



LEADERSHIP ACADEMY FOR STUDENT SUCCESS

Pathways Project Implementation Memorandum

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RE: The use of multiple measures to address the equity gap in college math completion
DATE: May 31, 2022

EXECUTIVE SUMMARY/INTRODUCTION

Achieving the Dream’s updated equity statement challenges higher education institutions to “interrogate the disconnect between institutionalized practices that impact student success and the systematic structures and processes that continue to oppress and exclude students based on the intersections of race, ethnicity, gender identity, language, (dis)ability, sexual orientation, economic status, and/or religion” (Achieving the Dream (ATD) 2022). As our team examined our pathways project through an equity lens, we were compelled by our institutional data surrounding math completions. Each of our institutions seeks to ensure inclusive student access, completion and post-secondary success in transfer and career pathways leading to in-demand, high wage careers. Many of these career and academic pathways require student success in college math.

Completing College level math within the first academic year has been found to be one of the predictors of credential and/or bachelor degree attainment within six years. Colleges across Ohio have implemented co-requisite models to eliminate barriers created by developmental math. Despite overall increases in the completion of College level math within the first year, equity gaps persist for students in three areas: race/ethnicity, Pell eligibility and traditional/non-traditional student status. Based on our research, our team is proposing that community colleges move towards a multiple measures implementation for math placement using metrics that focus on assessing equity achievement gaps.

RELEVANT LITERATURE REVIEWED

Our initial literature review focused primarily on literature on developmental math reforms across the country. Many of these reforms focused on transitions to co-requisite models, the development of math pathways, applying conceptual learning to real-world problems, implementation of study skills courses alongside developmental math, and compressed development math courses. A review of our institutional [Completion Plans](#) revealed that each of

our institutions have implemented some level of developmental math reform by implementing co-requisite models and have goals to support equitable increases in math completion.

Further review of the literature revealed another important reform in equitable math completion; the implementation of multiple measures. Multiple measures replace the high-stakes single placement exam (e.g. ACT, Accuplacer, etc.) as the determining factor in math placement that can dictate a student's entire academic and career pathway.

Research has shown that using one measure, such as ACT scores, to make complex predictions of a student's success could actually decrease the predictive ability of a placement process (ASCCC, 2014). In an effort to address the issue, colleges have adopted multiple measure models for placement. EdSource, a reputable multimedia education platform defines multiple measures as "an approach that relies on more than one indicator to measure a student's academic strengths or weaknesses" (Allen, 2018). The concept of multiple measures assessment is a well-established research approach that promotes impartiality and accurate placement (Lam, 2021).

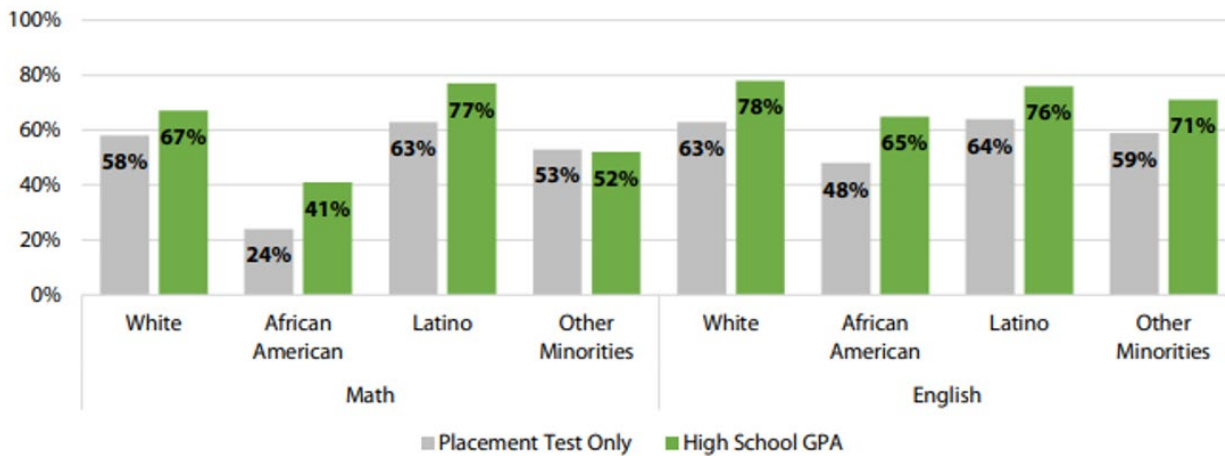
The use of multiple measures for college readiness has been and is currently in use at several public community colleges, yet some institutions still feel the process hasn't resulted in addressing equity concerns. However, our research showed that one Nevada community college believes they have a model that addresses both gateway math completion and closes the equity gap.

DATA EXAMINED

The Nevada System of Higher Education Board of Regents (2019) reported that Davidson County Community College (DCCC) in Nevada adopted a full-scale, multiple measures placement model in the 2013-14 academic year. The Multiple Measures for Placement policy established a four-tier hierarchy of measures to determine student readiness for college-level gateway courses. The first measure looked at students with a high school transcript in the last 5 years with an unweighted high school GPA of 2.6 or higher and 4 years of high school mathematics including Algebra II. The second measure focused on students who did not meet the first criteria and used specified ACT or SAT subject area scores. The third measure allows new college students to place directly into college level courses if they have previous college credit indicating college readiness and finally, the fourth measure is used when a student does not meet any of the above requirements. In this case, DCCC administered a diagnostic placement test.

Upon implementation of the policy, the disaggregated student data showed that when using high school GPA, there was a significant increase in gateway math completion rates. African American students showed a 17% increase, Latino students showed a 14% increase, and white students showed a 9% increase in completion rates (see Fig.5). This is evidence that multiple measures in practice increases access to college-level courses for underrepresented populations.

Figure 5. DCCC: Gateway Completions by Placement Mechanism



Source: CCCSE Davidson County Community College, Academic Years 2013-14 and 2014-15

Additionally, we considered research conducted by the Center of Analysis for Postsecondary Readiness (CAPR) of seven community college within the State University of New York (SUNY) system. The SUNY study was a random assignment review of a multiple measures placement system that assessed student outcomes based on placement accuracy.

The study was conducted using a status quo system for all seven community colleges. This process began with the review of student’s applications to each college to determine which placement method they must use. Students who were exempt from placement testing the exemptions was based on scores on the Regents exam, AP exam, or SAT. Students who could not be exempted were scheduled for testing. Placement determined by this method became the control group.

The researcher then created a model for estimating the relationship between high school GPA and success (defined as earning a grade of C or higher) for both math and English. Through an extensive review of historical data from all seven colleges, they developed an algorithm (Fig.6.) that analyzed the probability of failure based on several factors including high school GPA and placement test scores. This algorithm model all took into consideration the chance of under placement and overplacement in the college-level course. Placement determined by this method became part of the program group (Barnett, Bergman, Kopko, Belfield, & Roy, 2018).

Figure 6.

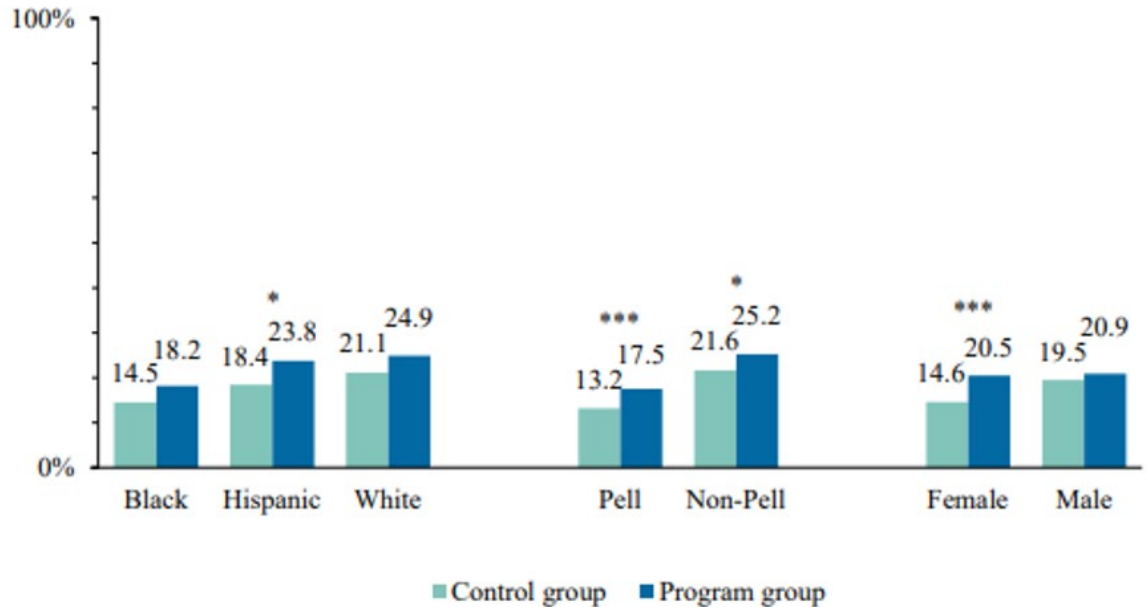
$$(5) \quad \text{Pr}(\text{Fail}) = \alpha + (\text{HS GPA})\beta_1 + (\text{ACCUPLACER})\beta_2 + X\beta_3 + \varepsilon$$

Fig.7 shows students in the program group produced both positive and statistically significant effects on all three demographic outcomes in both math and English. Based on the results for math, students in the

program group were, on average, 3.1 percentage points more likely to enroll in and complete (with a grade of C or higher) a college-level math course during their first term.

Figure 7.

Enrollment in and Completion of College-Level Math (Among Enrolled Students)



*** $p < .01$, ** $p < .05$, * $p < .10$.

PROPOSED CHANGES/REFORMS TO BE ADOPTED

Based on this research and the current success of multiple measures within our own institutions, our team is proposing community colleges move to an aggressive implementation of multiple measures for math placement using metrics that focus on assessing equity achievement gaps.

This would require a reassessment of any current multiple measure programs to ensure that data collection and reporting are strategically aligned from admissions to enrollment. In addition, collaborative efforts between community colleges would be essential to implementing a program on campuses currently without a multiple measures program.

IMPLEMENTATION CHALLENGES

Our team acknowledges the potential challenges of our proposed initiatives. To help with adoption of this policy, our project includes a compilation of resources to address the concerns listed below.

One of the barriers to implementing a multiple measures model involves getting buy-in for the changes. There are many stakeholders at the college that need to be involved in the process, and it is critical that all of them are consulted during the planning stages. Each group will be affected differently, whether the model changes existing processes or creates new ones. Changing how students are placed into courses is a complicated process that will undoubtedly

encounter problems along the way. The variety of perspectives brought by the diverse group of stakeholders that are impacted can help anticipate challenges that may arise. Proceeding without consulting some of the groups affected by the process can lead to costly delays or changes to implementation.

Data from high school transcripts is one of the most common additions in a multiple measures model. This is often a time and resource intensive source of data. First, the college must collect the data from the students, in the form of paper or electronic transcripts. Then an employee must manually enter the data into the system, which introduces the risk of data entry errors. Some interpretation of the transcripts may be required, especially regarding the different grading systems and course titles used by high schools. It may be difficult to compare GPAs across different schools as well as different time periods. The validity of grades, and whether they are an accurate measure of student preparedness, is especially salient now due to the effects of COVID-19 on K-12 education.

Using additional sources of data for student placement will necessarily affect course prerequisites and course offerings. Often one of the goals of implementing a multiple measures model is to increase the number of students placed in college-level courses during their first semester. This leads to higher enrollment in college-level math courses, and lower enrollment in developmental or remedial math courses. These shifts in enrollment will necessitate more course sections of college-level courses, and fewer sections of developmental courses. In Ohio, colleges have shifted away from offering developmental courses in favor of college-level courses with a co-requisite requirement for students with lower standardized test scores. How colleges implement the co-requisite model, especially regarding student agency in course selection, will influence the impact the additional data have on course enrollment. Regardless, colleges need to be deliberate about course offerings and staffing decisions when implementing a multiple measures model.

CONCLUSION

Success in College level math has several implications for student success, not least of which is a potential increase in student self-efficacy and an openness to consider programs in the STEM fields that lead to careers with higher wages. We started our project by sharing the importance of the completion of math in the first year of a student's enrollment as one measure of student success. However, we have also learned that getting our students access gateway math can be hindered at the very start based on the types of measures we have in place. Our research shows that implementing a multiple measures assessment policy increases the likelihood of students being placed in College level math and may reduce equity gaps.

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