Analysis of High School Achievement and College Readiness in Mathematics for Students in Illinois

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By

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Abstract:

This College Readiness project involved the collection and analysis of student data from eleven high schools in Illinois. The project included student data from the graduating classes of 2002, 2003, 2004, and 2005 from urban, suburban and rural high schools in Illinois. School districts were asked to provide mathematics' scores and achievement levels for students on the 8th grade ISAT and 11th grade PSAE, ACT, and Work-keys exams. The districts were also asked to list the mathematics courses taken by each student between 8th and 12th grade. This data allowed for explorations of connections between student coursework in mathematics and level of college readiness for those students. The relationships between achievement on the standardized tests, coursework and college readiness were also investigated. The data revealed a strong relationship between advanced mathematics courses and college readiness as well as a connection between 8th grade ISAT achievement levels and 11th grade success on the PSAE. The study also discovered that although the data collected for this project was valuable for school districts and policy-makers, few schools had the complete set of data readily available for investigation.

Background and Purpose of Study:

"Improving college readiness is crucial to the development of a diverse and talented labor force that is able to maintain and increase U.S. economic competitiveness throughout the world" (ACT, p.1). Yet, many students graduate from high school without the essential skills needed to succeed in college. In particular, many students enter college mathematically unprepared for collegiate level coursework. In fact, just 40% of ACT test-takers are ready for their first course in College Algebra (ACT, p.2). This data is provided by ACT research published in the 2005 article *Crisis at the Core*. As part of this study, the ACT organization established a score of 22 or higher on the mathematics portion of the ACT exam as the benchmark for college readiness in mathematics. This score predicts a higher probability of success for students in their first-year college mathematics course. Using this 22 benchmark, the *Crisis at the Core* document discusses the result of a national study comparing high school coursework and college readiness. The study had 3 primary conclusions:

1. Most students are not ready for college level mathematics when leaving high school.
2. The more math courses a student takes in high school, the more prepared they are for college.
3. In particular, every course taken beyond Advanced Algebra in high school results in greater preparation for college mathematics.

These results can be seen in the chart in Figure 1 which depicts the percentage of students ranked as college ready in mathematics as compared to the amount of high school coursework completed.

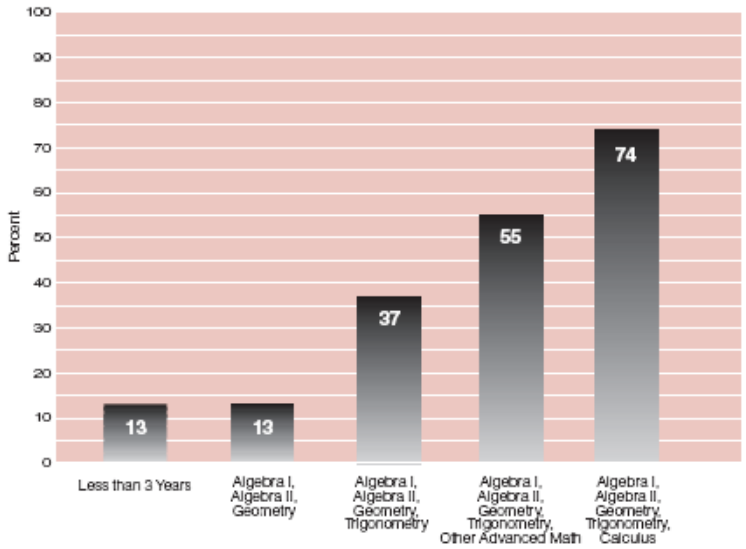

Figure 21: 2004 ACT-tested High School Graduates Meeting College Algebra Benchmark by Mathematics Course Sequence

Results such as these have prompted the ACT organization to call for increased requirements in high school mathematics courses across the nation. Recently, ACT has also released the data for the 2005 exam which showed similar results. Nationally, only 41% of test-takers in 2005 were considered college-ready and, in Illinois, only 38 percent had reached this level (AP, 2005). However, this data is based on all test-takers which, in Illinois, includes 100% of the juniors as well as students in other grades who elected to take the exam. Illinois and Colorado are the only states which require juniors to take the ACT exam and this fact needs to be considered when comparing state and national data in this area.

The results seen in the *Crisis at the Core* report are also supported by freshman data collected by an Illinois public regional state university. For the past four years, the percentage of entering freshman scoring a 22 or higher on the mathematics portion of the ACT has ranged from 45.3% to 49.4%. This indicates that less than 50% of the freshmen entering this college were actually college ready in mathematics. This is consistent with the schools' enrollment in remedial mathematics classes where typically over 50% of all entering freshman at this University register for a remedial mathematics courses as their first mathematics experience at the college level. These state results closely resemble national figures that indicate "In the fall 2000, 63% of public 2-year institutions, 38% of

public 4-year institutions, and 17% of private 4-yearinstituions reported that their students averaged a year or more of remedial course-taking" (NCES, 2004). This lack of preparation corresponds to a high attrition rate at the national college level where only six out of every ten students, on average, obtain a bachelors degree within 6 years (McClanahan, p.1). These figures are unacceptable in a global economy which requires a college degree for increasingly more jobs each year.

Such national results and data suggest a need for more advanced mathematics coursework in high school and a greater percentage of secondary graduates who are college ready. The purpose of this study is to provide a local analysis of the relationship between coursework and college readiness and to possibly extend the national trend seen in the ACT report to the local and state level in Illinois. This study collected and analyzed data with the intent of answering the following research questions:

1. In Illinois, what is the relationship between high school coursework in mathematics and the level of college-readiness?
2. In Illinois, what is the relationship between student achievement levels on state standards (as measured by the ISAT and PSAE) and the level of college readiness of these students?

The purpose of this study is not to provide a comprehensive overview of all students in Illinois but to analyze a relatively small sample of students to determine relationships, connections, and information that may be further investigated statewide in future studies. The data from this study is used to begin investigation on the relationship between student coursework in mathematics, achievement on standardized tests, and college readiness. In addition, the study provides feedback on the type and value of information collected with the intention of providing a preliminary research model that could later be refined and implemented by other schools within the state of Illinois.

Methodology:

The methodology used for this study built initially upon previous work done by school districts within the McDonough/Hancock Regional Office of Education #26. This ROE had already taken active steps to study the articulation from high school to college in the 6 year project entitled *P-16 Mathematics Experience for ALL Students* which was completed in 2003. For the College Readiness project, counselors from each of the high schools within this ROE were asked to provide data on all students in their graduating classes from 2005, 2004, 2003, and 2002. The data requested included information on 8th grade ISAT scores, secondary math coursework, and PSAE and ACT scores as well as certain demographic information for each student. The information received from this primarily rural area was pooled with data collected from representative urban and suburban districts in the state. In total, data was collected from 11 high schools and 3187 students.

This data was analyzed by school, by year, and as a complete group. The data was sorted according to various fields to analyze the impact of mathematics coursework on standardized tests and college readiness. Consistent with the ACT report, college readiness for mathematics in this study was measured by an ACT score of 22 or higher on the mathematics portion of the exam. Established state cut-off scores for the ISAT and PSAE were also used to compare and relate the data. School catalogs were referenced to determine the appropriate level of the many differently titled mathematics courses submitted by the various schools and analysis was conducted on mathematics course level completed and general achievement levels.

Individual district results as well as whole-group comparisons were analyzed and reported. General and district-specific results were shared with the faculty and administrators of many schools in the study and their feedback was collected. School faculty and staff were also asked to discuss the general availability of the data collected in this study and to comment on the important features of the resulting information. These responses were used to determine the general accessibility and value of the data collection and analysis process used in this college-readiness study.

Outcomes:

According to the state 2004 assessment results, about 53% of all juniors in Illinois have met or exceeded state standards in mathematics over the past 4 years (ISBE, p.16). For the students in this study, about 48% of all juniors have met or exceeded state standards in mathematics. Yet, only 28% of the juniors in this study were considered college ready in mathematics. The year by year results are displayed in Figure 2 below. The chart in Figure 2, like others in this document, lists the graduation year for each class.

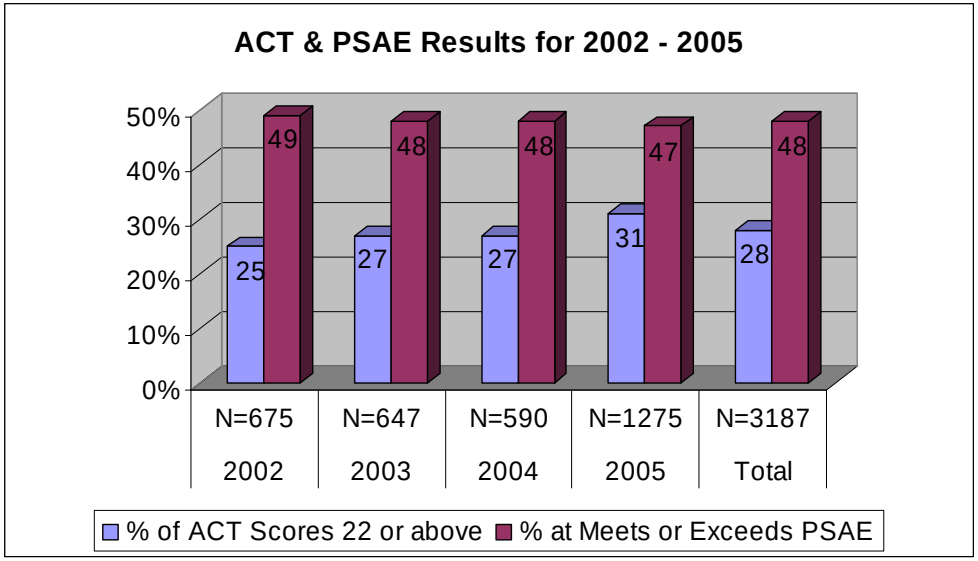

Figure 2: Achievement levels for juniors in this study.

Thus, 2005 would represent those students who graduated in 2005 but who, as juniors, took the PSAE in 2004. Though the results for all 11 schools as a group were consistent across the years, there were substantial fluctuations in achievement levels for some school districts every year. For example, the 2004 graduating class of one school had 64% of their student body meet or exceed state standards and 42% of their students achieve college readiness status. However, the following class had only 17% in each of those categories. Such dramatic changes were not uncommon in the data collected from the small rural schools involved in this study.

As displayed in Figure 2, only 28% of students in this study were considered college ready in mathematics according to the ACT benchmark score of 22. This value was significantly lower than the national rate of 40% documented by ACT. However, in Illinois, all juniors must take this exam whereas the national figures are based primarily upon college-bound students who elect to take the ACT. It is also important to realize that, as juniors, these Illinois students still have one more year to become ready for college and many would probably try to do so by completing another mathematics course during their senior year. Because of these two factors, we should not expect Illinois college readiness levels to match those of the nation. However, we should expect the Illinois levels to improve as state standards are achieved.

To better understand the relationship between Illinois state standards and college readiness, this project looked specifically at the college readiness levels of those students who did meet or exceed state standards on the PSAE. This data is broken down by years in Figure 3. Overall, nearly 59% of those students who met or exceeded state standards in mathematics were also college ready in mathematics as juniors. This percentage far exceeds the national college readiness rate of 40% and demonstrates that the state of

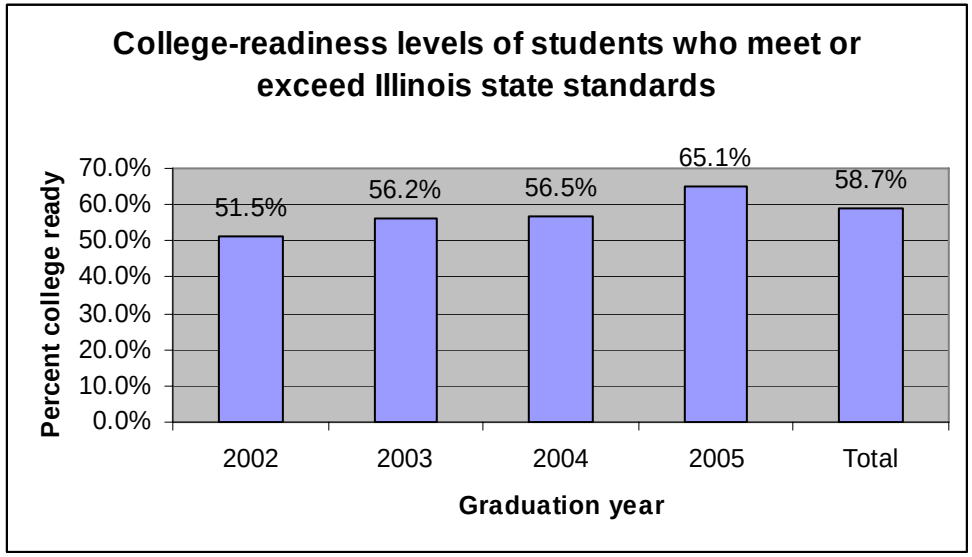

Figure 3: Comparison of state standards and college-readiness.

Illinois has set high standards for its students and that the achievement of these high standards better prepares these students for college. The 59% rate of college readiness for these students is even more impressive since, as juniors, they each have the opportunity to take another mathematics course their senior year and increase their likelihood of becoming college ready by the end of their secondary education. In general, the data reveals *that juniors in Illinois who meet state standards in mathematics are more likely to be college ready than their general national peers.*

The data in this study also reveals that *the number of advanced mathematics courses students take in high school has a significant influence upon state standards and college readiness*. Though this relationship is expected, the dramatic effect of advanced mathematics courses upon student achievement can be seen clearly in Figure 4 on the following page. This table separates the students into categories based on mathematics courses taken their junior year, the year in which they take the PSAE. The categories were created by analyzing the numerous course titles and descriptions provided by each school in the study and by grouping together those of the same mathematical level and rigor. Consequently, some categories, such as "Before Algebra", "Alternative Math Courses", and "Other Advanced Math" actually contain many courses with different titles. The specific titles of courses in each of these categories can be seen in Appendix A. The course categories are listed from lowest level on the left (none) to highest level on the right (pre-calculus and above) with the exception of "Other Advanced Math" which contains a variety of courses at the advanced level. Since this category was so eclectic, it was placed outside the usual progression of Algebra, Geometry, Algebra II and Pre-Calculus. For each category, the chart in Figure 4 shows the percentage of students who meet or exceed state standards on the PSAE and the percentage of students who are considered college ready in mathematics according to the ACT benchmark of 22. The rising staircase from left to right seen in this chart clearly demonstrates that as students take more advanced mathematics courses, they have more success on state and national exams.

This data also indicates that those students completing Algebra II or higher by their junior year were much more likely to meet or exceed state standards than those students who had completed only Geometry or previous courses by that time. Students in more advanced mathematics courses were also more likely to be college ready than those in the less advanced courses. In particular, this data demonstrates that the completion of Geometry is not enough to prepare most students for the PSAE as only 27% of those in Geometry their junior year met or exceeded state standards in mathematics. In contrast, that number jumps to 67% for those in Algebra II their junior year. The addition of this one important course, Algebra II, increased the percentage of success on the PSAE by 40 percentage points. *The data suggests then that Algebra II is a key component to meeting or exceeding standards on the PSAE.* This conclusion seems to validate recent efforts to increase core mathematics requirements in Illinois. It also confirms what many teachers of mathematics have proclaimed for years: students need more mathematics.

Although Algebra II appears to be the gatekeeper for success on the PSAE, the data in Figure 4 also shows *that a course beyond Algebra II is critical for achieving college readiness.* Only 7% of juniors in Geometry were college ready and this number jumped to 37% for those juniors in Algebra II. However, for juniors in courses beyond Algebra II, over 74% were considered college ready by ACT standards. Thus, the addition of one course beyond Algebra II appears to double the likelihood of a student being ready for college level mathematics. This data again confirms the beliefs of many counselors and teachers of mathematics and also agrees with the ACT national conclusion that students need to take a course beyond Algebra II during high school in order to be adequately prepared for college-level mathematics (ACT, 22).

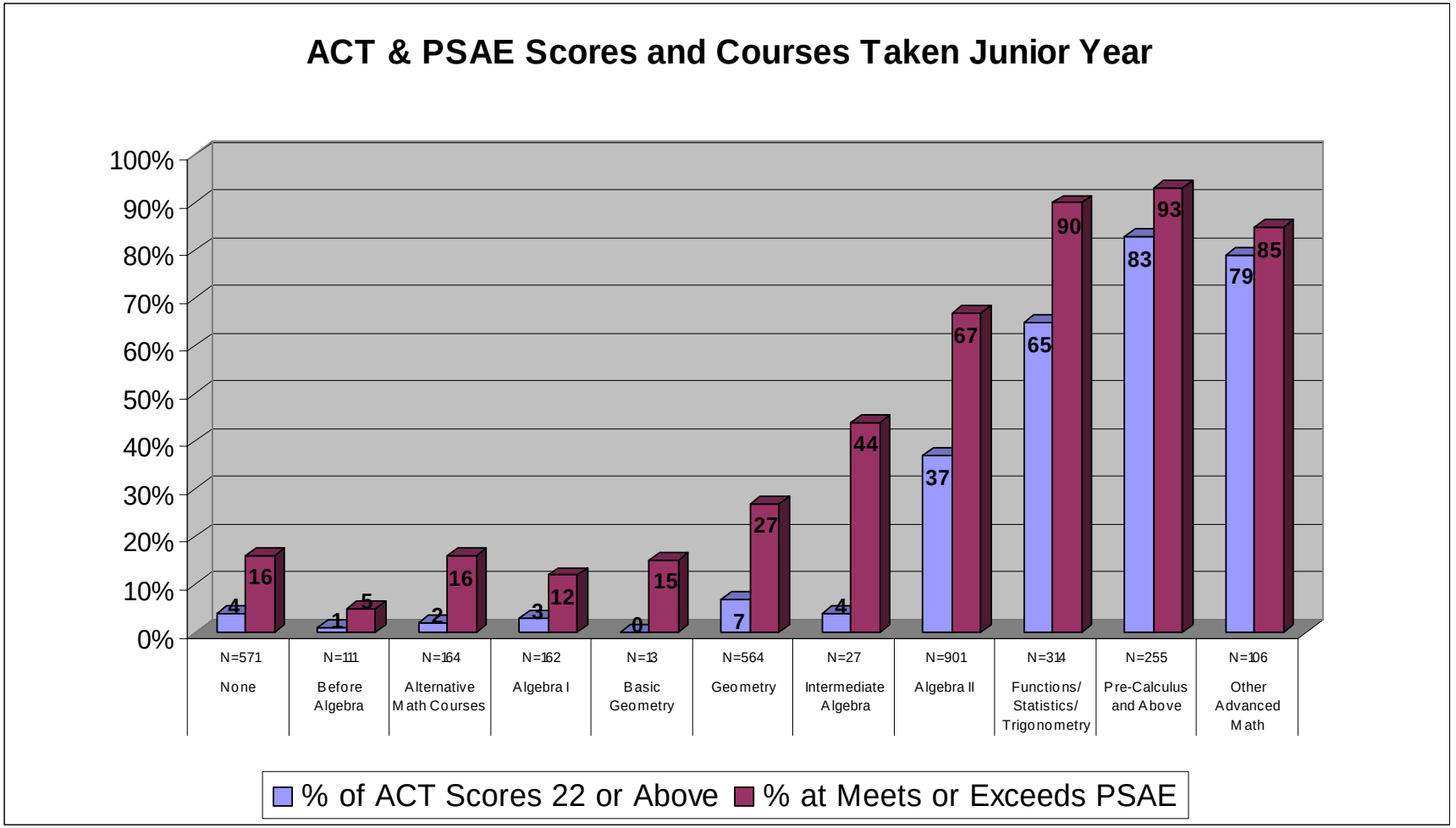

Figure 4: Achievement levels for students compared to mathematics courses taken their junior year.

The "none" category in Figure 4 represents the 571 students in this study who did not take a mathematics course their junior year. Though the 16% who met or exceeded state standards in this category is certainly a low number, it is comparable to the rates seen by students in Alternative Math Courses, Algebra I, and Basic Geometry. To better understand the nature of the juniors in the

"none" category, the mathematics course these students took their sophomore year was also collected and analyzed. This breakdown is seen in Figure 5.

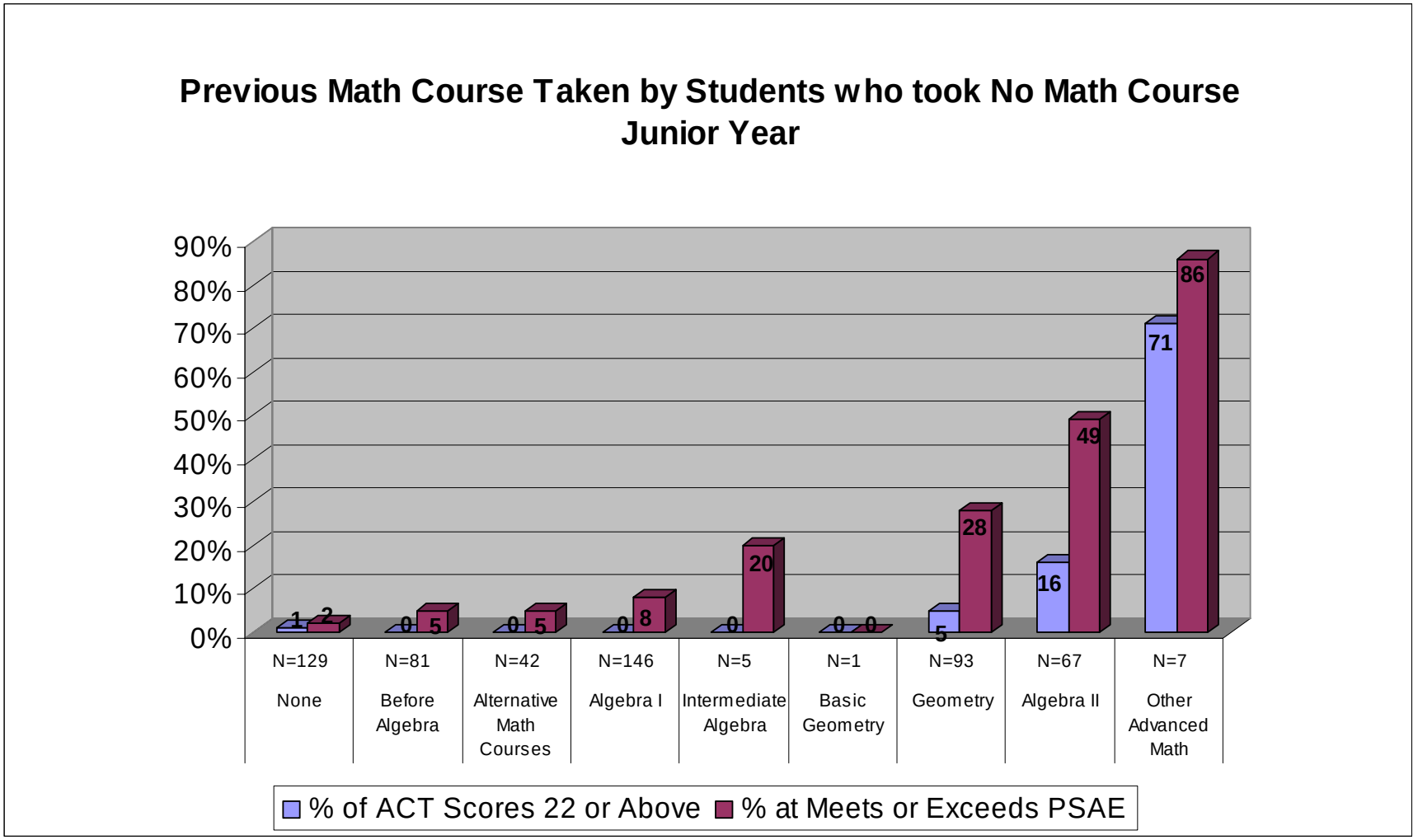

Figure 5: Achievement levels for students taking no mathematics their junior year.

The data in Figure 5 again indicates that Algebra II seems to be the key to meeting state standards in mathematics. For students who took no math course their junior year, 49% of those who took Algebra II and 86% of those who took a course beyond

Algebra II their sophomore year met or exceeded standards on the PSAE. In contrast, less than 10% of the students who took courses below Algebra II their sophomore year and avoided mathematics their junior year met or exceeded standards on the PSAE. Thus, even among students not taking courses their junior year; Algebra II is still the critical factor in determining mathematical success on the state standards.

However, it should be noted that only 49% of those students who took Algebra II as sophomores and then chose not to take mathematics their junior year met or exceeded state standards. Their peers in this study who took Algebra II as juniors had a 67% success rate on the PSAE. In addition, over 90% of their peers who took Algebra II or higher as sophomores and than chose to take an additional mathematics course their junior year met or exceeded state standards in mathematics. Clearly, the lack of mathematics during their junior year adversely affected those students who had taken Algebra II their sophomore year. The negative impact of not taking a mathematics course junior year is even more apparent on college readiness. The data in Figure 5 shows that only 16% of sophomore Algebra II students who did not take a mathematics course their junior year achieved a 22 or higher on the ACT mathematics exam. On the other hand, Figure 4 shows that 74% of sophomores in Algebra II who continued with a mathematics course their junior year achieved a 22 or higher on the ACT mathematics exam. By choosing to take a course beyond Algebra II their junior year, these accelerated sophomores increased their likelihood of being college ready by nearly 60 percentage points! Such information should be valuable for accelerated students who have met state requirements in mathematics their sophomore year and are considering not taking any further mathematics in high school.

Overall, the data displayed in Figure 4 and Figure 5 supports the following conclusions:

1. The more advanced mathematics courses a student takes, the more likely they are to achieve state standards and be college ready.
2. Students who are in Algebra II or higher their junior year are more likely to meet or exceed state standards in mathematics than their peers in classes below Algebra II.
3. Students who are in a course beyond Algebra II their junior year are more likely to be college ready in mathematics than their peers who are in Algebra II or below.
4. Not taking a mathematics course during the junior year of high school has a detrimental effect on achieving state mathematics standards and on college readiness in mathematics.

In general, Algebra II seems to be the key to acceptable achievement on the PSAE and "Algebra II plus one" seems to be the key to college readiness. Another representation of the collected data also exhibits this conclusion. The table depicted in Figure 6 shows success rates of the students sorted by only two categories: those in Algebra II or above their junior year and those in courses below Algebra II their junior year. As this table shows, Algebra II increases a students' likelihood of meeting or exceeding state standards in mathematics by nearly 57 percentage points and increases their likelihood of being college ready by over 48 percentage points. Only 4.2% of those students not in Algebra II managed to achieve college readiness status. This data further substantiates the conclusion that secondary students need to take at least Algebra II to be considered college ready in mathematics.

	Number of students in study	Number meeting or exceeding state standards in 11th grade	Percent meeting or exceeding state standards in 11th grade	Number College Ready in 11th grade	Percent College Ready in 11th grade
Students in Algebra II or higher their junior year	1576	1216	77.2%	830	52.7%
Students not in Algebra II or higher their junior year	1611	313	19.4%	68	4.2%
Total	3187	1529	48.0%	898	28.2%

Figure 6: Table comparing achievement rates of students sorted by Algebra II benchmark.

In addition to Algebra II, another significant factor in determining success on the 11th grade PSAE is success on the 8th grade ISAT. Though not an original focus of this study, 8th grade ISAT scores were also collected from the participating schools. Not all districts were able to provide the ISAT data but course information and ISAT and PSAE results were available for 1647 students in the study. The analysis of this data shows that success on the 8th grade ISAT has a strong influence on success on the 11th grade PSAE. For those students who met or exceeded standards in 8th grade, only 19% did not meet standards as juniors. This indicates that 81% of students who entered high school at or above state standards in mathematics maintained those standards through their junior year. On the other hand 89% of students who did not meet state standards in mathematics in 8th grade also did not meet standards in mathematics in 11th grade. *Together, these results suggest that much of the battle for achieving high school standards in mathematics is actually won or lost in the middle grades.* This conclusion is further supported by data from specific schools that shows low performance levels on the 8th grade ISAT in 2001 ultimately led to low performance levels on the 11th grade PSAE in 2004. Unfortunately, the data in this study does not indicate how to increase achievement levels in 8th grade, but it does suggest that improvements in 8th grade mathematics success rates will result in improvements in 11th grade mathematics success rates.

The addition of the ISAT data to this study reveals that 8th grade achievement levels are closely related to 11th grade achievement levels. To better study this relationship, the course-taking patterns of the students with ISAT data was further analyzed. In particular, the data of the 890 students who met or exceeded standards in 8th grade was inspected to determine whether or not these students had also taken Algebra II by their junior year in high school. This information was then combined with PSAE levels and ACT scores to create the table in Figure 7. This table exhibits a quick blueprint of students' mathematical success and pathways

	Number of students meeting or exceeding state standards in 8th grade	Number meeting or exceeding state standards in 11th grade	Percent meeting or exceeding state standards in 11th grade	Number College Ready in 11th grade	Percent College Ready in 11th grade
Algebra II or above their junior year	738	641	86.9%	445	60.3%
Not in Algebra II or above their junior year	152	75	49.3%	20	13.2%

Figure 7: Effect of Algebra II on achievement for students who met or exceeded standards in 8th grade

from 8th grade to junior year in high school. Once again, the data shows that Algebra II is a significant contributor to success on state standards and college-readiness. Nearly 87% of students who met or exceeded standards in 8th grade and were in Algebra II or higher their junior year also met or exceeded standards in 11th grade. Over 60% of these students were also college ready as juniors. By comparison, only 49% of students who met or exceeded standards in8th grade but did not take Algebra II by their junior year met or exceeded standards in 11th grade and only 13% were college ready. Algebra II is again responsible for about a 40 percentage point increase in state achievement and close to a 50 percentage point increase in college readiness.

The PSAE achievement levels for the 890 students who met or exceeded standards in 8th grade are shown in Figures 8 and 9. Figure 8 displays the results for those students who were in Algebra II or higher their junior year and Figure 9 displays the results for those not in Algebra II or above their junior year. Together, these charts reveal that students who were on the right track in 8th

grade and stayed on that track by taking Algebra II in high school were much more likely than their peers who chose not to take Algebra II to meet or exceed mathematics standards in 11th grade. The absence of Algebra II caused 50% of these students to fall from meets or exceeds in 8th grade to below standards in 11th grade. It also allowed one student to fall from meets in 8th grade to academic warning in 11th grade. This student's high school math courses are seen in Figure 10.

8th ISAT Math score	ISAT Math level	8th Course	9th Course	10th Course	11th Course	12th Course	PSAE Math score	PSAE Math level (E, M, B or W)
165	Meets	8th Math	Survey Math	Algebra I		Algebra B	129	Warning

Figure 10: Mathematical pathway of student moving from meets to academic warning.

Though this student was meeting standards in mathematics in 8th grade, he or she never took a course beyond Algebra in high school, took no mathematics course his or her junior year, and subsequently dropped to academic warning by 11th grade. This data serves as an example of a secondary mathematical pathway to avoid. Though this student is a notable exception, the data in general shows that students who achieve standards in 8th grade are likely to again achieve standards in 11th grade—especially if those students complete Algebra II by their junior year.

The data also shows that students who do not achieve standards in 8th grade are also likely to not meet state standards in mathematics in 11th grade. However, students in this group who do go on take Algebra II still improve their chances of meeting or exceeding state standards in their junior year. The data in Figure 11 shows the general effect of Algebra II on those students who did not meet or exceed state standards in mathematics in 8th grade. Though only 20% of these students who went on to take Algebra II

	Number of students not meeting state standards in 8th grade	Number meeting or exceeding state standards in 11th grade	Percent meeting or exceeding state standards in 11th grade	Number College Ready in 11th grade	Percent College Ready in 11th grade
Algebra II or above their junior year	244	49	20.1%	11	4.5%
Not in Algebra II or above their junior year	513	32	6.2%	4	.8%
Total	757	81	10.7%	15	2.0%

Figure 11: Effect of Algebra II on achievement for students who did not meet standards in 8th grade

as a junior met or exceeded standards on the PSAE, this number is still much higher than the 6% success rate obtained by those not completing Algebra II by their senior year. A similar result exists for college readiness as only 4.5% of students who did not meet standards in 8th grade but were still in Algebra II or above their junior year were considered college ready in mathematics. Though this number is much lower than the 87% achieved by similar students who had met standards in 8th grade, it far surpasses the value of .8% for students who did not meet standards in 8th grade **and** did not complete Algebra II by their junior year. One student was able to move from below state standards in 8th grade to exceeds state standards in 11th grade. This student's scores and mathematical pathway is displayed in Figure 12. Note that the ACT score of 30 also establishes this formerly below-standards mathematics student as college ready in mathematics by junior year!

8th ISAT Math score	ISAT Math level (E, M, B or W)	8th Course	9th Course	10th Course	11th Course	12th Course	PSAE Math score	PSAE Math level (E, M, B or W)	Work Keys Math score	Math ACT score
161	B	8th Math	Algebra I	Geom & Alg II	Math IV	Calc	181	E	7	30

Figure 12: Mathematical success and pathway of a student who moved from below to exceeds standards.

Conclusions and need for further research:

The data from this study points to four major findings:

1. Algebra II is the critical course for meeting or exceeding Illinois state standards in mathematics in 11th grade.
2. A course beyond Algebra II is the key to achieving college readiness in mathematics.
3. Students not taking a mathematics course their junior year are less likely to meet state standards and college readiness levels than their peers who are in a mathematics course that year.
4. Success on the 8th grade ISAT mathematics exam is connected to success on the 11th grade PSAE.

Many of these conclusions were expected or already supported by other studies. However, this study supports these conclusions on a local level while also revealing potentially new relationships to be further studied at a state-wide level. State-wide data is now available for students who have completed both the 8th grade ISAT and the 11th grade PSAE and the correlation between these two assessments can be further investigated and verified. The relationship between course-taking patterns in mathematics and achievement and college readiness levels can also be further investigated at both the state and district levels. Certainly, a more expansive study on the conclusions presented here could better establish state trends connected to mathematics coursework, achievement and college-readiness.

However, individual school district investigations on these topics may be more important than a comprehensive state study. Because of the value of the type of data and results demonstrated in this college readiness project, schools should be encouraged to pool together and investigate their ISAT, PSAE, and course data in a manner similar to that used in this study. The schools could then

analyze this data in many ways in order to track student achievement, evaluate course-effectiveness, and establish guidance and curriculum policies that better ensure success on the PSAE and ACT. For example, if a school were to obtain data similar to that presented here, they might immediately conclude that all students who meet or exceed standards in mathematics in 8th grade should be advised to take mathematics courses that lead to Algebra II or higher their junior year.

Such analysis and resulting policies could be very valuable to school districts and could result in increased levels of achievement in mathematics. However, this study also discovered that many schools do not have immediate access to the type of data collected for this project. Districts often have student transcripts containing coursework, ISAT results, and PSAE data, but they rarely have all three of these items in one complete data-base or spreadsheet. In fact, some of the data used in this study was copied by hand from student transcripts and then entered into a spreadsheet file.

The spreadsheet in Appendix B is similar to the one used for data collection in this study and displays the fields requested from each school. Overall, many school staff members involved in this college readiness project reported that the collection of the requested data was time-consuming because of the data being located in many different places and in many different formats. Yet, faculty feedback on the value and potential uses of the data and conclusions of this report was very positive. In particular, teachers liked the ability to easily track the mathematical courses of their students and to quickly compare that course sequence to achievement levels on the state mathematics standards. Hopefully, the data collection procedures and outcomes of this project can motivate school districts to adapt similar data collection goals and to create a comprehensive data base that can be easily updated, reviewed, and analyzed on a yearly basis.

The results from this research would suggest that each high school should have one computer program containing at least the following fields for each student: Identity code, 8th grade mathematics score and level, mathematics course for 9th, 10th, 11th, and 12th grade, PSAE mathematics score and level; and Work-keys and ACT score. Other information, like that seen in Appendix B, could also be gathered and investigated but the eleven fields listed above should be considered the minimum fields required for appropriate student and course analysis. With such information in one dynamic computer environment, schools would be able to quickly identify the course pathways of students who did well and poorly on the 11th grade PSAE and would be able to draw connections to the 8th grade ISAT and student growth. School districts could then make informed decisions regarding coursework, curriculum, and advising in mathematics and could hopefully construct plans and programs to increase student learning and achievement in mathematics. The fields described here and the type of analysis conducted within this College Readiness project could serve as a model for individual districts to replicate. This sort of local analysis and adaptation may ultimately be more beneficial than any state-wide report.

In general, the conclusions from this project do suggest a particular formula for success in achieving state standards and college readiness in mathematics: *Increase student success in mathematics in 8th grade and encourage more students to complete Algebra II or higher by their junior year of high school.* The combination of these two factors (8th grade meets or exceeds and completion of Algebra II by junior year) resulted in 87% of these students meeting or exceeding state standards in 11th grade and 60% achieving college readiness status in mathematics as juniors in high school. The particular interaction between these two variables and

their relationship to state standards and college readiness can be seen in Figure 13 on the next page. This table serves as a summary of the major findings of this study and clearly shows that both Algebra II and 8th grade ISAT levels impact the success rates for both meeting or exceeding state standards and for achieving college readiness in mathematics. The success rates for meeting or exceeding state standards on the PSAE range from a high of 86.9% for students who met or exceeded state standards in 8th grade **and** completed Algebra II by their junior year to a low of 6.2% for those students who did neither of those two items. The college readiness achievement rates ranged form a high of 60.3% for students who met or exceeded state standards in 8th grade **and** completed Algebra II by their junior year to a low of .8% for those students who did neither of those two items.

	Overall		Students who met or exceeded state standards in 8th grade		Students who did not meet state standards in 8th grade	
	Met or exceeded standards	College ready	Met or exceeded standards	College ready	Met or exceeded standards	College ready
Completed Algebra II by end of junior year	77.2%	52.7%	86.9%	60.3%	20.1%	4.5%
Did not complete Algebra II by end of junior year	19.4%	4.2%	49.3%	13.2%	6.2%	.8%

Figure 13: Effect of 8th grade ISAT achievement and Algebra II completion on student success rates for meeting or exceeding state standards and college readiness levels in mathematics in 11th grade.

The data displayed in Figure 13 demonstrates that 8th grade ISAT achievement and Algebra II are both important factors for success in mathematics as measured by the PSAE and ACT assessments. The relationships between the variables shown in Figure 13 can now be further investigated, and possibly confirmed and strengthened, using data from a larger representative sample of school districts throughout Illinois. In addition, the results depicted in the table of Figure 13 can also be used by districts to make decisions regarding student placement and general mathematics curriculum. School officials can then conduct a similar investigation of their own data to determine outcomes and relationships specific to their districts and beneficial to their students. Such investigations at both the local and state levels may lead to improved guidance, instruction, achievement, and college readiness for the students of Illinois.

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Appendix A: Listing of specific courses included in general categories of Figure 4.

Courses included in *Before Algebra* Category			
Class	Total Students	% of ACT Math Scores 22 or above	% at Meets or Exceeds PSAE
General Math	10	0%	0%
Math Skills	26	0%	0%
Intermediate Math	4	0%	0%
Resource Room Math	4	0%	0%
Pre Algebra	11	9%	9%
Basic Algebra	8	0%	13%
Vocational Math	2	0%	0%
Vocational Math III	9	0%	0%
Applied Math	6	0%	33%
Applied Algebra	5	0%	0%
Special Education Math III	7	0%	0%
Algebra A	6	0%	0%
Survey Math	10	0%	10%
Prof Math	3	0%	0%
Courses included in *Alternative Math* category			
Class	Total Students	% of ACT Math Scores 22 or above	% at Meets or Exceeds PSAE
Technical Math I	20	0%	15%
Technical Math II	12	8%	42%
Business Math	64	3%	17%
Consumer Math	11	0%	18%
Applied Math III	57	0%	11%
Courses included in *Other Advanced Math group*			
Class	Total Students	% of ACT Math Scores 22 or above	% at Meets or Exceeds PSAE
Advanced Math	71	85%	100%
Math IV	10	70%	90%
Accounting	1	100%	100%
College Algebra	5	80%	100%
Computer Science	11	100%	91%
College Prep Math	8	13%	38%

Appendix B: Spreadsheet used to collect data from schools in study.

Data Collection

School District:

School Name:

Name of Counselor (Data Collector):

Date to be completed by: May 9, 2005

Use One Sheet Per Year

Student Code (by school, year and student number or Student ID Code) (Graduating Class of 2002, 2003, 2004 or 2005)	**Gender (M or F)**	**Free and Reduced Lunch (Y or N)**	**8th ISAT Math score**	**ISAT Math level (E, M, B or W)**	**8th Course**	**9th Course**	**10th Course**	**11th Course**	**12th Course**	**PSAE Math score**	**PSAE Math level (E, M, B or W)**	**Work Keys Math score**	**Math ACT score**	**IEP, 504 or leave blank**	**After High School? (WF, Mil, C2 or C4)**	**Abrev. of Comm. Coll. or Coll/Univ**	**First College Math course taken (if known)**
Ex. HS02001	M	Y	156	M	8th math	Alg	Geom	Adv Alg	Calc	158	M	5	23		C4	WIU	127-Trig