In Brief

Illinois STEM College and Career Readiness: Forging a Pathway to Postsecondary Education by Curbing Math Remediation

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In a knowledge-based economy, a postsecondary credential is vital for gainful employment and upward socioeconomic mobility. By 2020, 65 percent of all jobs will require some postsecondary education, up from 28 percent in 1973 (Carnevale & Strohl, 2013). Among 25 to 64 year-olds in the United States, the median earnings difference between a high school diploma and an associate's degree in 2010 was $10,313.00 (National Center for Higher Education Management Systems, 2014). When considering a baccalaureate degree, lifetime earnings are nearly double the earnings of individuals with only a high school diploma (Carnevale, Jayasundera, & Cheah, 2012). A postsecondary degree correlates with non-financial benefits as well, including high levels of civic and family engagement, participation in low-risk health behaviors, and low levels of incarceration (Oreopoulos & Petronijevic, 2013; Pascarella & Terenzini, 2005). In short, a college degree matters because today's labor market calls for highly skill individuals to compete for increasingly technical jobs.

NOT COLLEGE OR CAREER READY: THE PROBLEM OF REMEDIATION

Unfortunately, the path a student takes from high school graduation to college course work is too often characterized by a troubling detour, namely, *remediation*. According to Complete College America (2012), over half of first-year students attending community college require at least one remedial course in English or mathematics. The challenge for students is one of academic catch up, which translates into extra time and money spent. Just 62 percent of students in remedial courses reach college readiness. In short, the costly path through remediation often means never reaching the intended destination: a postsecondary credential.

The problem of remediation is often one of misalignment between high school and college curricula. Picture a high school path that brings a student to the endpoint after a four-year journey. The next path will take the student through college and into a career, except that the new starting point is far away from where they stopped in high school. How can realignment occur in order to map a new, continuous path from high school through college?

Illinois STEM CCR: Math Intervention Before Remediation

In 2013, the Illinois Community College Board (ICCB) launched the STEM College and Career Readiness (STEM CCR) project as an academic intervention in high school mathematics and as a preemptive effort to help students avoid math remediation once they enter college. Through the Illinois Race to the Top grant and prepares students for careers in STEM and career-technical education (CTE). STEM CCR provides funding for seven community colleges in urban and rural Illinois to collaborate with local high schools to prepare students for college-level math before they graduate high school. It is a preemptive effort (see Table 1).

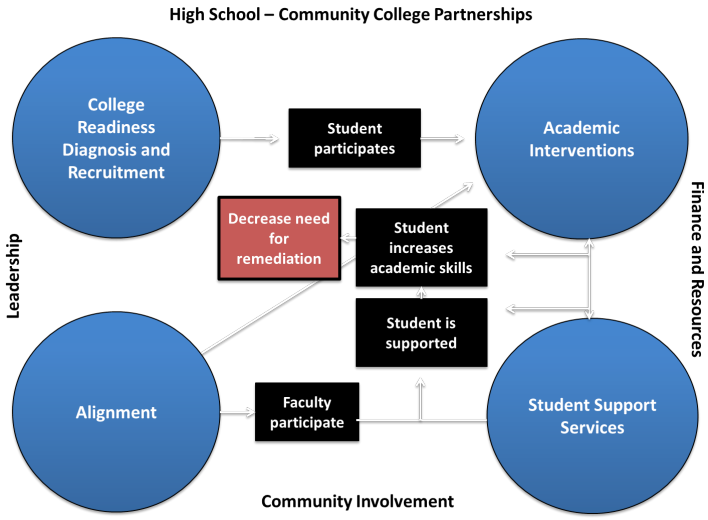
Table 1: Illinois Community College-High School STEM CCR Partnerships

Harold Washington College, Chicago, IL
Kenwood Academy
St. Rita HS
Marist HS
Ogden International HS
Ace Tech
Walter Peyton HS
South Shore International
Heartland Community College, Normal, IL
Normal West HS
Normal Community HS
Bloomington HS
Tri-Valley HS
Pontiac HS
Illinois Central College, East Peoria, IL
Richwood HS
East Peoria HS
Illinois Eastern Community College, Olney, IL
East Richland HS
Mt. Carmel HS
Newton HS
John Wood Community College, Quincy, IL
Western HS
Olive Harvey College, Chicago, IL
Corliss HS
Chicago Vocational
Wilbur Wright Community College, Chicago, IL
Lakeview HS
Taft HS

THE STEM CCR MODEL

The STEM CCR project is designed according to the College and Career Readiness Model developed by the Office of Community College Research and Leadership (OCCRL) (Bragg & Taylor, 2014; Taylor, Linick, Reese, Baber, & Bragg, 2012). Based on OCCRL's evaluation of an earlier pilot CCR program in Illinois, the model entails the integration of five main elements (see Figure 1):

Figure 1: STEM CCR Model



Context

STEM CCR begins with an educational, community, and financial environment that fosters successful programs.

- *Leadership*: The energy and dedication of chief academic officers, deans, faculty chairs, high school principals, department chairs, and others to rewrite the educational map between high school and college mathematics.
- *Partnerships*: Solid connections between high schools and community colleges through ongoing communication and joint planning.
- *Community Involvement*: In recognizing the cultural, social, and economic factors that influence student participation and performance in school, student clubs, civic organizations, and parent-teacher groups are brought into the equation. These groups represent the support system for students as they tackle a new, more intensive and rigorous kind of coursework.
- *Finances and Resources*: Adding into the mix questions of sustainability, scalability, and alignment with long-term readiness plans (e.g., connecting school to career activities, increasing high quality pathways that engage students STEM, providing human, technical and fiscal resources necessary to advance college and career readiness initiatives).

Alignment

Building on leadership and solid partnership, High School-Community College (HS-CC) curriculum alignment is vital. This can mean shared syllabi, coordinated instructional approaches, and collaboration between instructors, administrators, and counselors.

College Readiness, Diagnosis, and Recruitment

STEM CCR next turns to the students themselves by identifying and enlisting students who would most benefit from this kind of academic intervention. Recruiting — primarily juniors and seniors — can come from many sides: teachers and counselors, parent outreach, school and assembly announcements, flyers and websites. Using Compass® as a placement tool, STEM CCR focuses on students who test just below college readiness; primarily in the low-to-medium readiness need range. Specific Compass® scores defining low and medium readiness vary from institution to institution.

Academic Intervention

The academic intervention is the coursework, which takes two forms. During fall and spring terms, STEM CCR offers algebra and geometry courses on high school campuses taught by high school or college faculty. During the summer "bridge," students attend algebra and geometry courses on the partner-community college campus. Course instructors during the summer bridge are most often college faculty.

Student Services

Just as "Context," above, concerns the supporting environment for STEM CCR, "Student Services" entail the supporting context for students. On the academic side this means faculty or peer tutoring, online assistance, and note taking help. It also means college admissions counseling, financial aid orientations, and career counseling. In addition, on the non-academic side, it means workshops and help with time management, health and wellness, and other factors that contribute to a student's academic success.

LESSONS LEARNED: A CLOSER LOOK

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STEM CCR works best when community colleges collaborate with high school administrators at all levels: district, school, and department. At the district level, if the STEM CCR program gained significant energy and attention from the assistant superintendent (or above), the scope of the intervention was wider. At the school level, if the leading guidance counselor is involved, student participation levels tend to be higher. At the department level, math instructors who had occasions to communicate (formally or informally) with their colleagues at the community college demonstrate more support for the STEM CCR intervention. The following section highlights opportunities for growth for STEM CCR interventions at the seven Illinois community colleges and their high school partners.

Harold Washington

The Early College Coordinator and the Dean of Instruction at Harold Washington have led the STEM CCR efforts, but they received support from the college math faculty, developmental education director, as well as the math department chairs. Executive administrative support was characterized as being "incredibly supportive" and onboard with what STEM CCR is seeking to accomplish. At the high schools, the principals, math faculty, and counselors were integral to the implementation of the program. Harold Washington also plans to explore opportunities with the Urban League and other community-based organizations to expand the support system and even offer courses or tutoring on weekends.

Olive Harvey

Collaboration between Olive Harvey and high school faculty extends to class management, pedagogical practices, and curricular alignment. High school faculty report gaining additional knowledge about concepts covered in specific math courses at (e.g.

intermediate algebra). In turn, community college faculty report gaining greater appreciation for classroom management and innovative pedagogical practices they observed from the high school instructor. High school faculty also reports that students appreciated the presence of a community college faculty member in the high school classroom. For students, the experience with community college faculty served as a transitional bridge from high school to college. The collaborative, co-teaching experience is building trust between individuals at the high school and community college levels, setting up development of more sustainable conversations between departments and, eventually, across systems of education..

Wilbur Wright

A significant success for Wilbur Wright is their move to engage students at an earlier stage in high school. Through a pilot program with Lake View High School, the Assessment and Learning in Knowledge Spaces (ALEKS) program was employed. ALEKS is an artificially intelligent assessment and learning system that is web-based and used to determine what students do and do not know in algebra. Lake View has approximately 300 students in their incoming freshman class. However, less than 25 typically place out of algebra. A cornerstone of this intervention is freshman orientation, which takes place in the summer before the freshman year. During orientation, the ALEKS program is used to assess student math abilities followed by six weeks of math instruction if they do not place out of algebra. In a sense, Wilbur Wright is pioneering a new kind of intervention that helps students avoid math remediation in high school.

Wilbur Wright reports challenges as well, especially in student attendance. Some students attend in the beginning of the program but do not complete it; others show up for the first time weeks into the program and miss crucial first steps. Another challenge is the inconsistency of some students to do academic work outside the program.

Heartland

Heartland emphasizes modularized learning as the primary pedagogical approach for the academic intervention. Specifically, they used the Pearson product MyLabPlus (MLP). MLP software is modularized to identify specific math needs for each student. The curriculum begins with a pre-algebra module and moves through intermediate algebra. At each module, students watch a lecture video while taking notes in a guided workbook, complete homework programs, and then take a quiz. With a passing score, students then progress to the next module. During class, while students work independently, instructors circulate around the classroom to assist students. Instructors also track student progress through a classroom management system. If a group of students is stuck on a similar concept, the instructor gathers the class for a group discussion. Students can also access program material online, allowing them to work beyond the classroom space.

EVALUATING A NEW PARADIGM FOR CCR

The contemporary standards-based schooling context under the Common Core has increased the demands on educators to produce students who are college and career ready. The rise in concern regarding college access, academic preparedness, and postsecondary education completion calls for a revisiting of how college readiness is defined, and a reformulation of the policies and programs that promote college readiness (Darling-Hammond, Wilhoit, & Pittenger, 2014; Tierney & Sablan, 2014). Therefore, examining curriculum alignment, definitions of academic preparedness, student recruitment for interventions, and the availability of student support services leads to a deeper understanding of the complex issue of college readiness.

Alignment

Not surprisingly, alignment between high schools and community colleges is essential to support student achievement and/or transition to college on both administrative and instructional levels. In addition to curricular cohesion, alignment discussions focus on increasing consistency with pedagogical practices (e.g. problem-based learning, use of modular learning programs, calculator policy) across secondary and postsecondary environments. Collaborative conversations between high school and college faculty appear to be a strong base for fostering systematic and sustainable alignment.

Diagnosis and Recruiting

With one exception, the sites use the Compass® placement test to diagnose college readiness in math and to recruit students who fall below college readiness. Most sites focus on assisting low- and medium-need students. However, the definition of "low" and "medium" varies across sites. Most use the algebra domain but there are multiple levels of algebra, and the sites do not calibrate the Compass® test to the same levels. Some sites begin the test in the pre-algebra domain, while others start with the college algebra domain. In turn, the wide variety of standards points to the challenge of measuring success and comparing results between sites.

Intervention

Each CC-HS partnership offers its own set of STEM CCR courses across a range of levels, from pre-algebra to intermediate-algebra to geometry. The pre-algebra to geometry sequence prep enables students to be ready for college level math in their high schools or to take their first college level mathematics course when they matriculate to community college. During the school year, courses take place on high school campuses during designated periods and after school. In the summer, students attend class on community college campuses for shorter terms but, typically, for longer class periods.

After school, programs have smaller enrollments and can offer students more intense instruction. Conversely, embedded interventions (during the school day) have larger enrollments with a wider range of math needs. Additionally, not all high school partners are willing to collaborate on an embedded math intervention. After-school interventions face competing activities from other academic programs (e.g. SAT prep) and extra-curricular activities (athletics, student clubs, etc.).

One challenge for STEM CCR has been the use of the Compass® test to assess improvement at the end of the program. Since there are no immediate benefits to students, the test is often viewed as a low-stakes event and is not always taken seriously at the end of the intervention. STEM CCR avoids using post-test Compass® scores as part of the student grade evaluation for the course as the test is designed as a diagnostic for placement rather than a holistic measurement of student learning.

Support Services

During summer 2013 and 2014, many sites incorporated college and career readiness topics within the intervention. The typical structure was to focus on academic content in the morning and college and career skills in the afternoon (with a break for lunch, provided at a few sites). Throughout the academic year, incorporating student support services presents more challenges, particularly for services embedded in a high school math course. Covering college and career topics took away from instructional time, a key concern at many high schools. Similarly, there were concerns with extending after-school programs beyond an hour for logistical reasons, most notably transportation concerns and potential conflicts with other after-school activities. Some sites reported that the college already offered support services for high school students, and delivering new services would duplicate existing efforts and could result in low attendance. In all, student services in support of coursework seem to be both the highest ideal for the program and the least realized part of STEM CCR thus far.

CONCLUSION

Efficient and aligned partnerships between high schools and colleges may assist in creating approaches that will enable meaningful learning that prepares students for college and careers. The current era of accountability and assessment for college and career readiness standards under the Common Core has taken root nationally and is a reality for P-20 institutions. STEM CCR is one approach by which schools in the State of Illinois have sought to work toward fostering student progress, readiness, and access to higher learning. The approach of STEM CCR as a means of curbing remediation and building student capacity to embark on college-level coursework is a laudable endeavor. To date there have been promising preliminary results as well as systemic challenges should STEM CCR programs fail to benefit the students this initiative was designed to serve. Through fall 2015, additional data will be gathered on student participation and outcomes to evaluate the programs of the CCR sites regarding how the various interventions serve to mitigate underpreparedness for college and career.

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