How are community college students assessed and placed in developmental math: 
Grounding our understanding in reality.

Tatiana Melguizo
Holly Kosiewicz
University of Southern California

George Prather
Retired from LACCD

Johannes M. Bos
American Institutes for Research

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Abstract

Examining current assessment and placement policies used to assign students to a developmental math sequence in the Los Angeles Community College District, this study finds that the complex nature of the assessment instruments prevents faculty and administrators from improving these policies that favor increasing student success.
Within the past two decades, the effectiveness of developmental education\(^1\) for improving student success has attracted the increased attention of researchers and policymakers. Recent evidence suggests that nationwide approximately 60 percent of all incoming freshmen enroll in at least one developmental education course (NCPPHE & SREB, 2010). In California, it has been estimated that if the standards employed by the California State University System were to be applied to California’s community colleges, roughly eight out of ten entering students would need to enroll in developmental education (NCPPHE & SREB, 2010). An additional concern is that developmental education costs a significant amount of state funding (James, Merrow, & Perry, 2002; Author, 2008; Strong American Schools, 2008; Schneider & Yin, 2011). Facing tightened budgets, policymakers are seeking ways to identify in a more systemic fashion what elements and approaches of developmental education do and do not work.

The increasing amount of attention dedicated to developmental education has produced a significant body of literature within higher education research. Nonetheless, current scholarship has largely focused on: 1) calculating student participation rates in remedial education (Provasnik, & Planty, 2008; Wirt, et. al., 2001; Horn & Nevill, 2006; Attewell, Lavin, Thurston, & Levey, 2006), 2) calculating provision rates of remedial education across postsecondary institutions (Parsad, Lewis, & Green, 2006), 3) identifying students most likely to enter remediation (Kirst & Venezia, 2004; Cohen & Brawer, 2008), 4) discussing or testing the validity and reliability of placement tests (Brown & Neimi, 2007; Gerlaugh, Thompson, Boylan & Davis, 2007, Hughes & Scott Clayton, 2010), 5) calculating the cost of providing remedial

\(^1\) The terms basic skills, developmental, remedial and preparatory math education are frequently used interchangeably. Our preferred terms are either developmental or preparatory math.
education (Author, 2008; Schneider & Yin, 2011; Strong American Schools, 2008), and 6) assessing the impact of remedial education on various student outcomes (Attewell, Lavin, Thurston, & Levey, 2006; Bahr, 2008; Bailey, Jeong, & Cho, 2010; Bettinger & Long, 2009; Boatman, 2012; Calcagno & Long, 2008; Jepsen, 2006; Martorell & McFarlin, 2011; Author, 2012; Scott-Clayton & Rodriguez, 2012).

A new thread of research on developmental education has emerged within recent years, which emphasizes understanding assessment and placement policies used to assign students to community college and transfer-level\(^2\) developmental coursework (Perin 2006; Safran & Visher, 2011; Bailey, Jeong, & Cho, 2008; Bailey, 2009; Venezia, Bracco, & Nodine, 2010; Bunch et. al. 2010). This gain in currency can be partly attributed to the fact that assessment and placement have become staple characteristics of the current community college landscape (Gerlaugh, Thompson, Boylan & Davis, 2007; Hadden, 2000).

While current research on community college assessment and placement has given us a general understanding of assessment and placement policies used across two-year institutions, it has failed to provide a focused, more dialogic description of what a specific set of assessment and placement policies look like and why. For the most part, research has analyzed specific, discrete characteristics or stages of assessment and placement, i.e. the types of tests used (Boylan, 2009; Hughes & Scott-Clayton, 2010; Gerlaugh, Thompson, Boylan & Davis, 2007), the validity of the placement instruments (Brown & Neimi, 2007; Gerlaugh, Thompson, Boylan & Davis, 2007, Hughes & Scott Clayton, 2010), or the number of students placed into different

\(^2\) We avoid using the term college-level because developmental courses can count towards an Associate’s Degree, which is a college degree. We use “transfer-level” instead because these courses count towards a bachelor’s degree.
levels of a developmental course sequence (Bailey, 2009; Bailey, Jeong & Cho, 2010). Further, the majority of assessment and placement research presents data at the national or state level (Attewell, Lavin, Domina, & Levey, 2006; Bailey, Jeong, & Cho, 2010; Bettinger & Long, 2008; Bunch, Endris, Panatoya, Romero & Llosa, 2011; Collins, 2008; Hodara, Hughes, Karp, Wachen, & Weiss, 2012; Martorell & McFarlin, 2011). As a consequence, we know much less about assessment and placement policies and practices at a local level. Capturing a nuanced and integrated picture of assessment and placement at the community college level may help researchers and policymakers to identify specific paths to improve both policies and practices, as well as identify areas where more research is needed, particularly in states like California, which has one of the largest, most decentralized community college systems in the country.

This study capitalizes on current efforts to understand assessment and placement in community colleges by focusing on a specific group of two-year institutions that belong to a single district and operate under the same governance structure. In departing from current literature, we not only seek to describe assessment and placement policies used across the colleges in our sample, but also to distill how assessment and placement policies are designed and implemented, and relate with actual student testing, enrollment and placement in as well as progress through a developmental education sequence.

The main objective of this study is to provide a detailed description of math assessment and placement (A&P) policies in the Los Angeles Community College District (LACCD). We focus on math because a larger proportion of students place into remedial math compared to remedial reading or English (Parsad, Lewis, & Green, 2006; Bailey, Jeong & Cho, 2010). The following questions guide this study:
1) What does an actual set of assessment and placement policies for developmental math look like?

2) What implications do assessment and placement policies have on student testing, as well as placement and enrollment in and progress through a developmental math sequence?

3) What strategies and methods do faculty and administrators use to determine assessment and placement policies for developmental math at their colleges?

4) What conditions facilitate or constrain colleges from improving assessment and placement policies and practices for developmental math?

Unlike current studies that examine A&P policies (Hughes & Scott-Clayton, 2010; Bailey, Jeong, & Cho, 2010; Perin, 2006), we employ a mixed-method case study approach to investigate assessment and placement drawing data from college websites, placement criteria documents, student transcripts, and interviews conducted with college faculty and administrators. We used this approach because it allowed us to produce a more complete picture of what local A&P policies look like, how they are designed and implemented, and how they influence student placement and success. Further, this approach permitted us to uncover how factors like limited resources, high degrees of discretion, and conflicting demands bear on how community college administrators implement state-level policy at the local level.

We divide this paper as follows. First, we provide a review of the literature on A&P for developmental education in college, particularly focusing on community colleges. Second, we provide the context of our study by describing the governance structure and state policies that regulate A&P, and the LACCD. Third, we outline the methods we used to conduct this study. Fourth, we present the study’s findings. Finally, we present our conclusions and discuss the implications they have for understanding A&P in community colleges.
Literature Review

Current Overview of the Changing Landscape of Assessment and Placement Policies in Community Colleges

An overview of assessment and placement policies in developmental education

There is no national consensus on what constitutes developmental education (Attewell, Lavin, Thurston, & Levey, 2006; Bailey, 2009; Merisotis & Phipps, 2000), and even less on how students should be assessed or placed into developmental coursework (Hughes & Scott-Clayton, 2010). Some attribute this discord to the historical tensions that exist between ensuring access to higher education and maintaining academic standards for college-level work (Goldrick-Rab, 2010; Hughes & Scott-Clayton, 2010; Prince, 2005). For community colleges this tension is particularly acute since their policy for admission has traditionally been open access. Assessment and placement have thus become key factors in estimating a student’s level of preparedness for collegiate-level coursework, and for holding community colleges accountable for their students’ success.

While there is wide agreement between policymakers and higher education leaders that assessment and placement ought to be mandatory in community colleges (Berger, 1999; Hadden, 2000; Prince, 2005), the policies and practices used to assess and place students in developmental and collegiate-level coursework vary widely. A recent analysis of state policies on assessment and placement in developmental education shows that 13 states have legislated the use of a common assessment and common cut scores (Fulton, 2012)\(^3\). Fulton (2012) also found

\(^3\) Based on Fulton’s (2012) analysis, we are unable to tell whether these policies affect four-year or second-year institutions, or both.
that 17 postsecondary systems have policies that establish either the use of a common assessment or common cut scores or both for assessment and placement.

Despite the presence of state-wide or system-wide assessment and placement policies, the majority of states and postsecondary systems grant their institutions some level of autonomy. For example, Kentucky and Oklahoma set primary cut scores, but allow institutions to select secondary assessments and cut scores (Fulton, 2012). For this reason, it is important to examine assessment and placement at a local level.

Across the nation, institutions utilize different assessment or placement tests to estimate the college readiness of their students (Bailey, 2009, Boylan, 2009; Hughes & Scott-Clayton, 2010; Gerlaugh, Thompson, Boylan & Davis, 2007). Even though the College Board’s ACCUPLACER and ACT’s COMPASS are instruments most used to assess community college students (Hughes & Scott-Clayton, 2010), other less common tests are also employed. For example, Texas and Florida have each developed their own assessment for developmental education placement, and the University of California and California State University systems have jointly designed the Mathematics Diagnostic Testing Project (MDTP) to diagnose a student’s performance in several areas of math. Apart from differences in assessment tests, community colleges also set different cut scores to assign a student to a developmental education courses (Bailey, 2009). Students who are referred to developmental education can take a sequence of up to four courses before enrolling in an entry-level college course (Bailey, 2009).

Growing movement to standardize assessment and placement policies

Although assessment and placement policies differ across community colleges, some researchers argue that the ways in which students are assigned to development education should be revamped because they do not assess and place students fairly (Burdman, 2012). Testing
students readiness for college while they are still in high school is one reform that has received traction in several states, including California and Michigan (Adams, 2011; Howell, Kurlaender, & Grodsky, 2010). Other community colleges have added diagnostic capabilities to their assessments to provide faculty detailed information on each of their students’ specific learning needs (Burdman, 2012).

Implicitly, these changes represent a wider movement to standardize assessment and placement policies in developmental education. Research on those who have advocated for the adoption of a uniform set of assessment and placement standards state that it: 1) prepares students for college-level courses, especially underserved populations, 2) improves placement accuracy, 3) helps institutions establish a common benchmark to measure college readiness, 4) facilitates student transfer between two- and four-year institutions, and 5) helps states develop performance measures to assess the effectiveness of development education sequences across institutions (NCPPHE & SREB, 2010; Prince, 2005). By contrast, opponents of the standardization movement contend that uniformity will prevent institutions from meeting the needs of their students, increase the cost burden associated with assessment, and ultimately enroll more students – typically of minority status - in developmental education (Prince, 2005).

This movement has had a noticeable presence in California. After two reports suggesting that a uniform set of assessment and placement policies may help community colleges save financial resources and enable students to move between colleges without having to re-test (Consultation Council Task Force on Assessment, 2007; Consultation Council Task Force on Assessment, 2008), California passed AB743 in 2011, which establishes a common assessment system for placement at community colleges.
The effectiveness of the standardization movement to improve the way in which students are assessed and placed will hinge on the ability of administrators, teachers, and faculty to faithfully implement these reforms while at the same time effectively manage competing demands and limited resources. Literature on education policy implementation informs us that the reason why policy outcomes diverge from policy intent stem from the fact that individuals located at various policy levels interpret and implement policies in different ways (Honig, 2009; Lipsky, 2010; McLaughlin, 1987). Street-level bureaucrats (Lipsky, 2010) – or individuals who have direct contact with clients – are often considered “policymakers” because they have a high amount of discretion determining the amount of benefits or sanctions they allocate to clients (Lipsky, 2010). How street-level bureaucrats interpret and implement policy can be influenced by the degree to which they understand the policy, the extent to which they feel the policy can be implemented as stated, as well as the constraints they encounter in their work (Lipsky, 2010).

A review of states that are setting common assessment and placement policies through the Achieving the Dream Initiative gives us insight into the kinds of challenges and deliberations community college administrators and faculty face when determining what their assessment and placement policies should look like. In a study examining the standardization of A&P across three Achieving the Dream states, Collins (2008) charts how Virginia, North Carolina, and Connecticut developed common cut score polices as a means to improve success for community college students. Collins (2008) discovers that other broader assessment and placement questions emerge that question the facility of setting common cut scores. In their endeavors, state policymakers wrestled with questions like: Do we have a common procedure for placement? Do we have a common definition for who should be assessed? Do we have a uniform set of protocols for testing? How will staff be affected by the change in cut scores? Do we have the
data we need to set cut scores accurately? Collins (2008) concludes that policymakers must reach agreement on what it means to be “college-ready” before a standardization of assessment and placement policies can be effective.

In another study on 15 community colleges across six different states, Perin (2006) discovered that community college officials found ways to reduce the number of students placed into developmental education by overriding state-wide assessment requirements. She also found that these institutions altered policies when they felt they failed to accurately assess their students’ academic abilities. Taken together, Perin’s (2006) findings suggest that faithful implementation of common assessment and placement policies may hinge on whether policymakers and policy implementers agree on the goals, targets, and tools of the policies themselves (Honig, 2009).

Consequences of Community College Assessment and Placement Policies

Assessing the effectiveness of developmental education

A challenge that community colleges face is ensuring that students placed into remediation actually enroll and progress through remedial coursework. Work by Bailey, Jeong and Cho (2010) found that placement into remedial coursework related negatively with completion and enrollment. Employing data from Achieving the Dream and NELS 88, Bailey, Jeong, and Cho (2010) found that less than half of developmental education students actually completed the entire course sequence. They also learned that about three out of ten developmental education students never enrolled, and that less than two-thirds enrolled in the course to which they were assigned. These findings not only illustrate that students assigned to development education take multiple educational paths, but they also suggest that multiple factors may produce disparate outcomes.
Studies using more rigorous methods to determine the impact of community college placement decisions on short- and long-term student outcomes have produced mostly negative evidence. Using student-level data from different states, researchers on the whole have suggested that being placed into developmental education does not improve a student’s chances of obtaining a degree (Bettinger & Long, 2009; Calcagno & Long, 2008; Martorell & McFarlin, 2011; Scott-Clayton & Rodriguez, 2012). There is mixed evidence that developmental education courses increase college persistence (Bettinger & Long, 2009; Scott-Clayton & Rodriguez, 2012). Preliminary findings from our study evaluating the effects of assignment to different levels of a math sequence suggest that the effects are not homogeneous, and vary across courses and colleges (Author, 2012).

Assessing the validity of assessment and placement tests

While these studies highlight that developmental education may not be beneficial to students, others have challenged the actual validity of the placement instruments. Although the ACT and the College Board demonstrate that their placement tests have content validity, both test publishers fail to provide adequate proof of their predictive validity (Hughes & Scott-Clayton, 2010). Evidence on placement accuracy rates indicate that COMPASS can reasonably predict students who are likely to earn a “B” or higher than those who are at risk for failure (Hughes & Scott-Clayton, 2010). The poor predictive power of COMPASS may be related to a number of factors. For one, Brown and Neimi (2007) discovered poor alignment between content taught in the classroom and tested on placement exams. Second, it may also suggest that factors such as a student’s motivation and ability to dedicate to school may be more powerful predictors of student outcomes.

Assessing how faculty and administrators design and implement A&P policies
The effectiveness of A&P policies also rests with community college faculty and administrators who determine their design and implementation. Understanding what challenges they face in crafting A&P policies that work is one way to locate where reform can take place. Safran and Visher (2010), in a case-study of faculty and administrators from three community colleges, found that there are few organizational structures in place that allow faculty and administrators to conduct a careful examination of assessment and placement policies. This evidence suggests that faculty and administrators may not have the proper tools or the right knowledge about their students’ academic skills to determine how to improve their assessment policies and practices. Betts, Hahn, and Zau (2011) suggest that when faculty are equipped with information on a student’s weaknesses and strengths, they can better direct students to more appropriate course levels and determine where students need academic assistance.

From this literature review, we identify two gaps in current scholarship on collegiate-level assessment and placement policies. First, much of today’s research fails to emphasize the differences that exist in assessment and placement policies across our nation’s community colleges. As a result, researchers have only a general if not incomplete understanding of how community college students are tested and placed into developmental education. We have very few examples of what an actual set of A&P policies and practices look like. Second, studies highlighting the challenges community colleges face in assigning students to developmental education have not conducted a detailed examination of A&P policies used within a single college district. Consequently, we know little about how colleges determine assessment and placement policies and how those policies affect student enrollment, placement, and progress in their developmental education sequence.

**Context and Study Site**
The California Community College System and Governance Structure

A profile of the California Community College System

The California Community College System (CCCS) is the largest postsecondary education system in the nation (CCCCO, 2011a). It is composed of 72 districts and 112 community colleges, enrolling over 2.8 million mostly part-time students (CCCCO, 2011a; Sengupta & Jepsen, 2006).

The decentralized governance structure that guides A&P policies in California stands in stark contrast to that of Texas and Florida, where common A&P policies are in place. Similar to the K-12 sector, California’s community colleges are independent local government entities overseen by an elected board of trustees. District boards are in charge of developing administrative policies, approving curriculum, selecting program offerings, and negotiating with unions representing instructional and administrative staff. Board trustees also elect a district chancellor that serves as the Chief Executive Officer of the District.

High discretion in determining A&P policy

California’s community colleges have a significant degree of autonomy in determining assessment and placement. Although community colleges are required to assess their students, they determine how students are assessed and which students should receive an exemption. In the most recent version of the CCCC’s Matriculation Handbook (2011b), interviews, standardized tests, attitude surveys, as well as high school and college transcripts are some of the ways colleges can determine whether a student should be assigned to developmental coursework. Colleges that choose to employ standardized tests to determine placement must select an instrument from a list of those that have been approved by the California Community College Chancellor’s Office. Otherwise, colleges must prove that the instrument has content-validity.
State approved instruments for math assessment include: College Board’s ACCUPLACER/Companion test, ACT’s COMPASS, UC/CSU’s MDTP, and CASAS (Comprehensive Adult Student Assessment Systems). Colleges may also utilize “informed assessment”, which allows students to choose the placement level they feel best matches their level of knowledge and abilities. Further, each community college also has the right to set cut scores to place students based on their test performance. As a result of the 1991 MALDEF suit against the CCCCO, community colleges across California are obligated by law to consider measures other than the student’s assessment score when determining their placement into transfer or developmental courses. Known as “multiple measures”, these measures capture other cognitive and affective student characteristics. Acceptable multiple measures include: standardized placement tests, writing samples, performance-based assessments, surveys and questionnaires, past educational experience, among other measures (CCCO, 2011b).

**Los Angeles Community College District**

The LACCD is one the largest community college districts in California, serving approximately 250,000 full- and part-time students each year. It is comprised of nine colleges that serve the greater Los Angeles area. LACCD’s community colleges enroll a widely diverse group of students, the majority of whom consider themselves to be racial and ethnic minorities. Based on 2005 and 2006 cohort data obtained from the district, roughly 50 percent of the district’s students were Latino, and one-fifth classified as African-American. Roughly two out of five LACCD students reported that their native language was not English.

Approximately 50 percent of LACCD students assessed in math were placed into a developmental math course between 2005 and 2007. Today, the percent of students placed into developmental math is likely over 60. Since 2010, California requires students to pass
intermediate algebra to receive an Associate’s degree, one math level higher than elementary
algebra, the previous degree requirement. In eight out of the nine community colleges that
comprise LACCD, four math courses constitute the developmental math sequence. The math
sequence begins with arithmetic, and is followed by pre-algebra, elementary algebra, and
intermediate algebra. 4

Across LACCD’s nine community colleges, each has developed their own assessment
and placement policies.

**Methodology**

We employ a mixed-method case study approach for our study because we believe that
community colleges that comprise LACCD, which serves mostly non-traditional, and ethnic and
racial minority students, may provide an opportunity for us to learn how other large, urban,
minority serving colleges and districts implement developmental education their assessment and
placement policies.

A particular strength of this approach is the use of multiple sources of data (Stake, 1995).
For this study, we draw on qualitative and quantitative data from websites, transcripts, and
administrative documents produced by the district, and employ quantitative and qualitative
methods to collect and analyze them.

**Transcript data and analysis**

From the district, we obtained three types of student-level data: 1) student test scores and
multiple measure points which combined resulted in a placement for the 2005/06, 2006/07 or
2007/08 academic years; 2) student demographic information at the time of assessment; and 3)
student math enrollment data prior and subsequent to their assessments. We merged these three

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4 In one college, World Numbers precedes arithmetic, which introduces students to basic numeracy skills.
datasets to identify the subtests used for placement, the student’s math placement level, whether the student ever enrolled in a math class after being assessed in math, the student’s progression through the math sequence, and the impact of multiple measures on student placement. To measure a student’s progression in the developmental math sequence, we followed students through the 2009-2010 academic year because it gave us five years to detect whether they successfully completed the sequence. Examining student outcomes within six-years is the standard timeframe used by the U.S. Department of Education to measure graduation rates; if we had data for six-years our results may have been less conservative.

Content data and analysis

To conduct our content analysis, we drew on two sources of data: placement criteria and a student background questionnaire that is used to gather information on a student’s academic background and goals. We analyzed each college’s placement criteria to identify if and to what degree cut scores used to place students in math varied across the nine colleges in our sample. We also analyzed each college’s student background questionnaire to identify the multiple measures each college used for placement. Specifically, we were able to determine how many points students were awarded for each multiple measure and what each multiple measure attempted to assess. This analysis also helped us to identify the number of students who were placed into a higher-level math course because of multiple measures.

Interview Data and Analysis

We conducted twenty-five interviews with administrators and faculty across all nine community colleges to gain insight into how they determine and implement their assessment and placement policies. Interviews were conducted with matriculation coordinators, directors of
institutional research, and math chairs since according to district officials they play influential roles in the design and implementation of assessment and placement policies for math.

Each in-depth interview was used to elicit information on four broad subject areas: 1) the selection of the assessment instrument, 2) the process of setting and evaluating cut scores, 3) the process of selecting and evaluating multiple measures, and 4) the conditions that constrained faculty and administrators from improving assessment and placement policies for math. These broad themes were chosen because they allowed us to examine distinct stages of each set of assessment and placement policies, and gave us insight into challenges that faculty and administrators faced at each stage. These themes also informed the types of questions we used to interview faculty and administrators and expose differences and similarities in the way institutions designed and implemented assessment and placement policies.

All interviews were conducted in person using the same protocol and research staff. Interviews were limited to 45-60 minutes in length as a way to avoid interviewer fatigue, and thus ensure greater integrity of our data. With permission from interviewees, we digitally recorded interviews for transcription. Otherwise, interviews were recorded in writing. All interviews were transcribed.

To ensure the dependability of our information, we interviewed multiple individuals at each institution, and provided each interviewee with an opportunity to validate our interpretations of the information they provided (Creswell, 2007).

Data collected from our interviews were reviewed using thematic analytic methods advocated by Boyatzis (1998). Themes were discussed among members of the research team to draw consensus on what the data represented. This allowed us to remain as close to the data as possible (Lincoln & Guba, 1985). We also presented our findings to a group of math chairs,
matriculation coordinators, and institutional researchers to ensure that our interpretations resonated with their experiences and perceptions.

Findings

Use of placement instruments

During the assessment periods of our study, five out of nine LACCD colleges used ACCUPLACER, two used COMPASS, and two used the MDTP to assess and place their students in math. Since 2007, two colleges abandoned MDTP for ACCUPLACER, and another college returned to MDTP after having used it previously. At some colleges, the English department’s dissatisfaction with their own placement instrument precipitated the switch to ACCUPLACER or COMPASS while at other colleges efforts to reduce testing costs, decrease testing time, and facilitate quicker placement motivated the adoption of ACCUPLACER or COMPASS. Since faculty generally feel indifferent toward commercial placement tests, switching instruments was tolerated for achieving greater testing and placement efficiency at their colleges.

ACCUPLACER and COMPASS are computer-adaptive placement tests that employ an internal algorithm – or branching mechanism - to estimate the student’s placement score. Students start the exam with questions from a particular sub-test; the sub-test with which students begin is typically determined by the college or the information students provide on the background questionnaire. Based on the number of questions a student answers correctly on the first subtest, the branching mechanism may move that student to different subtests with less or more rigorous subject content. Because both placement tests can refer students to different subtests within one sitting, colleges that use ACCUPLACER and COMPASS eliminate the risk of “no shows” – students who are referred to a later administration of a different subtest, but
never show up to take it. Since each subtest is sold as an individual unit, colleges may strive to
place students with only one subtest. Matriculation coordinators and directors of institutional
researchers, in particular, cite the seamlessness between testing and placement as a major reason
for switching to a computer-adaptive placement instrument.

The MDTP is a diagnostic test that assesses a student’s abilities in specific math content
areas. On the one hand, MDTP is similar to ACCUPLACER and COMPASS in that it consists of
alternative subtests varying in content and rigor. Students who take the MDTP test also begin the
assessment process by answering questions from one subtest and can be subsequently referred to
another subtest, depending on their performance. On the other hand, MDTP is unique in
comparison with its computer-adaptive counterparts in that it allows administrators to set
subscores identifying a student’s strengths and weaknesses on questions constituting each
subtest. Since the MDTP is not computer-adaptive, each subtest lengthens the amount of time
students need to complete the assessment process. Further, the MDTP is administered with paper
and pencil and answer sheets are generally scanned in a batch process. Walk-ins are thus more
difficult to accommodate and students must wait at least a few hours before receiving a
placement or referral to another subtest. Relatively few are thus able to take a second subtest on
the same day and only one in five who must come back a second day for another session ever do.
Colleges using MDTP compensate for this problem by making much less use of referral to
another subtest assuming that the greater length of each MDTP subtest enables accurate
assessment even at the upper and lower limits of each subtest.

Finally, though reporting diagnostics is seen as a key advantage of MDTP over other
placement instruments, few faculty provided details about how they would use them to improve
overall remedial math instruction. While ACCUPLACER and COMPASS offer diagnostic tools, colleges must pay an additional fee to use them, which seems to discourage their use.

Setting and validating cut scores, determining multiple measures

Placement into a math class is based on a student’s test score and points awarded through multiple measures. At LACCD, administrators and faculty cannot manually determine students’ final placement since scores are determined by a common data system. Each college determines what cut scores and multiple measures they use to place students in math. In practice, colleges use cut scores to determine a student’s initial placement and then add multiple measures to determine their final placement.

College math departments are charged with setting cut scores largely because it is felt across campus that faculty know best on how to gauge a student’s math skills and abilities. Directors of institutional research and matriculation coordinators take an auxiliary role, providing data and conducting analysis to facilitate the process of setting cut scores.

Faculty utilize various methods to determine where to set cut scores. The most common methods includes faculty taking the placement test while pretending to be a student whose knowledge and skills fit a specific math class, and examining cut scores used by other colleges. Other methods include using the cut score guidelines published by research institutes and examining results from disproportionate impact studies. Faculty members using ACCUPLACER failed to mention referring to guidelines published by the College Board to set cut scores.

Math faculty also report that the process of setting cut scores involves much trial and error. Faculty have the difficult task of setting cut scores in a way that simultaneously minimizes and balances the number of false positives – students who should have been in a course but were not – against the number of false negatives – students who should not have been placed in a
course but were. Because factors other than skills and previous knowledge also determine student success, it is extremely challenging for faculty to determine proper student placement in math classes. For this reason, colleges do not validate cut scores periodically.

A review of placement criteria reveals that math cut scores vary substantially by college, despite the fact that some colleges benchmark cut scores against other colleges, and teach essentially the same math curriculum. Table 1 shows cut scores used to place students who took the ACCUPLACER arithmetic test, one of three ACCUPLACER’s subtests. From this data we learn that a student who took that test in College A and obtained a score of 35 would have been placed into pre-algebra. That same student would have been placed into arithmetic at College B. We see these same patterns for colleges using COMPASS and the MDTP. Differences in cut scores become less visible in the transfer-level subtests, irrespective of the placement instrument used. We hypothesize that these similarities may be grounded in the fact that transfer-level math courses are articulated to California’s public universities and, thus, course standards are more uniform.

Faculty do not use a common method to measure the effectiveness of their cut scores on placing students in the appropriate math class. Methods typically examine perceptional data from student surveys and faculty surveys, anecdotal data, as well as quantitative data on student grades and completion rates. Roughly half of the colleges report comparing success rates between students who placed directly into a course versus those who acquired the pre-requisite by passing the antecedent course.
On average, the student background questionnaire requires students to answer 20 questions, a restricted number of which are treated as multiple measures. Colleges vary in the number of multiple measures they use for placement, as well as the number of points they award through multiple measures. While one college used two multiple measures, another used six. Points awarded through multiple measures ranged from -2 to 5, suggesting that multiple measures could hurt or benefit students, particularly those whose test scores are located around a cut point. We also found that the majority of questions that count as multiple measures assess a student’s self perception of their cognitive rather than non-cognitive abilities. Matriculation coordinators, institutional researchers and faculty almost universally regarded multiple measures as insignificant. By and large, they treated the incorporation of multiple measures in placement decisions as a matter of a legal compliance.

5 An example of a question used as a multiple measure: “What is the highest level of Math that you have completed, with a grade of a grade of ‘C’ or higher”?
Consequences of assessment and placement policies on testing and placement in math

By analyzing transcript data, we found that the majority of students across the nine colleges placed students in the two lowest levels of the developmental math course sequence (Figure 1). Nearly two-thirds of all students who took the math assessment test at one of the five ACCUPLACER colleges placed into either World Numbers, arithmetic or pre-algebra. Disaggregating the data by college, we found an inconsistent set of placement distributions across colleges (Figure 2). This is likely a consequence of the wide variation we see in cut scores. College E placed roughly 53 percent of its students in arithmetic (four levels below transfer), whereas College I placed only two percent at that level. In some instances these variations can be seen as efforts to accommodate the curriculum to substantially different distributions of student math ability across the colleges. Although faculty want to teach classes with students of similar academic abilities, they disagree on what types of placement policies can group academically similar students together. Placement decisions to some degree may also be influenced by the availability of faculty during a particular semester.

Another consequence of cut score disparities is the diversity of subtests students take for placement. Figure 3 shows the type of ACCUPLACER subtests used to place students in College A, by each course constituting the developmental math sequence. We find that roughly four out of five students placed into elementary algebra took only the Elementary Algebra exam, 17 percent took the Elementary Algebra and College-Level Math tests, being referred from one of these to the other, and only two percent took the Elementary Algebra and Arithmetic tests. Because students can take multiple tests as a result of an automatic or manual branching mechanism, it is exceptionally difficult to determine where cut scores should change to improve placement accuracy. Indeed, adjusting cut scores requires faculty to essentially predict how
changing one cut score will move students of various academic abilities across multiple subtests with different cut scores. This complexity has made it difficult for faculty to make only but incremental changes to their cut scores.

Determining where cut scores should be located is the first step that faculty must complete to refine their placement process. Next, faculty must understand how multiple measures affect placement decisions. From our data, we find that of the total number of students assessed (N=17,800), only 1,028 students were awarded multiple measure points that moved them into a higher math level. That is, only six percent of all students assessed in the 2005-2006 academic year benefitted from multiple measures. Disaggregating that statistic by college and course level, we find that multiple measures can significantly impact a student’s placement in some instances (Table 3). In College E, roughly 25 percent of students were placed into pre-algebra instead of arithmetic as a result of multiple measures. These students represented nearly 24 percent of all students placed into pre-algebra at this college. We find similar evidence in College D. While these statistics illustrate the largest impacts multiple measures had on moving students to a higher math level, we also find smaller impacts at other colleges, where zero to nine percent of students benefitted from multiple measures.

These findings contradict a common belief shared by math faculty that multiple measures are irrelevant to placement because they are worth only a few points. The little importance attributed to multiple measures may partially explain why their validity in predicting student success is not explored. However, some faculty had definitive views on what constituted ideal multiple measures with roughly half reporting recency in math, motivation, and “life factors” as the best non-cognitive measures to predict student success.
Consequences of assessment and placement policies on enrollment in and progress through the math sequence

We found that approximately 10 percent of all students who were assessed did not attend at least one class in college; as the placement level increases this figure becomes larger (Table 2). Whereas approximately 20 percent of students placed five levels below transfer-level math did not enroll in college within a year of assessment, only six percent of students placed one level below transfer made the same decision. A similar pattern appears when we focus on the relationship between placement and enrollment in math. Roughly 45 percent of students placed five levels below transfer never enrolled in a math course compared with 18 percent of students placed one level below transfer. Approximately 27 percent of all students assessed in math never enrolled in math. This finding contrasts results presented by Bailey, Jeong, and Cho (2010) who report that roughly 17 percent of all students who placed three levels below transfer-level math did not enroll in any remedial course math compared with 34 percent of students who placed one level below transfer. It is possible that this difference is attributable to types of community colleges sampled by Bailey, Jeong, and Cho (2010). On the whole, our results convey a positive relationship between placement level and enrollment in college and math.

In addition, a student’s progress through the math sequence increases considerably with a student’s initial level of math enrollment. Using data from the 2005/06 and 2006/07 cohorts, Figure 4 illustrates that only two percent of students whose first math class was arithmetic successfully completed a transfer-level math course, whereas 70 percent of students whose first math class was a transfer-level math passed a similar level class over a three-year period. The low numbers of students passing transfer-level math may reflect students’ pursuit of an
associate’s degree, which only required passing elementary algebra. Only 28 percent of all students whose first math course was arithmetic completed it successfully. That figure increases to 35 percent for pre-algebra students, 36 percent for elementary algebra students, 42 percent for intermediate algebra students, and 70 percent for transfer-level math students. These statistics suggest that students enrolled in lower math levels encounter factors that make it more difficult to succeed in their first math class than students enrolled in higher math levels. Based on our analysis, it appears that these factors persist when students progress through the math sequence. This concern not only emerges from our results, but also from those reported by Bailey, Jeong, and Cho (2010) who use Achieving the Dream and NELS data.

Conclusions

The placement test is the typical mechanism determining the length of time a student must spend in developmental coursework. Getting placement wrong risks placing students in a needlessly labyrinthine series of remedial courses, and ultimately jeopardizes a student’s chances of enrolling in college-level coursework, obtaining an Associate’s degree, or transferring to a four-year institution. Such a scenario is worrisome not just because it has the potential to endanger our nation’s economic future, but also because it threatens a student’s chances for upward economic mobility, social connectedness, and civic engagement.

Efforts to improve the accuracy of placement must begin with developing a fundamental understanding of how assessment and placement processes work across our nation’s community colleges. The growing movement to standardize assessment and placement policies in

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6 In 2007, the Board of Governors adopted changes to Title V increasing math requirements for an Associate’s Degree from elementary algebra to intermediate algebra for students first enrolling college in the 2009-10 academic year.
community colleges, coupled with our increased interest to evaluate their impact on student success, only serve to underscore that we – as researchers and community college leaders - must reexamine silos that have thus far influenced us to think about assessment and placement as uniform across higher education institutions.

By examining the assessment and placement policies of nine colleges within a single district, the complexities and nuances of assessment and placement become acutely apparent. Each of the three instruments used by LACCD’s colleges has multiple moving parts that together inform a student’s placement. To get placement right, colleges must make sense of how cut scores not only determine a student’s final placement, but also how they determine the multiple subtest paths students can take to obtain their final placement score. Complicating matters, colleges must also evaluate whether their selected multiple measures work as an escape valve for students, who, for whatever reason, perform badly on placement tests, but otherwise ought to qualify for a higher-level math course.

Even though accurately placing students hinges on clear insight into how these different moving parts interact with one another, evidence from our study suggests that the majority of faculty and administrators are seldom aware of the complexities marking the assessment and placement process, and those who are find it difficult to navigate these complexities. Adjustments to cut scores are made in an incremental, trial and error fashion and are typically motivated by faculty dissatisfaction with students in a particular course. Faculty and administrators also attribute little importance to multiple measures, even though our evidence shows that they moved a significant proportion of students to a higher-level math class. Since multiple measures make a difference for students whose placement scores fall just below a cut point, we need to learn more about what information multiple measures ought to capture to
improve the exam’s placement accuracy and predictive power, as well as whether their current
cognitive focus should encompass a more non-cognitive one.

This study provides evidence that leaving A&P policies to the discretion of the colleges is
problematic, given that such a low percentage of students complete the developmental math
sequence and the complex design of placement tests. To increase success among students
assigned to developmental coursework will require the K-12 and higher education sectors to
agree on what it means to be college ready. In California, policymakers and education leaders
have recognized that improving assessment and placement is inherently connected with aligning
standards and curriculum across education sectors. A report published by Task Force on Students
Success (CCCSSTF, 2012) recommended that the K-12 and community college systems jointly
develop common standards for college readiness and career preparation. It also advocated for the
development of a centralized assessment system that uses information from diagnostic tests to
better determine in what areas students are academically strong and weak. Although these
recommendations can help to improve the efficiency and effectiveness of A&P policies, the
California Community College Chancellor’s Office (CCCCO) has little teeth to mandate their
implementation. In this instance, the heavily decentralized governance structure in California has
become an impediment for needed change.

Understanding assessment and placement has never been more important than it is today. The
large number of community college students entering developmental education and failing to
earn a college degree has prompted some states to rethink how developmental education is
delivered, and in the case of Connecticut, do away with developmental education all together.
While there can be no doubt that developmental education needs to be reformed, to argue that
developmental education puts all students on a path to nowhere is remiss and ultimately risks making a college degree an even more elusive goal for some students.

The success of efforts to reform developmental education will ultimately rest on a deeper commitment to define what it means to be college ready, and to design appropriate instruments that are aligned with what students ought to learn in high school. It will also depend on how effectively community college administrators and faculty can acquire and use data that can improve teaching and student outcomes. Such efforts can not only benefit California but also other states currently wrestling with identifying ways to improve the effectiveness of their developmental education programs.
References


James, J., Morrow, V.P., & Perry, P. (2002). *Study session on basic skills.* Board of Governors California Community Colleges.


Figure 1. Placement by mathematics level: Cohorts 2005-2009.

Figure 2. Distribution of placements in math of first-time students, Cohorts 2005-2007.
Figure 3. Distribution of math placement levels by ACCUPLACER subtests: College A, Cohorts 2005-2007.

Figure 4. Highest level of successful math completion after three years of initial enrollment level: Cohorts 2006-2009.
### Table 1

**Cut scores for math placement based on ACCUPLACER Arithmetic Test**

<table>
<thead>
<tr>
<th>Placement Level</th>
<th>Levels Below Transfer</th>
<th>COLLEGES</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>Below Arithmetic</td>
<td>&lt;=16</td>
<td>0</td>
</tr>
<tr>
<td>Arithmetic-105</td>
<td>&lt;=34</td>
<td>&lt;=64</td>
</tr>
<tr>
<td>Pre-Algebra-112</td>
<td>&lt;=64</td>
<td>&lt;=81</td>
</tr>
<tr>
<td>Elem Algebra-113/114</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Elem Algebra-115</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Higher Referral</td>
<td>&gt;=65</td>
<td>&gt;=82</td>
</tr>
</tbody>
</table>

Note: Scores for ACCUPLACER subtest range from 0-120.

### Table 2

**Post assessment enrollment by math placement level**

<table>
<thead>
<tr>
<th>Math Placement Level</th>
<th>5 levels below</th>
<th>4 levels below</th>
<th>3 levels below</th>
<th>2 levels below</th>
<th>1 level below</th>
<th>Transfer level</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>All colleges</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No enrollment within a year of assessment</td>
<td>19.2%</td>
<td>15.0%</td>
<td>10.5%</td>
<td>7.6%</td>
<td>5.5%</td>
<td>5.0%</td>
<td>10.1%</td>
</tr>
<tr>
<td>Never attended any class within a year</td>
<td>0.1%</td>
<td>0.1%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0.0%</td>
</tr>
<tr>
<td>Withdrew from all classes</td>
<td>3.5%</td>
<td>1.8%</td>
<td>1.2%</td>
<td>1.0%</td>
<td>0.8%</td>
<td>0.8%</td>
<td>1.3%</td>
</tr>
<tr>
<td>Enrolled other classes but not in math</td>
<td>21.4%</td>
<td>18.0%</td>
<td>15.4%</td>
<td>13.7%</td>
<td>11.8%</td>
<td>13.9%</td>
<td>15.2%</td>
</tr>
<tr>
<td>Subtotal never enrolled in math</td>
<td>44.2%</td>
<td>34.9%</td>
<td>27.1%</td>
<td>22.3%</td>
<td>18.1%</td>
<td>19.7%</td>
<td>26.6%</td>
</tr>
<tr>
<td>Enrolled but never attended first math class</td>
<td>6.7%</td>
<td>7.8%</td>
<td>7.7%</td>
<td>8.1%</td>
<td>8.3%</td>
<td>9.3%</td>
<td>8.0%</td>
</tr>
<tr>
<td>Dropped first math before no penalty deadline</td>
<td>7.1%</td>
<td>8.2%</td>
<td>9.2%</td>
<td>9.9%</td>
<td>10.0%</td>
<td>9.8%</td>
<td>9.2%</td>
</tr>
<tr>
<td>Remained but unsuccessful</td>
<td>29.0%</td>
<td>26.6%</td>
<td>27.6%</td>
<td>29.6%</td>
<td>27.4%</td>
<td>19.5%</td>
<td>27.3%</td>
</tr>
<tr>
<td>Successful in first math attempted</td>
<td>13.0%</td>
<td>22.5%</td>
<td>28.3%</td>
<td>30.0%</td>
<td>36.2%</td>
<td>41.7%</td>
<td>28.8%</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>N</td>
<td>1,826</td>
<td>21,648</td>
<td>20,333</td>
<td>18,734</td>
<td>12,416</td>
<td>4,632</td>
<td>79,229</td>
</tr>
</tbody>
</table>
Table 3

*Impact of multiple measures on placement: College D and College E*

<table>
<thead>
<tr>
<th>Course</th>
<th>Placement from Test Score Only</th>
<th>% Moved to Higher Level Due to Multiple Measures</th>
<th>% of Total Number Students Placed in Math Course Who Benefitted from Multiple Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>College D</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Math 101-World of Numbers</td>
<td>1,644</td>
<td>17.8%</td>
<td>6.2%</td>
</tr>
<tr>
<td>Math 105-Arithmetic</td>
<td>4,445</td>
<td>0.9%</td>
<td>6.2%</td>
</tr>
<tr>
<td>Math 112-Pre Algebra</td>
<td>1,151</td>
<td>1.2%</td>
<td>3.6%</td>
</tr>
<tr>
<td>Math 113/115-Elementary Algebra</td>
<td>555</td>
<td>1.1%</td>
<td>2.5%</td>
</tr>
<tr>
<td>Math 121-125-Intermediate Algebra</td>
<td>149</td>
<td>0.0%</td>
<td>3.9%</td>
</tr>
<tr>
<td>Transfer Level</td>
<td>19</td>
<td>0.0%</td>
<td>0.0%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>7,963</td>
<td>4.4%</td>
<td></td>
</tr>
<tr>
<td><strong>College E</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Math 105-Arithmetic</td>
<td>564</td>
<td>6.7%</td>
<td>23.8%</td>
</tr>
<tr>
<td>Math 112-Pre Algebra</td>
<td>162</td>
<td>24.7%</td>
<td>3.8%</td>
</tr>
<tr>
<td>Math 113/115-Elementary Algebra</td>
<td>1,044</td>
<td>2.3%</td>
<td>3.8%</td>
</tr>
<tr>
<td>Math 121-125-Intermediate Algebra</td>
<td>1,983</td>
<td>0.4%</td>
<td>1.2%</td>
</tr>
<tr>
<td>Transfer Level</td>
<td>523</td>
<td>1.3%</td>
<td></td>
</tr>
</tbody>
</table>