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A DIFFERENT VIEW OF HOW WE UNDERSTAND PROGRESSION THROUGH THE DEVELOPMENTAL MATH TRAJECTORY

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This brief is a product of a larger study, the main objective of which is to evaluate the effectiveness of math placement policies in the Los Angeles Community College District (LACCD) for entering community college students. The research was funded by a grant from the U.S. Department of Education's Institute of Education Sciences (IES).

SUMMARY

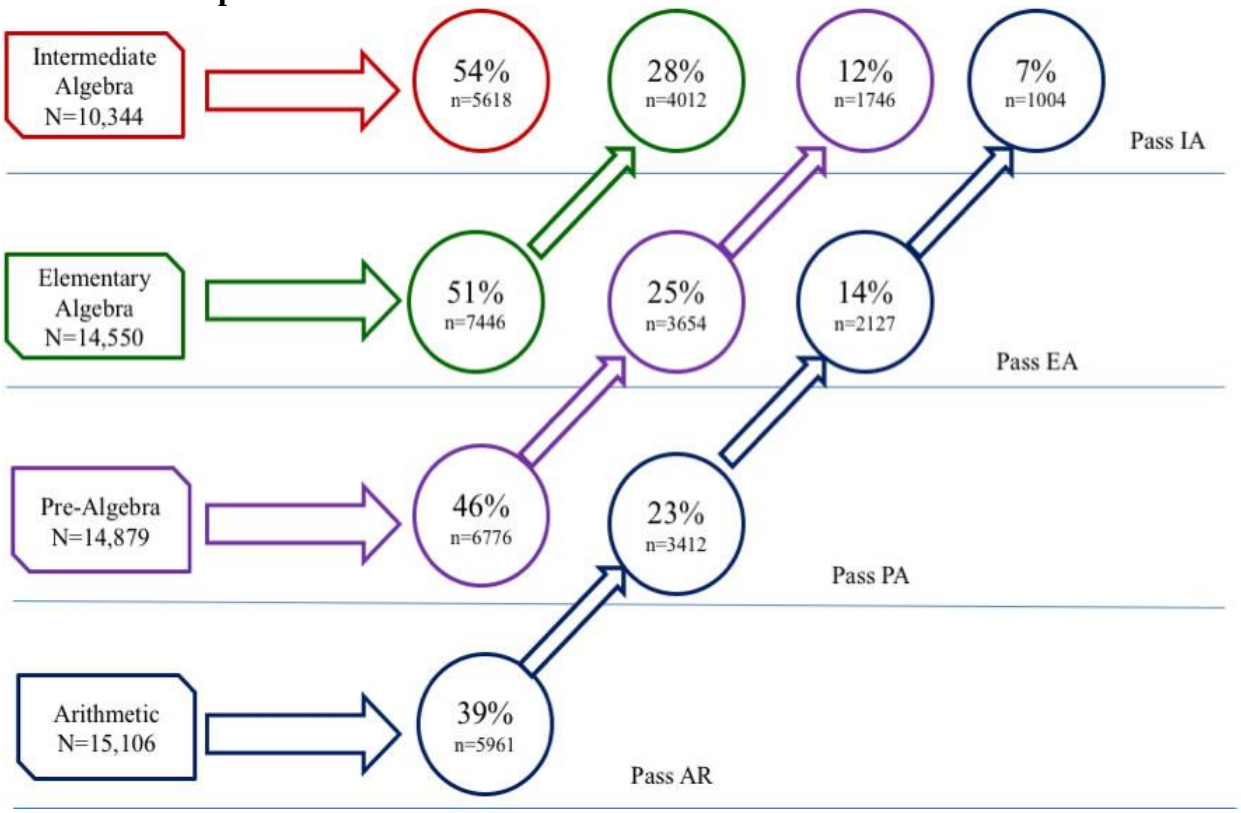
The traditional way to calculate pass rates of developmental math students is to divide the number of students who passed the course by the total number of students initially placed into that course. This policy brief describes an alternative view of community college students' progression through four levels of the developmental math trajectory, one that bases students' pass rates on whether they are actually attempting these developmental math courses. By disaggregating these figures in this manner, we find that students who are persisting through each stage of their math trajectory exhibit pass rates comparable to their initially higher-placed peers. This way of understanding progression through the developmental math sequence is a useful tool for community college administrators to identify where along the math trajectory students are failing to progress, and where they may want to focus their initiatives.

Developmental education is increasingly declared a broken system. It is not difficult to understand why. The statistics on student pass rates at community colleges are distressing: Less than 25 percent of students who begin at a developmental level of math or English attain an associate's degree within eight years (Bailey, 2009), and only about 33 percent even complete their developmental math sequence (Bailey, Jeong, & Cho, 2010). Another report, presented by Complete College America (CCA), has indicated that 22 percent of students who were referred into remedial math or English programs completed their "gatekeeper" course—the first college-level math or English course—within two years. And, of those students required to take three developmental math courses, just 16 percent complete their full sequence within three years (CCA, 2012). State policymakers are taking note. Some have called for urgent action to reform developmental education. In fact, Connecticut has just passed a bill that eliminates non-credit stand-alone remedial classes in the state's public institutions by fall 2014 (Fain, 2012).

The traditional way of calculating progression rates through the developmental math trajectory is to divide the number of students passing the course at the end of the sequence by the total

number of students initially placed at a specific lower level. Our data, as shown in Figure 1, does not dispute the view that few students who begin at the lowest levels of math persist to complete the higher levels (see Methodology box). Figure 1 illustrates pass rates for four levels of math below "transfer level": arithmetic (four levels below transfer level), pre-algebra (three levels below transfer level), elementary algebra (two levels below transfer level), and intermediate algebra (one level below transfer level). Starting at the lowest level, we see that only 39 percent of students placed into arithmetic pass that course, and that these rates decline at each subsequent math level until we are left with only seven percent of students initially placed in arithmetic passing intermediate algebra. This pattern of decline is consistent across all initial placement levels, although pass rates are higher with higher placement in developmental math. Of students initially referred to pre-algebra, for example, 46 percent pass that course and 12 percent pass intermediate algebra. Of students initially referred to elementary algebra, the pass rate declines from 51 percent in elementary algebra to 28 percent passing intermediate algebra. Slightly over half (54 percent) of students initially placed into intermediate algebra pass the course.

Figure 1. Percentage of students passing each level of the developmental math trajectory based on initial placement.



However, there are reasons for caution. The statistics cited above do not tell the full story. They are based on the assumption that all community college students intend to fulfill the requirements needed to transfer to a four-year college. They also assume that all students placed into a developmental education course have the opportunity to pass the class, without acknowledging whether the student actually attempted the course. Finally, though they rightfully note that completion of the developmental sequence may be a daunting task for students, they appear to imply that the length of the sequence by itself is the cause of non-persistence. The likelihood of

completion is also influenced by a number of factors extraneous to the sequence itself, such as financial obstacles and family obligations that work against persistence for all students.

This brief illustrates the value of taking a different approach to calculating pass rates, one that is based not on the number of students placed into a developmental math level but the number of students that attempted to complete the work of their developmental math class.

METHODOLOGY

Drawing on data from the LACCD Office of Institutional Research's computerized database, we analyzed student transcript data for students who were assessed between summer 2005 and spring 2008 and then tracked through spring 2010. Thus, data are based on three cohorts of students in developmental math education: 1) students assessed during the 2005-06 school year (five years of data), 2) students assessed in the 2006-07 school year (four years), and 3) students assessed in the 2007-08 school year (three years).

For more information, see Fong, K. E., Melguizo, T., & Prather, G. (in progress). Community college student progression through the preparatory math sequence.

FEW STUDENTS PLACED IN DEVELOPMENTAL MATH PASS INTERMEDIATE ALGEBRA, BUT FOR MANY IT WAS NOT REQUIRED TO MEET THEIR GOALS

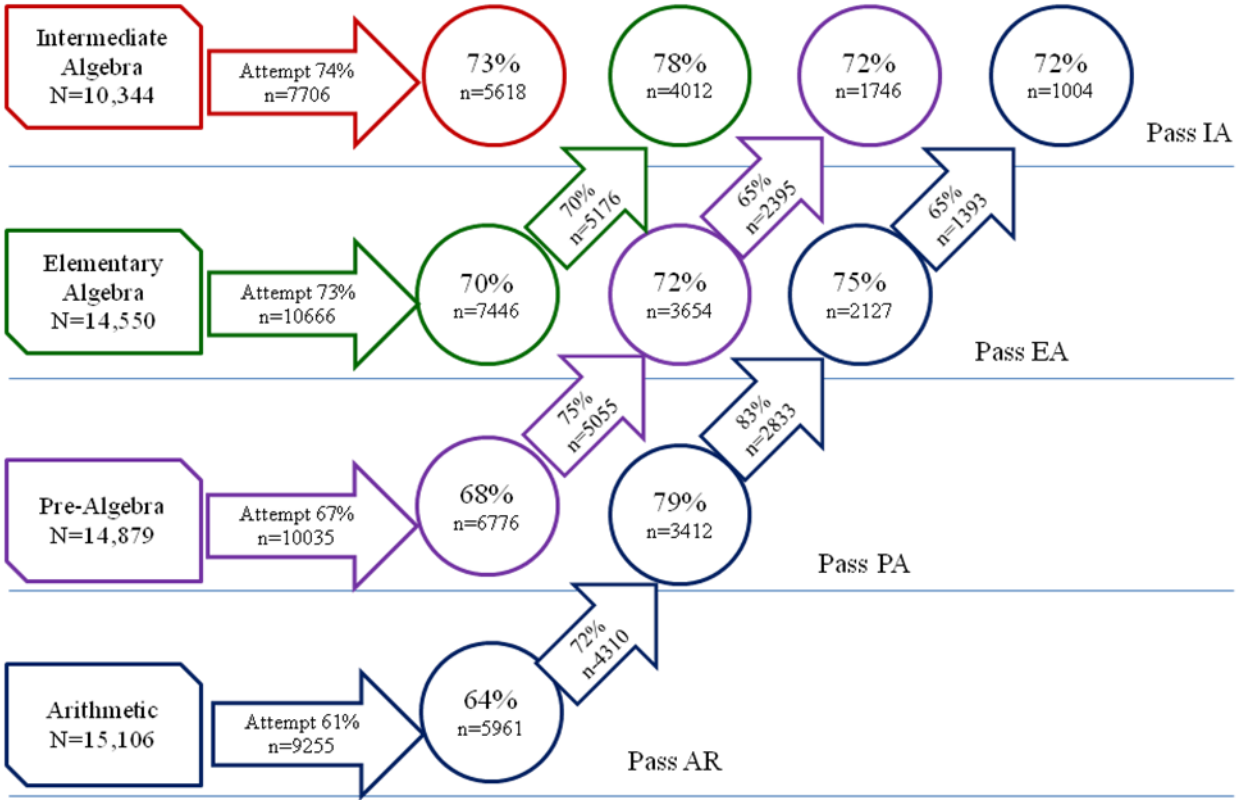
One of the problems with the previous picture of the developmental math sequence is that it fails to take into account the diversity of student objectives in community colleges. During our period of study, passing elementary algebra was the math requirement for an associate's degree (A.A.) in the LACCD and most other districts around the state. This was raised to intermediate algebra statewide beginning with students who entered in the 2009/10 academic year. While college algebra or its equivalent fulfills general transfer requirements, most certificate programs have no math requirement though some of the more technical vocational fields may embed math instruction in the program classes. Math prerequisites for individual courses are found only in the physical sciences and engineering, which along with a few other programs may impose higher math courses for the degree. For the great majority of students, the math sequence serves only to meet degree or transfer exit requirements. Students' educational goals are thus likely to influence their decisions about whether to continue to higher levels in the math sequence. Though supposedly only those students pursuing a degree or transfer goal will enter into the assessment and placement process, this may not be clear to all students at the time of assessment. Other students may change or clarify their goals after assessment or even after one or more developmental courses and choose to exit the sequence at that point. Therefore, a portrait of the math sequence as ending at the transfer level for all students creates an inaccurate picture.

STUDENTS PERSISTING THROUGH THEIR SEQUENCES PASS THEIR COURSES AT COMPARABLE RATES TO THEIR "HIGHER-PLACED" PEERS

An alternative approach to assessing developmental math progress is based on the number of students who are actually attempting and passing each subsequent course, as shown in Figure 2. This more-detailed description shows that students who enter at lower developmental levels are passing the higher courses at rates comparable to those who are initially placed in higher levels if they attempt those levels. The numbers in the circles represent the total number of students

passing each level while the total number of students attempting the next level is written in the arrows. We define "attempt" as students who enroll in the math course and remain in the class past the no-penalty drop date.

Figure 2. Percentage of students attempting and passing each level of the developmental math trajectory based on initial placement.



Though only a small number of students make it through to the highest levels, this figure suggests a more nuanced view of the condition of developmental education. For students initially placed in arithmetic who continue to attempt and pass each subsequent course, 72 percent of students who attempt intermediate algebra (n=1,004) pass the course. This percentage is comparable to the passing rates of students who were initially placed in intermediate algebra (73 percent). Similarly, students initially placed in pre-algebra who persist to intermediate algebra have a 72 percent pass rate (n=1,746). This percentage is comparable to the 78 percent passing rate of intermediate algebra for students initially placed in elementary algebra, and the 73 percent of students placed in intermediate algebra who passed the course. In other words, the developmental courses are helping students gain the skills necessary to successfully pass the course required for an associate degree and the pre-requisite course for transfer-level courses.

Although what is happening, or not happening, in the math classroom is no doubt important and could be improved, Figure 2 suggests that factors outside of the classroom must be considered. Specifically, we need to account for students whose educational goals do not require completion of the transfer-level course. The drop-off in attempts after elementary algebra of students who begin below that level is quite noticeable. Although there could be a "cooling-out" effect in

which some students reset their goals from transfer to an associate degree as a result of their difficulty achieving the elementary algebra milestone, this is not likely to explain all of the drop-off in course attempts. More significantly, the size of the "failure to attempt" the next level at each step makes this aspect of the math trajectory an important one for further study. Perhaps we can explore the reasons for this failure by examining the characteristics of students who do and do not attempt at each level.

Finally, this figure provides helpful information for community college administrators as it identifies the courses in the math trajectory where students are failing to progress. For example, a much smaller proportion of students attempt and pass the lower levels of the math trajectory (i.e., arithmetic and pre-algebra) compared to the higher levels (i.e., elementary algebra and intermediate algebra). This finding suggests that further research is needed to understand what factors are behind the relatively lower attempt and pass rates for the lowest levels of math. Through that investigation, practitioners will then be able to target interventions and define clear goals in terms of increasing attempt rates at specific courses or for specific populations (i.e., part-time students) that might help improve overall attempt and passing rates in the developmental math trajectory. Thus, this figure may be an important tool for practitioners who are determining where to focus their initiatives on improving developmental education.

CONCLUSIONS

Our research shows that it is important to explore the complexity of the developmental math trajectories of students before making broad generalizations about developmental education. Community colleges are open access institutions serving a diverse population of students with many different educational goals. The challenge for community college leaders and administrators is to identify a number of feasible pathways and try to orient the students to the pathway where they would be most likely to successfully attain their educational goals. Researchers have the potential to help colleges identify these pathways, and provide faculty and administrators with useful tools to help them chart student progress through the sequence.

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