Symposium Justification

The proposed symposium focuses on *Evidence on the Effectiveness of Using Technology-based Interventions and Practices to Support Postsecondary Success.* The first paper examines the extent to which rigorous evidence supports expert recommendations on promising uses of technology in postsecondary education. The evidence that supports these recommendations collectively has high internal validity, but it demonstrates the need for large-scale studies that examine the impacts of technology based interventions on postsecondary learning outcomes. The two other papers in this symposium describe current studies that answer that call – these studies serve as exemplars of large randomized control trials that will strengthen the evidence base on the role technology can play in supporting postsecondary success.

The first paper, *Using Technology to Support Postsecondary Learning: New Recommendations from a What Works Clearinghouse Practice Guide,* focuses on an upcoming (January 2019) report intended to provide higher education instructors, instructional designers, and administrators with five evidence-based recommendations for supporting learning through the effective use of technology. This paper will provide an overview of the process of developing the practice guide and describe the strengths and weaknesses of the evidence used to support each recommendation. The paper will conclude with specific strategies to support practitioners' implementation of the expert panel's recommendations, as well as a discussion of opportunities to further the evidence base for the use of technology to support postsecondary learning.

The second paper, *Study of Enhanced College Advising in Upward Bound: Impacts on Steps Toward College,* features an RCT that tests whether promising college advising strategies could improve college outcomes for students in federally-funded college access programs, including Upward Bound. It examines early indicators of college going hypothesized to reduce college undermatch (meaning students do not attend college or choose a college that is less selective than their academic credentials would allow). The study tested promising strategies for advising that were combined into a low-cost advising approach called *Find the Fit*, which included text or email messages customized to where students were applying. These programmed messages were sent to high school students from the end of their junior year through the end of their senior year. The messages included reminders about application and enrollment deadlines, *Find the Fit* materials students could use, and links to financial aid resources.

The final paper, *Studying the Integrated Planning and Advising for Student Success (iPASS) at Three Institutions*, highlights findings from RCTs conducted at three institutions to enhance iPASS, an approach to redesigning advising services around technologies to support high-quality advising. Technologies include education planning tools, counseling and coaching tools, and risk targeting technologies. In iPASS, integrated technology helps advisors focus holistically on students' college experience, including education and career planning, study skills, nonacademic support, and course registration. The enhancements evaluated in this study were designed to give students and advisors better, personalized data about their academic progress, to help advisors intervene earlier, to facilitate advising sessions informed by rich data sources, and to help advisors and students make adjustments to reach students' academic goals.

Paper #1: Using Technology to Support Postsecondary Learning: New Recommendations from a What Works Clearinghouse Practice Guide

Background/Context

Colleges are increasingly using technology to improve the quality of student learning; make active and engaged learning available throughout institutional offerings; and help students become more successful learners. Developed in conjunction with an expert panel, a new What Works Clearinghouse Practice Guide entitled *Using Technology to Support Postsecondary Learning* focuses on the most promising uses of technologies associated with improving postsecondary student learning outcomes.[1] It provides higher education instructors, instructional designers, administrators, and other staff with specific recommendations for supporting learning through the effective use of technology. The Practice Guide findings reflect the intersection of the expert panel's professional opinion on best education practice and evidence gleaned from group design studies that meet WWC's rigorous standards for high quality evidence.

Purpose/Objective/Research Question

The Practice Guide makes five evidence-based recommendations around how to use technology to support postsecondary learning. Relevant studies were reviewed, rated, and summarized in according to the What Works Clearinghouse Procedures and Standards Handbook (version 3.0) and the criteria defined in the Practice Guide Review Protocol.[2] Each recommendation includes examples of technologies and how to implement them, advice on how to overcome potential obstacles, and a summary of the research evidence that supports the recommendation.

This paper, the first to be presented in the proposed symposium *Evidence on the Effectiveness of Using Technology-based Interventions and Practices to Support Postsecondary Success*, will provide an overview of the process of developing the Practice Guide on *Using Technology to Support Postsecondary* are presented below, along with summary statements of what studies met those criteria, were determined to meet WWC Standards, and were ultimately included in the Practice Guide.

- **Setting.** To be eligible for review, studies must be conducted in college settings in the United States. Some studies were conducted at multiple institutions, but most were conducted at a single institution.
- **Population/Participants/Subjects.** To be eligible for review, the study sample must be composed of students enrolled at institutions of higher education. Nearly all studies that met WWC Standards had participant samples of undergraduate students, and two studies also included graduate students.
- **Intervention/Program/Practice.** To be eligible for review, studies must examine impacts of pedagogical strategies that utilize technology on at least one of the following

[1] The Practice Guide is currently being reviewed by IES' Standards and Review Office and is scheduled to be publically released in January, 2019. The specific recommendations in the Practice Guide are embargoed until release and, therefore, are not included in this abstract.

[2] The Practice Guide Protocol will be publicly available in January 2019, and the final paper will include a link to it.

outcomes: academic achievement; college attendance; credit accumulation and persistence; attainment; post-college employment and income; or student engagement and motivation. The technologies featured in the studies that met WWC Standards were designed to support communication and collaboration; varied course formats and delivery modes; self-regulated learning; feedback on student performance; and complex problem solving. Studies that met WWC Standards included outcomes primarily in the academic achievement domain, some of which were narrowly defined. Some studies also include credit accumulation outcomes.

- **Research Design.** To be eligible for review, a study must use a design with a strong counterfactual. The vast majority of the studies that met WWC Standards were randomized controlled trials (RCTs) with low levels of attrition. A small number of studies were either high-attrition RCTs or well-designed quasi-experimental designs (QEDs) that demonstrated that the treatment and comparison groups were similar at baseline on relevant outcomes.

Data Collection and Analysis

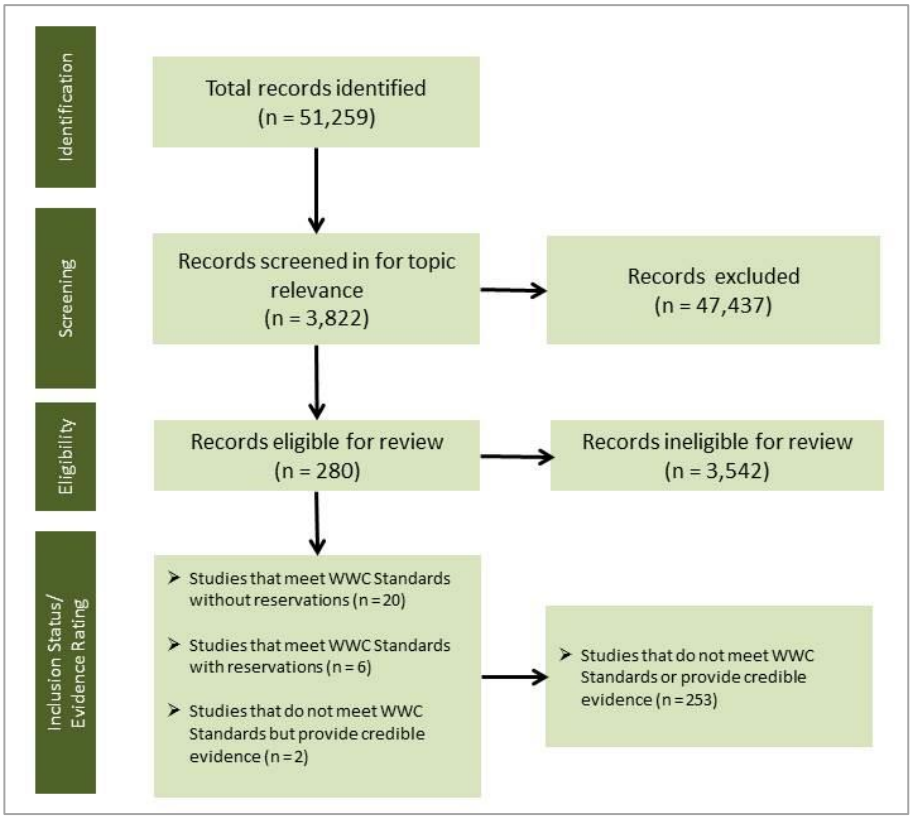
Data used to support the Practice Guide recommendations were generated by the systematic evidence review. The literature search performed for this review generated more than 50,000 studies, which were screened for relevance. Those screened in were reviewed for eligibility according to the criteria described above. Eligible studies were reviewed by WWC-certified staff against the WWC Standards. Once the review was complete, studies were assigned an evidence rating. Those studies determined to meet WWC Standards were classified as having a positive or negative effect on student outcomes if the findings were statistically significant. See the flowchart below for the number of studies identified, screened, deemed eligible, and ultimately included as supporting evidence in the practice guide.

Learning and describe each of the five recommendations developed by the expert panel. In describing the recommendations, the strengths and weaknesses of the evidence used to support each recommendation will also be discussed. The paper will conclude with specific strategies to support practitioners' implementation of the expert panel's recommendations, as well as a discussion of opportunities to further the evidence base for the use of technology to support postsecondary learning.

Review Criteria

A comprehensive literature search was conducted to identify studies potentially relevant to the practice guide. Studies had to be published between 1997 and 2017 and examine practices for using technology to support learning in postsecondary settings. Definitions of the review criteria

Exhibit 1. Studies identified, screened, and reviewed for practice guide



Findings/Results

Recommendations will be presented along with a description of the evidence that supports each recommendation. Some recommendations are supported by stronger evidence than others due to variation in the number of studies, research design, consistency of effects, and sample size. The extent of evidence will be discussed for each recommendation, as well as the expert panel's guidance for "How to Implement the Recommendation" and "Potential Obstacles and the Panel's Advice."

Conclusions

The Practice Guide on *Using Technology to Support Postsecondary Learning* is designed to be used by college and university instructors, administrators, and advisors seeking ways to support instructional practices and student learning with technology. Recommendations are presented that are supported by evidence that meets rigorous evidence standards. However, the findings are presented in a way that is intended to be actionable. Where appropriate, the suggestions for how to carry out a recommendation include tips and tools for instructional designers, technology developers, instructors, and administrators.

Despite identifying sufficient evidence to support the recommendations in the Practice Guide, there is a clear need for more large-scale group design studies to help the field better understand

the conditions under which technology can best be used to support postsecondary learning. The remaining two papers in this symposium offer examples of the types of research that can provide practitioners with evidence on the effectiveness of using technology-based interventions and practices to support postsecondary success.

Paper #2: Study of Enhanced College Advising in Upward Bound: Impacts on Steps Toward College

Background/Context

Where students go to college, not just whether they go, is key to their educational attainment and later economic success.[3] However, 41 percent of students nationally *undermatch*—meaning they do not attend college or they choose a college that is less selective than their academic credentials would allow. This issue is more acute among students from lower socioeconomic backgrounds,[4] for whom cost, application logistics, and concerns about falling short are real barriers to their attending more selective colleges.

Purpose/Objective/Research Question

Concern about undermatching prompted the U.S. Department of Education to test whether promising advising strategies, previously tested in more limited settings and with different populations, could improve college outcomes for students in its college access programs, including Upward Bound. This paper examines early indicators of college going hypothesized to reduce undermatch.

Setting

The Upward Bound program is designed to help high school students from disadvantaged backgrounds prepare to enroll in and complete postsecondary education, reports high rates of college going among its project participants.[5] However, these students, like many low-income students, may miss opportunities to enroll in more selective or higher quality colleges. As such Upward Bound is an important context in which to test strategies to increase the quality of colleges students attend and reduce college undermatch.

Population/Participants/Subjects

Of the 702 eligible Upward Bound projects, 194 projects volunteered to participate. These projects included 4,443 rising 2015-16 seniors who were the focus of the study. The characteristics of participating projects and students were similar to those of all eligible Upward Bound projects and students.

Intervention/Program/Practice

The study tested promising strategies for advising that were combined into a low cost approach called *Find the Fit*, including practical help on the logistics of applying to colleges, supports to

---

[3] Bowen, W.G., Chingos, M.M., and McPherson, M.S. (2009). *Crossing the Finish Line: Completing College at America's Public Universities.* Princeton, NJ: Princeton University Press; Dillon, E.W., and Smith, J.A. (2017). *The Consequences of Academic Match between Students and Colleges* (CESifo Working Paper No. 6344). Munich, Germany: Center for Economic Studies and Ifo Institute (CESifo). http://hdl.handle.net/10419/155586; Hoxby, C. (2001). The Return of Attending a More Selective College: 1960 to the Present. In M. Devlin and J. Meyerson (Eds.), *Forum Futures: Exploring the Future of Higher Education, 2000 Papers.* San Francisco: Jossey-Bass.

[4] Smith, J., Pender, M., and Howell, J. (2013). The Full Extent of Student-College Academic Undermatch. *Economics of Education Review, 32*(2013): 247-261.

[5] U.S. Department of Education. (n.d.). *Upward Bound and Upward Bound Math-Science Grantee-Level Performance Results: 2013-14.* Washington, DC: Author. https://www2.ed.gov/programs/trioupbound/ubgranteelevel-exp1314.pdf

reduce hurdles in applying for financial aid and understanding costs, and approaches to widen and raise students' aspirations and expectations regarding college choice. *Find the Fit* was made available to students through three components: college planning materials organized in personalized student folders with some information tailored to their likely college opportunities; training webinars for their advisors; and text or email messages customized to where students were applying. These programmed messages were sent to students about twice a month from the end of their junior year through the end of their senior year. The messages included reminders about application and enrollment deadlines, *Find the Fit* materials students could use, and links to financial aid resources.

Research Design

Projects were randomly assigned so that half were able to integrate *Find the Fit* into their regular services for their seniors (the treatment group, project n = 98 and student n = 2,336) while the other half did not receive access to *Find the Fit* until after the study period ended (the control group, project n = 96 and student n = 2,107).

Data Collection and Analysis

The study draws on administrative and survey data. The surveys consisted of a baseline student survey and a follow-up student survey conducted in the spring of students' senior year of high school; data for two of the outcomes come from the follow-up survey, which had a response rate above 80 percent. Administrative data included program data and data for the third outcome, Free Application for Federal Student Aid (FAFSA) completion, from the Federal Student Aid (FSA) office data; data from both sources were available for all students. For each outcome, the average value for the treatment group was compared with that of the control group using a regression model that took into account the demographic and academic characteristics of participating students and projects at baseline as well as clustering of students within projects.

Findings/Results

Because the delivery of regular Upward Bound services varies across projects, *Find the Fit* offered suggestions but did not require that all of its components and materials be used. Overall, almost 90 percent of treatment projects implemented *Find the Fit* to a high (37 percent) or moderate (51 percent) extent. These varied levels of implementation translated into impacts. *Find the Fit* increased the share of students who applied to four or more colleges and also resulted in students applying to colleges of higher selectivity level. Because applying to more colleges is associated with higher chances of enrolling in college[6] and attending a more selective one,[7] *Find the Fit* advising included a recommendation to apply to at least four colleges and to colleges ranging in selectivity. Overall, students in treatment projects were 9 percentage points more likely to report that they applied to four or more colleges than were students in control projects (Exhibit 1, Panel 1). Students in treatment projects consistently applied to colleges at higher selectivity levels than did students in control projects. For example, 48 percent of

[6] Smith, J. (2013). The Effect of College Applications on Enrollment. *B.E. Journal of Economic Analysis & Policy, 14*(1): 151-188.

[7] Pallais, A. (2015). Small Differences that Matter: Mistakes in Applying to College. *Journal of Labor Economics, 33*(2): 493-520.

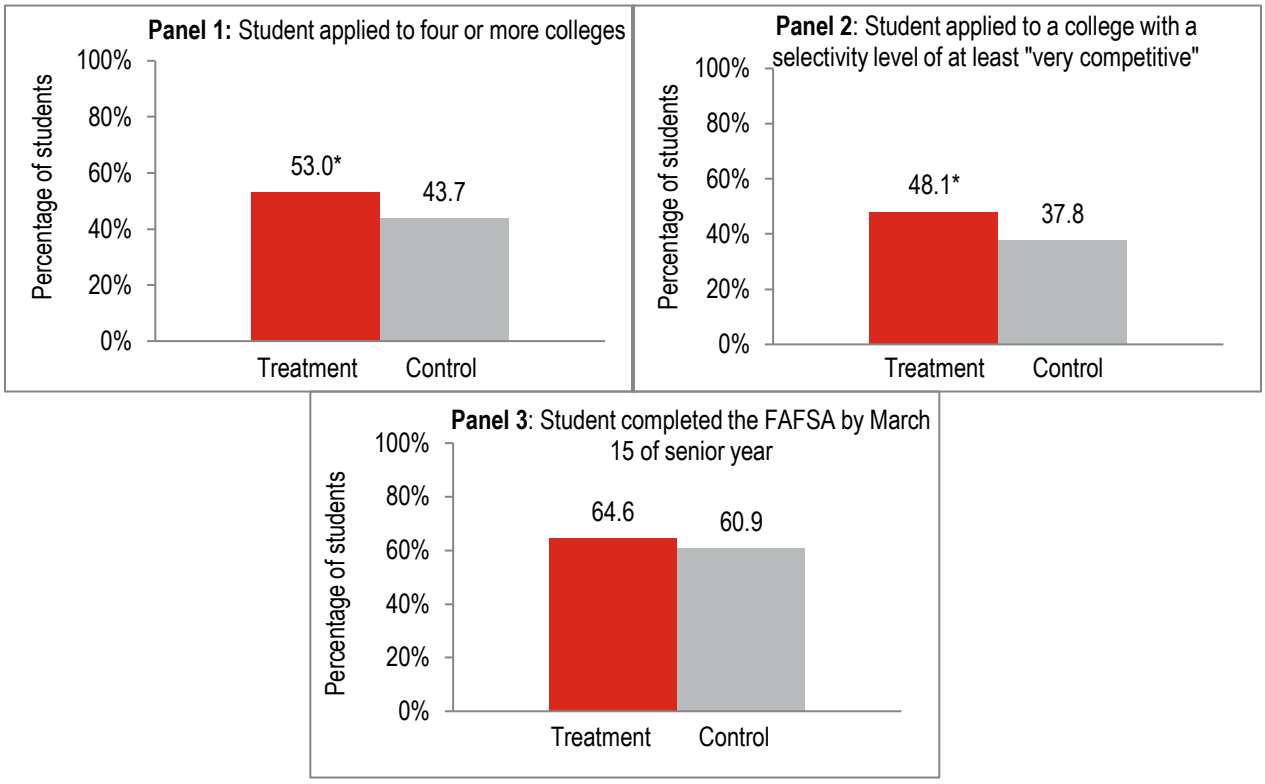
treatment students applied to colleges rated at least "very competitive" versus 38 percent of control students (Exhibit 1, Panel 2).

To help students feel more comfortable applying to more selective colleges, and to help them access all financial aid for which they are eligible, *Find the Fit* urged students to complete the FAFSA by a date when not only federal but also most state and individual colleges' aid is still available. *Find the Fit* did not have a significant effect on the overall share of students completing the FAFSA by March 15 of their senior year (Exhibit 1, Panel3), but it may have increased completion among some student subgroups underrepresented in college.

Conclusions

The effects on early indicators of college going suggest that *Find the Fit* may be more effective at changing concrete behaviors rather than mindsets. The findings support some of the hypothesized pathways to reducing college undermatch, but also raise some questions to be explored in the future about whether the effects on interim outcomes translate into improved college outcomes. A limitation is that the study is unable to disentangle the contributions of individual *Find the Fit* components to the outcomes.

Exhibit 1: Impact of *Find the Fit* on Early Indicators of College Going



Notes: *Difference is statistically significant at the .05 level. Sample for panels 1 and 2 = 1,920 treatment group students and 1,710 control group students. Sample for panel 3 = 2,336 treatment group students and 2,107 control group students. Percentage of students represents those who (panel 1) reported applying to four or more colleges by spring of their senior year in high school; (panel 2) applied to a college ranked as "very competitive" or above; and (panel 3) completed the FAFSA by March 15 of their senior year of high school. Treatment group percentage and impact are estimated using the study's regression model.

Source: For panels 1 and 2 – follow-up student survey 2016; for panel 2 – follow-up student survey 2016 and NCES-Barron's Admissions Competitiveness Index 2014; for panel 3—Federal Student Aid 2016.

Paper #3: Studying the Integrated Planning and Advising for Student Success (iPASS) at Three Institutions

Background

Postsecondary persistence and graduation rates for low-income students continue to be low at many open and broad access institutions. Advising has emerged as key strategy to support students, and colleges have been experimenting with a variety of new strategies. Integrated Planning and Advising for Student Success (iPASS) is an approach to redesigning advising services around new technologies, to support high-quality advising. Technologies include education planning tools, counseling and coaching tools, and risk targeting technologies. In iPASS, integrated technology is intended to help advisors focus holistically on students' college experience, including education and career planning, study skills, and nonacademic support, in addition to course registration. Since 2012, supported by multiple grants from various funders, including the Bill and Melinda Gates Foundation, 42 colleges have joined the iPASS initiative.

We are working with three institutions interested in causal evidence about the impacts of iPASS. Because the initiative involves system-level change, it could not be evaluated as a whole at each college. The research partners worked with the institutions to evaluate enhancements to the iPASS strategies using randomized controlled trials. Results will be used to refine, extend, and improve colleges' iPASS work.

Research Questions

The study is designed to answer the following questions:

RQ1: How did the colleges enhance their iPASS implementations?

RQ2: Did the iPASS enhancements produce a different experience for students compared with standard iPASS?

RQ3: Did the enhancements produce short-term gains in student outcomes, compared with standard iPASS?

RQ4: How can the three participating institutions colleges improve their iPASS implementations?

Setting

The study is being conducted at California State University, Fresno (CSUF); Montgomery County Community College (MCCC); and University of North Carolina at Charlotte (UNCC)—three institutions that have been working for several years in this area using previous iPASS grants. Table 1 briefly describes the three participating institutions.

Table 1. Participating colleges

College	Location	Size	Urbanicity
California State University, Fresno	Fresno, CA	24,000 students	Large City
Montgomery County Community College	Blue Bell and Pottstown, PA	11,500 students	Large Suburb
University of North Carolina at Charlotte	Charlotte, NC	29,000 students	Large City

Population

Eligibility criteria differed at each institution, but at a high level, continuing students at-risk of not graduating (using criteria defined by the college) were eligible for the study. Two cohorts of students were randomly assigned. The sample sizes for CSUF, MCCC, and UNCC are 1,219, 2,989, and 3,803, respectively. The measured background characteristics of both groups were similar at the outset of the study, as is expected in randomized experiments.

Program

The enhancements evaluated in this study were designed to give students and advisors better, personalized data about their academic progress, to help advisors intervene earlier, to facilitate advising sessions informed by rich data sources, and to help advisors and students make adjustments to reach students' academic goals. The intervention studied at each institution was a set of enhancements that used iPASS technologies to: (1) conduct targeted outreach to at-risk students; and (2) provide richer data to be used in enhanced advising sessions. The institutions used new technologies such as: predictive analytics to identify at-risk students; early alerts derived from course progress, degree and career planning tools, and personalized communication campaigns. Advisors used a new protocol to facilitate advising sessions and communication using the data gathered from these technology tools when meeting with students in-person. Students randomly assigned to the program group received the program for two semesters.

Research Design

To estimate the program's effects on students' academic outcomes, the evaluation uses a random assignment design with individual-level random assignment to compare students in a program group, whose members had access to the enhancements, with students in a control group, whose members had access to the college's standard advising services. Implementation research was conducted to measure implementation fidelity and treatment contrast.

Data Collection and Analysis

Student outcomes data includes student transcript records and implementation data includes a range of qualitative and quantitative data sources.

A linear estimation model will be used to estimate the effect of the program, as follows:

$$y = \beta_1 T + \sum \lambda_j Block_j + \sum \gamma_k X_k + \varepsilon \qquad (1)$$

Here, y represents a target outcome, such as persistence or credit accumulation. T is a binary indicator, equal to 1 if a student is randomly assigned to the program group and 0 otherwise. $Block_j$ is a vector of random assignment block indicators, equal to 1 if a student is in block j and 0 otherwise. Blocks are defined differently at each college, as stratification varied between colleges. Depending on the college, blocks are based on the unique college x advisor x cohort combination in which a student was randomly assigned. X_k is a vector of baseline characteristics that will be included in the model to improve the precision of the estimates of β_1 (Bloom, Richburg-Hayes, & Black, 2007). β_1 is an estimator of the average effect of the intent-to-treat (ITT) for the evaluation sample; weights will be used so that this estimator is unbiased.

Findings/Results

The enhancements evaluated in this study were designed to extend the use of new technologies to help improve student advising. Although the institutions made progress towards this goal, the enhancements led to more incremental changes, rather than dramatic changes in the student experience. Institutions also experienced challenges using predictive analytics tools, and had mixed results getting faculty to use new technologies. One college did experience some mixed successes in both of these areas, and as group, the colleges experiences provide lessons for the field. Several of the colleges have already made adjustments to their practices based on implementation findings. On the whole, the enhancements did not produce a strong treatment contrast, but interim findings about impacts on student outcomes will be released in time for presentation at the SREE conference, along with lessons synthesized from across the three institutions. The impact findings will also have been shared with the colleges, who are using the research findings to determine next steps.

Conclusions

iPASS is an ambitious initiative to integrate technology, data, and advising. Institutional practices are starting to visibly change, but movement is generally incremental in nature. The findings from this research suggest that absent more dramatic, technology-based changes to student support practices, these incremental changes will need to continue accumulating over time if technology is to produce big changes in students' experiences and outcomes.

References

Bloom, H. S., Richburg-Hayes, L., & Black, A. R. (2007). Using Covariates to Improve Precision for Studies that Randomize Schools to Evaluate Educational Interventions. *Educational Evaluation and Policy Analysis, 29*(1), 30-59.

Kalamkarian, H. S., Karp, M. M., & Ganga, E. (2017). What we know about technology-mediated advising reform. New York, NY: Community College Research Center, Teachers College, Columbia University.

Tyton Partners (2016). Driving toward a degree: The evolution of planning and advising in higher education, part 2: Roadmap for institutional adoption. from http://tytonpartners.com/tyton-wp/wp-content/uploads/2015/08/Tyton-Planning-Advising-Paper-2.pdf