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STEM-Focused Technology-Mediated Advising Reform: Plans for Implementation by Four Colleges

By Markeisha Grant

Jobs in science, technology, engineering, and math (STEM) fields currently make up 20 percent of all employment in the United States (Educause, 2015), and job prospects in STEM fields are expected to grow. Yet for some time policymakers and others have been concerned that the nation is not producing enough college graduates with skills in high-growth STEM fields to meet employer demand (Xue & Larson, 2015). Roughly half of all STEM jobs require less than a bachelor's degree (Rothwell, 2013).[1] Therefore, community colleges certainly have a role to play in fulfilling this demand, both by preparing students for transfer into appropriate STEM bachelor's degree programs and by educating students through STEM career and technical education (CTE) programs for direct entry into the labor market. Carrying out this role could bring great benefit to first-generation students, low-income students, and students of color, who are underrepresented in STEM fields generally but who are highly concentrated in community colleges. By producing more STEM graduates, community colleges could both help underrepresented students pursue college and career paths that have good labor market outcomes and help regional employers and the nation's economy as a whole. Thus, there is a need to understand how community colleges can increase the "flow" in what has been called the "pipeline" of STEM workers. Some colleges are considering the use of enhanced advising and student supports as a means to increase the numbers of students who complete STEM programs.

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In order to support community colleges in this work, in 2015 The Helmsley Charitable Trust provided grants to four Achieving the Dream (ATD) Leader Colleges to engage in STEM-specific iPASS reform beginning in fall 2016.[2] iPASS, or Integrated Planning and Advising for Student Success, is a whole-school reform approach that uses technology to promote, support, and sustain long-term, intrusive advising relationships with students. The goal of the STEM-focused iPASS projects the colleges are embarking upon is to use iPASS to improve student persistence and completion in STEM programs—particularly among first-generation students, low-income students, and students of color—in order to meet local and nationwide workforce demands. The four colleges just completed a one-year planning period; iPASS implementation is expected to begin in fall 2016.

As part of an evaluation of the colleges' work, CCRC has conducted pre-implementation site visits and will conduct post-implementation visits at each of the four colleges. The primary goals of CCRC's fieldwork are to understand (1) how iPASS is being implemented within the institutional context of each college, (2) how colleges are tailoring iPASS to meet the needs of STEM students, (3) whether colleges are experiencing transformative change over time, and (4) what effect iPASS appears to be having on student outcomes.

The first round of site visits, conducted in spring 2016, provided a general understanding of the iPASS implementation plans at each institution. Researchers were particularly interested in how colleges might be tailoring their iPASS reform plans to meet the needs of STEM students. Two CCRC researchers visited each of the four Helmsley-funded colleges over two or three days and conducted individual interviews with a total of 69 participants, including 21 members of the iPASS implementation committees at the colleges (such as iPASS project directors, contributors to the iPASS proposals, and IT personnel), 31 end-users (individuals who are the primary users of iPASS technology tools such as faculty members and advisors), and 17 high-level administrators (e.g., presidents, provosts, and deans). In these interviews we asked participants (depending on their roles in the college's reform effort) about their reasons for adopting iPASS, their rationale for choosing a STEM focus, and their implementation plans. We also asked questions to better understand their college's practices for advising and student support services, with an emphasis on STEM students. Each interview lasted approximately one hour and was audio recorded with the consent of the interviewee. During our first round of visits, colleges were in the planning year, getting ready to begin iPASS implementation in fall 2016. A second round of site visits, to be conducted in fall 2017, will further explore iPASS implementation, the role of iPASS in producing transformative change over time, and possible improvements in student outcomes.

This brief presents preliminary findings from the first round of site visits on how these four institutions are approaching STEM-focused iPASS, their rationale for selecting STEM students and programs as a focus for the reform, and their implementation plans. It is important to note that implementation plans may have changed since the time of CCRC's visit; this brief thus presents findings about the perspectives on STEM iPASS as it was understood at the time the data were collected. This brief begins with an overview of the colleges. It then explores the colleges' rationale for STEM-focused iPASS reform and their plans for scaling up iPASS, and then discusses early evidence of transformative change. The names of the colleges used below are pseudonyms.

Overview of the Colleges and Their Implementation Plans

River Fork College is a small community college enrolling about 3,000 students located in the rural Midwest. The college has experienced tremendous growth over much of the past decade, especially in STEM fields. Ninety-five percent of River Fork students currently enroll in CTE programs, and nearly 70 percent are majoring in STEM programs. However, the college has experienced significant decreases in student enrollment over the past couple of years, and it wants to use iPASS as a way to improve student retention. River Fork has selected the Jenzabar Academic Planner and Jenzabar Retention software as the technology tools for its STEM-focused iPASS implementation. The Jenzabar Academic Planner will allow for multiple-semester planning to ensure that students are taking the necessary courses to complete their programs, and it will provide advisors with alerts if students enroll in a course outside of their established plans. The Jenzabar Retention tool will provide a case management system for improved communication between faculty advisors and general advisors through shared case notes, the tracking of student progress, and the provision of non-academic information such as each student's College Student Inventory score (used to identify incoming students who are at risk of dropping out) and financial aid awards.

Oak Park College is a medium-sized community college in the Southwest enrolling about 8,000 students that is part of a larger university system, which includes the main university campus and a few other community colleges. The college wants to use iPASS to create a systemic process

for tracking student degree plans and maintaining shared case-specific documentation. While there are already existing technologies for degree audit and early alerts at Oak Park, they are not used by all advisors, and student/advisor meetings are typically conducted using both computer- and paper-based processes. As part of its plans for iPASS, the college aims to integrate the three disparate technologies it currently uses for credit tracking, degree audit, and early alerts into one comprehensive system. This effort includes replacing the current early alert technology with Ellucian CRM Advise, as the current tool is difficult to use, has limited functionality, and cannot integrate with the other technology.

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Orange Hill College is a small minority-serving community college enrolling about 4,000 students that is one of about a dozen two-year and four-year colleges that make up a state system. This college was chosen by the system as the pilot site of an iPASS reform at least in part because of the system's confidence in the Orange Hill leadership and the leadership's enthusiasm for student success initiatives. The system currently uses Banner for student records, Ad Astra for course and facility scheduling, STAR for degree audits, and Starfish for early alerts and advising appointments. However, the system-level IT department maintains the flexibility to customize tools to reflect the student services structure and the particular objectives of each individual college. Indeed there is substantial variation in the ways in which and the extent to which the colleges within the system use these technologies. As part of its iPASS pilot at Orange Hill, the system plans to (1) integrate PAR predictive analytics into Starfish and (2) add degree maps to STAR (which will allow students to create their course schedules and register for courses). These technical upgrades to Starfish and STAR are part of a larger effort to improve and re-introduce these tools in order to increase take-up among advisors and faculty. The system anticipates that the iPASS reform pilot at Orange Hill will serve to proactively identify and better support at-risk students and foster a culture of shared responsibility for student success with an emphasis on more holistic advising and support services.

Milford Beach College is a large community college enrolling about 15,000 students located in the Southeast. One important challenge at Milford Beach is the significant number of students it loses between the application and enrollment period. Therefore, the iPASS project at Milford Beach has a heavy focus on "on-boarding," or ensuring that new students are provided with intensive and personalized advising during their first interactions with the college. The college's primary goal for iPASS is to launch the EAB program planning tool that will enable students to identify academic and career goals and create long-term academic plans. A secondary goal is to launch the EAB early alert system to replace their current paper-based system.

Rationale for the STEM Focus in iPASS Reform

Meeting Workforce Needs and Preparing Students for Good Jobs

The colleges elected to focus on STEM in their iPASS reform efforts as a means to increase the number of STEM program completers and thus better meet local and national workforce needs. For instance, nearly 20 percent of all jobs in the major city near Oak Park College are in STEM fields, and they pay higher wages than other jobs in the area. Oak Park thus recognizes the importance of STEM education to meet the demands of employers and to prepare students for fields experiencing strong job and wage growth. Similarly, in the state in which Orange Hill College is located, jobs in healthcare and technical occupations are expected to grow considerably in the next few years, and the college wants to respond to this growth. Much in the same way, the interest in STEM at Milford Beach College derives in large measure from an increase in the number of high-tech companies in the area. The college is also responding to a growth in interest among students wanting to pursue credentials in more specialized STEM fields. The college currently

offers 75 STEM-related programs and places high priority on aligning program offerings to local industry needs.

A similar rationale exists at River Fork College, where many persons in the surrounding community are struggling economically. The area served by the college is below national and state averages in terms of the percentage of the population with a postsecondary education, and it has high levels of unemployment and poverty. At the same time opportunities for skilled employment are expected to grow. For example, the demand for medical technicians and health information management workers is anticipated to grow substantially in the coming years. To help address this skills mismatch challenge, the Midwestern state in which River Fork is located has prioritized middle-skill STEM education pathways and has launched initiatives to increase dual enrollment, to strengthen CTE, and to expand work-based learning options. River Fork wants to create a well-defined and well-understood trajectory for its STEM programs to help more dual-enrolled students transition successfully to River Fork following high school graduation, decrease the time to program completion, and ensure that the college continues to equip students with the skills necessary for jobs in high-growth areas.

Attracting Underrepresented Students to STEM

The colleges are also pursuing STEM-focused iPASS as a way to attract and retain more underrepresented students into STEM fields. Low-income and first-generation college students and students of color are underrepresented in STEM programs nationwide and in these colleges. This has prompted the colleges to think more deliberately about strategies for getting more students from these populations to enter and complete STEM programs of study. Such strategies include actively recruiting underrepresented students and creating pipeline programs such as the middle-skills STEM-focused dual enrollment program at River Fork.

Using STEM to Pilot iPASS Reform

Three of the four colleges also elected to focus on STEM as a means of piloting their iPASS reform measures. These colleges plan to use a subset of STEM students in a pilot effort before moving to a whole-college iPASS reform. Using STEM programs and STEM students as the basis for a pilot is intended to help ensure that the iPASS reform works well with a small group of students before scaling it as an institution-wide intervention.

River Fork College plans to pilot iPASS with three of its selective admissions programs in allied health and will use iPASS to provide greater support for students participating in these middle-skill STEM pathways. The selective admissions programs are competitive, require an additional application process, and are comprised of small cohorts allowing for intensive faculty and staff interactions. One specific reform aim is to help high school students who are in dual-enrollment programs gain admission into these selective admissions programs at the college. The institution plans to hire an additional advisor to support high school students interested in pursuing these programs as part of its iPASS work.

Similarly, Milford Beach intends to pilot its new course planning tool with a small group of STEM students. The college has selected the STEM-oriented information technology (computers and networking) and engineering associate of applied science programs (which are focused on direct entry into the labor market) and STEM-oriented associate of science programs (which are focused on transfer to bachelor's degree programs). One of the college's primary goals is to create individual online learning plans for each participating STEM student so that each student has a clear map of all the coursework he or she needs to complete to fulfill program requirements. Having this map will facilitate ongoing conversations with a trained STEM advisor.

Orange Hill College plans to pilot its iPASS reform with students enrolled in the relatively new associate of science program in natural science, which is designed for students who intend to transfer to bachelor's degree programs. Orange Hill College and its larger system are specifically

interested in increasing enrollment and expanding this program in an effort to ensure its sustainability.

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These three colleges will use their pilots to inform the implementation of iPASS for the entire institution. Plans to use iPASS tools for STEM students have already begun to raise questions about advising and registration at these colleges, and the STEM pilots will provide answers and help determine what larger institutional changes may need to take place for the colleges to launch iPASS at scale. For instance, Milford Beach was reconsidering the roles of its "navigators," college personnel from the college's one-stop center, during our visit. The role of navigators was recently expanded. Navigators had previously focused only on registration assistance, but they are now beginning to lead orientation activities. However, several questions have arisen about whether navigators should also provide academic advising, which is currently done by faculty members, and the STEM pilot will allow the college to see how the approach works and determine whether or not further changes to the navigator role are necessary before it scales up its iPASS reform.

Scaling iPASS as a Whole-College Reform

Even though River Fork, Orange Hill, and Milford Beach chose to pilot iPASS using STEM, the colleges certainly do not view iPASS as a STEM-only intervention; they plan to scale iPASS as a whole-school reform once it is working smoothly in the pilot phase. At that point, iPASS will presumably begin to touch all students in all certificate and degree programs, not just STEM students.

Oak Park College is distinct from the other three colleges in that it has chosen to forgo its STEM pilot and proceed instead with a much larger system-wide reform. Upon learning about the receipt of the Helmsley grant at Oak Park, the larger university system of which it is a part committed additional funds to pay for a larger scale implementation. This resulted in the system having greater control over the iPASS implementation process at Oak Park, and it contributed to the decision to use a whole-college approach from the start rather than first undertaking a STEM pilot.

This whole-college approach might work better for Oak Park due to the organization of the university system of which it is a part. The system administers and maintains the IT department for Oak Park and all other colleges in the university system; therefore, any new software implementation at Oak Park College must be approved by the system and must be implemented across its colleges. Accordingly, plans have been made to launch the iPASS early alert tool system-wide. However, this whole-college, whole-system reform is not without its challenges. The inclusion of multiple institutions in the iPASS implementation has led to communication and coordination issues and has delayed the implementation plan due to lack of consensus on the customization of the iPASS early alert tool. To address these challenges, the system has created an iPASS task force to coordinate implementation efforts and facilitate communication between multiple campuses.

Early Evidence of Transformative Change

Despite the challenges encountered by Oak Park, the approach the college is taking is certainly consistent with Karp et al.'s (2016) iPASS theory of action in that iPASS is conceptualized as a whole-school reform. When implemented as designed, iPASS is intended "to touch all students throughout their educational careers, involves multiple departments within a college, and requires institutions to rethink how they deliver an array of services" (Karp et al., p. 3). In order for colleges to substantially improve their advising services and provide students with the support that they need to be successful, substantial change across the whole college is likely required. One might therefore expect to see change at Kezar's (2013) three levels of organizational functioning: structure, process, and attitudes. Structural change refers to modification to the organization or design of broad systems and

policies—for instance, creating a centralized location for all student services resources at a college. Process change refers to change in practices, individual engagement, and behavior—such as starting to regularly reach out to students, engage in conversations about challenges to completion, and enter case notes using shareable iPASS technologies. Attitudinal change refers to underlying attitudes, values, and beliefs among participants. Faculty, administrators, and staff making student support an institutional priority (instead of a single-department responsibility) is an example of attitudinal change.

All four colleges were either planning to make or starting to make structural and process changes across the entire college (not just in STEM departments) before our visits. Structural changes at River Fork College included creating a one-stop center housing all its student support services in a centralized location and hiring an iPASS advisor to support its dual-enrolled students in their application process to the college as part of its iPASS initiative. River Fork also changed its intake and orientation processes and has moved to a joint model of advising between faculty advisors and general one-stop advisors. Similarly, Orange Hill College plans to create a one-stop student success center, and Milford Beach College plans to restructure its current one-stop center to make it more comprehensive. The aim in developing these centers is to make it easier for students to know where to go to get help and to allow the support staff to more easily coordinate how they serve students. Milford Beach has recently begun to expand the role of its navigators so that they not only provide registration assistance but also lead student orientation activities.

The colleges have thus begun to plan or make some important changes; we will further explore transformative change over time and the impact of iPASS on student outcomes during our second visit to the colleges in fall 2017.

Conclusion

iPASS is intended as a whole-college reform that uses technology to promote, support, and sustain long-term, intrusive advising relationships for all students. However, engaging in a smaller STEM pilot might be a useful way to start an iPASS reform and ensure that it is working as intended before implementing it broadly across an institution. Further investigation may help to reveal additional advantages of undertaking a pilot iPASS implementation before scaling it up.

One benefit of starting their iPASS reforms with STEM students and programs for the colleges under study here is that it provided a mechanism for drawing attention to a population of underrepresented students who have much to gain by enrolling in and completing STEM programs. Stakeholders at the colleges want to retain more underrepresented students in STEM programs so that such students can gain credentials that are highly valued in the labor market, and they anticipate that iPASS reform, coupled with other student support services, will serve that goal well.

Community colleges can play an important role in helping students obtain a STEM-focused education that leads to promising career outcomes, both by preparing students for further education in bachelor's degree programs in STEM fields and by preparing students for middle-skills STEM jobs that require an associate degree or certificate. As institutions consider iPASS reform, striking a balance between emphasizing support for STEM students and non-STEM students is important because ultimately iPASS is about whole-college reform. The colleges in this study will help inform and document the challenges and opportunities in finding this balance as they seek to think holistically about changes to structures, processes, and attitudes that are required to scale iPASS.

Endnotes

1. Lundy-Wagner and Chan (2016) devised a classification of three STEM program categories relevant to community colleges based on the course offerings at the Virginia Community College System. These programs included: (1) traditional STEM fields (e.g., engineering or biology); (2) allied health STEM fields (e.g., licensed practical nursing or occupational therapy); and (3) technology and technician STEM fields (e.g., automotive technology or heating, ventilation, and air conditioning [HVAC] technician), which tend to be more vocational in nature but still have requirements in math or science.

2. ATD is a comprehensive non-governmental reform movement for student success comprised of more than 200 colleges across 36 states. The Leader College designation is awarded to community colleges that commit to improving student success and closing achievement gaps. The four Leader Colleges that received Helmsley grants are part of a larger cohort of 26 institutions that are implementing iPASS (the remaining 22 colleges in the cohort—some of which are also ATD colleges—received grants from the Bill & Melinda Gates Foundation to engage in iPASS reform for their entire student populations). As part of the larger cohort of iPASS colleges, the four colleges under study here will be participating in a range of evaluation activities, including analysis of key performance indicators (such as credit accrual and program completion).

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CCRC COMMUNITY COLLEGE RESEARCH CENTER

TEACHERS COLLEGE, COLUMBIA UNIVERSITY

Community College Research Center
Teachers College, Columbia University
525 West 120th Street, Box 174
New York, New York 10027
Tel: 212.678.3091 Fax: 212.678.3699
ccrc@columbia.edu
http://ccrc.tc.columbia.edu