below Basic	500
2716677	9	HIXSON HS	2716677	White	Free or Reduced Lunch	First Time Taker	F	2012-2013	Below Basic	500
2716724	9	HIXSON HS	2716724	White	Free or Reduced Lunch	First Time Taker	F	2012-2013	Proficient	734
2717332	9	HIXSON HS	2717332	Black or African American	Free or Reduced Lunch	First Time Taker	M	2012-2013	Below Basic	500
2717339	9	HIXSON HS	2717339	Black or African American	Free or Reduced Lunch	First Time Taker	M	2012-2013	Basic	710
2717391	9	HIXSON HS	2717391	Black or African American	Free or Reduced Lunch	First Time Taker	M	2012-2013	Basic	674
2717914	9	HIXSON HS	2717914	White	Fully Paid	First Time Taker	M	2012-2013	Basic	701
2719923	9	HIXSON HS	2719923	Black or African American	Free or Reduced Lunch	First Time Taker	M	2012-2013	Below Basic	650
2933936	9	HIXSON HS	2933936	White	Free or Reduced Lunch	First Time Taker	F	2012-2013	Proficient	738
2970631	9	HIXSON HS	2970631	Black or African American	Free or Reduced Lunch	First Time Taker	M	2012-2013	Below Basic	591
2971350	9	HIXSON HS	2971350	White	Free or Reduced Lunch	First Time Taker	F	2012-2013	Below Basic	640
2971410	9	HIXSON HS	2971410	White	Free or Reduced Lunch	First Time Taker	F	2012-2013	Proficient	746
2971426	9	HIXSON HS	2971426	White	Fully Paid	First Time Taker	F	2012-2013	Advanced	770
2971701	9	HIXSON HS	2971701	White	Free or Reduced Lunch	First Time Taker	F	2012-2013	Basic	659
2971842	9	HIXSON HS	2971842	Black or African American	Free or Reduced Lunch	First Time Taker	M	2012-2013	Advanced	770
2972551	9	HIXSON HS	2972551	Black or African American	Free or Reduced Lunch	First Time Taker	M	2012-2013	Proficient	722
2972716	9	HIXSON HS	2972716	Black or African American	Free or Reduced Lunch	First Time Taker	F	2012-2013	Basic	705
2972783	9	HIXSON HS	2972783	White	Fully Paid	First Time Taker	M	2012-2013	Proficient	750
2973318	9	HIXSON HS	2973318	Black or African American	Free or Reduced Lunch	First Time Taker	M	2012-2013	Proficient	750
2973953	9	HIXSON HS	2973953	White	Fully Paid	First Time Taker	F	2012-2013	Advanced	775
2973973	9	HIXSON HS	2973973	White	Free or Reduced Lunch	First Time Taker	M	2012-2013	Proficient	722
2974269	9	HIXSON HS	2974269	White	Fully Paid	First Time Taker	M	2012-2013	Basic	691
2974270	9	HIXSON HS	2974270	White	Fully Paid	First Time Taker	M	2012-2013	Below Basic	640
2974286	9	HIXSON HS	2974286	White	Fully Paid	First Time Taker	F	2012-2013	Proficient	746
2974293	9	HIXSON HS	2974293	White	Free or Reduced Lunch	First Time Taker	M	2012-2013	Proficient	726
2974400	9	HIXSON HS	2974400	Black or African American	Free or Reduced Lunch	First Time Taker	F	2012-2013	Proficient	714
2974480	9	HIXSON HS	2974480	White	Free or Reduced Lunch	First Time Taker	M	2012-2013	Basic	696
2974481	9	HIXSON HS	2974481	White	Fully Paid	First Time Taker	M	2012-2013	Proficient	750
2974486	9	HIXSON HS	2974486	White	Fully Paid	First Time Taker	M	2012-2013	Advanced	785
2974492	9	HIXSON HS	2974492	White	Free or Reduced Lunch	First Time Taker	M	2012-2013	Basic	674
2974495	9	HIXSON HS	2974495	White	Free or Reduced Lunch	First Time Taker	M	2012-2013	Proficient	730
2974498	9	HIXSON HS	2974498	White	Fully Paid	First Time Taker	F	2012-2013	Advanced	758
2974580	9	HIXSON HS	2974580	Black or African American	Free or Reduced Lunch	First Time Taker	F	2012-2013	Basic	674
2974840	9	HIXSON HS	2974840	White	Fully Paid	First Time Taker	M	2012-2013	Basic	691
2974928	9	HIXSON HS	2974928	Asian	Free or Reduced Lunch	First Time Taker	F	2012-2013	Proficient	746
2976697	9	HIXSON HS	2976697	White	Free or Reduced Lunch	First Time Taker	F	2012-2013	Advanced	766
2982862	9	HIXSON HS	2982862	White	Fully Paid	First Time Taker	F	2012-2013	Advanced	762
2988237	9	HIXSON HS	2988237	White	Free or Reduced Lunch	First Time Taker	F	2012-2013	Basic	659
2988243	9	HIXSON HS	2988243	White	Fully Paid	First Time Taker	M	2012-2013	Advanced	762
2988282	9	HIXSON HS	2988282	White	Free or Reduced Lunch	First Time Taker	F	2012-2013	Basic	710

3057569	9	HIXSON HS	[redacted]	3057569	White	Fully Paid	First Time Taker	F	2012-2013	Basic	667
3074600	9	HIXSON HS		3074600	Asian	Fully Paid	First Time Taker	F	2012-2013	Basic	701
3184353	9	HIXSON HS		3184353	Hispanic Latino	Free or Reduced Lunch	First Time Taker	F	2012-2013	Advanced	758
3195139	9	HIXSON HS		3195139	Black or African American	Free or Reduced Lunch	First Time Taker	M	2012-2013	Advanced	754
3348209	9	HIXSON HS		3348209	White	Free or Reduced Lunch	First Time Taker	F	2012-2013	Proficient	734
3437531	9	HIXSON HS		3437531	Hispanic Latino	Free or Reduced Lunch	First Time Taker	F	2012-2013	Proficient	750
3630560	9	HIXSON HS		3630560	White	Fully Paid	First Time Taker	F	2012-2013	Basic	696
3682478	9	HIXSON HS		3682478	White	Fully Paid	First Time Taker	M	2012-2013	Advanced	758
3745972	9	HIXSON HS		3745972	Black or African American	Free or Reduced Lunch	First Time Taker	F	2012-2013	Basic	696
3805339	9	HIXSON HS		3805339	Black or African American	Free or Reduced Lunch	First Time Taker	M	2012-2013	Basic	686
3938700	9	HIXSON HS		3938700	Black or African American	Free or Reduced Lunch	First Time Taker	F	2012-2013	Proficient	718
3943046	9	HIXSON HS		3943046	White	Fully Paid	First Time Taker	M	2012-2013	Below Basic	640
4029771	9	HIXSON HS		4029771	White	Fully Paid	First Time Taker	F	2012-2013	Below Basic	628
4071541	9	HIXSON HS		4071541	White	Free or Reduced Lunch	First Time Taker	F	2012-2013	Below Basic	640
4215881	9	HIXSON HS		4215881	Black or African American	Fully Paid	First Time Taker	F	2012-2013	Proficient	718

Appendix H: Disaggregated Quantitative Data

2011-2012 Descriptive Statistics

Year-Long Algebra I End-of-Course Exam Scores Proficiency Levels

All Numerical Values below indicate percentage of students

	Absent Students	Below Basic 500 – 656	Basic 657 – 711	Proficient 712 – 751	Advanced 752 - 900
Teacher A Class					
	3.4	12.1	40.5	26.7	17.2
Teacher B Class					
	0.0	10.0	34.0	36.0	20.0
Teacher C Class					
	3.7	37.0	22.2	22.2	14.8
Overall Percentages of students enrolled in Algebra I					
	2.1	14.0	35.8	30.0	18.1
Percentage of students proficiency levels by teacher class disaggregated by gender listed in the columns below:					
Teacher A Class					
Males	0.0	19.4	38.7	16.1	25.8
Females	7.4	3.7	42.6	38.9	7.4
Teacher B Class					
Males	0.0	14.3	35.7	28.6	21.4
Females	0.0	4.5	31.8	45.5	18.2
Teacher C Class					
Males	5.8	35.3	11.8	35.3	11.8
Females	0.0	40.0	40.0	0.0	20.0
Overall percentages of students enrolled in Algebra I by gender					
Males	0.7	19.3	34.1	23.7	22.2
Females	3.7	7.4	38.0	38.0	12.9
Percentage of students proficiency levels by teacher class disaggregated by ethnicity listed in columns below:					
Teacher A Class					
White	6.3	6.2	31.3	31.3	25
African-American	0.0	25.0	55.0	15.0	5.0
Hispanic/Latino	0.0	0.0	40.0	60.0	0.0
American Indian/Alaska Native	0.0	0.0	0.0	0.0	100.0

Asian	0.0	0.0	0.0	0.0	0.0
Teacher B Class					
White	0.0	5.9	32.4	38.2	23.5
African-American	0.0	27.2	27.2	45.5	0.0
Hispanic/Latino	0.0	0.0	75.0	0.0	25.0
American Indian/Alaska Native	0.0	0.0	0.0	0.0	0.0
Asian	0.0	0.0	0.0	0.0	100.0
Teacher C Class					
White	0.0	16.7	16.7	33.3	33.3
African-American	11.1	44.4	22.2	22.2	0.0
Hispanic/Latino	0.0	100.0	0.0	0.0	0.0
American Indian/Alaska Native	0.0	0.0	0.0	0.0	0.0
Asian	0.0	50.0	50.0	0.0	0.0
Overall percentages of students enrolled in Algebra I by ethnicity					
White	2.8	6.9	30.6	34.7	25.0
African-American	1.4	28.2	42.2	25.4	2.8
Hispanic/Latino	0.0	10.0	50.0	30.0	10.0
American Indian/Alaska Native	0.0	0.0	0.0	0.0	100.0
Asian	0.0	33.3	33.3	0.0	33.3
Percentage of students proficiency levels by teacher class disaggregated by socioeconomic status listed in columns below:					
Teacher A Class					
Economically Disadvantaged	5.4	16.2	48.6	21.6	8.1
Non-Economically Disadvantaged	0.0	4.8	23.8	38.1	33.3
Teacher B Class					
Economically Disadvantaged	0.0	11.1	33.3	44.4	11.1
Non-Economically Disadvantaged	0.0	8.7	34.8	26.1	30.4

Teacher C Class					
Economically Disadvantaged	0.0	50.0	16.7	16.7	16.7
Non-Economically Disadvantaged	6.7	26.7	26.7	26.7	13.3
Overall percentages of students enrolled in Algebra I by socioeconomic status listed in columns below:					
Economically Disadvantaged	2.9	17.1	40.0	30.0	10.0
Non-Economically Disadvantaged	1.0	9.7	29.1	31.1	29.1

2012-2013 Descriptive Statistics

Year-Long Algebra I End-of-Course Exam Scores Proficiency Levels

All Numerical Values below indicate percentage of students

	Absent Students	Below Basic 500 – 656	Basic 657 – 711	Proficient 712 – 751	Advanced 752 - 900
Teacher A Class					
	1.4	22.5	26.8	31.0	18.3
Teacher B Class					
	1.4	21.9	27.4	43.8	5.5
Teacher C Class					
	2.1	21.7	28.3	37.0	10.9
Overall Percentages of students enrolled in Algebra I					
	1.5	22.1	27.4	37.5	11.5
Percentage of students proficiency levels by teacher class disaggregated by gender listed in the columns below:					
Teacher A Class					
Males	2.6	28.9	26.3	28.9	13.2
Females	0.0	15.2	27.3	33.3	24.2
Teacher B Class					
Males	2.9	20.5	29.4	41.2	5.9
Females	0.0	23.1	25.6	46.2	5.1
Teacher C Class					
Males	0.0	25.9	29.6	33.3	11.1
Females	5.3	15.8	26.3	42.1	10.5
Overall percentages of students enrolled in Algebra I by gender					
Males	2.0	25.3	28.3	34.3	10.1
Females	1.1	18.7	26.4	40.6	13.2
Percentage of students proficiency levels by teacher class disaggregated by ethnicity listed in columns below:					
Teacher A Class					
White	2.1	25.5	25.5	27.7	19.1
African-American	0.0	20.0	30.0	35.0	15.0
Hispanic/Latino	0.0	0.0	0.0	50.0	50.0
American Indian/Alaska Native	n/a	n/a	n/a	n/a	n/a
Asian	0.0	0.0	50.0	50.0	0.0

Teacher B Class					
White	0.0	17.8	28.9	46.7	6.6
African-American	6.7	40.0	20.0	33.3	0.0
Hispanic/Latino	0.0	16.7	33.3	50.0	0.0
American Indian/Alaska Native	0.0	0.0	0.0	0.0	100.00
Asian	n/a	n/a	n/a	n/a	n/a
Teacher C Class					
White	3.1	21.9	25.0	37.5	12.5
African-American	0.0	25.0	41.7	25.0	8.3
Hispanic/Latino	0.0	0.0	0.0	100.0	0.0
American Indian/Alaska Native	n/a	n/a	n/a	n/a	n/a
Asian	n/a	n/a	n/a	n/a	n/a
Overall percentages of students enrolled in Algebra I by ethnicity					
White	1.6	21.8	26.6	37.1	12.9
African-American	2.1	27.7	29.8	31.9	8.5
Hispanic/Latino	0.0	12.5	25.0	56.3	6.2
American Indian/Alaska Native	0.0	0.0	0.0	0.0	100.0
Asian	0.0	0.0	50.0	50.0	0.0
Percentage of students proficiency levels by teacher class disaggregated by socioeconomic status listed in columns below:					
Teacher A Class					
Economically Disadvantaged	0.0	22.2	28.9	37.8	11.1
Non-Economically Disadvantaged	3.8	23.1	23.1	19.2	30.8
Teacher B Class					
Economically Disadvantaged	0.0	18.8	28.1	43.8	9.3
Non-Economically Disadvantaged	2.4	24.4	26.8	43.9	2.4
Teacher C Class					

Economically Disadvantaged	0.0	27.3	36.4	27.3	9.0
Non-Economically Disadvantaged	4.2	16.7	20.8	45.8	12.5
Overall percentages of students enrolled in Algebra I by socioeconomic status listed in columns below:					
Economically Disadvantaged	0.0	24.1	29.6	38.9	7.4
Non-Economically Disadvantaged	2.4	19.5	24.4	36.6	17.1

Appendix I: Data Usage Agreement

Appendix I

DATA USE AGREEMENT

This Data Use Agreement ("Agreement"), effective as of January 13, 2014 is entered into by and between Michael E. Smith and Hamilton County Department of Education. The purpose of this Agreement is to provide Data Recipient with access to a Limited Data Set ("LDS") for use in research in accord with the HIPAA and FERPA Regulations.

1. Definitions. Unless otherwise specified in this Agreement, all capitalized terms used in this Agreement not otherwise defined have the meaning established for purposes of the "HIPAA Regulations" codified at Title 45 parts 160 through 164 of the United States Code of Federal Regulations, as amended from time to time.

2. Preparation of the LDS. Hamilton County Department of Education shall prepare and furnish to Data Recipient a LDS in accord with HIPAA or FERPA Regulations

3. Data Fields in the LDS. No direct identifiers such as names may be included in the Limited Data Set (LDS). In preparing the LDS, Hamilton County Department of Education shall include the **data fields specified as follows**, which are the minimum necessary to accomplish the research (list all data to be provided):

    a. Teacher demographic information

        i. Years of teaching experience

        ii. Highest education degree

        iii. Years of experience with Hamilton County

        iv. Teacher Algebra I end-of-course assessment scores

    b. Student data for 2011-2012 and 2012-2013 academic year including:

        i. Age

        ii. Gender

        iii. Grade level

        iv. First time test taker status

        v. Pass/Fail status for Algebra I course

        vi. Ethnicity

        vii. Economically disadvantaged

        viii. Limited English proficiency

        ix. Students with and without disabilities

        x. Algebra I end-of-course assessment score and proficiency level

4. Responsibilities of Data Recipient. Data Recipient agrees to:

    a. Use or disclose the LDS only as permitted by this Agreement or as required by law;

    b. Use appropriate safeguards to prevent use or disclosure of the LDS other than as permitted by this Agreement or required by law;

    c. Report to Data Provider any use or disclosure of the LDS of which it becomes aware that is not permitted by this Agreement or required by law;

    d. Require any of its subcontractors or agents that receive or have access to the LDS to agree to the same restrictions and conditions on the use and/or disclosure of the LDS that apply to Data Recipient under this Agreement; and

    e. Not use the information in the LDS to identify or contact the individuals who are data subjects.

5. Permitted Uses and Disclosures of the LDS. Data Recipient may use and/or disclose the LDS for its Research activities only.

6. Term and Termination.

    a. Term. The term of this Agreement shall commence as of the Effective Date and shall continue for so long as Data Recipient retains the LDS, unless sooner terminated as set forth in this Agreement.

    b. Termination by Data Recipient. Data Recipient may terminate this agreement at any time by notifying the Data Provider and returning or destroying the LDS.

    c. Termination by Data Provider. Data Provider may terminate this agreement at any time by providing thirty (30) days prior written notice to Data Recipient.

    d. For Breach. Data Provider shall provide written notice to Data Recipient within ten (10) days of any determination that Data Recipient has breached a material term of this Agreement. Data Provider shall afford Data Recipient an opportunity to cure said alleged material breach upon mutually agreeable terms. Failure to agree on mutually agreeable terms for cure within thirty (30) days shall be grounds for the immediate termination of this Agreement by Data Provider.

    e. Effect of Termination. Sections 1, 4, 5, 6(e) and 7 of this Agreement shall survive any termination of this Agreement under subsections c or d.

7. Miscellaneous.

    a. Change in Law. The parties agree to negotiate in good faith to amend this Agreement to comport with changes in federal law that materially alter either or both parties' obligations under this Agreement. Provided however, that if the parties are unable to agree to mutually acceptable amendment(s) by the compliance date of the change in applicable law or regulations, either Party may terminate this Agreement as provided in section 6.

b. Construction of Terms. The terms of this Agreement shall be construed to give effect to applicable federal interpretative guidance regarding the HIPAA Regulations.

c. No Third Party Beneficiaries. Nothing in this Agreement shall confer upon any person other than the parties and their respective successors or assigns, any rights, remedies, obligations, or liabilities whatsoever.

d. Counterparts. This Agreement may be executed in one or more counterparts, each of which shall be deemed an original, but all of which together shall constitute one and the same instrument.

e. Headings. The headings and other captions in this Agreement are for convenience and reference only and shall not be used in interpreting, construing or enforcing any of the provisions of this Agreement.

IN WITNESS WHEREOF, each of the undersigned has caused this Agreement to be duly executed in its name and on its behalf.

DATA PROVIDER

Signed: Kirk Kelly

Print Name: Kirk Kelly

Print Title: Director Accountability and Testing

DATA RECIPIENT

Signed: Michael Smith

Print Name: Michael Smith

Print Title: Graduate Student / Administrator

Appendix J: Institutional Review Board Approval

Dear Mr. Smith,

This email is to notify you that the Institutional Review Board (IRB) has approved your application for the study entitled, "The Art of Teaching: Professional Development to Improve Mathematics."

Your approval # is 05-06-14-0271666. You will need to reference this number in your doctoral study and in any future funding or publication submissions. Also attached to this e-mail is the IRB approved consent form. Please note, if this is already in an on-line format, you will need to update that consent document to include the IRB approval number and expiration date.

Your IRB approval expires on May 5, 2015. One month before this expiration date, you will be sent a Continuing Review Form, which must be submitted if you wish to collect data beyond the approval expiration date.

Your IRB approval is contingent upon your adherence to the exact procedures described in the final version of the IRB application document that has been submitted as of this date. This includes maintaining your current status with the university. Your IRB approval is only valid while you are an actively enrolled student at Walden University. If you need to take a leave of absence or are otherwise unable to remain actively enrolled, your IRB approval is suspended. Absolutely NO participant recruitment or data collection may occur while a student is not actively enrolled.

If you need to make any changes to your research staff or procedures, you must obtain IRB approval by submitting the IRB Request for Change in Procedures Form. You will receive confirmation with a status update of the request within 1 week of submitting the change request form and are not permitted to implement changes prior to receiving approval. Please note that Walden University does not accept responsibility or liability for research activities conducted without the IRB's approval, and the University will not accept or grant credit for student work that fails to comply with the policies and procedures related to ethical standards in research.

When you submitted your IRB application, you made a commitment to communicate both discrete adverse events and general problems to the IRB within 1 week of their occurrence/realization. Failure to do so may result in invalidation of data, loss of academic credit, and/or loss of legal protections otherwise available to the researcher.

Both the Adverse Event Reporting form and Request for Change in Procedures form can be obtained at the IRB section of the Walden web site or by emailing irb@waldenu.edu:

http://researchcenter.waldenu.edu/Application-and-General-Materials.htm

Researchers are expected to keep detailed records of their research activities (i.e., participant log sheets, completed consent forms, etc.) for the same period of time they retain the original data. If, in the future, you require copies of the originally submitted IRB materials, you may request them from Institutional Review Board.

Please note that this letter indicates that the IRB has approved your research. You may not begin the research phase of your doctoral study, however, until you have received the **Notification of Approval to Conduct Research** e-mail. Once you have received this notification by email, you may begin your data collection.

Both students and faculty are invited to provide feedback on this IRB experience at the link below:

http://www.surveymonkey.com/s.aspx?sm=qHBJzkJMUx43pZegKlmdiQ_3d_3d

Sincerely,

Jenny Sherer, M.Ed., CIP

Associate Director

Office of Research Ethics and Compliance

Email: irb@waldenu.edu

Fax: 626-605-0472

Phone: 612-312-1341

Office address for Walden University:

100 Washington Avenue South

Suite 900

Minneapolis, MN 55401

Curriculum Vitae

Michael Smith

michael.smith1906@yahoo.com

Objective

Completion of Ed. D. degree for Administrative Leadership for Teaching and Learning

Teaching Experience

2013-2014 Graduation from the Principal Leadership Academy Cohort 4

2010 - Present Hixson High School Hixson, TN

Positions

Assistant Principal

2007 - 2009 Calvin Donaldson Environmental Science Academy Chattanooga, TN

Positions

5th Grade level Chair

Mathematics teacher

2007 - 2008 Orchard Knob Middle School Chattanooga, TN

Positions

Assistant Principal trainee

Athletic Director

2004 - 2007 Eastlake Academy of Fine Arts Chattanooga, TN

Positions

8th grade team leader

Applied Technology teacher

Foundations II Mathematics

Algebra IA Mathematics

Language Arts

Coaching Experience

2004-2007 Eastlake Academy of Fine Arts Chattanooga, TN

- Head Boys Cross-Country Coach 2004-2005
- Head Boys Track Coach 2004-2005
- Head Boys Basketball Coach 2004-2007
- Assistant Girls Basketball Coach 2004-2007
- Head Boys Football Coach 2006-2007

Education

2011-Present Walden University Minneapolis, MN

- Ed. D. Administrative Leadership for Teaching & Learning

2006-2007 Tennessee Technological University Cookeville, TN

- Educational Specialist Degree in Instructional Leadership

2005-2006 Tennessee Technological University Cookeville, TN

- Master's Degree in Instructional Leadership
- Administrative Licensure

1998-2003 University of Tennessee-Chattanooga Chattanooga, TN

- Bachelor's Degree in Middle School Mathematics
- Highly Qualified teacher of Middle School Mathematics and History
- Completion of the Teachers Education Program.
- Residential Advisor for the Housing Department in the Boling Complex for the freshman residents.
- Member of the Black Student Association.
- Treasurer of the Alpha Phi Alpha Fraternity, Inc. from 1999-2000.

1992-1996 Rhea County High School Evensville, TN

- Captain of the Varsity Basketball Team in 1994-1996.
- Captain of the Varsity Track Team in 1996.

Interests

Basketball, jogging, swimming, pool, bowling, and golf. Experience in Microsoft Word, Excel, Prezi, and PowerPoint.

- 1998 – Present Alpha Phi Alpha Fraternity, Inc. Chattanooga, TN

Volunteer Hours

- Voter's Registration Program for campus students.

Go to High School, Go to College Program to encourage high school students to go to college.

2005 – 2009 Hamilton County Chattanooga, TN

- Gear – Up Representative for preparing students for college.
- S.T.A.R.S. Representative