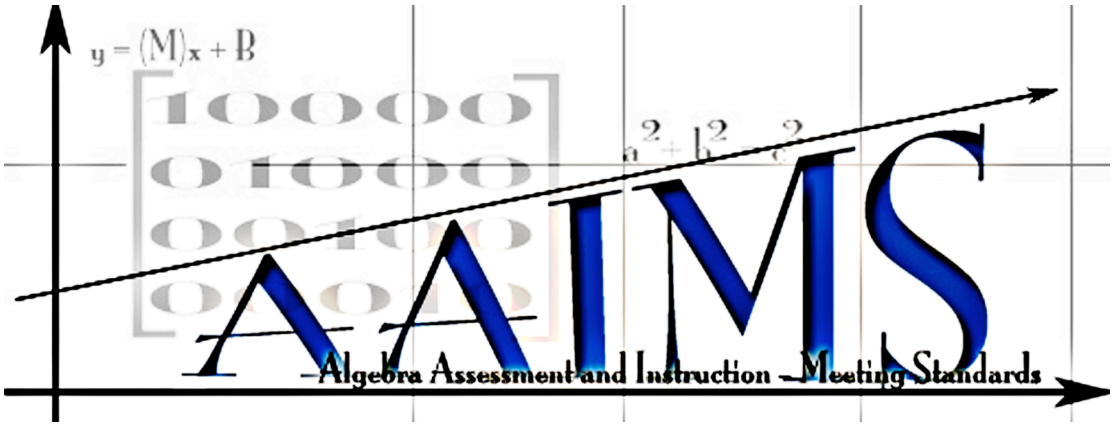
PROJECT AAIMS: ALGEBRA ASSESSMENT AND INSTRUCTION – MEETING STANDARDS



Classroom Observation Data for District C:

Anecdotal Observation Results

Technical Report #9

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Executive Summary

This report documents the results of anecdotal observations conducted in District C during the fall of 2004. It describes the algebra topics addressed during our observations, the expected tasks (class activities), teacher actions, and student actions in three Algebra I classes inthis district. We looked at the algebra curriculum for students in theseAlgebra I classes, the ways that class periods were structured in these classes, the kinds of instructional approaches that were used, and students' responses to these instructional approaches.

All of the students who were enrolled in the Algebra I classes taught by the participating teachers in this study were exposed to the same curriculum. During our observations students with different teachers were working on assignments from the same chapters each time we visited. Most often one algebra teacher was just a few pages ahead of his colleague. Each of the participating teachers from District C structured their beginning algebra class periods in their own unique way; however they spent similar amounts of time engaged in teacher-led instruction. However, whole class instruction was observed in no more than 15% of the observation segments for a class. The most typical instructional approaches were providing individual student assistance and modeling how to solve problems while checking homework or leading a review. Completing assignments was the most typical student action in all three Algebra I classes. Other student actions were dependent on which teacher taught a particular class. For example, students worked in a group much more often in Teacher II's class than they did in either of Teacher I's classes. Off task behavior occurred most often during times when students were completing assignments or working in small groups and teachers were providing individual assistance, monitoring students as they worked independently or with a group, or leading a review. There were no observation segments in any class when off task behavior was the only student action that was observed.

Overview

Access to general education curriculum has become a major emphasis in the education of students with disabilities since the 1997 reauthorization of the Individuals with Disabilities Education Act (IDEA 1997). Access includes having meaningful participation in and sufficient opportunities to make adequate progress toward the district and state standards (Baker, Gersten, & Scanlon, 2002). Although this access does not necessarily require that instruction be delivered in general education settings by general education teachers, a growing proportion of students with disabilities are receiving a large proportion of their math instruction in this manner. One of the objectives of Project AAIMS is to examine the alignment of algebra curriculum, instruction, and assessment for students with and without disabilities. This report summarizes one portion of our efforts to explore this issue.

To determine the extent to which algebra[1] instruction, curriculum, and assessment for students with disabilities is aligned with that of their non-disabled peers, the research activities

[1] Throughout this report any time we refer to algebra, we mean beginning algebra classes such as Algebra 1.

imbedded in Project AAIMS included multiple means of gathering data. Two types of classroom observations were conducted concurrently. The first type used a systematic, momentary time sampling observation system, while the second type used an anecdotal observation form to document aspects of instruction that may not have been captured with the former system. In addition, interviews were conducted with teachers, administrators, and curriculum specialists to gather additional information about curriculum, instruction, and assessment at the district, building, and classroom level. Finally, school district documents related to instruction and assessment were reviewed as an additional source of information. Eventually, all of these sources will be integrated to develop a case study of each of the three participating districts.

This report documents the findings from the anecdotal observations conducted in District C during the fall of 2004. The following research questions are addressed:

1) How similar is the algebra curriculum for students with and without disabilities?
2) How are beginning algebra class periods structured?
3) What kinds of instructional approaches are used to help students learn algebra?
4) How do students with and without disabilities respond to these instructional approaches?

METHOD

Setting and Participants

Setting

District C serves five small towns and a Native American settlement. Approximately 17,700 people reside in the school district. The senior high school has an enrollment of about 450 students. Nearly 15 percent of this population receives special education services, and approximately 44 percent of the district's students are eligible for free and reduced lunch. Twenty-five percent of District C's students have diverse backgrounds in terms of race, culture and ethnicity.

Four terms of math are required for graduation in District C. There are many different math options; therefore, students are not required to take Algebra I to graduate. Nevertheless, a majority of the students take Algebra I at some point during high school. Students also have the option of taking Algebra I during eighth grade in this district. The students who take this class are enrolled in a different building; therefore, they were not included in this study.

This district operates on a block schedule with four 90 minute periods each day. The Algebra I course we observed takes one half of the academic year to complete while addressing the same content that a full year Algebra I course in a district with a traditional schedule would cover. There was one Algebra class at the high school that spread the Algebra I content out over the full academic year; however, this class was taught by a teacher who did not participate in this study.

Participants

The participants in this study included general education teachers and general education students. Two Algebra I teachers from District C consented to participate in this study. Students in these general education teachers' algebra classes were invited to participate in project

activities. Parent and student consent were obtained for the use of individual scores and demographic information that were analyzed for other technical reports. However, since this report focuses on group data gathered during observations of public behavior, our observations were not limited to only those students for whom both parental and student consent were obtained.

Teachers. The two participating general education algebra teachers held initial Iowa teacher's licenses with 7-12 mathematics endorsements. Both had earned Bachelor's degrees and had one year of teaching experience. Two special education teachers also consented to be part of this project, but they did not teach any classes that were observed for this study.

Students. Student participants included youth in the ninth through twelfth grade who were currently enrolled in Algebra I. We hoped to have general education and special education students participate in this study; however, there were no special education students enrolled in the algebra classes taught by the District C teachers who chose to participate in Project AAIMS during Fall 2004. Consequently, we could not compare the algebra curriculum for students with and without disabilities or their responses to different instructional approaches.

Data Collection Procedures

A primary objective of this study was to describe what happened during our observations of beginning algebra classes. Each class was observed three times at the end of the first quarter and beginning of the second quarter of the 2004-2005 academic year. (See Table 1 for the details of the observation schedule.) At least two observers were present for each observation. One observer recorded momentary time sampling data using the SOS-AAIMS instrument (See AAIMS Technical Report #5, Olson & Foegen, 2006) while the other took handwritten notes on an anecdotal recording form. (See Appendix A for a copy of this form.)

Table 1. Observation Schedule

	Alg I Teacher I	Alg I Teacher I	Alg I Teacher II
Obs 1	10/28/2004	10/28/2004	10/28/2004
Obs 2	11/4/2004	11/4/2004	11/4/2004
Obs 3	11/23/2004	11/23/2004	11/23/2004

There were several major differences between the two observation techniques. The first difference was the length of the observation intervals. With the momentary time sampling procedure, the intervals were only 15 seconds, while the anecdotal observation segments were five minutes long. The second difference was the codes that were assigned to the data. Whereas the momentary time sampling procedure used predetermined codes for teacher behavior, student behavior, instructional organization, and task format, the codes for anecdotal observations were developed after the observations occurred. Finally, the researchers could use more than one code for each category of interest (expected tasks, teacher actions, and student actions) for each segment of the anecdotal observations, while only one code could be chosen during the momentary time sampling observations.

The AAIMS Technical Report #5 (Olson & Foegen, 2006) includes the findings from the momentary time sampling observations conducted in District C. This report addresses the findings from the anecdotal observations. As we indicated earlier, the observers used the anecdotal recording form in Appendix A to note what was going on in the beginning algebra classes that were included in this study. This form had observer instructions, a column to record the times for each five minute interval, and a column for anecdotal notes. The instructions directed observers to focus on academic content, teacher actions, student actions, and classroom activity. We determined that ninety minutes was too long for the observers to concentrate without taking some kind of break; therefore, the observers using the anecdotal form would observe the class for 25 minutes, then take a five-minute break, observe for another 25 minutes, take another five-minute break, and then observe for 25 more minutes. These handwritten notes were transcribed into Word files which were printed to start the coding process.

We started developing the coding system for the anecdotal observations as a part of our analysis for AAIMS Technical Report #3 (Olson, Foegen, & Lind, 2007), which used observation data from District A. We began by developing a hierarchical coding system using constant comparison methods (Blank, 2004; Richardson & Richardson, 1995; Tesch, 1990). This iterative process began with the principal investigator, the project coordinator, and a research assistant gathering to discuss possible codes for the data we had collected based on our observation experiences. During this meeting we brainstormed some potential codes for each of three categories of interest: expected task, teacher actions, and student actions. Expected tasks were the activities that the teacher intended during a particular time period. As one might guess, teacher actions were what the teacher did during a segment and student actions were the activities students participated in or the behaviors they displayed during a segment. (See the Project AAIMS Anecdotal Observation Manual in Appendix B for the final set of codes and their definitions.)

After some discussion, we decided that teacher actions and student actions would have at least two levels of coding. First, we would determine whether or not a teacher action was instructional or non-instructional. Then we would note the specific teacher action. For student actions, we first considered whether the action was productive or nonproductive. In other words, did the student actions contribute to their understanding of that day's algebra topic (productive) or not (nonproductive)? Next, we assigned a more specific code reflecting the observed student behavior. With this preliminary list of codes in hand, each member of the research team independently examined the same set of two observation reports to verify that the codes we had brainstormed would work for the data we had collected. We wanted to ensure that our codes would be applicable for both general education and special education classes so we selected one observation report from a general education class and another from a special education class. (District A had separate general education and special education algebra classes.)

At our next meeting we discussed new codes we decided were necessary and changed some of our initial codes. We also determined that we needed an additional level of codes for teacher actions related to teaching new skills or procedures. In addition, we discussed specific intervals where we disagreed about code assignments, which helped us refine the definitions for each of the individual codes. We determined that we could use more than one code for each category of interest for each five-minute segment because it was not possible for the coder to determine the most prevalent behavior during an interval from the observation reports.

We repeated the process with the new codes and decision rules. The level of code agreement among the three members of the research team ranged from 53% to 88% for this round. Once again, we discussed why we disagreed about the codes we assigned to particular text segments in the anecdotal observations. These discussions led to even more precise code definitions. After three rounds of code refinement using different sets of observations, the team concluded that we had sufficient agreement (at least 95%) to begin the final round of coding. The research assistant recoded all of the previous observations using the current list of codes. After coding all of the anecdotal observations for District A, the research assistant began coding the observations for District B and District C to see if any additional codes were necessary. It turned out that we did need to add a few new codes to cover all of the expected tasks, teacher actions, and student actions in all three districts. (See Appendix B for the finalized list.) The project coordinator spot checked each completed set of coded observations.

The final set of codes included eight codes for the expected task. For example, E-WU was used to indicate a warm up activity, E-TLI was used when teacher led instruction was observed, and E-NM was marked when a non math activity occurred (i.e. playing a game of hangman when a class assignment was completed).

As we described earlier, teacher actions were first sorted into instructional and non-instructional categories. There were six teacher actions that were considered instructional. These ranged from checking homework to leading a review or teaching a lesson. The teaching a lesson category was further subdivided into four more specific teacher actions including explaining, modeling, questioning, and providing individual or small group assistance. There were four teacher actions that were deemed non-instructional. These included behavior management, task management, being out of the room, and doing something that was not related to algebra.

The team generated eight codes for productive student actions and three codes for nonproductive student actions. Some examples of productive student actions were asking questions, participating in guided practice activities, and working on assignments during class time. Nonproductive student actions included being off task, working on an assignment or studying for a different class, and being disruptive.

Once the research assistant had hand coded the printed observations, the next step was to transfer the hand coded data into an electronic form for additional analysis. We chose to use a qualitative analysis software program called Qualrus from The Idea Works (www.qualrus.com) to analyze the data from the anecdotal observations. To do this we imported each observation as a separate source document so that its individual character could be maintained even when all the observations for a specific course were grouped together. All of the possible codes were added to the software. The codes for each five-minute segment were entered by highlighting the text for each interval and selecting the appropriate ones for that particular interval. Very often more than one code was assigned to an observation interval to describe the teacher or student behavior during an interval. However, this was not often the case for a segment's expected task. In addition, the research assistant added the topic being addressed during a particular class period as an additional code, if this was noted in the anecdotal record. Any content information was coded as content-topic (e.g., content-percent and proportions or content-calculating slope). Our analysis was completed by using the "statistics" option from the "QTools" menu. This tool

allowed us to see the number of times different codes appeared, as well as the frequencies for any paired combinations of codes.

Results

In all, 130 five-minute segments from nine observations of algebra classes (three each) were analyzed. The database included an average of 43 total segments for a single class across the three observations, with two classes having 45 segments and one class having 40 segments. It is important to note that the findings we report in this document are based on a limited number of observations at the end of the first quarter and the beginning of the second quarter of the academic year. Nevertheless, they do illustrate what curriculum and instruction are like for beginning algebra students in District C.

Algebra I

The three Algebra I classes were taught by two general education algebra teachers. One teacher taught two sections of Algebra I during 1st Period (8:30 – 10:00 AM) and 4th Period (1:54 – 3:24 PM), while the other teacher taught one section of Algebra I during 1st Period. A total of 45 students were enrolled in Algebra I during the semester when these observations were conducted. Algebra I class sizes ranged from twelve students to nineteen students. As we noted before, no students with disabilities were enrolled in the Algebra I classes we observed in District C.

Algebra I Content

All of the Algebra I classes used the same textbook, *Algebra I*, which is published by McDougal Littell (Larson, Boswell, Kanold, & Stiff, 2001). Even though the three Algebra I classes were taught by two different teachers, the students were studying basically the same topics during each of the observations, which occurred on the same days. (See Table 1 for observation schedule.) Our first observation was conducted at the end of the first quarter of the academic year; therefore, we were not surprised to see all of the classes engaged in cumulative reviews of the first five chapters of the book in addition to wrapping up their study of chapter 6, which focuses on solving and graphing linear inequalities. During our second observation all of the classes were learning how to solve linear systems, which is a topic from chapter 7. By the time we made our last observation, the teachers had progressed to solving quadratic equations in chapter 9.

Algebra I Expected Tasks

When we looked across all three of the Algebra I classes, we found that the most prevalent expected task was working on an assignment (41 segments). The next most common expected tasks (teacher-intended activities) were participating in a review (28 segments) and checking homework (27 segments). These were followed by taking a quiz (18 segments) and teacher-led instruction (17 segments). There was no assigned task during ten segments and non-math tasks during five segments. Warm ups were observed during five segments. Table 2 includes the combined expected task data for all the Algebra I classes, as well as the data for each individual class.

The teacher who taught the two sections of Algebra I (Teacher I) used the same kinds of expected tasks during each of our observations for both classes; however, the expected tasks varied on each day we observed. On the day we conducted our first observation checking homework was the first activity. The teacher modeled how to solve problems that the students struggled with as they checked their homework. This task lasted about twenty-five minutes in both classes. Next, we observed twenty-five to fifty minutes of a review activity. (We did not observe all of period 4 on this day because the teacher was scheduled to leave early for an athletic event, which accounts for the variation in the amount of time for the review activity in the different periods.) During our second observation class started with checking homework again, with at least twenty-five minutes devoted to this activity in both classes. Students spent the remainder of the class period taking a quiz (approximately 45 minutes). Students worked on packets for fifteen to twenty minutes during the beginning of our third observations. This was followed by teacher-led instruction for twenty-five to thirty-five minutes and then an assignment for twenty-five to thirty minutes.

Table 2: Expected Tasks Across Beginning Algebra Courses in District A

Expected Task	**All Algebra I** (130 segments)		**Teacher I 1st Period** (45 segments)		**Teacher I 4th Period** (40 segments)		**Teacher II 1st Period** (45 segments)	
	#	%	#	%	#	%	#	%
Assignment	41	32%	13	29%	11	28%	17	38%
Review	28	22%	10	22%	5	13%	13	29%
Teacher Led Instruction	17	13%	6	13%	6	15%	5	11%
Checking Homework	27	21%	13	29%	10	25%	4	9%
Warm up	5	4%	0	0%	0	0%	5	11%
Taking a quiz	18	14%	8	18%	10	25%	0	0%
Non-math task	5	4%	1	2%	2	5%	2	4%
No assigned task	10	8%	5	11%	5	13%	0	0%

In contrast to the variability in expected tasks in Teacher I's classes, the algebra teacher with one section (Teacher II) used a similar structure for most of our observations. He always started with a warm up activity that was usually followed by checking homework, the main activity for day, and then a wrap up activity. The warm up took five minutes during the first two observations and fifteen minutes during the last observation. Checking homework activity took fifteen minutes during the second observation and only five minutes during the third observation. He returned a quiz during the last five minutes of our first observation. During our second and third observations he ended class with a five to ten minute "homework check," which was like a short quiz. The main activity during the first observation was a review, during the second it was working on a worksheet in pairs or trios, and during the third observation the teacher taught a

fifteen minute lesson on square roots, a ten minute lesson on using the graphing calculator, and then he gave the students some time to work on their assignment.

Comparing the percentage of time spent on each expected task for each teacher, we found that Teacher II gave students more time to work on assignments (38% as compared to 29% and 28%) and spent more time engaged in review activities (29% as compared to 22% and 13%). Teacher I and Teacher II used close to the same percentage of time for teacher led instruction (13% and 15% as compared to 11%, respectively). Teacher I allocated considerably more time for checking homework (29% and 25% compared to 9% for Teacher II). Teacher II was the only teacher to use warm up activities at the beginning of his classes. The time spent on non-math tasks was similar for the two teachers (2% and 5% for Teacher I and 4% for Teacher II); however, there was much more time when there was no assigned task during our observations of Teacher I's classes (11% and 13% compared to 0% for Teacher II). The percentages for taking a quiz are a consequence of the dates we were able to observe. We know that Teacher II gives quizzes; however, none were given on any of the days we observed.

Algebra I Teacher Actions

The next category of interest that we will examine is teacher actions. We began by looking at the data for instructional and non-instructional teacher actions (Table 3). When we look at the percentages for District C as a whole, we found that a majority of the time we observed was devoted to instructional teacher actions (60%). During 29% of the observation segments instructional and non-instruction teacher actions were noted, and during 11% of the segments only non-instructional teacher actions were observed.

Table 3: Teacher Actions Across Beginning Algebra Classes in District C

Course	Instructional		Non-instructional		Both		Total	
	Segments	%	Segments	%	Segments	%	Segments	%
All Algebra I	78	60%	14	11%	38	29%	130	100%
Teacher I 1st Period	27	60%	7	16%	11	24%	45	100%
Teacher I 4th Period	21	52%	3	8%	16	40%	40	100%
Teacher II 1st Period	30	67%	4	9%	11	24%	45	100%

We were a little surprised by the differences in percentages for the two classes taught by Teacher I. The percentage of segments when instructional teacher actions were observed was higher in first period (60%) as compared to fourth period (52%). First period also had a higher percentage of segments when there was only non-instructional teacher behavior noted (16% as compared to 8% for fourth period). When we looked at the percentages for the segments when both instructional and non-instructional teacher actions were observed, we found the percentage was considerably higher for fourth period (40% as compared to 24% for first period).

Teacher II engaged in more instructional teacher actions than Teacher I (67%). The percentage of segments with only non-instructional teacher actions was close to that for Teacher I's fourth period class (9%), and the percentage of segments with both kinds of teacher actions was the same as Teacher I's percentage in his first period class (24%).

Our next task was to look more closely at specific teacher actions. When we looked across all three Algebra I classes, we found that the most typical teacher action was teaching a lesson (59%). Academic monitoring was the second most common teacher action (34%), and checking homework was the third most prevalent teacher action (21%). District C teachers were engaged in leading a review during 15% of the segments we observed. The same percentage of time was spent giving directions for a quiz and leading warm up activities (2%). (One teacher gave a quiz during our observations and the other teacher used warm up activities.) Taking a closer look at the teaching a lesson segments, we found that nearly the same percentage of time was devoted to providing individual student assistance (24%) and modeling (23%). Asking questions was the next most common teacher action (9%) along with providing an explanation (8%).

Table 4: Number of Segments for Observed Teacher Actions

Instructional Teacher Actions	**All Algebra I** (130 segments)		**Teacher I 1st Period** (45 segments)		**Teacher I 4th Period** (40 segments)		**Teacher II 1st Period** (45 segments)	
	#	%	#	%	#	%	#	%
Checking homework	27	21%	13	29%	10	25%	4	9%
Conducting a warm up activity	3	2%	0	0%	0	0%	3	7%
Academic monitoring	44	34%	17	38%	12	30%	15	33%
Administering a test/quiz	2	2%	1	2%	1	3%	0	0%
Leading a review	20	15%	6	13%	1	3%	13	29%
Teaching a lesson	76	59%	24	53%	25	63%	27	60%
Modeling	30	23%	14	31%	8	20%	8	18%
Providing individual student assistance	31	24%	5	11%	12	30%	14	31%
Providing an explanation	10	8%	2	4%	6	15%	2	4%
Asking Questions	12	9%	6	13%	1	3%	5	11%
Non-instructional Teacher Actions								
Behavior management	15	12%	3	7%	5	13%	7	16%
Non math activity	23	18%	12	27%	10	25%	1	2%
Task management	30	23%	8	18%	14	35%	8	18%
Out of the room	1	1%	1	2%	0	0%	0	0%

There was considerable agreement between the rankings for the different instructional teacher actions in both of Teacher I's classes, although there was much more variability among the percentage of segments devoted to these activities. The most common instructional teacher action for both the first and fourth period classes was teaching a lesson (53% and 63%,

respectively). The next most typical instructional teacher action was academic monitoring (38% and 30%). Checking homework was the instructional teacher action with the third highest percentage of segments in Teacher I's two algebra classes (29% and 25%) Leading a review was ranked fourth for both classes, with first period having a much higher percentage (13%) than fourth period (3%) due to the shortened observation of fourth period on this day. Administering a test or quiz was also ranked fourth for fourth period at 3%, but it was ranked fifth for first period at 2%.

When we looked at the more specific teacher action codes during segments that were labeled "teaching a lesson" in Teacher I's classes, we found very different percentages for these codes. During the first period class, the most prevalent teacher action was modeling (31%), while it was providing individual student assistance (30%) during fourth period. Asking questions was the second most common teacher action in first period (13%); for fourth period it was modeling (20%). Providing individual student assistance was the third most typical teacher action during Teacher I's first period class (11%), but it was providing an explanation during fourth period (15%). The teacher action that was ranked fourth for first period was providing an explanation (4%), while it was asking questions during fourth period (3%).

The first two instructional teacher actions that were displayed most frequently by Teacher II were the same as those for both of the classes that were taught by Teacher I. Teaching a lesson was the instructional teacher action we observed most often (60% of all observation segments). The second most common teacher action was also the same for Teacher II with academic monitoring observed during 33% of the observation segments. Leading a review was the third most prevalent instructional teacher action (29%) for Teacher II. Checking homework was ranked fourth at 9%, and conducting a warm up activity was fifth at 7%.

A closer examination of the "teaching a lesson" segments for Teacher II revealed rankings that were the same as Teacher I's fourth period class for the two most typical teacher actions. These were providing individual student assistance (31%) and modeling (18%). The third most common "teaching a lesson" teacher action for Teacher I was asking questions (11%), and the fourth most prevalent action was providing an explanation (4%).

Next, we examined non-instructional teacher actions. When all the beginning algebra classes in District C were combined, the non-instructional teacher action observed most frequently was task management (passing out papers, providing non-instructional directions) at 23% of all observation segments. Teachers were engaged in non math activities for 18% of the segments and behavior management during 12% of the segments. There was only one segment when one of the teachers was out of the room during a single class period. When we examined the data for each beginning algebra class we found that each one had a different set of rankings for non-instructional teacher actions. For Teacher I's first period class, non math activities were observed most frequently (27%). Task management was his second most frequent non-instructional teacher action (18%), and behavior management was third at 12%. The only time a teacher was out of the classroom during a lesson was during Teacher I's first period class. In this teacher's fourth period class, the most common non-instructional teacher action was task management (35%), followed by non-math activities (25%), and then behavior management (12%). Teacher II engaged in non-instructional teacher actions much less often than Teacher I. His most frequent non-instructional teacher action was task management (18%). He used

behavior management slightly more often (16%), and was only engaged in a non math activity for one segment (2%).

Algebra I Student Actions

The final category of interest related to the data from the anecdotal observations conducted for this study is student actions. Our analysis of student actions began by classifying these actions as productive or nonproductive. As we described previously, productive student actions are assumed to be related to learning, while nonproductive student actions interfere with learning. Table 5 includes the number and percentages of segments when productive, nonproductive, or both types of student actions were observed. When we examined the combined data for all of the Algebra I classes in District C, we found that students displayed productive student actions during more than half of the observation segments we witnessed (55%). There were very few segments (2%) when only nonproductive student actions were noted. Both productive and nonproductive student actions were observed during 42% of the observation segments.

Table 5: Student Actions Across Beginning Algebra Classes in District C

Course	Productive		Nonproductive		Both		Total*	
	#	%	#	%	#	%	#	%
All Algebra I	72	55%	3	2%	55	42%	130	99%
Teacher I 1st Period	30	67%	1	2%	14	31%	45	100%
Teacher I 4th Period	21	53%	1	3%	18	45%	40	101%
Teacher II 1st Period	21	47%	1	2%	23	51%	45	100%

*NOTE: Due to rounding, some totals may not add up to 100%.

Teacher I's first period class had the greatest percentage of segments when students only displayed productive student actions (67%). The students in Teacher I's fourth period class displayed productive student actions during 53% of the observation segments, while the students in Teacher II's class were engaged in such actions during 47% of the segments. There was one segment in each beginning algebra class when only nonproductive student actions were noted by the observers, which accounted for 2 or 3 percent of the observation segments in a particular class. Both productive and nonproductive student actions were observed in 31% of the segments in Teacher I's first period class, during 45% of Teacher I's fourth period class, and during 51% of Teacher II's class.

Table 6 includes the frequencies and percentages for each of the specific student actions that were displayed in the Algebra I classes in District C. When we look at the combined data for all the classes, we found that the most typical productive student action was completing assignments (46%). (This student action was the most common for all three of the classes we observed.) The second most prevalent productive student action was working with a group (27%). Checking homework was the student action with the third highest percentage (20%). The percentages for answering questions, taking a quiz or test, and listening were very close (15%, 14%, and 13%, respectively). The last three productive student actions were also

clustered together with participating in guided practice activities noted during 8% of the observation segments, asking questions noted during 7% of the segments, and taking notes observed during 5% of the segments.

Table 6: Number of Segments for Observed Student Actions

Productive Student Actions	**All Algebra I** (130 segments)		**Teacher I 1st Period** (45 segments)		**Teacher I 4th Period** (40 segments)		**Teacher II 1st Period** (45 segments)	
	#	%	#	%	#	%	#	%
Checking homework	26	20%	13	29%	9	23%	4	9%
Completing assignments	60	46%	23	51%	15	38%	22	49%
Participating in guided practice activities	11	8%	8	18%	1	3%	2	4%
Working with a group	35	27%	9	20%	5	13%	21	47%
Listening	17	13%	6	13%	6	15%	5	11%
Asking questions	9	7%	2	4%	5	13%	2	4%
Answering questions	20	15%	9	20%	2	5%	9	20%
Taking notes	7	5%	4	9%	2	5%	1	2%
Taking a quiz/test	18	14%	8	18%	10	25%	0	0%
Nonproductive Student Actions								
Off task	48	37%	9	20%	17	43%	22	49%
Non-Math	12	9%	6	13%	4	10%	2	4%
Disruptive	0	0%	0	0%	0	0%	0	0%

As we noted earlier, the most frequent productive student action observed in Algebra I classes in District C was completing assignments. Such behavior was observed in 51% of the observation segments in Teacher I's first period class, during 38% of the segments in his fourth period class, and during 49% of the segments in Teacher II's class.

All nine types of productive student actions were observed in both of classes taught by Teacher I. During the first period class the second most typical productive student behavior was checking homework (29%). This was followed by answering questions and working with a group (both student actions were noted in 20% of the segments). Participating in guided practice activities was observed as frequently as taking a quiz or test (18%). Listening was noted during 13% of the observation segments in this class, and taking notes was noted during 9% of the segments. The least typical student action observed in Teacher I's first period class was asking questions (4%).

During our observations of Teacher I's fourth period class, taking a test or quiz was the second most prevalent productive student action (25%). Checking homework was ranked a very close third at (23%). Listening was observed during 15% of the segments, while observers noted

working with a group and asking questions during 13 % of the segments. Students in fourth period Algebra I were seen answering questions and taking notes during five percent of the segments each. Participating in guided practice activities was the student action with the lowest percentage for this class at 3%.

As we noted earlier, the most typical productive student action in Teacher II's class was completing assignments (49%). Working with a group was ranked a very close second at 47%. The third most common action was answering questions. Listening was observed during 9% of Teacher II's observation segments, while checking homework was noted during 9% of these segments. Participating in guided practice activities and asking questions were both observed during 4% of the observation segments in Teacher II's class. Taking notes was observed during 2% of the segments. The only productive student action we did not observe in Teacher II's class was taking an exam or quiz.

Next, we considered nonproductive student actions. First of all, it is worth noting that there were no segments when disruptive behavior was observed. Nevertheless, off task behavior was observed during at least 37 % of the segments in all three classes. Such behavior was noted during 49% of the segments in Teacher II's Algebra I class, during 37% of the segments in Teacher I's first period class, and during 43% of Teacher II's fourth period class. Students in Teacher I's classes engaged in non-math activities more than twice as often as the students in Teacher II's class (4% as compared to 13% and 10%).

Algebra I Interactions Between Teacher Actions and Student Actions

When we looked at the interactions between teacher actions and student actions, we found somewhat different patterns in each of the three Algebra I classes. (See Appendix C for interaction frequencies of teacher action and student action pairs.) The most frequent teacher action and student action pairing during Teacher I's first period class was academic monitoring as students completed assignments. The next most common combination was academic monitoring when students were working in groups. The teacher modeled how to solve problems most often when students were checking their homework. Students asked and answered the most questions during times when the teacher was modeling the steps needed to complete a particular homework problem. These were also the segments when "listening" was noted most often. The most frequent teaching a lesson behavior while students were completing assignments was providing individual student assistance. When we reviewed the data for non-instructional teacher actions, we found that Teacher I engaged in the most non math activity while students completed assignments during first period. Off task behavior was fairly evenly spread across most teacher behaviors, with such behavior noted in four or fewer segments with any type of teacher action.

During Teacher I's fourth period class the most frequent pairing was providing individual student assistance when students were completing assignments. The next most typical combination was academic monitoring as students took a quiz. Academic monitoring was paired with completing assignments and providing individual student assistance when students were working in small groups were the next most common pairings. One similarity to the first period class was that students were most likely to listen, ask questions, and answer questions during times the teacher modeled how to solve problems while it was time to check homework. The most frequent pairing that included a non-instructional teacher action was task management with

completing assignments. Off task behavior was observed most often when the teacher was managing tasks and providing individual student assistance. (There may have been more similarities between the two classes taught by Teacher I if we did not have a short observation on one of the days we visited this school.)

Teacher II's most frequent combination of teacher action and student action was leading a review when students worked in small groups. The second most prevalent combination was providing individual student assistance while student completed assignments. Academic monitoring and completing assignments was the third most common pairing, while academic monitoring as students worked in small groups was fourth. Students answered the most questions when the teacher was leading a review, and listening was noted most often when the teacher modeled the steps to solve an algebra problem. Task management while students completed assignments was the most frequent pairing of a non-instructional teacher action with a student action. There was a considerable amount of off task behavior when students were completing assignments and the teacher was either providing individual assistance or performing academic monitoring. In addition, off task behavior was displayed during more than half of the segments with the students were working in groups and the teacher was leading a review or providing individual student assistance.

Discussion

As we pointed out at the beginning of this report, this study was designed to answer four research questions:

1) How similar is the algebra curriculum for students with and without disabilities?
2) How are beginning algebra class periods structured?
3) What kinds of instructional approaches are used to help students learn algebra in general and special education?
4) How do students with and without disabilities respond to these instructional approaches?

We address each of these questions in this section of the report, beginning with the curriculum in the beginning algebra courses in District C.

There were no students with IEPs enrolled the Algebra I classes that we observed in District C; therefore we cannot address the first research question with our data from this school district. We did find that different teachers covered the same algebra topics in the same order, but they moved through the text at slightly different rates (with one teacher only a few pages ahead of the other during some of our observations); therefore students with different instructors experience very similar curricula in Algebra I.

Each of the participating teachers from District C structured their beginning algebra class periods in their own unique way. Teacher I used the same expected tasks for both of his classes each day, but the kind of expected tasks changed from day to day. On the other hand, Teacher II used the same basic pattern of expected tasks each day. Both teachers spent similar amounts of time engaged in teacher-led instruction. Teacher I gave students less time to complete

assignments in class because more time was spent checking homework. Teacher I was the only one to give a quiz during our observations. In addition his classes had some segments when there was no assigned task, while this was not the case for Teacher II. Teacher II was the only one who used warm up activities.

More than half of the observation segments in each class had teacher actions that were related to teaching a lesson. However, there was very little whole class instruction of new algebra content during our observations. The most typical instructional approaches that we observed in District C were providing individual student assistance and modeling as the teacher showed how to solve homework problems or reviewed for an exam. Academic monitoring was noted in almost one third of all the segments for each class.

Once again, we cannot address how students with and without disabilities respond to the instructional approaches that were used in District C because there were no students with disabilities in the classes that we observed. Nevertheless, we can report that completing assignments was the most common student action in all three classes with at least 38% of the observation segments in a class devoted to this activity. Beyond this commonality, there were only a few other student actions that received the same rankings or had similar percentages across the three Algebra I classes in District C. We will start with similarities between the classes, and then point out important differences among the classes. Answering questions was the third most prevalent student action in Teacher I's first period class and Teacher II's class. The percentage of segments when this behavior was observed was also the same (20%). The percentages for listening were similar across the three classes with this student action noted during 11% of the segments in Teacher II's class, during 13% of Teacher I's first period segments, and 15% of his fourth period segments. For all classes, taking notes was ranked last or second to last for all three classes. Differences in percentages and rankings for some student actions were dependent on which teacher students had. Students in Teacher II's Algebra I class worked in groups much more often than students in either of Teacher I's classes (47% as compared to 20% and 13%). These same students checked homework for much less time than their peers in the other teacher's classes (9% as compared to 29% and 23%).

On the whole students responded well to the instructional approaches that District C Algebra I teachers used. Every segment when off task behavior was observed was accompanied with productive student actions in every class. For the most part, off task behavior occurred when students were completing assignments or working in small groups and the teacher was providing individual student assistance, performing academic monitoring, or leading a review.

Student achievement data will be reviewed as a part of the next phase of this study, which will be the creation of a case study of beginning algebra curriculum and instruction in District C. This case study will be based on the findings from this report, the data from Technical Report #5 (Olson & Foegen, 2006), as well as interviews with district personnel and district documents.

References

Baker, S., Gersten, R., & Scanlon, D. (2002). Procedural Facilitators and Cognitive Strategies: Tool for Unraveling the Mysteries of Comprehension and the Writing Process, and for Providing Meaningful Access to the General Curriculum. *Learning Disabilities: Research and Practice, 17*, 65-77.

Larson, R., Boswell, L., Kanold, T., & Stiff, L. (2001). *Algebra I*. McDougal Littell: Evanston.

Olson, J. & Foegen, A. (2006). *Classroom Observation Data for District C: Momentary Time Sampling (Technical Report 5)*. Project AAIMS, Department of Curriculum an Instruction, Iowa State University, Ames, Iowa.

Olson, J., Foegen, A., & Lind, L. (2007). *Classroom Observation Data for District A: Anecdotal observation results (Technical Report 3)*. Project AAIMS, Department of Curriculum an Instruction, Iowa State University, Ames, Iowa.

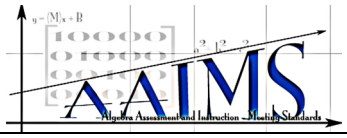
Richards, T. & Richards, L. (1995). Using Hierarchical Categories in Qualitative Data Analysis. In U. Kelle (Ed.), *Computer-Aided Qualitative Data Analysis: Theory, Methods and Practice* (pp. 80-95). Thousand Oaks, CA: Sage.

Qualrus: The Intelligent Qualitative Analysis Program [Computer software]. (2002). Columbia, Missouri: Idea Works.

Tesch, R. (1990). *Qualitative Research: Analysis Types and Software Tools*. New York: Falmer Press.

Appendix A

Project AAIMS Anecdotal Recording Form



Teacher _____ Period ____ Date _____ IEP LA

Project AAIMS Anecdotal Recording Form

Observer instructions: As you observe the classroom you will need to focus on the academic content, the teacher's actions, the student's actions, and the classroom activity. Your anecdotal notes should focus on what type of activity is occurring in the classroom (direct instruction, cooperative groups, etc.) as well as the actions of both the students and the teacher.
Please be very specific in your recording of your anecdotal notes

Five-minute interval	Anecdotal notes

Appendix B

Anecdotal Observation Coding Handbook

Project AAIMS
Anecdotal Observation Coding Handbook

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May 2005

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Project AAIMS
Anecdotal Observation Coding Handbook
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Code Generation

Codes for Project AAIMS anecdotal observations were developed through an iterative process that began with principal investigator, the project coordinator, and a research assistant meeting to discuss possible codes for the data we had collected. During this meeting we brainstormed some potential codes for each of three categories of interest including: expected task, teacher actions, and student actions. We also decided to also note the particular algebra topic or topics that were addressed during an observation. With this preliminary list of codes in hand, each member of our research team independently examined the same set of two observation reports to verify that the codes we had brainstormed would work for the data we had collected. We wanted to ensure that our codes would be applicable for both general education and special education classes so we selected one observation report from a general education class and the other from a special education class. At our next meeting we discussed new codes we decided were necessary and changed some of our initial codes. In addition, we discussed specific segments where we disagreed about code assignments, which helped us refine the definitions for each of the individual codes. We determined that we could use more than one code for each category of interest for each five-minute interval because it was not possible for the coder to determine the most prevalent behavior during an interval from the observation reports that were completed by different observers. After three rounds of code refinement using different sets of observations, the team concluded that we had sufficient agreement (95%) to begin the final round of coding. The research assistant recoded all of the previous observations with the finalized list of codes. This work was spot checked by the project coordinator.

Coding begins by noting the content being addressed during the class period that was observed. Next, the researcher considers the expected task, the teacher's actions, and the students' actions for each five-minute observation segment.

Expected Tasks

The first step is to identify the expected task for the observation interval. Identify the type of activity or activities the teacher expects to occur during a particular five-minute interval. There are eight possible expected tasks. These include warm up activities, teacher led instruction, checking homework, reviewing, working on an assignment, participating in group work, or no assigned task. Code all the expected tasks that are evident from the observation notes. If available, be sure to note the source of an assignment such as textbook or worksheet.

Expected Task Codes:

- warm ups (**E-WU**)
- teacher led instruction (**E-TLI**)
- checking homework (**E-CH**)
- assignment (**E-A**)
- test/quiz (**E-TQ**)
- non-math (**E-NM**)
- no assigned task (**E-NAT**)

Teachers' Actions

As you examine each observation interval decide if the noted teacher actions are instructional or non-instructional. In other words, do the actions promote algebra learning or not? Once you have decided if a teacher action is instructional or non-instructional, note this code. Then, determine what category of instructional or non-instructional actions is being demonstrated and record the appropriate code.

Instructional activities include conducting warm-ups, checking homework, academic monitoring, administering a test or quiz, leading a review, or teaching a lesson. If the teacher is teaching a lesson, list an additional code such as questioning, modeling, or explaining content if these can be distinguished. Providing individual or group assistance is also considered "teaching a lesson."

Non-instructional teacher actions are subdivided into task management (general non-instructional classroom tasks), behavior management, being out of the room, or non-math content.

Teacher's Action Codes:

<u>Instructional</u>
- conducting warm-ups (**T-WU)**
- checking homework (**T-CH**)
- academic monitoring (**T-AM**)
- administering a test/quiz (**T-TQ**)
- leading a review (**T-LR**)
- teaching a lesson (**T-TL**)
    - questioning (**T-Q**)
    - modeling (**T-M**)
    - explaining content (**T-E**)
    - providing individual/ small group assistance (**T-ISA**)

<u>Non-Instructional</u>
- task management (**T-TM**)
- behavior management (**T-BM**)
- out of the room (**T-OR**)
- non-math content (**T-NM**)

Students' Actions

The students' actions are first classified as productive or nonproductive behaviors and then further subdivided just as the teacher's actions were. Productive student actions include: guided practice, verbally answering questions, asking questions, seatwork (working on an assignment), group work, checking homework, or listening (use only when this seems to be the predominant student activity during a five-minute interval). Nonproductive student actions can be subdivided into disruptive, off task, or non-math. As with the other categories, more than one label can be used during an observation segment.

Students' Action Codes:

Productive	vs.	Nonproductive
- guided practice (**S-GP**)		- disruptive (**S-D**)
- verbally answering questions (**S-VQ**)		- off task (**S-OFF**)
- asking questions (**S-AQ**)		- on task non-math (**S-NM**)
- seatwork (**S-S**)		
- taking a test/quiz (**S-TQ**)		
- checking homework (**S-CH**)		
- group work (**S-GW**)		
- listening (**S-L**)		
- taking notes (**S-TN**)		

Glossary

Expected Tasks

E-A (assignment) – homework or class work given to the students by the teacher to complete.

E-CH (checking homework) - correcting a completed assignment.

E-NAT (no assigned task) – students are not given an expected task.

E-NM (non-math) – a non-algebra related task is assigned such as a game or reading the newspaper when an assignment is finished.

E-R (review) – students are going over previously learned or corrected material.

E-TLI (teacher led instruction) – teacher is teaching a lesson.

E-TQ (test/quiz) – students are taking a test or quiz.

E-WU (warm ups) – students are solving puzzles to prepare their minds for a lesson.

Teacher Actions

T-AM (academic monitoring) - teacher is walking around the room answering students' questions, listening to their responses, and/or watching as they complete their work.

T-BM (behavior management) - teacher's actions designed to maintain classroom order by redirecting extinguishing negative behavior or .

T-CH (correcting homework) – teacher is helping students check homework as a class or grading individual student papers.

T-E (explaining content) - teacher's verbal explanation of material during a lesson.

T-ISA (individual/ small group assistance) - teacher is providing personal instruction to an individual or portion of the class.

T-LR (leading a review) – teacher is reviewing previously covered or corrected material.

T-TM (task management) - teacher performs activities that are non-instructional yet related to learning math such as preparing for a lesson, passing out papers, or cleaning up materials.

T-M (modeling) - teacher demonstrates how to solve particular problems or concepts during a lesson.

T-NM (non-math content) – teacher is involved in non-math related ideas or activities such as discussing the day's current events, facilitating a non-math game, attending to mechanical errors, or speaking with visitors at the door or on the phone.

T-OR (out of the room) – teacher is not in the classroom.

T-Q (questioning) – type of teaching strategy in which the teacher asks students questions during a lesson to assess their understanding of the material.

T-TL (teaching a lesson) – teacher is presenting a math related lesson.

T-TQ (administer test/quiz) – teacher is explaining a test or quiz for students to complete during class.

T-WU (conducting warm-ups) – teacher is discussing or correcting warm-up activities.

Student Actions

S-AQ (asking questions) – students are asking the teacher math related questions during a lesson.

S-CH (checking homework) – students are correcting assignments

S-D (disruptive) - any out of control behavior, such as throwing objects, fighting, or yelling by a student, that interrupts another student from the assigned task.

S-GP (guided practice) – students solve problems during a lesson with feedback and direction from the teacher during a lesson either at their seats or on the boards.

S-GW (group work) – students are on task working with other peers to complete the expected task.

S-L (listening) – the students are attentive to instruction. Use this only if no other on-task student behavior is specified.

S-NM (on task non-math) – students are performing an expected task that is not math related without distracting others. These tasks include waiting quietly for class to begin, working on other subjects if allowed to do so, or playing an approved non-algebraic game.

S-OFF (off task) – students are not participating in the expected task.

S-S (seatwork) – students are working at their desk on an assignment, warm up, or other assigned task.

S-TN (taking notes) – students are taking notes

S-TQ (taking a test/quiz) – students are taking a test or quiz.

S-VQ (verbally answering questions) – students are responding to math related questions or verbally interact with the teacher during a lesson.

Appendix C

Interaction Frequencies of Teacher Action and Student Action Pairs

Teacher Action and Student Action Codes

Teacher Actions

TI – instructional
T-CH – correcting homework
T-WU – conducting warm-ups
T-AM – academic monitoring
T-TQ – administer test/quiz
T-LR – leading a review
T-TL – teaching a lesson
T-M – modeling
T-ISA – individual/ small group assistance
T-E – explaining content
T-Q – questioning

TN – non-instructional
T-BM – behavior management
T-NM – non-math content
T-TM – task management
T-OR – out of the room

Student Actions

PSB – productive student behavior
S-CH – checking homework
S-S – completing an assignment
S-GP – guided practice
S-GW – group work
S-L – listening
S-AQ – asking questions
S-VQ – verbally answering questions
S-TN – taking notes
S-TQ – taking a test/quiz

NSB – nonproductive student behavior
S-OFF – off task
S-NM – on task non-math

Interactions Between Teacher Actions and Student Actions for Teacher I First Period

	TI	TCH	TWU	TAM	TTQ	TLR	TTL	TM	TISA	TE	TQ	TN	TBM	TNM	TTM	TOR
PSB	37	13		16	1	6	24	14	5	2	6	18	3	8	8	1
SCH	13	13				3	12	7			5					
SS	17			14		3	6	2	5			13	2	10	6	
SGP	8	3		3		2		5			1	1	1			
SGW	9			8		3	1		1			2	1		1	
SL	6	5				1	6	3			3	2	1			1
SAQ	2	2				1		2								
SVQ	9	6		1		2	8	5		2	3	1		1		
STN	4			4		2							1			
STQ	5			4	1							5		3	3	
NSB	13	3		5		1	12	5	5		3	9	2	6	2	1
SOFF	8	2		4		1	8	4	3		2	5	2	3	1	
SNM	5	1		1			4	1	2		1	5		3	2	1

Interactions Between Teacher Actions and Student Actions for Teacher I Fourth Period

	TI	TCH	TWU	TAM	TTQ	TLR	TTL	TM	TISA	TE	TQ	TN	TBM	TNM	TTM	TOR
PSB	37	9		12	1	1	24	8	12	5	1	18	5	9	13	
SCH	8	9					5	3		2	1	4	1	3	2	
SS	14			4		1	12	2	10	2		9	2	4	7	
SGP	1						1		4	1						
SGW	5			1		1	4			1		2	1		2	
SL	6						6	3		2		3	3	2	1	
SAQ	5	3					4	2		1	1	3	2	1	2	
SVQ	2	2					2	1			1	1			1	
STN	2			1			1			1		1			1	
STQ	9			9	1		1		1			5		2	5	
NSB	16	2		4	1	1	12	2	7	3		13	5	7	10	
SOFF	16	1		4	1	1	11	2	7	2		11	5	5	8	
SNM	2	1		1			2			1		3	1	3	2	

Interactions Between Teacher Actions and Student Actions for Teacher II First Period

	TI	TCH	TWU	TAM	TTQ	TLR	TTL	TM	TISA	TE	TQ	TN	TBM	TNM	TTM	TOR
PSB	41	4	3	15		13	27	8	14	2	5	14	7	1	6	
SCH	4	4					4	2			2					
SS	19		3	10			12		12			9	3	1	6	
SGP	2		1	1												
SGW	21			8		13	13	3	7	1	2	6	5		1	
SL	5						5	3	2	1	1	1	1			
SAQ	2					1	1	1				1			1	
SVQ	9	2		2		5	8	2		1	4	1			1	
STN	1						1	1								
STQ																
NSB	22			10		5	18	4	14	1	1	11	6		5	
SOFF	21			9		5	18	4	14	1	1	9	6		3	
SNM	1			1								2			2	