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Strategies for Postsecondary Students in Developmental Education – A Practice Guide for College and University Administrators, Advisors, and Faculty

ies NATIONAL CENTER FOR EDUCATION EVALUATION AND REGIONAL ASSISTANCE

Institute of Education Sciences

About this practice guide

The Institute of Education Sciences (IES) publishes practice guides in education to provide educators with the best available evidence and expertise on current challenges in education. The What Works Clearinghouse (WWC) develops practice guides in conjunction with an expert panel, combining the panel's expertise with the findings of existing rigorous research to produce specific recommendations for addressing these challenges. The WWC and the panel rate the strength of the research evidence supporting each of their recommendations. See Appendix A for a full description of practice guides.

The goal of this practice guide is to offer specific, evidence-based recommendations for college and university faculty, administrators, and advisors working to improve the success of students academically underprepared for college. Each recommendation includes an overview of the practice, a summary of evidence used in support of the evidence rating, guidance on how to carry out the recommendation, and suggested approaches to overcome potential roadblocks. Each recommendation includes an implementation checklist, as guidance for getting started with implementing the recommendation.

Practice guides published by IES are available on the WWC website at http://whatworks.ed.gov

This report was prepared for the National Center for Education Evaluation and Regional Assistance, Institute of Education Sciences, under the WWC contract to Development Services Group, Inc. (Contract ED-IES-12-C-0084).

Disclaimer

The opinions and positions expressed in this practice guide are those of the authors and do not necessarily represent the opinions and positions of the IES or the U.S. Department of Education. Educators, colleges, universities, and organizations should review the practice guide and apply its recommendations according to their specific needs and goals. It is important to recognize that the practice guide represents the judgments of the review panel regarding what constitutes sensible practice, based on the research that was available within the publication timeframe established in the review protocol. This practice guide should be used as a tool to assist in decisionmaking rather than as a "cookbook" or "recipe" that contains instructions to be strictly followed. Any references within the document to specific education products are illustrative and do not imply endorsement of these products to the exclusion of other products that are not referenced.

Strategies for Postsecondary Students in Developmental Education – A Practice Guide for College and University Administrators, Advisors, and Faculty

November 2016

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Introduction to the Practice Guide on Strategies for Students in Developmental Education

Approximately one-third of students entering higher education do so without the necessary skills in at least one subject to enroll and succeed in college-level work.[1] Underprepared college students are less likely than their peers to complete their educational objectives. As an example, 1992's high school graduates who first entered community college and enrolled in at least one developmental education course had lower degree attainment rates 8 years after high school than first-time community college entrants who did not enroll in any developmental education courses (28% vs. 36%). For students first entering 4-year institutions, the picture was even bleaker, with students enrolling in at least one developmental course earning a degree at a much lower rate (52%) than first-time entrants to 4-year institutions not enrolling in developmental courses (78%).[2]

Colleges and universities have developed and adopted various strategies to help underprepared students acquire the skills and knowledge needed to move into college-level courses.[3] These policies and practices have been referred to as "developmental education," "remedial education," or "college-readiness programs."[4] While all of these labels are currently used in postsecondary education and have been debated, state policymakers, higher education administrators, and faculty recognize that these policies and strategies can help create conditions that give underprepared students the best chance of realizing their educational goals.

This practice guide brings together two distinct sets of evidence-based practices: those that focus on *instructional interventions*, and those that focus on *structural interventions*. More specifically, two of the six recommended practices focus on student and faculty interactions in the classroom. These interventions involve curricular decisions that affect the content and pacing of classroom instruction. The second set includes four practical recommendations focused on structure and largely involve systems for determining which types of supports will be offered or mandated for students in, or at risk of requiring, developmental education. Together, these six practices can help create a learning environment that maximizes the chances that students will succeed in their coursework and chosen degree program. These practices can be implemented widely, regardless of

existing policies on developmental or remedial education. However, without the support of policymakers and administrators, they will be difficult to implement at the institutional level.

Audience and institutions of interest

Administrators and faculty at institutions of higher education should find these practical recommendations helpful in meeting the needs of students who are underprepared for college-level work. Audiences that may be particularly interested in the instructional practices include program coordinators or directors of developmental education, curriculum design professionals, and faculty who teach developmental education. Certain interest groups, such as philanthropic leaders and associations engaged in developmental education reform, will find the evidence regarding instructional interventions for developmental education useful. Academic leaders in state and community colleges will be interested in interventions that mitigate the impact of lack of readiness for college-level coursework.

Audiences particularly interested in the structural interventions may include higher education administrators—especially those in financial aid offices, student counseling divisions, academic advisors, admissions offices,

articulation officers at community colleges and universities, and liaisons who collaborate with high school systems to foster college readiness. Administrative leaders—including presidents, deans, provosts, and department chairs—can find recommendations that shape practices at the institutional, college, or departmental level. Test developers may find the information on assessment and placement helpful as they work to create new assessments and refine existing ones.

While the majority of students in need of additional developmental education in higher education are enrolled in community colleges, four-year institutions also serve students with developmental education needs.[5] Even though the majority of the research with students in developmental education has been conducted in community colleges, this guide includes evidence conducted at four-year institutions that met our review criteria. Faculty, institutional leaders, and advisors from both sectors are encouraged to extrapolate from the recommendations and evidence presented for their own institutional contexts. The intended audience for this practice guide is all postsecondary institutions that serve students who are placed in, have been recommended to, or are at-risk of being placed into developmental education.

Scope of the practice guide

The goal of this practice guide is to present rigorously and systematically reviewed evidence in support of practical recommendations for improving outcomes for students at-risk for, or placed into, developmental education. The practice guide primarily focuses on interventions or practices aimed at improving students' progress through developmental education, credit accumulation and persistence, academic achievement, and degree attainment.

To determine the scope of the practice guide, expert researchers and practitioners initially considered more than twenty practices, and narrowed the focus to eight practice areas, based on available evidence and expert opinion. The eight practices identified were: 1) comprehensive and integrated support programs; 2) contextualized instruction; 3) early assessment programs for at-risk high school students; 4) enhanced and early alert advising; 5) performance-based monetary incentives; 6) practices to accelerate, compress, or mainstream developmental education; 7) practices to modify information used to make placement decisions; and 8) practices to teach metacognition, productive persistence, and college success skills. This introduction includes a description of how the assembled team of expert researchers and practitioners reviewed the evidence on these practices to develop and refine their final recommendations.

Based upon review of the evidence, the expert panel decided not to include practice recommendations for early assessment programs for at-risk high school students, and contextualized instruction (without compression or acceleration) in the practice guide. The expert panel also found little evidence to support broad practices to teach metacognition, productive persistence, and college success skills. With evidence on positive effects of teaching self-regulated learning to students in developmental education, the expert panel refined this practice recommendation to teaching self-regulated learning.

Even though the panel did not include early assessment programs for at-risk high school students as one of its recommendations, one of the primary ways to help students succeed in higher education is engage students in early assessment and implement college-readiness interventions, so that they do not need developmental education courses in the first place. Several states have initiated programs to assess students during their junior year of high school and offer courses for underprepared students during their senior year.[6] These programs involve measuring high school students' readiness for

college-level coursework, which can inform students and their families about the need for skill building in math, reading, or writing, and help them avoid formal placement in developmental education.[7] While there are few studies of these relatively new programs, the expert panel convened by the What Works Clearinghouse (WWC) to review the evidence of these interventions believes that these early assessment and college-readiness interventions show promise, especially when implemented statewide. Due to the limited available evidence, however, early assessment and college-readiness interventions are not included as one of the six recommendations in this practice guide.

Once students arrive on a college campus, a primary challenge that practitioners face in improving outcomes for underprepared students is identifying those students who may need extra assistance to be college-ready. Unfortunately, many policies divide students into two broad categories: students who are ready for college-level work and those who are not.[8] Within those two broad categories, states and postsecondary institutions have established multiple levels of developmental education progression, and college-level coursework (typically denoted in 100-level, 200-level, etc. courses). Since readiness for college-level work exists on a continuum, with most students displaying different degrees of readiness for different subjects, the expert panel recommends tailoring interventions for students at different degrees of readiness for college-level work.

A second challenge is that there is no single "magic bullet." Many interventions may be more effective in combination than if implemented alone. For example, the evidence suggests that the bundling of interventions is associated with relatively strong effects in developmental students' outcomes.[9] These bundles of interventions can include some combination of full-time enrollment, enhanced advising, tutoring, accelerated

coursework, a cohort model, or student financial incentives, among others.

Finally, the quality of instruction that occurs in developmental education likely plays a large role in students' eventual success in postsecondary education. While this guide includes evidence-based teaching practices, such as self-regulated learning, there are other instructional practices not included that likely would also improve learning and result in higher rates of success for developmental students. Evaluations of many of these practices fell outside the scope of this guide, often because their efficacy has not been assessed rigorously using developmental students.

Summary of recommendations

1. Recommendation 1: Use multiple measures to assess postsecondary readiness and place students.

2. Recommendation 2: Require or incentivize regular participation in enhanced advising activities.

3. Recommendation 3: Offer students performance-based monetary incentives.

4. Recommendation 4: Compress or mainstream developmental education with course redesign.

5. Recommendation 5: Teach students how to become self-regulated learners.

6. Recommendation 6: Implement comprehensive, integrated, and long-lasting support programs.

Development of the practice guide

An expert panel guided the development of the practice guide. The panel included: Dr. Thomas Bailey, director, Community College Research Center and George and Abby

O'Neill Professor of Economics and Education, Teachers College, Columbia University; Dr. Joanne Bashford, president, InterAmerican Campus, Miami Dade College; Dr. Angela Boatman, assistant professor of Public Policy and Higher Education, Vanderbilt University; John Squires, director of High School to College Readiness, Southern Regional Education Board; and Dr. Michael Weiss, senior associate, MDRC. The panel represented perspectives of practitioner leaders working on reforms in developmental education and the expertise of senior scholars in this field.

Once the expert panel was confirmed, practice guide development began with the Panel's identification of 21 initial practices to improve outcomes for students in developmental education, in collaboration with the senior content expert (a member of the staff leadership team). In the first meeting, panelists received a briefing book on these 21 collaboratively-identified practices for supporting the success of underprepared students. The briefing book provided practice descriptions, contexts of implementation for the practice, and brief summaries of evidence for 21 interventions targeted at improving outcomes for students placed into, and at-risk of placement in, developmental education. Based on discussion of briefing materials on these 21 practices, the expert panel agreed upon an initial set of recommended practices for systematic search and review of the evidence. The initial list of practices provided a beginning foundation to define the scope of the practice guide. In their deliberations, panel members raised discussion about other practices, and freely deliberated as they narrowed a final list of practices for systematic search and review of evidence.

Panel members were asked to consider three questions about each possible practice:

1. In your professional opinion, is this practice likely to help underprepared students succeed? In short, does it work?

2. Is there likely to be a substantial evidence base to support the effectiveness of this practice?

3. Can this practice be replicated in a wide variety of locales, or is it highly specific to the institution or setting in which it has been developed?

The result of this meeting was a set of practices that panel members believed were promising enough to warrant a close investigation. The WWC developed a protocol that described how the review of these practices would be carried out, and this protocol included a systematic literature search strategy for each recommended practice. From this systematic search of literature reported between January 1, 1995, and August 31, 2015, 25,697 studies were identified from abstracts in the EBSCO and ProQuest research databases, and 95 additional studies were identified from supplemental searches of relevant websites, literature reviews, and reference harvesting from other studies.

Based upon the review protocol, studies were screened for relevance (e.g., whether they investigated the effects of an intervention and whether the sample consisted exclusively or largely of students in developmental education), and the full text of each study judged to be possibly relevant (based on information in the title and abstract) was obtained.

Trained and certified reviewers then examined these studies against the standards of the WWC, using the *What Works Clearinghouse Procedures and Standards Handbook, Version 3.0*. Among the 48 eligible reports and publications, 10 studies met WWC standards without reservations or met WWC standards with reservations.[10]

The panel then met to discuss the results of the literature search. Based on the findings and review of the evidence, the panel then made its final determination regarding the level of evidence for each practice. The panel was supported in its work by the reviews

conducted by WWC staff, but the panel members made the final determination for each type of evidence.

In making its determination, the panel used the levels of evidence criteria, which are set by WWC policy, in Table A in this Introduction.

The full text of 439 studies was screened for relevance. While 68 studies met criteria for review in eight original practices, 48 studies were found to be eligible for review under the protocol, and aligned with the final six practice recommendations. As part of their deliberations, the panel considered evidence from 20 studies which were originally rated in the areas of early assessment and intervention, contextualized instruction, and meta-cognition. After review of the evidence, these 20 studies no longer aligned with the panel's recommendations.

Figure A. Prisma flow diagram for study identification, screening, eligibility, and inclusion status/ratings

Identification

Records identified through database searching
(eight original practice guide areas; six final eligible practices)*
(*n* = 25,697)

Additional records identified through other sources
(*n* = 95)

Total records identified
(*n* = 25,792)

Screening

Screened for relevance
(*n* = 439)

Records excluded
(*n* = 25,353)

Eligibility

Eligible for review
(Six final eligible practices)
(*n* = 48)

Full-text articles excluded
(*n* = 391)

Inclusion Status/Rating

1. Studies that met WWC Standards with OR without reservations (*n* = 10)
2. Eligible studies that did not meet WWC standards, used as credible evidence (*n* = 5)
3. Studies with high-quality correlational designs, used as evidence (*n* = 2)
4. Studies with samples of equal or greater than 40% students in developmental education, and less than 66%, that met WWC standards, used as evidence (*n* = 2)

Total = 19 studies used as evidence to support ratings

(Among six final eligible practices)
Eligible studies not meeting WWC standards and not used as evidence
(*n* = 36)

Effectiveness not solely due to intervention (n = 3)
Equivalence not demonstrated (n = 30)
Did not meet regression discontinuity standards (n = 2)
Outcomes did not meet review requirements (n = 1)

* Accelerated Instruction; Advising; Incentives; Integrated, Comprehensive, & Long-Lasting Supports; Multiple Measures; Self-Regulated Learning

(Three practices were excluded for lack of evidence: Contextualized Instruction, Early Assessment & Intervention, Metacognition.)

Table A. Institute of Education Sciences levels of evidence for WWC practice guides

Criteria	STRONG Evidence Base	MODERATE Evidence Base	MINIMAL Evidence Base
Validity	High internal validity (high-quality causal designs). Studies must meet WWC design standards with or without reservations.[11] AND High external validity (requires multiple studies with high-quality causal designs that represent the population on which the recommendation is focused). Studies must meet WWC design standards with or without reservations.	High internal validity but moderate external validity (i.e., studies that support strong causal conclusions but generalization is uncertain). OR High external validity but moderate internal validity (i.e., studies that support the generality of a relation but the causality is uncertain).[12]	The research may include evidence from studies that do not meet the criteria for moderate or strong evidence (e.g., case studies, qualitative research).
Effects on relevant outcomes	Consistent positive effects without contradictory evidence (i.e., no statistically significant negative effects) in studies with high internal validity.	A preponderance of evidence of positive effects. Contradictory evidence (i.e., statistically significant negative effects) must be discussed by the panel and considered with regard to relevance to the scope of the guide and intensity of the recommendation as a component of the intervention evaluated.	There may be weak or contradictory evidence of effects.

Criteria	STRONG Evidence Base	MODERATE Evidence Base	MINIMAL Evidence Base
Relevance to scope	Direct relevance to scope (i.e., ecological validity)—relevant context (e.g., classroom vs. laboratory), sample (e.g., age and characteristics), and outcomes evaluated.	Relevance to scope (ecological validity) may vary, including relevant context (e.g., classroom vs. laboratory), sample (e.g., age and characteristics), and outcomes evaluated. At least some research is directly relevant to scope (but the research that is relevant to scope does not qualify as strong with respect to validity).	The research may be out of the scope of the practice guide.
Relationship between research and recommendations	Direct test of the recommendation in the studies or the recommendation is a major component of the intervention tested in the studies.	Intensity of the recommendation as a component of the interventions evaluated in the studies may vary.	Studies for which the intensity of the recommendation as a component of the interventions evaluated in the studies is low, and/or the recommendation reflects expert opinion based on reasonable extrapolations from research.
Panel confidence	The panel has a high degree of confidence that this practice is effective.	The panel determines that the research does not rise to the level of strong but is more compelling than a minimal level of evidence. The panel may not be confident about whether the research has effectively controlled for other explanations or whether the practice would be effective in most or all contexts.	In the panel's opinion, the recommendation must be addressed as part of the practice guide; however, the panel cannot point to a body of research that rises to the level of moderate or strong.

Criteria	STRONG Evidence Base	MODERATE Evidence Base	MINIMAL Evidence Base
Role of expert opinion	Not applicable	Not applicable	Expert opinion based on defensible interpretations of theory (theories). (In some cases, this simply means that the recommended practices would be difficult to study in a rigorous, experimental fashion; in other cases, it means that researchers have not yet studied this practice.)
When assessment is the focus of the recommendation	For assessments, meets the standards of *The Standards for Educational and Psychological Testing.*[13]	For assessments, evidence of reliability that meets *The Standards for Educational and Psychological Testing* but with evidence of validity from samples not adequately representative of the population on which the recommendation is focused.	Not applicable

Table B summarizes the recommended levels of evidence for each practice. The expert panel assessed the levels of evidence based on the IES criteria outlined in Table A.

TABLE B. LEVELS OF EVIDENCE FOR EACH PRACTICE RECOMMENDATION.

PRACTICE RECOMMENDATION	STRONG	MODERATE	MINIMAL
1. Use multiple measures to assess postsecondary readiness and place students.			●
2. Require or incentivize regular participation in enhanced advising activities		●	
3. Offer students performance-based monetary incentives.		●	
4. Compress or mainstream developmental education with course redesign.			●
5. Teach students how to become self-regulated learners.			●
6. Implement comprehensive, integrated, and long-lasting support programs.		●	

Criteria for review of the evidence

The review protocol for the practice guide provides detail on the product scope, study review criteria, procedures for systematic search, and methods used for study review. For example, the review protocol for the practice guide established criteria regarding the study populations that would be considered eligible for review. In order for a study to be eligible for review, and used for a **strong, moderate, or minimal evidence rating**, a study must have included postsecondary students in the United States or Canada (including students who have not yet started their college careers), **at least two-thirds** of whom are in, have been recommended for, or are at risk for being placed into developmental education.

To be eligible for review and used for a **moderate or minimal evidence rating**,

a study must have included postsecondary students in the United States or Canada (including students who have not yet started their college careers), **at least 40 percent** of whom are in, have been recommended for, or are at risk for being placed into developmental education.

The review protocol also established outcomes relevant to the review, briefly defined below. Within each outcome area, study reviewers follow guidance regarding which outcome measures are to be considered primary, and which are considered supplemental.

- **College access and enrollment** refers to the process of applying to, actually enrolling in, and attending a postsecondary institution. Examples of ways that enrollment might be operationally defined in studies include (a) applied vs. did not apply to college, (b) number of applications

**Study Eligibility Criteria
(see review protocol)**

Publication Timeframe: Studies reported between January 1, 1995, and August 31, 2015

Study Sample Location: Participants must be based in the United States or Canada.

Sample Requirements:
- For use with a strong, moderate, or minimal evidence rating – At least two-thirds of the study sample must be students who are placed in, have been recommended for, or are at-risk for being placed into developmental education.
- For use with a moderate or minimal evidence rating – At least 40% of the study sample must be students who are placed in, have been recommended for, or are at-risk for being placed into developmental education.

Setting: Study samples in any postsecondary education setting that meet the above criteria (i.e., may be two-year or four-year institutions)

completed, (c) attended vs. did not attend a postsecondary institution or enrolled vs. not enrolled in the first semester or year of college, (d) selectivity of enrollment institution, (e) full time vs. part time enrollment, and (f) 4-year college or institution vs. 2-year college or institution vs. non-enrollment. Actual enrollment is the preferred measure.

- **Progress through developmental education** refers to the process of completing required developmental coursework. Examples of ways that progress through developmental education might be operationally defined include a) completed versus did not complete developmental education coursework, b) completed versus did not complete first college-level course in which remediation was needed, and c) grades earned in developmental courses. Passing college-level courses in the area of required developmental education is the preferred measure.

- **Credit accumulation and persistence** refers to progress toward the completion of a degree, certificate, or program.

As mentioned under "outcome period relevance," the primary focus for this outcome domain is upon the longest time period observed for the outcome (or outcomes) in this domain. Examples of ways that credit accumulation might be operationally defined in studies include a) number of credits earned toward degree completion, b) proportion of degree-bearing versus non-degree-bearing credits earned, c) ratio of credits earned to credits attempted, and d) enrollment persistence. If a study assesses credit accumulation and enrollment persistence, the former is the preferred measure.

- **Academic achievement** refers to measures which assess the extent to which students adequately complete expected coursework. Examples of ways that academic achievement might be operationally defined in studies include grade-point average, departmental final exams, and the ratio of courses passed versus failed.

- **Transfer to a four-year institution** refers to students' transition to a bachelor's degree granting program

or institution, typically from a 2-year postsecondary institution that does not have any baccalaureate-degree granting programs (or may have few, selected ones). National Student Clearinghouse records are the preferred data source (which may be integrated into state longitudinal data systems).

- **Attainment** refers to the completion of a degree, certificate, or program. Examples of ways attainment might be operationally defined in a study include certificate completion rates and degree completion rates. Official school records are the preferred data source.

- **Labor market** refers to outcomes related to employment after the postsecondary experience. Examples of ways that labor market outcomes might be operationally defined in studies include (a) employed vs. not, (b) employed full-time vs. employed part-time, (c) employed in field of study vs. not, and (d) income earned. Continuous measures of actual income are preferred.

How to use this practice guide

Each section of this guide contains a recommended practice in which the practice itself and examples of the practice in action are described. The evidence base for the practice is reviewed, and recommendations for effectively implementing the practice are listed. When recommendations have two or more studies of similar interventions that assess effects on outcomes in the same outcome domain, meta-analyses were conducted (see the WWC's *Procedures and Standards Handbook,* version 3.0, for more information). Individual effect sizes for studies used as evidence in support of a recommendation are also presented in Appendix D.

Note that this practice guide does not provide step-by-step instructions on how to fully implement each practice, but does provide preliminary guidance on how to implement the recommendation, as well as common roadblocks and suggested approaches for overcoming them.

Leaders on college campuses are subject to a host of constraints that could make implementing some of these recommendations difficult. These constraints come from budgets, available staff resources, or from system or state policies. With the exception of Recommendation 6, the practices identified here can be implemented in isolation, working within the constraints for a given institution. Recommendations 1–5 do not depend in a cumulative sense on having implemented another practice beforehand. In contrast, implementing comprehensive supports does imply a set of interdependent policies and practices which must be put in place at the same time.

Recommendation 1: Use multiple measures to assess postsecondary readiness and place students.

Most open-access institutions require incoming students to take brief standardized assessments in math, reading, and writing. The results of these assessments are used to place students in either developmental or college-level courses. However, few would argue that a single placement test is a perfect measure of college readiness. In fact, several studies have highlighted concerns about misplacement rates.[14] For example, Scott–Clayton (2012) found that 24%–33% of students were misplaced when they matriculated. It was more common for students to be placed in developmental courses when they could have succeeded in college-level courses than the reverse. Since nearly 40% of community college students enrolled in developmental education fail to progress to credit-bearing coursework,[15] misplacement into developmental education is particularly troubling.

A basic principle of psychological measurement is that when a construct like college readiness is measured imperfectly, one way to improve measurement is to assess the construct in multiple ways. Therefore, one way to improve the measurement of college readiness (and therefore to reduce misplacement) is to use multiple measures—such as high school GPA, the number of years since high school graduation or equivalent, the number of courses taken in the subject (e.g., English or math), and the highest level taken in the subject (e.g., Algebra I or Algebra II)—to inform placement decisions.

Figure 1.1. illustrates types of measures to assess postsecondary readiness and place students. In this regard, it is notable that the state of California mandates the use of multiple measures for placement into developmental education (Title 5 §55502, California Code of Regulations),[16] and companies that produce the placement tests recognize that adding information beyond the test itself can improve placement decisions.[17]

Summary of evidence: Minimal Evidence

Experimental studies of the use of multiple measures for course placement investigate the effectiveness of different placement criteria (e.g., placement test alone versus placement test plus high school GPA) on students' outcomes (such as credit accumulation and grades).

The WWC identified two studies that investigated the effectiveness of alternative or multiple measures for placement.[18] Neither study met WWC group design standards. One study was a randomized controlled trial[19] for which the WWC could assess neither how much attrition the study experienced nor the extent to which the groups were similar at baseline. Similarly, in another study,[20] the WWC was unable to assess the extent to which the groups were similar at baseline. Nevertheless, the panel believes that these studies offer useful insight into this recommendation. The studies are further discussed in Appendix D Table 1.1.

Two additional non-experimental studies are highlighted in Appendix D Table 1.2.[21] Both of these studies suggest that adding information about student high school experiences (in particular, high school GPA) might help improve placement decisions. In addition to multiple measures, these studies offer some evidence that alternative measures of high school preparation (compared to scores on the institution's standardized placement test) can also be effective in reducing misplacement.

How to carry out the recommendation

Several prominent groups have provided guidance on using multiple measures to place students in developmental education.[22] Below

Figure 1.1. Types of measures to assess college readiness and place students into courses

TYPES OF MEASURES TO ASSESS COLLEGE READINESS AND PLACE STUDENTS INTO COURSES

High school grade point average

Letter Grade	GPA
A	4.0
B	3.0
C	2.0
D	1.0
F	0

Score on an approved college readiness test

1. A B C D E
2. A B C D E
3. A B C D E
4. A B C D E

Completion of, or grade in, a specified high school course or course sequence

Algebra	A+
Biology	A+
English II	B-
U.S. History	B+

COLLEGE READINESS

Work/life experience (e.g., military, participation in juried competitions)

A - Past learning
B - Life experiences
C - Careers
D - Professional training

Assessment score on a non-cognitive measure

A - Academic motivation
B - Confidence and self-efficacy
C - Study skills and work ethic

are the implementation considerations that the panel believes to be relevant.

1. **Explore potential additional measures that faculty and administration believe might inform placement decisions.** Investigate the feasibility of each of these, and retain those that can be measured reliably and with minimal additional cost (possible examples include high school GPA, the highest math course taken, the number of years since graduation, high school graduation status, and scores on college entrance examinations). Then, develop one or more placement rubrics based on the selected measures, and use administrative data to investigate the effect of the different rubrics on placement decisions. Use this information to propose a specific multiple measures policy.

2. **Use a pilot period to study the placement rates and success rates of students involving different placement methods at your institution.** For example, use existing administrative data at your institution to develop one or more alternative placement rubrics. Then, randomly assign students to be placed using the new multiple measures rubric(s) or your college's current placement method. After random assignment, determine if student success rates varied as a function of placement method. For example, you might examine the course pass rate for students placed into college algebra using your current placement method compared to the course pass rate for students placed into college algebra using an alternative method. Finally, use the findings to modify the proposed policy as needed. The Research and Planning (RP) Group's Multiple Measures Assessment Project offers some resources for setting up pilot studies, including a "Getting Started Guide."[23] As needed, partner with independent researchers from universities and contract research firms for additional

capacity and expertise on the design and conduct of these studies.

3. **After implementation, investigate the effects of the multiple measures policy on desired student outcomes over time.** Continue to monitor the effects of the placement policy, and use new information to adapt, change, or expand implementation of multiple measures policies and practices.

4. **Consider how college-readiness policies and practices in your state and local area impact the parameters of decision-making and implementation of multiple measures.** For example, as states implement new college-readiness assessments associated with implementation of the Common Core State Standards, validation studies of these assessments then may offer information to guide the potential effectiveness of using them as a placement measure.

Potential roadblocks and suggested approaches

Roadblock 1.1. *Using multiple measures for placement is resource-intensive.*

Suggested Approach 1.1.a. Scale up a pilot effort, with support from leadership for larger-scale implementation, to gradually influence changes in placement practices. Perhaps the most significant barrier is the lack of resources to pay for a more comprehensive assessment process. For example, one faculty member at an institution that was incorporating multiple measures estimated that, to make recommendations, each student file required a 10-minute review, totaling about 40 hours for 250 students.[24]

One strategy for initiating time- and labor-intensive systemic change is to begin by convening a work group to lead small-scale piloting and plan for gradual expansion. For example, the University of

Wisconsin-Marathon County began using multiple measures to place students with certain risk factors and then expanded to a larger population.[25] Similarly, Long Beach City College (LBCC) first offered alternative measures for placement in fall 2012 with 933 students from the Long Beach Unified School District, expanded to two additional large districts the next fall, and two more the year after.[26] Piloting also enabled gradual adjustments, refinements, and adaptations across colleges in California and in Wisconsin's university system.

Moreover, the pilot efforts from LBCC helped to guide expansion of the multiple measures implementation across colleges in California. LBCC conducted and shared its pilot research with other colleges as part of the Student Transcript-Enhanced Placement Study, which found that high school grades were better predictors than placement tests (and other measures) of students' passing their first attempted courses in English and math.[27] Subsequently, a consortium of California colleges (California Partnership for Achieving Student Success) have implemented and studied the effects of using multiple measures for students' academic outcomes.[28]

To maximize successful, long-term implementation of new multiple measures practices and policies that begin with a pilot effort, leadership strategies should be inclusive, collaborative, and adaptive. To translate pilot efforts to larger-scale change, leaders must also consider how to best leverage and maximize scarce resources in each step, while investing strategically in implementation of new placement measures.

Suggested Approach 1.1.b. Consider additional measures already collected by your institution or those that are easily assessed. Certain measures (such as college entrance tests, high school GPA, and the number of years since high school graduation) may already be collected by your institution and, therefore, represent low-cost information that can be used to potentially improve placement decisions.

Roadblock 1.2. *Lack of support from key institutional staff can inhibit robust implementation.*

Suggested Approach 1.2. Key institutional staff need to be motivated and engaged for effective reform to occur.[29] Broad sharing of information about the severe error rates associated with the use of single-assessment measures for placement in courses may motivate and engage faculty and staff to reform institutional practices.

In addition to sharing research about the limitations of single-test placement, faculty and administrators can also provide evidence regarding the advantages of using multiple measures to increase probability of more accurate placement for a greater number of students, without negatively affecting student success rates. Duffy et al. (2014) reported that a multiple-measures working group in North Carolina met with faculty on several occasions to explain the research conducted by the Community College Research Center on this topic as a way of supporting faculty in adopting new placement practices and using multiple measures. When available, sharing the results of institutional research from pilot studies can garner support among faculty and staff.

Roadblock 1.3. *Data availability and quality may be varied, depending on the specific assessment measures to be used.*

Suggested Approach 1.3. Access available data for the targeted student population for the multiple measures to be used and, as a secondary strategy, consider the use of students' self-report data. Access to high school transcript data by many open-access institutions has increased with the continued development of P–20 longitudinal, educational data systems in states. However, some institutions may still have limited access to

transcript data, or find the data to be of low quality for their student population. In the absence of official records or other desired data, using students' self-report data should be considered.

In cases where transcript data is not easily shared or accessible, student self-report data may offer some insight to the student's academic preparedness, even if that information is relatively unreliable. According to Research for Action (2014), some colleges in California use measures, such as student surveys and interviews, to gather information about highest math course completed and grades in last English and math class completed. Several testing companies have also developed and evaluated assessments to measure students' persistence, dependability, motivation, and ability to work with others. ACT, Inc., developed a standardized measure of student motivation, social engagement, and self-regulation, aligned with its college readiness standards. The assessment, Engage, is a 30-minute, multiple choice test designed to measure psychosocial attributes and study skills associated with college readiness. Little or no evidence has been reported to show the effectiveness of using these non-cognitive measures for students' course placement.

While some researchers have identified concerns with students inflating their responses to socially desired qualities, Schmitt and colleagues (2011) found that students' inflation on responses did not "impact the variability or validity of responses" (p. 12). Because research findings on this issue vary, the expert panel recommends cautiously monitoring response quality from self-report data in high-stakes situations.

Roadblock 1.4. *Developing new algorithms for placement, merging data sources, and supporting use of new data for placement requires technical expertise that many open-access institutions do not currently have.*

Suggested Approach 1.4. Faculty and staff who have strong interest and technical aptitude can be supported through professional development, encouragement, and compensated time for leading and performing the work involved. Resources and available expertise for implementation of new measures for placement will vary by state and institution. As mentioned previously, for example, the RP Group in California provides resources to help institutions get started with multiple measures implementation, and other states have developed similar expertise. Institutions should think creatively and strategically about how to develop internal expertise while investing in external advice on the development of new placement policies, integration of data sources, and analysis of the results from pilot studies.

Recommendation 1 implementation checklist

Recommendation 1
Use Multiple Measures to Assess Postsecondary Readiness and Place Students.
Implementation Checklist[30]

Phase I. Define the Initial Measures and Data Sources.

☐ Convene a working group to lead the multiple measures adoption process.

☐ Determine the placement measures with broad stakeholder input and background research.

☐ For all measures, find the data source and data match rate for your population (e.g., proportion of targeted student population with high school transcript data).

Phase II. Report Baseline Statistics, Student Eligibility, and Outcomes.

☐ To show where students would have placed using a multiple measures system compared to the current placement method, produce a report with retrospective cohorts of students to show differences in placements and outcomes. In this baseline report, include outcomes such as:

  - Placement into English and math, by level
  - Proportion of students who enroll, by placement level
  - Completion of initial college-level course, by placement level
  - Completion of course sequence, by initial placement

☐ If not a retrospective analysis, produce an analysis of multiple measures placement with a theoretical cohort of students. Report on potential impacts of the new placement rules on a set of students that have already completed their courses, for whom success rates are available. Use the same data matching procedures that you would use for existing or previously enrolled students.

☐ Apply the new placement rules to new applicants who have not yet enrolled. Decide whether the new placement rules will be applied to a specific cohort of students? From specific, feeder high schools? Randomly selected subset of students assigned to courses by different types of measures? Include a matched comparison group that was not placed by multiple measures and was placed by traditional methods.

☐ Complete the data matching for the new set of measures to the targeted student population, and define the outcomes to be tracked for students placed by new

measures vs. existing policy. Set up the process to track these students by placement method and outcome.

- Proportion of incoming students placed at transfer level
- Enrollment in discipline course (yes/no) and which level
- Success rate of students in first course
- Successful completion of transfer-level course in first year, second year, third year
- Disaggregations by demographics, equity categories

Phase III. Use Pilot Data and Stakeholder Input to Modify Implementation and Scale-Up.

☐ Use outcome data on the new placement methods compared with traditional placement methods (from Phase II) to inform revisions to the new placement rules and scale-up of multiple measures implementation.

☐ Engage faculty and staff in decision-making and implementation of multiple measures policies and practices.

☐ Track results from each phase of multiple measures implementation and modify process as needed

Recommendation 2: Require or incentivize regular participation in enhanced advising activities.

Advising, guidance, and counseling services have been developed to help students at all levels make choices about academic majors, understand the relationship between school and subsequent employment, and address a variety of academic and personal issues.[31] Some colleges have created more intensive advising experiences, often called "enhanced advising"[32] or "intrusive advising."[33] Enhanced advising replaces the quick, transactional structure of traditional advising (e.g., a focus on class schedules, degree requirements, and financial aid procedures) with a more holistic structure in which advisors ask deeper questions and engage more with students to help them succeed.[34] Mentoring programs that aim to build relationships between students and knowledgeable adults on goal-oriented academic planning may also be considered as enhanced advising.

Researchers have estimated typical advisor-to-student ratios for large, community colleges and regional open-access institutions to be about 600:1.[35] In a study of the Opening Doors program in Ohio, implementation of enhanced advising meant a reduction of the advisor-to-student ratio to 150:1, compared to the typical 1,000:1 in that college. Scrivener and Weiss (2009) also emphasized the importance of addressing any underlying structural deficiencies that limit more personalized, holistic advising practices.

To address costs associated with reducing advisor-to-student ratios, postsecondary institutions have adopted a range of technology-mediated advising tools and systems as a way of efficiently advising large numbers of students. Advising technologies may empower students to more actively engage with advisors, and provide tools to support effective "advising-as-teaching" approaches, but not supplant direct, interactive contact with advisors.[36] In a study of community college students' attitudes towards technology-mediated advising systems, Kalamkarian and Karp (2015) found that students seek an interactive approach with advisors, particularly for multi-semester course planning and other complex, cognitive tasks.

Summary of evidence:
Moderate Evidence

The panel defined the level of evidence for this recommendation as moderate.

This recommendation is supported by three studies that met standards without reservations (Cousert, 1999; Scrivener & Weiss, 2009; Visher, Butcher, & Cerna, 2010). Cousert (1999) and Visher et al., (2010) investigated the impact of one-semester mentoring programs, and Scrivener and Weiss (2009) evaluated effects of an incentivized advising program offered over a two-semester period. The large majority (79%) of the three study samples (totaling 3,563 students) consisted of students enrolled in developmental education courses within the study period.

Credit accumulation was assessed in all three studies.[37] Meta-analytic results indicated a small, statistically significant effect in favor of the group of students who received enhanced advising on college-level credit accumulation ($g = +0.11$, $p < .001$). To contextualize this effect, if comparison group students earned an average of 6.0 credits during the program semester, then the enhanced advising group would earn about 6.7 credits on average. This means that for approximately every 100 students who receive enhanced advising, 23 students will complete one additional 3-credit-hour course.

Academic achievement was assessed in two of the three studies. Meta-analytic results indicated a non-statistically significant effect for academic achievement ($g = +0.01$, $p = .73$). Progress through developmental education was assessed in two of the three

studies;[38] the effect was positive, but not statistically significant ($g = +0.07$, $p = .18$).

Other effects assessed in these studies tended to be small and not statistically significant. For example, Scrivener and Weiss (2009) found a small but non-statistically significant positive effect on initial enrollment and a small but non-statistically significant negative effect on degree attainment (3% attainment in the comparison group versus 2% in the advising group, from the first program semester through third post-program semester). Appendix D Table 2 has more detail about these studies.

How to carry out the recommendation

An important aspect of enhanced advising is a dedicated and lasting interaction between an advisor and a student. The purpose is to interact personally with the student to foster learning, encourage course completion, and decrease institutional barriers that limit or prevent student participation in the intellectual and social life of the college.

1. **Recruit and train advisors.** It is crucial to encourage and gain the participation of a critical mass of advisors. The advisors may be college counselors,[39] volunteers from college staff, or professors.[40] Strategies for increasing the number of advisors may involve a combination of negotiating with existing faculty and staff to take responsibility for enhanced advising roles, along with hiring of additional professional advisors.

    The program should include advisor training, and specific enhanced advising techniques should be discussed in the training. The National Academic Advising Association offered essential steps and components for developing the content of effective advisor training which include the college's concept and definition of

the advising process, the informational aspects of advising, and the relationship skills involved in supporting students' decision-making and planning.[41] Researchers have also found that training faculty and staff in how to conduct "advising-as-teaching" is a promising way to engage with students, and utilize technological advising tools as supports to facilitate this advising instruction.[42]

Furthermore, training should establish expectations for the frequency and intensity of contact with students, and provide supports for accomplishing this. Visher and colleagues (2010), as an example, suggested providing a variety of programming, including a training manual to advisors with student services information and frequently asked questions, a monthly "brown-bag" training or refresher sessions, incorporating team-building exercises between faculty/staff-student pairs, or a final semester gathering to recognize the hard work and dedication of the advisors and students.

2. **Require or incentivize in-person advising meetings.** While students may favor using technology-mediated tools for simple, administrative tasks, they generally find in-person meetings to be more effective for support and encouragement, and for productively engaging in goal-setting, complex educational planning, and problem-solving.[43] Figure 2.1. offers a sample planning tool used to facilitate enhanced advising services at Ivy Tech Community College in Cousert (1999). While students were not required to participate in mentoring as part of the Cousert (1999) study, Ivy Tech Community College requires all new students to meet with an academic advisor before registering for classes. The Beacon Mentoring Program similarly offered support for accessing enhanced advising in the context of students' required mathematics classes.

Incentivizing participation in in-person advising, such as by providing a small stipend contingent on attendance, is another way to bolster attendance. For example, Ohio's Opening Doors program offered students $150 per semester for attending at least two in-person advising sessions.[44] It may be helpful to prioritize supports for at-risk students, who are especially susceptible to discontinuing due to difficulties navigating the enrollment process.[45]

3. **Require or incentivize students to meet with advisors frequently and over a long(er) period of time.** One advisory meeting is generally not enough time to advise students, particularly for multi-semester course planning and career guidance. In the Opening Doors Program in Ohio, students had an average of 8 contacts with their advisors during the first and second semesters.[46] Offering regular meetings, before, during, and at the end of semesters is one way to encourage frequent meetings. In addition, advisors may meet with groups of students, such as during a certain class or at a structured time, to facilitate the communication of information more efficiently. As reported in Visher et al. (2010), the

Beacon Mentoring Program encouraged advisors to plan short information sessions to be presented during a developmental English course, which occurred 2–3 times per semester. Advisors also met with students throughout the semester. The Opening Doors Program encouraged advisors to meet with students at least twice per semester for two semesters in a row.[47]

4. **Use early alert systems to identify the students who most need enhanced advising.** Early alert and intervention systems are designed to identify and support students at risk of attrition and improve their retention, persistence, and success.[48] Early alert systems, or early warning systems, identify students in need of an intervention, which often includes enhanced advising. Though no studies on early alert systems met WWC standards for inclusion in this practice guide, Zachry Rutschow and Schneider (2011), suggested that these systems can be effective if they bring students in contact with needed services (though note that mere alerts, without subsequent resource mobilization, are unlikely to be effective).

Figure 2.1. Sample enhanced advising planning tool

Sample
Enhanced Advising Tool[49]

ADVISOR'S ROLE AND PREFERRED CONTACT INFORMATION

Student Name and Preferred Contact Info: _____

Advisor Name and Preferred Contact Info: _____

Advisor's Role

- Discuss short- and long-term goals.
- Address concerns and barriers to achieving goals.

↓

- Listen to and provide support for the student's plan of action.
- Recommend resources and supports to address barriers and concerns.

↓

- Help student set realistic, achievable timelines and meet necessary deadlines.
- Set up next check-in time to discuss progress toward goals, completed actions, and new actions to be taken.

↓

Student Action Plan	My Goal or Concern	My Plan of Action	My Timeline/Expected Completion Date
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

Note: Your institution may already have advising tools available through software already purchased or designed that has these components. If so, evaluate how effectively the current system works to facilitate ongoing communication between advisors and students. If not, consider developing a shared framework, such as this, to guide advising sessions.

Potential roadblocks and suggested approaches

Roadblock 2.1. *Decreasing the student-to-advisor ratio means finding and training more advisors.*

Suggested Approach 2.1. Recruit advisors from various sources in addition to hiring trained specialists. For example, the Beacon Mentoring program recruited advisors not only from the counseling and advising department, but also from student life, research/technology, special academic/career programs, assessment and placement, admissions and records, outreach and orientation, administration, and financial aid. Faculty provided advisors with in-class time to make at least three presentations per semester, and also gave advisors data on students' attendance and grades so that advisors could intervene with struggling students.[50]

The student-to-advisor ratio is high at most community colleges, and many students may then make decisions that are poorly suited to their needs, academic goals, and career objectives. In relation to a typical student-to-advisor ratio of about 600:1 in community colleges, the National Academic Advising Association recommends decreasing the advisor load as low as possible (without recommending a specific ratio; see Robbins, 2013). In the Opening Doors Demonstration in Ohio,[51] the student-to-advisor ratio was 81:1 at Owens Community College and 157:1 at Lorain Community College. In this program, the reductions in student-to-advisor ratio were achieved by hiring additional counseling staff in the student services divisions of the colleges.[52]

To decrease the advisor load, trained college counselors and advisors should not be the only ones to provide assistance to students. Well-trained college faculty and staff should also provide advising and mentoring to at-risk students (for an example of how faculty and staff were used in this way, see Visher et al., 2010). While faculty and staff who volunteered to serve as mentors in the Beacon Mentoring program did so as part of their job, engaging additional faculty in staff in new advising roles may require additional incentives or contract requirements. Importantly, decreasing institutional barriers can be accomplished by simply discussing challenges in addressing the procedural aspects of college. For example, staff or faculty with experience determining college courses can be helpful to students who have difficulty making these decisions.

Roadblock 2.2. *It may be difficult to get students to attend advising sessions.*

Suggested Approach 2.2. Due to scheduling issues, community college students may find it difficult (and some may be unwilling) to participate in one-on-one advising sessions. In addition, the advising sessions may be difficult for students to set up or keep track of. Be attentive to potential scheduling issues when establishing the schedule for enhanced advising sessions. Scheduling of enhanced advising sessions should consider students' work and course schedules. Also, some enhanced advising activities may be appropriate for class time (especially on the first day of classes; see, for example, Visher et al., 2010), and some may appropriately take advantage of video conferencing services, such as Skype and FaceTime. Finally, consider setting up an electronic reminder system (e.g., via email or text message).

Roadblock 2.3. *Advisors may not always be fully equipped to deal with the range of issues presented by students.* The range of issues faced by at-risk students is large and may require a skill set similar to that needed by counselors. College advisors may not be well-equipped to handle such problems and may inadvertently allow students to return to recurring behaviors.

Suggested Approach 2.3. Train and pro-vide guidance to advisors regarding the range of services available on campus. Scrivener and Weiss (2009) provided a specific training module along with certification, while Visher et al. (2010) suggested providing a training manual to advisors with student services information and frequently asked questions, offering monthly "brown-bag" training or refresher sessions, and utilizing team-build-ing exercises between faculty/staff-student pairs. The nature of this training should ensure that advisors understand the range of services available on campus.

Roadblock 2.4. *Coordination and communi-cation across student services is ineffective or underdeveloped.* Advisors, professors, tutors, and staff sometimes fail to communicate or follow-up to all invested parties regarding students' needs, in relation to their academic and career goals.

Suggested Approach 2.4. Train advisors to work with students and other resource providers to connect students with multiple solutions and supports as needed so that they may be successful with short- and long-term goals agreed upon in an action plan. Cousert (1999) outlined the approach used by Ivy Tech State College in central Indiana, whereby faculty mentors work with students on an individualized action plan. The men-tors document referrals and resources for the students to access in the plan and then follow-up with the students to determine their results in accessing those supports. The action plan documents students' concerns, actions to be taken, and timeline for complet-ing the actions. At South Texas College, the Beacon Mentoring Program provided students with knowledge and support of campus resources, such as tutoring, advising and counseling services, financial aid, and priority registration. To provide support before they failed or dropped out of the class, mentors communicated with math instructors about struggling students and also instilled a cli-mate where they were the "go-to" person on campus for students' questions.[53] Depending on the type of advising structures, communi-cation mechanisms, and resources available, campuses can be resourceful and strategic about how to personalize and maximize students' knowledge and access of needed campus resources.

Recommendation 2 implementation checklist

Recommendation 2
Require or Incentivize Regular Participation in Enhanced Advising Activities.
Implementation Checklist[30]

Phase I. Planning

☐ Set goals, objectives, and measures of success for the enhanced advising process. For example, to which degree are your institution's advising goals focused on:

- Course scheduling/registration
- Compliance advising
- Academic planning
- Developmental advising and mentoring

☐ Engage existing and potential advisors in determining advising goals and measures of success.

☐ Determine tangible administrative supports and commitments needed to achieve enhanced advising goals. For example, in which ways do you need:

- Technology-based advising system for administrative advising tasks
- Additional full-time-equivalent staff
- Financial incentives for faculty to expand advising time
- Financial incentives for students to regularly participate in advising sessions
- Resources for training advisors to achieve the new goals and outcomes
- System for providing and monitoring support to students identified as at-risk through early alert processes
- Time allotted in courses for advising functions
- Changes to faculty evaluation process to include changes to advising expectations
- Resources and time to recognize the work and accomplishments of advisors and students

Phase II. Implementation

☐ Use your institution's most experienced advisors to recruit, hire, and engage more advisors.

☐ Create and use a comprehensive advising manual in training new advisors and in refresher sessions.

☐ Provide training and support, so that new advisors can address many college-related issues with their students.

☐ Determine how the new advising methods will be implemented, based on the agreed-upon advising goals, measures of success, and process agreed upon by faculty, staff, and administration.

- Track participation and results from in-person advising meetings.
- Support the use of technology-mediated advising tools for simple, administrative advising tasks.
- Provide incentives for students to regularly attend in-person advising sessions.
- Expect and plan for regular, frequent meetings with advisors.
- Offer small group advising sessions to support peer connections on shared concerns.
- Identify and support at-risk students early.

☐ Consider piloting the new advising method with a smaller population before scaling up the process for all students.

Phase III. Evaluation and Expansion

☐ Evaluate student outcomes achieved from enhanced advising methods compared to traditional advising methods, such as credit accumulation, retention, and academic achievement.

☐ Using the evaluation criteria your institution established for advisors, conduct evaluations of advisors that will guide conferral of incentives and rewards.

☐ Provide recognition to the efforts of students and advisors through celebrations and tokens of appreciation.

☐ Evaluate the effectiveness of various components of the advising system such as student incentives, technology-mediated advising tools, advisor training, and administrative supports.

☐ Share report findings on the degree to which the enhanced advising program achieved its goals and desired outcomes with key stakeholders.

☐ Use evaluative data to modify the enhanced advising processes, allocate additional resources, or expand enhanced advising to additional student populations.

Recommendation 3: Offer students performance-based monetary incentives.

Performance-based incentives are monetary awards that are disbursed to students based on meeting specific academic benchmarks. These awards supplement students' financial aid packages, which may be based on need (e.g., Pell grants) or past achievement (e.g., state merit aid grants). In certain instances, the performance-based awards may reduce the number of loan dollars taken and grant dollars awarded, but they usually result in a net financial gain for students (see Patel & Valenzuela, 2013). The short-term goal of such initiatives is to encourage students to perform better in (and successfully complete) their classes. A longer-term goal is to support students' progress through developmental and degree requirements to increase degree attainment.[54]

Incentive programs can vary in several ways, including the amount of the incentive and the number of semesters for which students are eligible for it. In the studies summarized below, the incentive amounts ranged from about $600 to $1,500 per semester, and students were typically eligible for 2 or 3 semesters. Generally, students are allowed to use the awards for any purpose (that is, not necessarily for educational expenses; Scrivener & Coghlan, 2011). Incentives are usually distributed at predetermined time points throughout the semester, rather than in one lump-sum payment. The rationale behind this disbursement structure is that it encourages students to meet program goals (e.g., maintaining a minimum level of enrollment).

Summary of evidence: Moderate Evidence

The panel judged the level of evidence supporting this recommendation to be moderate.

Six randomized controlled trials, which involved nearly 8,000 participants, examined the effects of performance-based monetary incentives. About two-thirds (67%) of the students across these six study samples enrolled in developmental education courses within the study period. Three of these studies examined the effects of performance-based monetary incentives alone or with minimal additional services[55] and three studies examined performance-based incentives with

additional services (i.e., Miller et al., 2011, coupled incentives with enhanced advising; Patel & Valenzuela, 2013, coupled incentives with enhanced advising, tutoring, workshops, and other supports; Sommo et al., 2014, combined incentives with supplemental math lab instruction).

Offering incentives only. Three randomized controlled trials were identified that investigated the impact of performance-based incentives alone or offered monitoring advising support in addition. All three studies met WWC group design standards without reservations. In two of these studies,[56] most students (85 percent, across the two study samples) were in developmental education. In the other study,[57] about 40% of students in the study sample took at least one developmental education course. (See Appendix D Table 3.1 for further details.)

Across these three studies, incentives were associated with a small but statistically significant impact on the first instance of enrollment after randomization to condition ($g = +0.08$, $p < .01$). To contextualize this effect, if the base rate of enrollment in the first academic term was 94% in the comparison group, about 94.6% of students in the intervention group would have initially enrolled. Two studies[58] assessed the effect of performance-based incentives on academic achievement; this meta-analytic effect was positive, but not statistically significant ($g = +0.09$, $p = .09$).

All three studies evaluated the effects of providing performance-based incentives on college-level credits earned, and the meta-analytic results indicated a positive and statistically significant increase (g = +0.10, p < .001) in credits earned (after 7 or 8 semesters, depending on the study). To contextualize this effect, if the typical comparison student earned 14 college-level credits during the first year, the typical intervention student would have earned about 15.2 credits. This suggests that for every three students in the intervention condition, one additional student would complete an additional 3-credit-hour course over 7–8 semesters.

Finally, two studies assessed the effect of performance-based incentives on degree attainment.[59] The meta-analytic results indicated a non-statistically significant positive increase (g = +0.06, p = .07).

Combining incentives with other supports. Combining incentives with other supports. Similar to the meta-analytic effects observed in incentives-only studies, providing performance-based incentives with additional supports also had a small but statistically significant impact on enrollment (g = +0.08, p < .03) across the three studies.[60] Contextualizing this effect leads to the same conclusion as the enrollment analysis above in the incentives-only grouping: if the base rate of enrollment was 94% in the comparison group, about 94.7% of students in the intervention group would have enrolled.

Sommo et al. (2014) was the only one of these studies to examine student progress through developmental education (i.e., later earning college-level credit in their area of remediation). In this study, developmental math students in the intervention condition were more likely than developmental math students in the comparison group to pass college-level math (32% versus 26%, p < .05).

Academic achievement was measured by two studies in this group.[61] In both cases, academic achievement was measured by assessing the proportion of students who earned a C average or better across their coursework. Meta-analytic results indicated a positive and statistically significant intervention effect (g = +0.12, p < .01). To help understand this effect, if 50% of students in the comparison group earned at least a C average or better, on average, 54% of students in the intervention group would earn at least a C average or above.

All three studies assessed the effect of performance-based incentives with additional supports on credit accumulation, but the meta-analytic effect was not significant (g = +0.03, p = .30).

Finally, two studies assessed the effect of performance-based incentives on degree attainment. The meta-analytic results indicated a positive, statistically significant impact (g = +0.08, p < .02). To contextualize this effect, if 33% of students in the comparison group graduate, 36.1% of students in the intervention group would graduate. (See Appendix D Table 3.2 for further details.)

How to carry out the recommendation

The primary purpose of this intervention is to support students by tying monetary incentives, which do not replace financial aid but are given in addition to it, to achieving academic success. See Figure 3.1. for some tips on how to budget for performance-based monetary incentives.

1. **Design and structure payments of students' performance-based incentives to yield students a net financial gain.** Since many financial aid packages are tied to a student's level of unmet need, an important consideration is the impact that this monetary incentive will have on the overall level of aid. Mayer, Patel, and

Gutierrez (2015a) suggested that financial aid offices work with students and administrators to ensure that any incentives provide a net financial gain to participating students.

2. **Distribute payments incrementally, according to specific desired performance benchmarks.** To encourage and motivate students to reach academic milestones, distribute payments throughout the semester or year. Midterms and final exams are good candidates for disbursement periods.

3. **Target incentives to low-income students.** The evidence suggests that providing monetary incentives has positive effects for low-income students and various at-risk student populations (such as Latino male students with delayed entry to college). Programs should consider prioritizing these students.

4. **Provide student support services, in conjunction with performance-based monetary incentives.** Many students in developmental education may find it difficult to make time for additional campus

supports without a specific incentive—given their work, family, and academic demands. Monetary awards can help incentivize students to take advantage of support services (e.g., academic advising, tutoring, mentoring) that will help them succeed. For example, the Adelante Performance Award Program linked payments to utilizing support services and academic milestones, thereby achieving high student attendance for supports, such as program orientations, advising sessions, tutoring services, and workshops.[62] These supports are academically useful for students, and the personal contact made during these interactions may also help students feel motivated, encouraged, and accomplished when they succeed.

As a useful resource, MDRC published a technical assistance guide for developing and implementing performance-based scholarships which highlights key strategies for assembling key stakeholders, funding your program, creating a budget and partnerships, as well as aspects of important elements of designing, implementing, and monitoring the program.[63]

Figure 3.1. How to budget for performance-based monetary incentives

How to Budget for Performance-Based Monetary Incentives[64]

Imagine your institution wants to encourage high-risk students to earn 12 or more credits per term. You have decided to offer 100 students a performance-based monetary incentive in which they can earn up to $1,000 over the term. How much do you need to budget to achieve this goal?

You plan to pay the first installment of $100 to students who enroll in 12 or more credits. Your institution expects that 90 percent of students will earn the first payment. The cost will be **90 students x $100 = $9,000.**

You plan to pay the second installment of $900 to those who complete at least 12 credits with a 2.0 GPA. Your institution expects that 60 percent of those 100 students will earn the second payment. The cost will be **60 students x $900 = $54,000.**

The budget for the students' performance-based monetary incentives is thus **$63,000.** Because your institution will end up paying for incentives for fewer students than the number of students eligible for the incentive, your institution may be able to incentivize more students.

Projections of how many students will earn each incentive payment should guide budgeting. Administrative costs to manage the program should also be figured into the budget.

Potential roadblocks and suggested approaches

Roadblock 3.1. *Performance-based incentives are expensive to offer.*

Suggested Approach 3.1. Consider costs in relation to potential enrollment increases and successes from the program. Although the initial financial commitment to these programs may result in difficult allocation decisions, institutions may benefit from increases in student enrollment over time if enough students are successful. Furthermore, Patel and Rudd's (2012) analysis suggests that the cost to implement such programs might decrease as a function of the number of students enrolled (i.e., administrative costs per student are lower when more students are enrolled in the incentive program). Further, Mayer and colleagues (2015b) conducted cost-effectiveness analyses of six performance-based monetary incentives programs. In 2014 dollars, the average direct cost of a performance-based scholarship program was $2,345 per student for the program's duration. Mayer and colleagues (2015b) reported that about 72% of the direct cost was direct payments to students, about one-fourth (26%) was program administration costs, and 2.5% of the cost was additional student services. They found that while the performance-based monetary incentives required substantial financial investment, the average cost per

degree was about the same for students who received the intervention compared to students who did not have the opportunity to earn performance-based monetary incentives.

In addition, the costs of the performance-based monetary incentives will likely be a small proportion of students' total financial benefits package. For example, in Ohio, students received an average of $765 in performance-based incentives, compared with $7,947 in total financial aid in the same year.[65] Even though proportionately the performance-based monetary incentives are a small investment, the opportunity to earn performance-based monetary incentives appears to result in small, positive effects—both short- and long-term.

Roadblock 3.2. *Institutions lack staff members who can be dedicated to running these programs.*

Suggested Approach 3.2. These programs entail new processes that require dedicated staff to oversee them to be effective. If possible, create a new position to oversee the program or utilize "student success coordinators" where available. The duties of this person or persons should include monitoring transcripts to determine whether students had met the award criteria and distributing payments to students. This position could be housed in the financial aid office or the student services office.[66] If resources are not available to hire dedicated staff, other individuals within the school could also serve as monitors (e.g., counselors) and payment conduits (financial aid officers or departmental staff).

Roadblock 3.3. *Additional monetary awards may decrease the financial aid packages that students might otherwise receive.*

Suggested Approach 3.3. Because many low-income students have unmet financial need after financial aid and expected family contributions are calculated, performance-based incentives can be a source to fill this gap rather than extra work hours, taking fewer courses, or taking out more loans. After financial aid is calculated, students without remaining unmet need may not be able to receive money from incentives due to federal, state, and institutional policies that restrict funding beyond students' level of unmet need. One way to address this issue is to target students with larger amounts of unmet financial need. Another strategy that institutions can use to ensure a net financial gain for students is to reduce loans when a student earns a performance-based monetary incentive. In the case of students who do not earn the anticipated money from incentives to fulfill their unmet need, financial aid directors should make sure that students have access to loans to fill the gap. Financial aid offices should develop and apply procedures for not reducing students' grant aid in the event of aid overages.[67]

Because students' financial aid awards could be reduced if they receive additional funding through performance-based incentives, administrators and financial aid officers should work together to ensure students experience a net increase in aid. For example, the nonprofit education research organization MDRC worked with Hillsborough Community College (Tampa, FL) financial aid staff to ensure that the Mathematics Access Performance Scholarship recipients did not experience a negative impact on their financial aid packages, using strategies described above.[68]

Recommendation 3 implementation checklist

Recommendation 3
Offer Students Performance-based Monetary Incentives.
Implementation Checklist[69]

Phase I. Planning and Design

☐ Assemble key stakeholders for program funding, design, and implementation and identify an administrative program champion (such as the vice president of academic affairs or dean of student services).

☐ Identify sources of funding for the performance-based monetary incentives among college and community foundations, college departments, and state programs.

☐ Create a budget for program support (i.e., staff time, supplies, materials) and student incentive budget projections (based on targeted population, anticipated level of participation, and incentive amounts).

☐ Once program funding sources and program budgets have been outlined, form partnership agreements between funders and the institution to guide program financing, implementation, and evaluation.

Phase II. Implementation and Evaluation

☐ In tandem with funding negotiations, confirm the targeted population of students, based on information about which students would most benefit and be prioritized for incentives (e.g., students in developmental education courses, Pell-eligible students or students with zero expected family contribution, part-time students, "non-traditional" students).

☐ In the decision-making, ensure that target population and incentive amounts and types will operate as incentives for changes in behavior among students most at-risk for not achieving the desired goal, not rewards for students who would have already achieved the desired goals without the incentive.

☐ In conjunction with the budget decisions, confirm the types of incentives (cash, gas or metro cards, course credit).

☐ Decide upon when and how the incentives will be distributed:
- By whom?
- How much at the beginning, mid-term, and end of the semester?

- For what student actions and achievements?

☐ Determine the length of the incentive program, based upon information for key drop-off points for the targeted population on the desired outcomes (e.g., persistence, achievement in gatekeeper courses, etc.).

☐ Identify whether the distribution of incentives will occur during fall and spring terms only, or whether winter and summer terms will be added (if on a quarter system or intersessions are available).

☐ Based on the program's theory of change and population, confirm the details of the staffing plan, and train and support staff as necessary for effective implementation.

☐ Determine how student outcomes and incentive distribution will be tracked and how success of the program will be evaluated.

☐ Celebrate the successes of the program at key intervals, and learn from progress as the program is implemented and evaluated.

Recommendation 4: Compress or mainstream developmental education with course redesign.

Many colleges have adopted an accelerated developmental coursework sequence in which students can more quickly complete developmental education courses and enroll in college-level courses.[70] These reforms are referred to interchangeably in the literature as "intensive," "compressed," "condensed," or "time-shortened" models.[71] And, while the specific steps employed in the models may vary,[72] the intent is always to reduce the length of time students spend in developmental education with the aim of improved student success rates.

Participation in accelerated developmental experiences can minimize the negative effects of being placed into developmental education. Edgecombe (2011) noted that if students can register for more than one sequential course in a semester, they are more likely to enroll in the second course, thereby improving retention. Accelerated courses that mainstream developmental education students into college-level work with contextualization or supplemental instruction also help students achieve the goals and outcomes of the college-level course assignments. Further, Jaggars et al. (2015) noted that acceleration may promote persistence and academic success because the reduced time in developmental education also reduces the opportunity for external factors, such as work or family responsibilities, to hinder students' success.

The following three types of accelerated instructional models have promising evidentiary support in the research literature.

***Compressed courses with curricular redesign.** This approach involves offering developmental courses in a compressed schedule so students may either complete more levels of coursework in a single term or a term of coursework in less than the traditional 16-week semester. These courses and models also adapt curricular, instructional, and assessment practices as needed while supporting students' mastery of skills and content. Faculty adjust the pacing, workload, and instructional strategies to cover similar curricular content in a shorter timeframe. Examples include the City University of New York's (CUNY) accelerated courses,[73]*

Chabot College's (California) one-semester English redesign, Community College of Denver's FastStart program in math, and Broward (Florida) College's math redesign.[76]

***Mainstreaming with supplemental support.** Mainstreaming involves placing developmental students into college-level courses alongside their non-developmental education peers. In doing so, students underprepared for college-level work may succeed in college-level classes with the addition of supplemental support services. Supplemental supports may include companion classes (whereby the course instructor also provides additional instruction to students who are identified as needing developmental education), lab sessions, integrated tutorial support, and additional class sessions.[77] One example is the Accelerated Learning Program (ALP) at the Community College of Baltimore County.[78] Another example is the New Mathways Project provides a 1-year statistical reasoning pathway for students in social sciences or a 1-year quantitative reasoning pathway for students in science, technology, engineering, and math fields paired with a college-level student success course. This helps students develop strategies for knowledge development, self-regulation, motivation, and learning.[79]*

***Mainstreaming with contextualization to students' academic goals and interests.** This model simultaneously provides students with college-level content instruction and integration of developmental education skill-building, tailored to students' career, technical, or academic interests. For*

example, the Integrated Basic Education and Skills Training program (I-BEST) geared toward basic skills students interested in career and technical education majors, linked developmental education curricula with college-level curricula in a co-teaching model, focused on students' occupational or disciplinary interests, and engaged local employers as partners.[80] Statway, is geared toward students interested in humanities and social science majors who place into developmental math courses. The program involves mainstreaming these students into a 1-year college-level statistics course to provide them with foundational skills in statistics, data analysis, and causal reasoning.[81]

Summary of evidence:
Minimal Evidence

The panel assigned a rating of minimal evidence to this recommendation.

One study that evaluated the effects of a compressed, redesigned developmental writing course[82] met WWC standards with reservations. The researchers found that students in an accelerated developmental writing course sequence were more likely than students in the traditional, longer sequence to pass college-level English, to have earned more college-level credits after 3 years, and to have earned a degree after 5 years. All of these effects were statistically significant. This study reported the effects of compression of developmental course material from 8–12 credit hours to 6–7 credit hours at CUNY and provides promising evidence to support accelerated writing instruction.[83] The following three additional studies did not meet WWC group design standards, but the panel believes that they provide credible evidence to support this recommendation. See Appendix D Table 4 for further details about all four studies.

Mainstreaming with supplemental support: Additional evidence from the ALP. Cho et al. (2012) examined the

effectiveness of the ALP at the Community College of Baltimore County. This study did not meet WWC group design standards because the WWC could not assess baseline equivalence between intervention and comparison groups. However, the researchers used a propensity-score matched sample and controlled for a number of observed student characteristics in the analyses to account for influences of factors, such as gender, age, race, and measures of student academic background (college placement scores in reading, English, and math, median household income, several financial aid indicators, and employed campus and cohort fixed effects). Based on an analysis of several cohorts of students followed for at least 1 academic year, the authors concluded that ALP students outperformed non-ALP students on college-level English course completion rates and persistence to the next year (Table 2, p. 7). While about 75% of ALP students completed first college-level English by the next year, only 39% of non-ALP students completed the first college-level English course in that timeframe. The rate of persistence was also higher for ALP students: 64% of ALP participants compared to 48% of non-ALP participants persisted to the next year. The effects for both of these outcomes were statistically significant.

Mainstreaming with contextualization: Additional evidence from Washington's I-BEST program. Zeidenberg, Cho, and Jenkins (2010) assessed the effects of the I-BEST intervention on students enrolled in the 2006/07 and 2007/08 academic years.[84] In the I-BEST program (a mainstreaming and contextualized instruction intervention), college-level occupational courses with integrated basic skills content are co-taught by a basic skills instructor and an occupational instructor. The occupational coursework was available in a variety of fields, such as health care, office work, and skilled trades. This quasi-experimental study did not meet WWC standards because the WWC could not assess the baseline equivalence of the intervention and

comparison groups. In the propensity-score matched sample, all students in both groups were in adult basic education and workforce programs (i.e., all students took at least one career or technical education course). Adult basic education serves students at the lowest levels of developmental education coursework. Even though the study did not meet WWC evidence standards, regression analyses controlled for a number of factors, including students' basic skills test scores, English proficiency, socioeconomic status, race, age, and gender. The researchers found substantial differences between college credits earned by I-BEST students and the non-I-BEST comparison group (Table 6, p. 14). I-BEST students earned a mean of about 25 college credits; students in the comparison group earned only 17. I-BEST students also had a substantially higher rate of receiving a degree or certificate: 51% of I-BEST participants earned a degree or certificate by Spring 2009 while just 14% of students in the comparison group earned a degree or certificate. The effects for both of these outcomes were statistically significant.

Compressed courses with redesign: Additional evidence from Chabot College's integrated reading and writing course. Edgecombe et al. (2014) investigated the effectiveness of a 1-semester accelerated developmental education course in English compared with an equivalent two-course sequence. The accelerated course model also included a redesigned curriculum and pedagogical changes that attempted to strengthen the integration of developmental reading and writing instruction. This study did not meet WWC standards because the baseline equivalence of the intervention and comparison groups could not be assessed. However, regression analyses controlled for a number of factors, including students' placement scores, socioeconomic background, gender, age, marital status, racial and ethnic background, educational goals, graduation from high school, enrollment status, and prior participation in a learning community. Based on the 5-year outcomes,

the researchers found that 60% of accelerated developmental English course-takers passed the first college-level English course (i.e., completed and received a grade of C or higher) compared with just 40% of students who took the longer English developmental course sequence. Furthermore, students who participated in the 1-semester developmental English course earned an average of 36 college-level credits while students who took the traditional developmental English course sequence only earned an average of 29 college-level credits. Finally, while only 18% of non-accelerated developmental English course-takers graduated from college, 25% of accelerated English course-takers graduated from college. All of these effects were statistically significant.

How to carry out the recommendation

Many individuals working together contribute to successful outcomes achieved by underprepared college students through mainstreaming or compression of developmental education courses. Administrators, professional developers, faculty,[87] articulation officers, advisors, and students each have important roles to play in ensuring efficient transitions for developmental education students to succeed in college-level courses. See Figure 4.1. for an illustration of this concept.

1. **Obtain faculty and leadership support for rethinking course structures and policies to efficiently support students in mastering developmental education skills and earning college credits.** Support from faculty and leadership is vital to developing and implementing an effective accelerated course model, especially if the large majority of students are to be affected by the changes. Particularly for mainstreaming models, colleges must establish collaborative structures and processes for instructors to communicate

with one another and ensure that students are mutually supported as they complete college-level coursework. To begin, assess the existence and effectiveness of current strategies for accelerating students' progress through developmental education (See Figure 4.2.). During planning, anticipate challenges and strategize collaboratively to achieve optimal success (See Figure 4.3.).

Figure 4.1. Student success through accelerated coursework
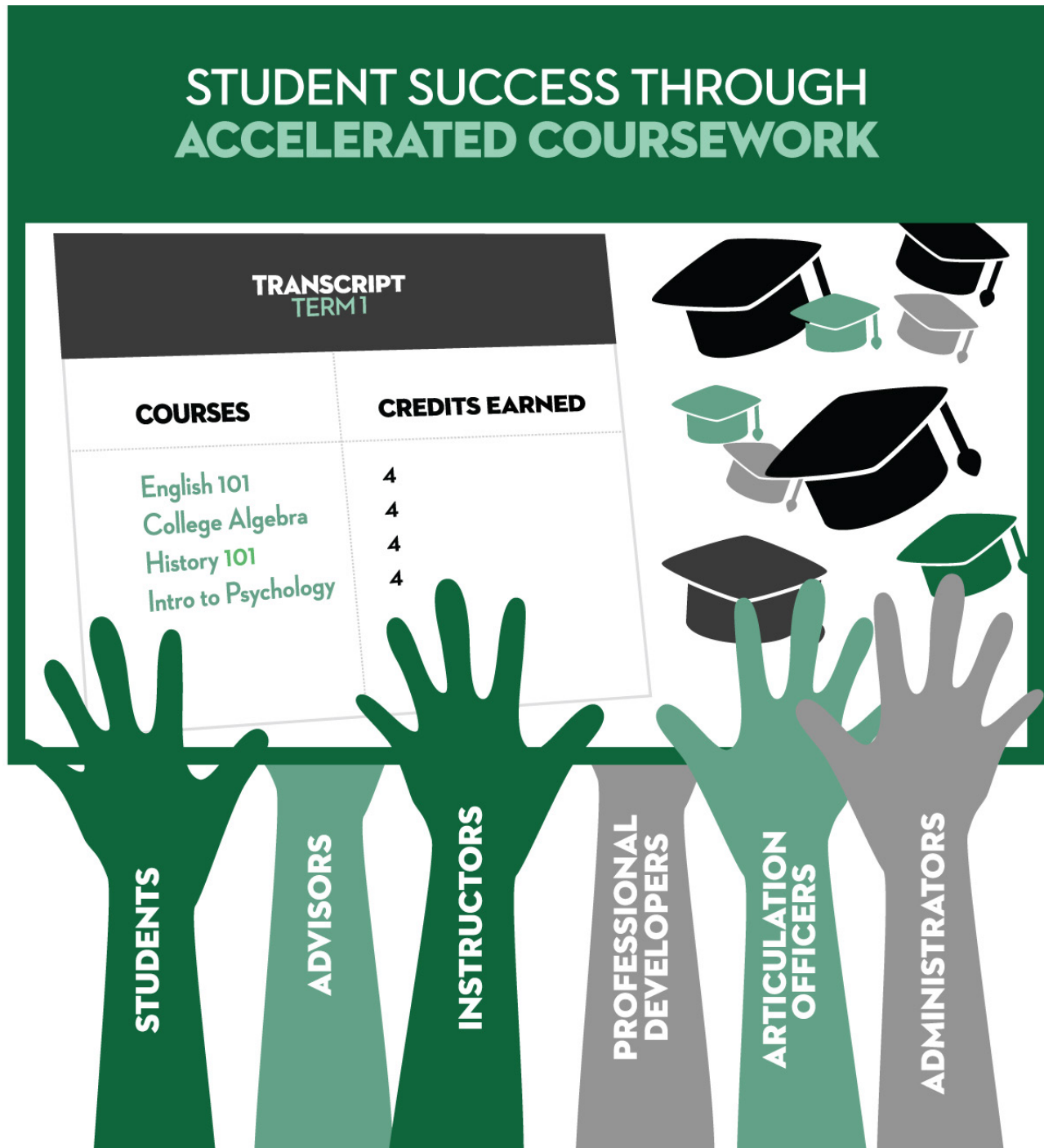
Figure 4.2. Inventory of strategies currently in place for accelerating students' progress through developmental education

Figure 4.3. Planning issues and considerations in adopting compressed and mainstreaming developmental education models

Figure 4.2.

Inventory of strategies currently in place for accelerating students' progress through developmental education.[85]

Do you already have

☐ Self-placement options for students to reduce need for placement into developmental education?

☐ Compressed developmental education curriculum, with rigorous course content aligned with transfer-level and career/technical fields?

☐ Provision of additional student supports integrated with coursework?

☐ Integration of skill-building in English and math within credit-bearing courses, aligned with students' academic and career interests?

☐ Monitoring of student progress at regular, frequent intervals based on student mastery of content rather than seat time?

Figure 4.3.

Planning issues and considerations in adopting compressed and mainstreaming developmental education models.[86]

☐ Anticipate key challenges in redesigning developmental education courses.

☐ Strategize about how to engage each stakeholder group in redesigning and accelerating developmental education.

☐ Think about who may resist redesign of developmental education, if not engaged in the process.

☐ Consider the goals and methods for engaging stakeholders in redesigning developmental education, to maximize success.

☐ Know what the best-case scenario outcomes are for the redesign and key milestones to be accomplished to achieve those outcomes.

☐ Think through the worst-case scenario outcomes when engaging with stakeholder groups and what strategies can be used to mitigate the chances of these outcomes.

2. **Provide systematic professional development and support for faculty to implement new accelerated course models.** New models of acceleration generally require systematic professional development for faculty and, depending on the type of acceleration, faculty needs for professional development will vary. Principles of faculty professional development should address:

   - How to maintain rigorous college-level content and skill development while meeting needs of students who are not college-ready in all areas.

   - Ways to best use the institution's resources and the expertise of various instructors to compress, mainstream, or modularize course content.

   - Models for integrating accelerated course models in mathematics, reading, and English, or contextualizing courses to students' academic and career interests.

   - If computer-based tools and programs are being adopted, training and support for effectively using these tools to support accelerated course models should be provided.

3. **Offer support to faculty for differentiating instruction to students of varied levels of academic preparedness in their classes.** In mainstreaming models, faculty who teach introductory college-level courses may not be accustomed to differentiating instruction for students without college-level proficiency. Or, they may not have experience tightly coordinating their curriculum and instructional delivery with other instructors (e.g., those who provide supplemental instructional support). Developmental education instructors need to become familiar with the rigor of the college course content and assessments and determine how to best support students' success in mastering the college-level course material.

4. **Mobilize and communicate targeted supports for students' specific instructional needs.** When accelerating students' progress in developmental coursework, students who are not yet college-ready may require targeted supports.[88] For example, students may need help sustaining motivation and integrating the skills and knowledge learned from module to module when using a modularization approach. Specific suggestions include:

   - Decide on the best structure, staffing, and allocation of credit for supplemental instruction, modularized content, and redesigned courses to offer necessary targeted supports to students of varying skill levels.

   - Use communication supports—such as text-based reminders about upcoming deadlines and encouragement to keep working—to keep students motivated, on track, and primed to use existing campus resources.

Potential roadblocks and suggested approaches

Roadblock 4.1. *Students may not take advantage of accelerated course options and their benefits.*

Suggested Approach 4.1. Faculty should work with academic advisors or mentors to ensure the appropriate students register for accelerated courses. Underprepared students may be hesitant to sign up for an accelerated course in a topic area in which they consider themselves weak or have been told they need remediation.[89] Faculty and support staff should develop and distribute materials to inform students of available accelerated course sequencing.[90] This practice would likely be more effective when implemented in concert with enhanced advising.

Roadblock 4.2. *Adjunct faculty who teach developmental education students are often disconnected from instructional decision-making, professional development opportunities, and institutional supports.*

Suggested Approach 4.2. Most developmental education courses are taught by adjunct faculty,[91] who have more limited contact with students outside of class, are less aware of administrative changes, and are less involved in collective faculty decision-making, than full-time faculty and staff.[92] Without intervention, an over-reliance on adjunct faculty to teach developmental education courses can limit the capacity of institutions to create effective accelerated instruction models. When considering the implementation of accelerated instructional models, adjunct faculty need institutional support, professional development, and engagement with curriculum development. As discussed by Kosiewicz and colleagues (2016), the involvement and support of adjunct faculty in the design and implementation of the accelerated curriculum will strengthen their investment and capacity to deliver the results anticipated from the new approach.

Roadblock 4.3. *Faculty members are accustomed to the status quo of existing developmental education sequences, structures, and readiness levels of students in their classes.*

Suggested Approach 4.3. Colleges should provide faculty with professional development, opportunities to collaboratively plan with other faculty on curriculum development, and incentives for faculty collaboration.[93] Faculty who currently teach

college-level courses may resist adaptations needed for mainstreaming developmental education students in their classes. Smooth and successful implementation of the changes requires deliberate efforts to cultivate champions and support from all stakeholders, which takes time and persistence. Faculty with expertise in teaching college-level content and faculty skilled in teaching developmental skills will need to partner to maintain instructional rigor for college-level mastery while differentiating instruction to meet students where they are. Communication and collaborative decision-making across departments and/or course levels will be necessary.

Roadblock 4.4. *Existing state, college, and regional accreditation policies may not be well-aligned with chosen accelerated course models.*

Suggested Approach 4.4. College-level leaders, state policymakers, regional accreditors, and discipline-specific associations should discuss adjustments to any necessary policies and procedures that would inhibit students in receiving appropriate credit for redesigned courses. Transfer and articulation policies may not currently support the models identified in this guide, and colleges may need to work proactively to ensure that new course models are recognized and properly credited when students transfer. Bracco and colleagues (2015) report upon North Carolina's creation of the NC Ready for Success Steering Committee as one example of how multiple sectors worked together to better align policies and practices to smooth transitions for students' success.

Recommendation 4 implementation checklist

Recommendation 4
Compress or Mainstream Developmental Education with Course Redesign.
Implementation Checklist[94]

Phase I. Evaluation of Current Developmental Education Course Models

- ☐ Conduct an inventory of the length and scope of current developmental education courses.
- ☐ Investigate the costs associated with the current model.
- ☐ Investigate the outcomes achieved in the courses under the current model.
  - ☐ Overall
  - ☐ Within different courses
  - ☐ By sub-groups
- ☐ Work to identify why students are not succeeding in the current courses and sequence.
  - ☐ Solicit feedback from faculty.
  - ☐ Solicit feedback from students.
- ☐ Work to identify why students are successful in the current courses and sequence.
  - ☐ Solicit feedback from faculty.
  - ☐ Solicit feedback from students.
- ☐ Investigate the effects and lessons learned from previous efforts to compress or accelerated developmental education (if any), and use them in planning.
  - ☐ Interview administrators and faculty who participated in previous efforts.
    - What worked?
    - What did not?
    - What do they identify as challenges to success?
    - What do they suggest as ways to improve?

Phase II. Planning and Decision-Making for Compressed or Mainstreamed Models

- ☐ Consider which compression or mainstreaming strategies might work best for your college.

- ☐ Meet with developmental education faculty to review the strategies outlined in this guide.
- ☐ And, based on students' needs and college resources, decide which model is best for your college.
- ☐ Decide how your college should choose, sequence, and prioritize strategies and solutions.
- ☐ Determine additional information needed to support students' successful transition to college-level work and how you will determine the success of the strategies employed.

Phase III. Implementation and Evaluation

- ☐ Cultivate champions of the new approaches, strategies, and models.
- ☐ Engage faculty in the redesign and obtain faculty support for the new approach.
- ☐ Offer professional development for faculty to build this team of change agents in development education.
- ☐ Work with developmental education faculty, student support personnel, and core academic faculty on the strategies.
- ☐ Evaluate the outcomes achieved from the mainstreamed or compressed courses compared to the traditional course sequences.
- ☐ Use evaluation data to guide course revisions, resource allocation decisions, advocacy for policy change to help articulation and transfer as needed, and expansion of the accelerated course models.

Recommendation 5: Teach students how to become self-regulated learners.

Traditional academic instruction emphasizes learning content. However, many students, including those in developmental education, arrive on college campuses without knowing much about how they learn and which study strategies might work best for them. Teaching students to be more aware of their own learning processes through encouraging monitoring and reflection of their learning can help them become better learners.[95]

Teaching students to be self-regulated learners focuses students on the parts of the learning process over which they have control. Teaching students how to learn more effectively can be embedded into existing subject-matter coursework. Typically, teaching students to become self-regulated learners involves demonstrating how to (a) approach a task, (b) implement that approach or strategy, (c) evaluate how well the approach or strategy worked, and (d) decide what to do next.[96]

Young and Ley (2003, 2001) describe four instructional principles and activities to support underprepared students to become better self-regulated learners: 1) prepare and structure the learning environment to help students cope with distractions, 2) organize and transform instructional materials to support self-regulated learning, 3) work with students to keep records and monitor progress, and 4) work with students to evaluate performance against a standard.

Summary of evidence: Minimal Evidence

The panel judged the level of evidence supporting students in regulating their own learning as minimal.

One study met WWC standards without reservations.[97] Zimmerman et al. (2011) observed statistically significant effects on three measures of progress in developmental education, including the best measure: the proportion of students who passed the college-level course in which remediation was needed (in this case, math). In the intervention group, 25% of students passed-

college level math; only 13% of students in the comparison group did. See Appendix D Table 5 for more detail on this study.

How to carry out the recommendation

Again, teaching students how to become self-regulated learners involves introducing students to the process of (a) approaching a task, (b) implementing that approach or strategy, (c) evaluating how well the approach or strategy worked, and (d) deciding what to do next. Figure 5.1. provides an overview of the self-regulated learning process for instructors and students.

1. **Encourage students to improve their estimation of their current capabilities.** When students plan which strategies to use in a learning task, they have to make an accurate judgment of their capabilities and resources. Completing tasks in which students have been previously successful will likely take less forethought, because they already know strategies that work in those learning situations. When students encounter new learning tasks or situations, they will have to use their own judgment of how they performed previously on similar tasks and which strategies might be relevant. However, struggling learners are often poor judges of their own knowledge and capabilities.[99] Monitoring and reflecting on the learning process allows students to practice judging their abilities, performing a task, and getting feedback to improve their judgment of their own knowledge and

capabilities. For example, instructors can prompt students to reflect on what they think they know and can do while doing an academic task. After students receive feedback on the task, instructors can ask students to reflect on whether they were as able as they thought. Zimmerman et al. (2011) observed that after students in developmental education courses practiced this type of structured reflection, they were better judges of their own abilities than students who did not regularly participate in the reflection.

2. **Integrate monitoring and reflecting on the learning process with coursework or course content.** Students can learn to be better learners while learning course content. Instructors can structure their courses to support this by integrating into the course expectations and assignments student planning, reflection, and evaluation of the learning process.[100] Instructors can prompt students at the start or end of assignments to aid students in monitoring and reflecting on their learning. These prompts can be steps that students have to go through to complete the assignment or process questions to direct students to evaluate their learning approach and determine what to do on similar tasks in the future. For example, for more general studying behaviors, instructors can ask questions, such as: "How do you take notes in class? Do you review your notes? When? How? Do you stop periodically and check to see if you are understanding the material?"[101]

The intervention in Zimmerman et al. (2011) gave students a chance to learn from their errors on quizzes by completing a self-reflection form in which they had to compare their estimates of ability with their quiz score, explain why they got the quiz item wrong, select a different strategy to try in the future,

state their confidence that that strategy would be effective, and complete a similar problem to the one they answered incorrectly on the quiz. Teaching students to improve their learning process can also occur in a standalone course that makes linkages to content in courses that students are concurrently attending. See Figures 5.2 through 5.7 for examples.

3. **Present students with examples and models of how to monitor and reflect in the course subject matter.** Instructors can model monitoring and reflecting through making their thinking explicit in classroom discussions and lectures so that students have a model for how to approach an academic task. For example, an instructor might explain to students how to determine what is important in a reading passage. Or, instructors can ask students to be explicit about their monitoring and reflecting in class discussions. Student responses in discussion or homework problems can be used in the same way as instructor modeling of monitoring and reflecting.[102] In addition, these examples may be more accessible for students because they may be more similar to their own thinking. For example, in Zimmerman et al. (2011), "the instructor encourage[d] students to go to the board to demonstrate problem solving and error detection strategies, and . . . the instructor encourages students to verbalize error detection and problem solving strategies while working through practice problems" (p. 146).

Potential roadblocks and suggested approaches

Roadblock 5.1. *Some faculty may resist teaching developmental education students to regulate their learning because of scarce time and resources in the classroom.*

Suggested Approach 5.1. Assure faculty that teaching students to be better self-regulated learners leads them to be more effective and efficient learners in the long term. Hudesman et al. (2013a) noted that new instructors are often resistant because of the extra time required to implement self-regulated learning programs. Experienced instructors may also have these concerns, particularly since adding more content or lessons to a course will necessitate the use of class time. However, as suggested by Hudesman et al. (2013a), after initial lags in learning, students may actually learn more efficiently once they become more effective self-regulated learners. Also, once students become more self-directed, the need for faculty intervention may fade.[103] Hudesman et al. (2013a) also found that instructors may find it useful to automate administration and scoring of quizzes with tablet PCs to create time efficiencies and engage students with online feedback on quizzes and assignments.

Roadblock 5.2. *Building students' learning skills may not fit into faculty goals for a given course.*

Suggested Approach 5.2. Involve faculty as meaningful partners in integrating practices to teach self-regulated learning. There are many reasons why faculty members may not see building learning skills as appropriate for their course. For example, they may assume that students already have these skills or that they should be learning them elsewhere. Given that the specific strategies chosen are likely less important than finding strategies that faculty can implement well and believe will be effective, there is room for faculty choice in the specific strategies implemented, which may facilitate faculty investment.

Roadblock 5.3. *Students may resist monitoring and evaluating their learning process because they feel it is unfamiliar, cumbersome, time-consuming, irrelevant, or useless.*

Suggested Approach 5.3. Discuss the relevance of reflecting on students' own

learning processes and give students time and space to internalize these practices. As postsecondary learners, students in developmental coursework have a long history of learning which, oftentimes, was less productive than it could have been. Instructors may find that students' engagement in self-regulated learning processes in academic coursework increases after engaging students in applying these techniques to career objectives and personal goals such as improved relationships, health and athletics, weight loss, and others.

Students may be set in their ways about what works for their own learning. Or, students may not have considered or used more effective strategies that require them to monitor and reflect on their learning process. Also, thinking about the learning process while they are learning may feel more difficult to students, and the pace of learning can seem slower. Instructors can present self-regulated learning instruction as a way for students to become better learners, which will help them in their current and future classes and careers. Instructors can discuss how they use these strategies in their own learning and how other students have used these strategies to become more successful learners. Instructors can also model strategies in the classroom.

If instructors can give students time, space, and instruction to support them in becoming self-regulated learners, instructors may overcome the initial negative reaction to the novelty of the practices. For example, Hudesman et al. (2013b) noted that students, after being exposed to a self-regulated learning program, said the program created a "positive educational experience" regardless of whether they passed the course.[104]

Roadblock 5.4. *Instructors may not be skilled self-regulated learners themselves.*

Suggested Approach 5.4. Provide instructors with materials and training so they can put the skills they are teaching developmental education students into

practice. Instructors may not use these practices regularly in their own learning. Or, they may be unfamiliar with terminology or steps for implementation. Like students, instructors can become more skilled in self-regulated learning through direct instruction and practice. In a supplemental report to Zimmerman et al. (2011), Hudesman and colleagues (2014) described how instructors in the intervention attended a 2-day onsite training program to learn how to implement self-regulated learning

practices in their classes.[105] Over the semester and after the training program ended, instructors completed logs covering classroom experiences and how they applied self-regulated learning. The logs gave instructors practice participating in the self-regulated learning process, because they asked instructors to reflect on their goals for the class period and evaluate how effective their strategies were implemented.[106] Instructors received feedback on their logs from program staff.

Figure 5.1. Overview of the self-regulated learning process[107]

INSTRUCTORS

EVALUATE
Evaluate effectiveness of the curriculum, instruction, and assessment practices.

Modify course as needed.

PLAN
Plan how to integrate self-regulated learning in course components.

Make predictions and confidence estimates.

PRACTICE
Facilitate students' self-regulated learning skills with all assignments.

Work with other instructors to reinforce these practices.

STUDENTS

EVALUATE
Self-evaluate strategy use and goal achievement.

Maintain or adapt the strategy.

PLAN
Review prior performance.

Conduct a task analysis.

Select strategies.

Set goals and confidence estimates.

PRACTICE
Set processing goals to implement a learning strategy.

Self-observe your strategic behavior and outcomes.

Figure 5.2. Overview of the self-regulated learning process

Integration of Self-Regulated Learning Throughout a Course

The following instructional tools and examples illustrate how to integrate the teaching of self-regulated learning within quizzes. Self-regulated learning strategies—such as student predictions, assessment of confidence, reflections on performance—should be embedded in homework, tests, and other course assignments. Students should also be encouraged to apply them in other courses.

Figure 5.3. Sample self-regulated learning quiz in mathematics

<div>

SAMPLE

Self-Regulated Learning Quiz in Mathematics[108]

The following is an example of a quiz that helps students focus on their self-efficacy to do class tasks. Over time, comparing the before and after judgments can help students to improve their judgment of their capabilities and knowledge of class topics and tasks.

Name _____   Date _____   Quiz # _____

Predicted Score: _____   Preparation Time: _____mins.

BEFORE solving each problem, how confident are you that you can solve it correctly?	**REMEMBER!** Show all your work. Simplify all your answers.	**AFTER** you have solved each problem, how confident are you that you solved it correctly?
0% 25% 50% 75% 100%	1. Factor completely: $10x^2y^2 + 4xy^3 - 2y =$	0% 25% 50% 75% 100%
0% 25% 50% 75% 100%	2. Solve: $\dfrac{8a^2b^2 - 12a^3b^2c + 4ab^2}{4ab^2}$	0% 25% 50% 75% 100%
0% 25% 50% 75% 100%	3. Express in scientific notation: a) 6700000 b) 0.000015	0% 25% 50% 75% 100%
0% 25% 50% 75% 100%	4. Compute and express in scientific notation: $(3.6 \times 10^5)(6 \times 10^3)/12 \times 10^3$	0% 25% 50% 75% 100%
0% 25% 50% 75% 100%	5. Solve: $(5x - 3)^2$	0% 25% 50% 75% 100%

</div>

Figure 5.4. Sample quiz reflection and revision sheet in mathematics

SAMPLE
Quiz Reflection and Revision Sheet in Mathematics[109]

After students receive feedback on their quiz performance, the Revision Sheet asks them to think about whether the strategies that they chose to use were appropriate, which strategy to use on an item that they got incorrect, and whether they feel confident that the new strategy will be effective.

SRL Math Revision Sheet, Quiz # _____   Item #_____

Student: _____   Instructor: _____

Date: _____

Now that you have received your corrected quiz, you have the opportunity to improve your score. Complete all sections thoroughly and thoughtfully. Use a separate revision sheet for each new problem.

8 PTS

PLAN IT

1. a. How much time did you spend studying for this topic area?
    b. How many practice problems did you do in this topic area in preparation for this quiz?
        (circle one) 0 – 5 / 5 – 10 / 10+
    c. What did you do to prepare for this quiz? (use study strategy list to answer the question)

2. After you solved this problem, was your confidence rating too high (i.e., 4 or 5)?
    yes / no

3. Explain which strategies or processes went wrong on the quiz problem.

    _____

    _____

8 PTS

PRACTICE IT

4. Now redo the original quiz problem and write the strategy you are using on the right.

Problem	Strategy

5. How confident are you now that you can correctly solve a similar item?

    1   Definitely not confident

    2   Not confident

    3   Undecided

    4   Confident

    5   Very confident

4 PTS

6. Now use the strategy to solve a similar problem.

Problem	Strategy

EVALUATE IT

7. How confident are you now that you can correctly solve a similar problem on a quiz or test in the future?

    1   Definitely not confident

    2   Not confident

    3   Undecided

    4   Confident

    5   Very confident

Figure 5.5. Paired discussion among students—evaluation of the quiz format

> ### Paired Discussion among Students
> ### Evaluation of the Quiz Format[110]
>
> This activity links with the quiz reflections that students are assigned. The partner format helps students reflect on how they can be more engaged ("active") learners and focus on the process of learning rather than their own unchangeable or innate abilities.
>
> **Sample Discussion Questions about the Self-Regulated Learning Quiz Format**
>
> Find a partner and discuss your reaction to the Self-Regulated Learning Quiz format, using the following questions.
>
> 1. What are some of your initial reactions to this quiz format?
>
> 2. How can this quiz format help you become a more active learner?
>
> 3. What is the relationship between the time you spend preparing for the quiz and your quiz score? How can you check out this relationship?
>
> 4. Why is it useful to judge how well you think you did on a problem before AND after you complete the problem?

Figure 5.6. Guided self-reflection about the course

Guided Self-Reflection About the Course[111]

This activity helps students to reflect on their growth as learners throughout the course. The questions ask students to discuss specific strategies or examples of being an "active learner" as well as how they've become more effective learners because of the course.

Sample Self-Reflection Questions About the Course

Think about the semester so far, and answer the following questions:

1. What are two strategies that work for you in math class that you would recommend to your classmates?

2. What has changed about you as a math student since the first week of class?

3. What are two examples of why you are more of an active learner than you were the first week of class?

4. What is one question you have for your classmates or instructor?

Figure 5.7. Discussion questions for applying self regulated learning skills to other courses

**Discussion Questions for
Applying Self-Regulated Learning Skills to Other Courses**[112]

This activity encourages students to transfer the self-regulated skills that they have learned to their other coursework.

Sample End-of-Course Discussion Questions (for students on how to translate these strategies to other courses)

During the discussion about monitoring, take notes on significant points and ideas you want to remember.

1. What are examples of monitoring tools you have noticed other people (instructors, friends, etc.) using?

2. What is the relationship between self-monitoring and academic success?

3. What makes an effective self-monitoring tool?

4. How can your self-monitoring tool affect whether or not you reach your goal?

5. What new self-monitoring tool would you like to try? Why do you want to try that self-monitoring tool?

Recommendation 5 implementation checklist

Recommendation 5
Teach Students How to Become Self-Regulated Learners
Implementation Checklist[113]

Planning

- ☐ Consider how to integrate the teaching of self-regulated learning skills into your course structure and syllabus.

- ☐ Adapt course quizzes, assignments, tests, and homework to incorporate self-regulated learning components.

- ☐ Throughout the course, include time and space for students to make plans for doing their assignments and evaluate their follow-through on the plan they created.

- ☐ Finalize a plan for course curriculum, instruction, and assessment, as well as ways to evaluate the effectiveness of your plan in your course (and courses in your department, as applicable).

- ☐ Make predictions about how well your students will do in the course; and document the work performed to prepare for the course and your level of confidence in how effective the self-regulated learning process will be.

Implementation

- ☐ Motivate and introduce students to self-regulated learning strategies as a way to improve their learning.

- ☐ Guide students to understand that they have some control over their learning process and they can become active, self-regulated learners not just in this class, but in all their classes.

  Strategies include:

  - ☐ Ask students to evaluate their pre-existing learning processes and compare these to what self-regulated learners do.

  - ☐ Ask students to share strategies that were effective and ineffective.

- ☐ Provide assignments to scaffold the self-regulated learning process.

  For example, in quizzes:

  - ☐ Ask students to predict their quiz score.

- ☐ Have students record the time they spent preparing for the quiz, and their level of confidence in answering correctly.

- ☐ After they have completed the quiz, ask students whether they believe they succeeded and whether their predictions were correct.

- ☐ Invite students to reflect upon why they succeeded or not, and write down plans for what they will do for future assignments.

- ☐ Integrate self-regulated learning instruction with course content, so that students have a disciplinary context in which to apply their self-regulated learning skills.

- ☐ In communication with students, reinforce how assignments will help them become more active learners so that they can transfer these skills to other coursework.

  Strategies include:

  - ☐ Provide reflection points for students to pause and plan their learning or to evaluate their learning and their learning plan.

  - ☐ Establish classroom norms that allow students to support each other in becoming better learners. For example, let students know that asking for help is not an indication of failure; it is an indication that they are honestly evaluating their own learning process and trying to improve.

  - ☐ Teach students to set achievable goals. Student learning goals should be quantifiable, have a time limit, and have a strategy connected with them.

  - ☐ Have students record changes to goals and plans so that they can look back, evaluate, and improve their goal-setting skills.

  - ☐ Emphasize in discussion and assignments the importance of learning from feedback to improve future learning.

  - ☐ Show students ways of organizing or viewing feedback to make the feedback more useful. For example, students may summarize written feedback across assignments or use online tools to graph changes in feedback.

- ☐ Have students make predictions about both short-term (i.e., assignments) and long-term (i.e., course) learning performance.

- ☐ Have students carry out an academic plan and evaluate how well the plan worked.

- ☐ Work with other instructors to reinforce self-regulated learning skills in their courses, so that students can apply these skills in multiple academic courses.

- ☐ Guide students to apply self-regulated learning processes to other courses, even when instructors do not explicitly integrate them.

Evaluation

- ☐ Evaluate how well self-regulated learning processes were integrated into course content and whether your predictions of student performance were achieved with the methods implemented.

- ☐ Based on analysis of course evaluations and student performance in the course, modify curriculum, instruction, and assessment practices as needed.

- ☐ Write a plan for the next course's curriculum, instruction, and assessment, as well as make any needed changes to course evaluation or departmental planning.

Recommendation 6

Recommendation 6: Implement comprehensive, integrated, and long-lasting support programs.

Some institutions have implemented comprehensive and integrated support programs that incorporate a variety of components with the goal of improving student educational outcomes. While many colleges offer multiple supports to their students, what differentiates this practice from business as usual is the intentional focus on integrating these supports and incentivizing participation in the long term. One example is the City University of New York's (CUNY) Accelerated Study in Associate Programs (ASAP). ASAP provides a "comprehensive array of services and supports over a three-year period to help more students graduate and to help them graduate sooner."[114]

Summary of evidence:
Moderate Evidence

The panel has assigned a moderate evidence rating for this practice.

The rating is based on the expert judgment of the panel and on one large randomized controlled trial of 896 low-income students with developmental education needs[115] that meets WWC standards without reservations.

This study revealed statistically significant effects on its primary outcomes; many of these effect sizes were large in magnitude. Specifically, students who participated in ASAP were more likely to complete their developmental education requirements (75% completion rate in the ASAP group versus 57% in the comparison group); earn better grades (about 69% of the ASAP group and 60% of the comparison group earned at least a 2.0 GPA); earn more college credits (after 6 semesters, the ASAP group accumulated 43 credits and the comparison group earned 35 credits); earn a degree (usually an associate's degree) at the study's longest follow-up date (by the sixth semester, 40% of the ASAP group and 22% of the comparison group had earned a degree); and enroll at a four-year college within 3 years of entering the program (transfer rates were 25% in the ASAP group and 17% in the comparison group). Figure 6.1. and Appendix D Table 6 summarize these impacts.

Of the interventions studied for this guide, ASAP was the largest in terms of scale and scope. As a result of the expansive scope of the ASAP intervention, the panel observed greater improvement across more outcomes than in any of the other practices in this guide. While other practices received a moderate rating from the panel, this practice—implementing comprehensive, integrated, and long-lasting support programs—showed the largest increases in effects on college success outcomes, including degree attainment.

> **"While other practices received a moderate rating from the panel, this practice—implementing comprehensive, integrated, and long-lasting support programs— showed the largest increases in effects on college success outcomes, including degree attainment."**

Figure 6.1. Postsecondary impacts of Accelerated Study in Associate Programs

**Postsecondary Impacts of
Accelerated Study in Associate Programs (ASAP)[116]**

EFFECT SIZES

0.12 — Enrolled in postsecondary education (semester 1)

0.50 — Completed developmental education requirements within 3 yrs.

0.28 — Cumulative college-level credits within 3 yrs.

0.18 — Achieved greater than 2.0 GPA (semester 1)

0.53 — Earned a degree within 3 yrs.

0.29 — Transferred to four-year institution within 3 yrs.
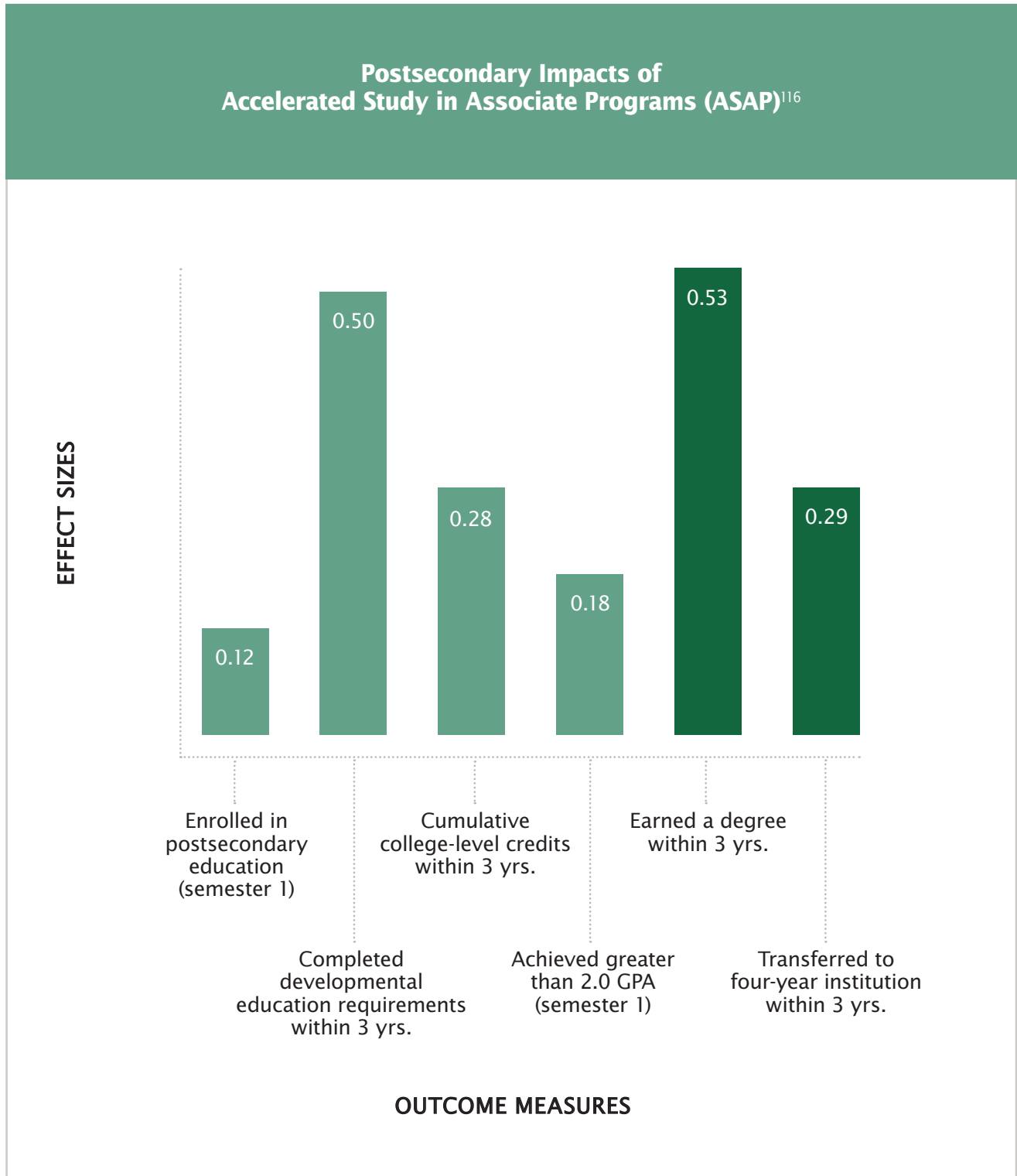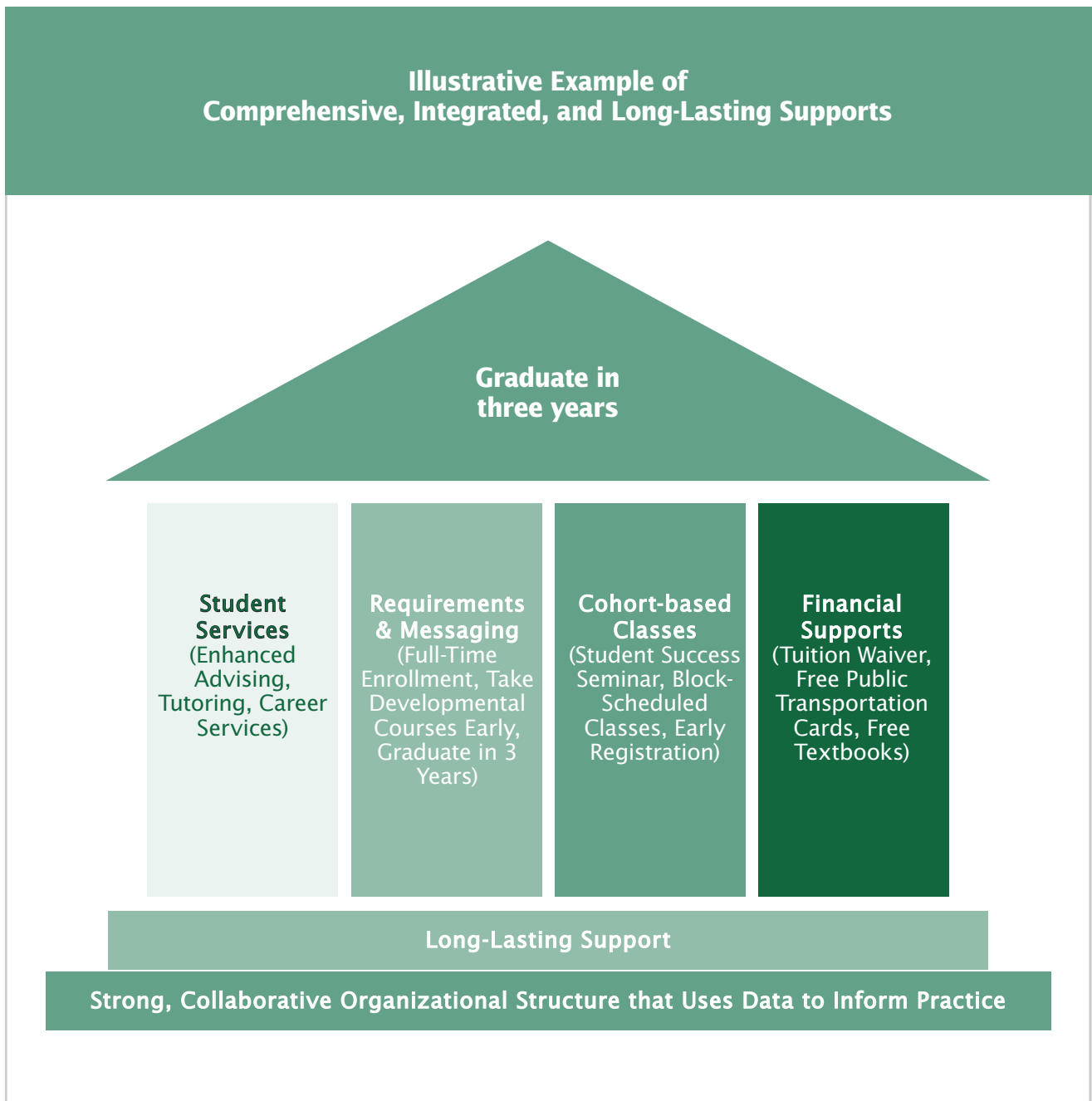
OUTCOME MEASURES

Figure 6.2. Illustrative example of comprehensive, integrated, and long-lasting supports

How to carry out the recommendation

Many students in developmental education face a range of challenges.[117] To ensure that they can succeed, institutional leaders should consider programs that combine student services, specific requirements, scheduling that encourages student cohorts, and financial supports. The impact of combining these supports appears to be more than simply providing additional help and instead creates a clear path to students' success by systemically eliminating institutional barriers that create obstacles to students' progress and attainment.

The ASAP intervention is one example of how to carry out comprehensive, integrated support programs for developmental education students.

The primary purpose of ASAP was to accelerate progress through college so that students could graduate in 3 years. ASAP required full-time attendance and provided students with services (such as comprehensive advisement, tutoring, and career assistance) and financial support (such as tuition waivers, free textbooks, and free public transportation passes). To ensure student schedules that facilitated accelerated study, ASAP offered and encouraged students to take blocked or linked courses for the first year and a student success course for the first few semesters. ASAP students were able to register for courses early, which helped them to design a schedule suitable to their needs. ASAP students were encouraged to take their developmental courses early and to graduate within 3 years. To successfully implement all of the programmatic components, a strong, collaborative organizational structure was developed. Figure 6.2. provides an overview of the components of this program.

1. **Develop a strong, collaborative organizational structure that uses data to inform practice.** Attention to the oversight and coordination of a comprehensive and integrated support program is critical. A large number of people and units will need to be involved in fairly constant communication for a program like this to be successful. Leadership at different levels is also necessary. For example, ASAP was implemented as a partnership between the CUNY Office of Academic Affairs and three participating community colleges. This required multiple layers of organizational structure and high levels of collaboration. The Office of Academic Affairs provided fiscal and programmatic oversight while the individual colleges established ASAP teams that operated the programs at their sites and provided direct services to the students. The central office staff and college ASAP directors met monthly and communicated frequently between meetings.[118]

    It is also important to use data to inform program structure, monitor program implementation and usage, and evaluate effectiveness. ASAP implementers used data to:

    - Develop the program structure based on motivating factors and needs of the student population. A comprehensive, integrated, long-lasting support program may look quite different from one location to another because students in different colleges are motivated by different incentives and have different needs. For example, in New York City, many students consider MetroCards to be valuable, given the expense, efficiency, and popularity of public transportation. Thus, MetroCards were given as an incentive to fulfill program requirements, such as going to advising appointments. In other locations, gift cards for gasoline may be a comparable incentive.

- Track the students as they go through the program and meet the various requirements. Students are required to enroll full time and attend advising, tutoring, career services, and the ASAP seminar. These activities need to be tracked to identify which students are eligible to receive their monetary incentives and remain in the program. To keep track of this information, each ASAP college recorded information about contact with participating students in a centralized data management system. Contacts with advising and career services were logged monthly, while ASAP seminar participation and tutoring visits were tracked weekly. CUNY central office evaluation staff analyzed program data monthly, and shared reports with the colleges. Key program staff and administrators then used the data to manage and modify the program, so that program benchmarks would be met. If data at a college showed, for example, that students were not meeting the target to meet with their advisor twice a month, the CUNY central staff and the college's program director would enact solutions to resolve this issue.

- Assess program effectiveness. The central office conducted periodic surveys of ASAP students and held student focus groups about their perceptions of and satisfaction with the program. An impact evaluation was also conducted.

2. **Clearly communicate expectations to students.** By way of example, ASAP communicated its goals of full-time enrollment, taking developmental courses early, and graduating quickly through written materials, program orientation, and discussions with advisers.[119] The messaging began immediately as

students entered ASAP and continued throughout the program. The primary messages students received were to:

- Enroll full time and take intersession courses. Full-time enrollment was required for the ASAP intervention in each fall and spring semester that students were enrolled in the program. Advisors also encouraged students to take courses in the 6-week intercessions. Although it is still unknown which program components resulted in ASAP's positive effects, the researchers speculated that the full-time enrollment requirements, coupled with the multiple supports to facilitate that enrollment, appear to be "central to the program's success".[120] [121] Colleges may also be able to be flexible when defining "full time." For example, if full time is defined as 12 credit hours per semester for an undergraduate student, it could be redefined to 24 credit hours in an academic year (perhaps with a minimum of six credit hours in the fall and spring semesters). Doing so would allow students taking courses during intersessions and in the summer to count these toward their full time enrollment status, thereby both encouraging a more continuous enrollment pattern and providing some degree of flexibility for students who cannot manage four courses at a time.

- Take developmental courses early. Although ASAP did not incorporate an accelerated developmental coursework sequence, it promoted taking developmental courses early, mostly through conversations about course planning and registration with advisors. Developmental courses for ASAP students were often part of the linked or blocked

courses offered to students during the first 2 semesters.[122]

- Graduate quickly. ASAP promoted a messaging strategy that students "should and can graduate within three years".[123] This message was promoted during program orientation, through written materials, and during advising sessions from the beginning through the end of the program. Taking advantage of winter and summer intersessions also helped students to graduate within three years.

3. **Design course enrollment strategically.** In ASAP, program developers designed course enrollment structures to group ASAP students together and allow ASAP students to maximize the likelihood of maintaining a full-time schedule. This included:

- Blocked or linked courses. ASAP students may enroll in linked courses in their first year. These linked courses include two or more classes grouped together with seats reserved for ASAP students.[124] The purpose of linking was to create a learning community for students, which are based on the belief that active learning in a community based setting can improve academic outcomes by increasing academic and social integration.[125]

- Student success course. ASAP Students enroll in an ASAP seminar as a cohort during their first few semesters.[126] This seminar was a noncredit course covering topics such as problem solving, stress management, study skills, and campus information. The seminar also helped with career and transfer planning and facilitated discussions on topics such as leadership and community involvement.

- Early registration. ASAP students can register for courses early,[127] which gives students who work full time (or

have other out-of-school responsibilities) the best chance to create a course schedule that fits their lives.

4. **Decide which student support services will be provided and how to ensure that students participate.** There are a number of different types of student support services that can be offered to developmental education students. In ASAP, participation in enhanced advising, tutoring, and career services was mandatory. There were also some voluntary services. Students were provided with:

- Enhanced comprehensive advising on academic, social, and interpersonal issues by ASAP advisors. The student-to-advisor ratio was between 60:1 and 80:1, and ASAP participants met with their advisors very frequently (an average of 21 times in the first semester and 17 times in the second semester; Scrivener et al., 2015). The ASAP advisors worked specifically with ASAP students and had an ASAP supervisor who helped to define their role.

- Required tutoring during their developmental courses and during any semesters they were on academic probation. Each of the participating colleges hired tutors dedicated to ASAP students. Tutors were generally former students at four-year colleges or adjunct faculty.[128]

- Required meetings with an ASAP-dedicated career and employment specialist. Topics include balancing work and school, finding scholarships, finding part-time work, networking, writing resumes, and aligning college majors with career paths. Participants engaged in an average of five meetings in the first semester and four meetings in the second semester. Students continued to visit with career and employment specialists at "comparatively high rates"[129] in the second and third

years. Visits began decreasing in the fourth and fifth semesters. The career and employment specialist also hosted career fairs and job talks.

Voluntary services were also provided. For example, ASAP participants could meet with a social work intern one-on-one as needed. Although this service had much potential, it was staffed by rotating interns, and having a new intern each semester was identified as a challenge to the popularity and effectiveness of this offering.[130] Additionally, a small number of students were selected to participate in the ASAP Student Leadership Program, which focused on public speaking skills, teamwork, diversity, and advocacy.

5. **Provide performance-based monetary incentives and other financial supports.** In exchange for program participation, ASAP provided three primary monetary incentives: 1) financial assistance with textbooks, 2) a tuition waiver that covered the difference between a student's tuition and fees and financial aid, and 3) a monthly transportation pass. The requirement for ASAP participants to receive the program's financial benefits was enrollment in at least 12 credits or more per term. A 3.0 GPA or higher was required to receive advisors' discretionary funds for covering students' winter or summer coursework.

To address course-related financial concerns, ASAP students received free textbooks for all courses. At the end of the semester, students were responsible for returning the books. ASAP staff estimated the textbook cost for a full-time student to be approximately $270 per semester.

ASAP waived the difference between a student's financial aid package and their tuition and fees. Financial aid offices and college ASAP directors worked together to ensure that the tuition waiver

was applied to accounts internally and not paid directly to students. Only 9% of ASAP students needed this extra financial assistance during the first semester of study participation; during the third year of the study, 3–5% of the participants received this waiver. Among students receiving a waiver, the average amount was $719.[131]

Students in the ASAP program were given free monthly MetroCards for public transportation, contingent on participation in program requirements, such as advising, tutoring, and full-time enrollment. Among the ASAP participants, 93% reported that they had received financial assistance with transportation in the first year of the study, and the vast majority of ASAP students received their MetroCard in most or all of the months when they were taking classes. The cost of the transportation passes increased during the 3-year evaluation. By the end of the follow-up period in 2013, this cost was $112 per month.[132]

ASAP provided a comprehensive, integrated package of student services, monetary incentives, linked courses, an ASAP seminar, and other supports. Furthermore, CUNY sent consistent, strong messages to ASAP students to enroll full time, take their developmental classes early, and graduate within three years. The available evidence does not show which of these program components, or which combination of components, were responsible for the success of the program. However, based on the relatively large effects achieved by ASAP relative to the effects of an individual program or a combination of supports implemented for a short time, the expert panel recommends adopting a systematically integrated set of interventions over multi-year period over any single intervention in isolation.

For additional guidance, CUNY published a resource guide for college administrators,

faculty, and other key stakeholders interested in instituting a program such as ASAP at their own institution. The resource guide shares information about program structure, program components and implementation, program evaluation and management, as well as sample planning templates.[133]

Potential roadblocks and suggested approaches

Roadblock 6.1. *The college is on a limited budget and cannot afford to provide such comprehensive services.*

Suggested Approach 6.1. Focus on the long-term benefits of cost per degree from this type of program. Comprehensive and integrated support programs are expensive to implement compared with business-as-usual models. Over 3 years of implementation, Scrivener et al. (2015) estimated the CUNY ASAP program cost (which included the base cost of the program plus indirect costs attributable to the program) per ASAP student per year to be about $5,400 more than the cost for a student who received the usual college services. However, the base operating cost per student for ASAP at CUNY fell about by about 20% after the first few years of implementation, to about $3,900 additional cost, per student per year, compared to students who received typical college services.[134]

Even though it is more costly at the front end to implement comprehensive and integrated support programs, the benefits can outweigh the costs. For example, the CUNY ASAP program generated more graduates than the business-as-usual comparison (40% versus 22%, respectively). And, although beyond the scope of this guide, a benefit-cost study suggested that the cost per degree was lower.[135]

Roadblock 6.2. *Sustaining student interest and progress through the summer is challenging.*

Suggested Approach 6.2. Promote and support students' year-round enrollment whenever possible. To the extent possible, year-round enrollment should be a priority for underprepared college students. This roadblock may also be alleviated by providing student assistance with employment, providing on-campus employment, addressing students' financial aid challenges for summer courses, and offering other student supports (e.g., child care).

Roadblock 6.3. *Turnover in leadership and objections to change among staff can hinder the implementation of the program.*

Suggested Approach 6.3. For a comprehensive, integrated, and long-lasting program to be successful, provide and support leadership, coordination, and collaboration at all levels. Leadership and staff turnover during a long-term implementation process presents a formidable challenge. One strategy for ensuring collective responsibility of long-range implementation of the program is to engage stakeholders throughout the institution in the coordinated design of the program and ongoing learning and modifications. Program developers must provide a structure for collaboration and support the participation of key individuals involved in each facet of the programming. Given the positive outcomes for the ASAP program, available evidence may be effective at convincing staff to participate and make changes to existing practices and policies. Champions should be cultivated from all the important sectors and levels to ensure adaptive implementation, as leadership and staffing changes occur. With structures for collaborative solution-finding, discussion of existing data on current programs' impact on student outcomes,

and broad participation in learning from existing evidence, champions at all levels can be effectively created and nurtured.

Roadblock 6.4. *Many students placed in developmental education are part-time, so requiring full-time enrollment would exclude that population.*

Suggested Approach 6.4. Depending on the proportion of your institution's full-time and part-time enrollment, consider designing comprehensive, integrated, and long-lasting programs for both full-time enrolled students and part-time enrolled students, while incentivizing students to enroll full time. About 40% of students enrolled in U.S. community colleges are enrolled full time,[136]

and, as a sector, community colleges serve the largest share of students underprepared for college. Although some researchers question whether a full-time attendance requirement benefits all students in 2-year programs,[137] most research does find a relationship between full-time enrollment and positive outcomes for college students, especially when implemented with sufficient planning and supports for the students— and not in isolation. Some part-time students may be incentivized to enroll full time to have the benefits of an ASAP-like program, while other part-time students may not be able to alter their enrollment and yet benefit from a modified ASAP program geared toward part-time students.

Recommendation 6 implementation planning checklist

Recommendation 6
Implement Comprehensive, Integrated, and Long-lasting Support Programs.
Implementation Checklist[139]

Enrollment Targets and Eligibility

☐ What is your current enrollment by major with full-time and part-time distributions?

☐ What are your current 1-year retention and 3-year graduation rates? If possible, disaggregate by majors and full-time vs. part-time status at time of entry.

☐ What is the developmental education profile for your most recently admitted first-year student cohort (e.g., by skills area and level of need) and proficiency status after two semesters?

☐ What is the percentage of students who transfer to 4-year colleges with and without a degree by major?

☐ Which students do you plan to target? Consider majors as well as enrollment status (e.g., first-time freshmen, transfer students, continuing students, etc.).

☐ Which eligibility criteria will you use with regard to financial need, credits accumulated, developmental needs, etc.?

☐ What are your program enrollment targets?

Financial Incentives and Resources

☐ What financial incentives can you offer to students (e.g., textbooks, transportation vouchers/gas cards, childcare, tuition and fee waivers, etc.), and how will this affect your annual program budget and enrollment targets?

☐ Will you be able to provide any funds for students to take courses in winter and summer terms?

Staffing

☐ How will you identify dedicated program staff to administer the program? What will your plan be for hiring new staff?

☐ What will your advisor-to-student ratio be?

☐ Who will create and lead staff training, and is there a plan for ongoing professional development?

College Integration

- ☐ Where will the program be housed, and what will the reporting structure be?

- ☐ What will your communication plan be to facilitate collaboration with other college units? (i.e., admissions, financial aid, testing, registrar, learning support center(s), bookstore, bursar, budget office, academic departments, adult/continuing education, etc.

- ☐ What are three to five strategies you will use to ensure that program staff members are working collaboratively with other college units and that program services are integrated into existing college systems?

- ☐ Is there interest in faculty directly supporting students? If so, for what type of student? What types of supports could be provided by faculty?

- ☐ Are there professional development opportunities for faculty working closely with your program, especially in the areas of advisement?

- ☐ Which systems will encourage faculty, especially those teaching blocked courses, to provide feedback on student progress?

- ☐ Are there opportunities for faculty to be integrated into academic support services? What are they?

Additional Costs Require Pre-Planning

- ☐ Explore potential funding options (e.g., reallocation of existing college resources, government funding, and private grants from industry partners and foundations).

- ☐ Acquire required funding.

- ☐ Set up the budgetary structure for the initiative.

Appendix A

Appendix A – Postscript from the Institute of Education Sciences

What is a practice guide?

The Institute of Education Sciences (IES) publishes practice guides to share evidence and expert guidance on addressing education-related challenges not readily solved with a single program, policy, or practice. Each practice guide's panel of experts develops recommendations for a coherent approach to a multifaceted problem. Each recommendation is explicitly connected to supporting evidence. Using What Works Clearinghouse (WWC) design standards, the supporting evidence is rated to reflect how well the research demonstrates the effectiveness of the recommended practices (see Table A in the Introduction for more details on levels of evidence):

- Strong Evidence means positive findings are demonstrated in multiple well-designed, well-executed studies, leaving little or no doubt that the positive effects are caused by the recommended practice.

- Moderate Evidence means well-designed studies show positive impacts, but there are questions about whether the findings can be generalized beyond the study samples or whether the studies definitively show evidence that the practice is effective.

- Minimal Evidence means that there is not definitive evidence that the recommended practice is effective in improving the outcome of interest, although there may be data to suggest a correlation between the practice and the outcome of interest.

How are practice guides developed?

To produce a practice guide, IES first selects a topic. Topic selection is informed by inquiries and requests to the WWC Help Desk, a limited literature search, and evaluation of the topic's evidence base. Next, IES recruits a panel chair who has a national reputation and expertise in the topic. The chair, working with IES and WWC staff, then selects panelists to help develop the guide. Panelists are selected based on their expertise in the topic area and the belief that they can work together to develop relevant, evidence-based recommendations. Panels include two practitioners with expertise in the topic. Relevant studies are identified through panel recommendations and a systematic literature search. These studies are then reviewed using the WWC design standards by certified reviewers who rate each effectiveness study. The panel synthesizes the evidence into recommendations.

WWC staff summarize the research and help draft the practice guide. IES practice guides are then subjected to external peer review. This review is done independently of the IES staff who supported the development of the guide. A critical task of the peer reviewers of a practice guide is to determine whether the evidence cited in support of particular recommendations is up-to-date and that studies of similar or better quality that point in a different direction have not been overlooked. Peer reviewers also evaluate whether the level of evidence category assigned to each recommendation is appropriate. After the review, a practice guide is revised to meet any concerns of the reviewers and to gain the approval of the standards and review staff at IES.

Levels of evidence for What Works Clearinghouse practice guides

This section provides information about the role of evidence in IES's WWC practice guides. It describes how practice guide

panels determine the level of evidence for each recommendation and explains the criteria for each of the three levels of evidence (strong, moderate, and minimal evidence). The level of evidence assigned to each recommendation in this practice guide represents the panel's judgment of the quality of the existing research to support a claim that, when these practices were implemented in past research, positive effects were observed on student outcomes.

After careful review of the studies supporting each recommendation, panelists determine the level of evidence for each recommendation using the criteria in Table 1. The panel first considers the relevance of individual studies to the recommendation and then discusses the entire evidence base, taking the following into consideration:

- Number of studies;

- Study designs;

- Internal validity of the studies;

- Whether the studies represent the range of participants and settings on which the recommendation is focused;

- Whether findings from the studies can be attributed to the recommended practice; and

- Whether findings in the studies are consistently positive.

A rating of strong evidence refers to consistent evidence that the recommended strategies, programs, or practices improve student outcomes for a diverse population of students. In other words, there is strong causal and generalizable evidence.

A rating of moderate evidence refers either to evidence from studies that allow strong causal conclusions, but cannot be generalized with assurance to the population on which a recommendation is focused (perhaps because the findings have not been widely replicated) or to evidence from studies that are generalizable but have some causal ambiguity. It also might be that the studies that exist do not specifically examine the outcomes of interest in the practice guide, although the studies may be related to the recommendation.

A rating of minimal evidence suggests that the panel cannot point to a body of evidence that demonstrates the practice's positive effect on student achievement. In some cases, this simply means that the recommended practices would be difficult to study in a rigorous, experimental fashion; in other cases, it means that researchers have not yet studied this practice, or that there is weak or conflicting evidence of effectiveness.

A minimal evidence rating does not indicate that the recommendation is any less important than other recommendations with a strong or moderate evidence rating. In developing the levels of evidence, the panel considers each of the criteria in Table A. The level of evidence rating is determined by the lowest rating achieved for any individual criterion. Thus, for a recommendation to get a strong rating, the research must be rated as strong on each criterion. If at least one criterion receives a rating of moderate and none receives a rating of minimal, then the level of evidence is determined to be moderate. If one or more criteria receive a rating of minimal, then the level of evidence is determined to be minimal.

The panel relied on WWC design standards to assess the quality of evidence supporting education programs and practices. The WWC evaluates evidence for the causal validity of instructional programs and practices according to WWC design standards.

Information about these standards is available at http:// whatworks.ed.gov. Eligible studies that meet WWC designs standards without reservations or meet WWC design standards with reservations are indicated by bold text in the endnotes and references pages.

A final note about IES practice guides: In policy and other arenas, expert panels typically try to build a consensus, forging statements that all its members endorse. Practice guides do more than find common ground; they create a list of actionable recommendations.

Where research clearly shows which practices are effective, the panelists use this evidence to guide their recommendations. However, in some cases research does not provide a clear indication of what works. In these cases, the panelists' interpretation of the existing (but incomplete) research plays an important role in guiding the recommendations.

As a result, it is possible that two teams of recognized experts working independently to produce a practice guide on the same topic would come to very different conclusions. Those who use the guides should recognize that the recommendations represent, in effect, the advice of consultants. However, the advice might be better than what a school or district could obtain on its own. Practice guide authors are nationally recognized experts who collectively endorse the recommendations, justify their choices with supporting evidence, and face rigorous independent peer review of their conclusions. Schools and districts would likely not find such a comprehensive approach when seeking the advice of individual consultants.

—Institute of Education Sciences

Appendix B – About the Authors

Panel

Tom Bailey, Ph.D. Dr. Bailey is the George and Abby O'Neill Professor of Economics and Education at Teachers College, Columbia University. He is also director of the Community College Research Center (CCRC) and two national centers funded by a grant from the Institute of Education Sciences (IES): the Center for Analysis of Postsecondary Education and Employment, established in 2011, and the Center for the Analysis of Postsecondary Readiness, established in 2014. From 2006 to 2012, Dr. Bailey directed another IES-funded center, the National Center for Postsecondary Research.

Dr. Bailey has been the director of the Institute on Education and the Economy at Teachers College since 1992. In 1996, he established the CCRC with support of the Alfred P. Sloan Foundation. In June 2010, U.S. Secretary of Education Arne Duncan appointed Dr. Bailey chair of the Committee on Measures of Student Success, which developed recommendations for community colleges to comply with completion rate disclosure requirements under the Higher Education Opportunity Act. Dr. Bailey and the CCRC won the Terry O'Banion Prize for Teaching and Learning at the annual conference for the League for Innovation in the Community College in 2013, and was also inducted as an American Educational Research Association (AERA) Fellow in the same year. He has been a member of the National Academy of Education since 2012.

Dr. Bailey's papers have appeared in a variety of education, policy-oriented, and academic journals, and he has authored or co-authored several books on the employment and training of immigrants and the extent and effects of on-the-job training. He authored, with Shanna Smith Jaggars and Davis Jenkins, *Redesigning America's Community Colleges: A Clearer Path to Student Success*, which was published by Harvard University Press in April 2015. Other books include *Defending the Community College Equity Agenda* (Johns Hopkins University Press, 2006), co-edited with Vanessa Morest; *Working Knowledge: Work-Based Learning and Education Reform* (Routledge, 2004), co-authored with Katherine Hughes and David Moore; *Manufacturing Advantage* (Cornell University Press, 2000), written with Eileen Appelbaum, Peter Berg, and Arne Kalleberg; and The *Double Helix of Education and the Economy* (Institute on Education and the Economy, 1992), co-authored with Sue Berryman. Dr. Bailey earned his Ph.D. in labor economics from the Massachusetts Institute of Technology.

Joanne Bashford, Ph.D. Dr. Bashford is president of Miami Dade College's (MDC) InterAmerican Campus. She began her community college career at MDC in 1992 and served the college in various roles, including assisting with strategic planning, institutional effectiveness, and institutional research. From 2012 to 2014, she served as associate vice president for developmental education and student success at Broward College. Dr. Bashford has also served as a consultant for the Achieving the Dream initiative since 2005 and consulted with numerous colleges on planning, assessment, and continuous improvement to improve student success. Dr. Bashford earned her Ph.D. in education from Florida International University, a master's degree in education from the University of Pittsburgh, and a bachelor's degree in psychology from the University of Florida.

Angela Boatman, Ed.D. Dr. Boatman is assistant professor of public policy and higher education in the Department of Leadership, Policy, and Organizations at Vanderbilt University. Her work focuses on the evaluation of college access and completion policies, particularly in the areas of postsecondary remediation, financial aid, community college student success, and postsecondary instruction and course

delivery models. Past projects include an evaluation of the impact of innovations in the delivery of remedial courses, including the use of instructional technology, on collegiate student outcomes, as well as the effects of more traditional remedial and developmental courses for students further down the academic preparation distribution. Currently, she is examining the effects of peers in mainstreamed remedial and college-level math courses, as well as the effects of using learner-adaptive technologies in community college courses. Dr. Boatman earned her Ed.D. in higher education from Harvard University, an M.P.P in public policy and an M.A. in higher education from the University of Michigan, and a B.A. from the University of Minnesota.

John Squires. Mr. Squires is director of high school to college readiness at the Southern Regional Education Board (SREB). He works with states, colleges, and high schools to implement policies and programs to improve student preparedness for postsecondary studies. Prior to joining SREB, Mr. Squires served as chair of the math department at Chattanooga State Community College, where he worked with faculty to improve student learning and outcomes through course redesign. He also worked to expand dual enrollment opportunities with local high schools and he started the Tennessee SAILS initiative, which introduces developmental math in the senior year of high school. While at Chattanooga State, Mr. Squires was the co-principal investigator for the Do the Math grant as part of Next Generation Learning Challenges, and he served as a mentor for colleges in the Changing the Equation grant for the National Center of Academic Transformation. Before joining Chattanooga State, Mr. Squires served as chair of the math department at Cleveland State Community College, where he taught mathematics for 19 years.

Mr. Squires' work at both Chattanooga State Community College and Cleveland State Community College has been nationally acclaimed. He received the 2014 Bellwether Legacy Award, given by the American Community College Trustees, and the 2009 Bellwether Award, given by the Community College Futures Assembly. Mr. Squires received the 2014 Faculty Excellence Award by the American Association of Community Colleges for his work in departmental redesign and expanding dual enrollment. His math program at Cleveland State has been featured in the Chronicle of Higher Education and was highlighted by President Obama in a 2010 speech on higher education. Mr. Squires was the 2010 Cross Scholar for the League of Innovation in the Community College and he authored the 13th Cross Paper, which focused on course redesign. Mr. Squires serves as a redesign scholar for the National Center for Academic Transformation. He has written articles for the American Association of Community Colleges, the Education Commission for the States, the League for Innovation in the Community College, Inside Higher Education, and the Huffington Post. Upon retiring from the Tennessee Board of Regents after a 25-year teaching career, Mr. Squires was named Professor Emeritus at Chattanooga State Community College. Mr. Squires has an M.S. in mathematics from the University of Tennessee, an M.A.T. from Drake University, and a B.S. in economics from Iowa State University.

Michael Weiss, Ph.D. Dr. Weiss is a Senior Associate at MDRC. Weiss's work focuses on evaluating programs designed to improve community college students' chances of achieving academic success. He is also deeply involved in methodological projects intended to improve the quality of random assignment evaluations. Dr. Weiss was recently the principal investigator on an IES-funded study of the long-term effects of two of MDRC's Opening Doors programs (learning communities and a student success course). He is currently the co-principal investigator on an IES-funded random assignment evaluation of the effectiveness of approaches to accelerate community college students' progress through developmental (remedial)

math courses and principal investigator on an IES-funded random assignment evaluation of the City University of New York (CUNY) Start, a pre-matriculation program for students with significant developmental needs. He was the quantitative lead investigator on MDRC's random assignment evaluation of CUNY's Accelerated Study in Associate Programs (ASAP) and is the quantitative lead investigator on the ASAP replication project. In his methodological work, Dr. Weiss has authored peer-reviewed articles on teacher effects in experiments, on measuring school performance, and on a conceptual framework for understanding the sources of variation in program effects. He is currently the primary investigator on an IES research methods grant exploring issues of program-effect variation. He has been invited to give presentations at numerous conferences and organizations, including at IES and the U.S. Department of Labor. Dr. Weiss formerly worked as a data analyst at Educational Testing Services. He earned his Ph.D. from the University of Pennsylvania's Graduate School of Education.

Staff Leadership Team

William Doyle, Ph.D. Dr. Doyle is associate professor of higher education and public policy coordinator, higher education leadership program in the Department of Leadership, Policy, and Organizations at Vanderbilt University. Dr. Doyle is the senior content expert for the Evidence Review and Support contract with the WWC in postsecondary education. Professor Doyle's work investigates the antecedents and outcomes of higher education policy at the state and federal level, and uses theoretical and methodological insights from political science to better understand both higher education politics and policy. Dr. Doyle also serves as an associate editor of *Research in Higher Education* and is on the editorial board of the Journal of Higher Education and *Educational Evaluation and Policy Analysis*. From 2004 to 2013, Dr. Doyle served as an associate editor of *Change* magazine, where

he wrote the "Playing the Numbers" column, which explained quantitative research to a broader policy and practitioner audience. He earned his Ph.D. in higher education from Stanford University. Prior to Vanderbilt, he held the position of senior policy analyst at the National Center for Public Policy and Higher Education. Dr. Doyle facilitated deliberations by the expert panel and was the lead content expert for the practice guide.

Robin LaSota, Ph.D. Dr. LaSota is a senior research scientist at Development Services Group, Inc. She is a mixed-methods researcher, program evaluator, and technical assistance provider in the field of K–12 and postsecondary education, human services, and youth development. Dr. LaSota coordinates the development of products for the WWC postsecondary education contract and conducts reviews as part of the Reviews, Reporting, Dissemination, and Development (R2D2) contract. Her research on state, college, and student factors associated with community college students' upward transfer has been published in *Research in Higher Education*. She conducted post-doctoral research at the University of Illinois Urbana-Champaign at the Office of Community College Research and Leadership. Dr. LaSota has managed professional development programs for urban school leaders and school teams, provided research-based materials to educators, conducted program evaluation and policy analysis, and designed educational programs as part of successfully obtaining grant funding. She received her Ph.D. in education leadership and policy studies from the University of Washington as part of an IES-funded pre-doctoral program called Collaborative Researchers for Education Sciences Training. She led the development of content for the practice guide through collaboration with staff writers, with guidance from the expert panel and leadership team.

Jeffrey C. Valentine, Ph.D. Dr. Valentine is a professor in and coordinator of the Educational Psychology, Measurement,

and Evaluation program in the College of Education and Human Development at the University of Louisville. As an internationally known expert, Dr. Valentine has written more than four dozen works that use, explain, or seek to improve the methods of systematic reviewing and meta-analysis. He co-edited (with Harris Cooper and Larry Hedges) the *Handbook of Research Synthesis and Meta-Analysis* (2nd ed.), is an associate editor for the peer-reviewed journal *Research Synthesis Methods*, is a statistical editor for the Developmental, Psychosocial, and Learning Problems Group for the Cochrane Collaboration, and is the co-chair for the Training Group for the Campbell Collaboration. Dr. Valentine served as methodological expert for this practice guide, provided input on the practices and recommendations, and oversaw the quality assurance process for the practice guide.

Martha Yeide, Ph.D. Dr. Yeide currently serves as Development Services Group's project director for the R2D2 contract for IES and the evidence review and support for the WWC postsecondary education. Dr. Yeide also serves as associate project director for the Substance Abuse and Mental Health Services Administration's (SAMHSA) National Registry of Evidence-based Programs and Practices (NREPP), where she was part of the team that developed new standards and procedures for the review process. She worked with teams refining standards for review and developing scoring instruments for the assessment process for National Institute of Justice's CrimeSolutions.gov. She is a certified reviewer for the WWC as well as Office of Juvenile Justice and Delinquency Prevention's (OJJDP) Model Programs Guide, CrimeSolutions.gov, and NREPP. Dr. Yeide previously served as deputy project director for OJJDP's National Forum on Youth Violence Prevention Training and Technical Assistance Program, which supports the work of 10 cities to effectively address the pressing issues of gang and youth violence. Dr. Yeide was responsible for the oversight and execution of the development of this practice guide.

Staff Writers

Joshua R. Polanin, Ph.D. Dr. Polanin is a senior research scientist at DSG. He is an expert in the application and use of quantitative methodology in education, behavioral health, and social sciences. He currently serves as methodological consultant and research analyst on IES's WWC postsecondary reviews. Dr. Polanin maintains methodological standards in the review process, trains WWC-certified reviewers, and provides feedback on developing WWC products. In addition, he serves as the methodological expert for SAMHSA's NREPP. Dr. Polanin received a Campbell Collaboration Systematic Review Grant and led a team of researchers to complete a review on teen dating violence prevention programs. Dr. Polanin received his Ph.D. in education quantitative methodology from Loyola University Chicago and completed a 2-year IES postdoctoral fellowship focused on social policy research and methodology at Vanderbilt University's Peabody Research Institute.

Elizabeth Spinney. Ms. Spinney is a project director and research analyst at DSG. She serves as a research analyst for the U.S. Department of Education's WWC. She is also a WWC-certified reviewer for group design studies. Ms. Spinney currently serves as project director OJJDP's Technical Assistance to End Racial and Ethnic Disparities in the Juvenile Justice System program. As project director, she coordinates training and technical assistance for states on how to reduce disparities at the local level and works with partner organizations to provide recommendations to OJJDP on how to address racial disparities at the national level. Ms. Spinney received a master's degree in public policy from the John F. Kennedy School of Government at Harvard University.

Wesley Wilson, Ed.D. Dr. Wilson is a research scientist at DSG. He reviews studies and prepares written material for DSG's evidence review and support for the WWC contract

in postsecondary education, as well as the Education Department's R2D2 project. Dr. Wilson develops content for webinars and other communications for the WWC to connect research to both evaluation and practice. He has more than two decades of experience as a practitioner at community colleges and higher education institutions. Dr. Wilson served as the academic lead faculty for the Community College Leadership Initiative for the state of New Jersey and has been recognized by Austin Community College with the 2012 Faculty Excellence Award. Dr. Wilson received his Ed.D. from the University of Florida, where his work focused on community college leadership.

Sarah H. Young, Ph.D. Dr. Young is a research analyst at DSG. She has worked on a variety of topics, including the use of portfolios in dental education, a meta-analysis of the social interdependence literature, and investigating the mathematical education of future elementary teachers. Her research has employed diverse methods, including qualitative case study, survey research, qualitative observation and interview, meta-analysis, and hierarchical linear modeling. Dr. Young has experience as a university educator at Michigan State University. In addition, as a research analyst and certified reviewer for WWC, Dr. Young helps manage the quality control process so that all products meet WWC standards. She also manages and leads abstract and full-text screening of studies found in systematic searches, retrieves studies and other resources using systematic searches, and constructs and collaborates in constructing search strategies for systematic searches. Dr. Young received her Ph.D. in educational psychology and educational technology from Michigan State University.

Appendix C

Appendix C – Disclosure of Potential Conflicts of Interest

Practice guide panels are composed of nationally recognized experts on the topics about which they are making recommendations. IES expects the experts to be involved professionally in a variety of matters that relate to their work as a panel. Panel members are asked to disclose these professional activities and institute deliberative processes that encourage critical examination of their views as they relate to the content of the practice guide. The potential influence of the panel members' professional activities is further muted by the requirement that they ground their recommendations in evidence that is documented in the practice guide. In addition, before all practice guides are published, they undergo an independent external peer review focusing on whether the evidence related to the recommendations in the guide has been presented appropriately.

The professional activities reported by each panel member that appear to be most closely associated with the panel recommendations are noted below.

Tom Bailey, Ph.D. He is the director of the Community College Research Center (CCRC) at Teachers College, Columbia University, which produced many of the studies reviewed and used as evidence for this practice guide. For example, CCRC published many of the studies reviewed and used as evidence for Recommendation 4 on compressing or mainstreaming developmental education. CCRC also reported two studies used as evidence for Recommendation 1 on using multiple measures to assess and place students into courses.

Joanne Bashford, Ph.D. She does not have research reviewed for the recommendations presented in this practice guide, or any notable conflict of interest with the panel's recommendations.

Angela Boatman, Ph.D. Her research on the effectiveness of accelerated instructional approaches in developmental education has been reviewed for this practice guide.

John Squires. He does not have research reviewed for the recommendations presented in this practice guide, or any notable conflict of interest with the panel's recommendations.

Michael Weiss, Ph.D. He works at MDRC, which produced many of the independent evaluations of interventions reviewed for this practice guide. Two of the practice guide's recommendations rely in part on evidence from evaluations that Dr. Weiss was integrally involved in, Recommendation 2 on enhanced advising and Recommendation 6 on comprehensive, integrated, and long-lasting supports. Additionally, Dr. Weiss' wife, Reshma Patel, played a substantial role in much of the evidence reviewed for Recommendation 3 on performance-based monetary incentives.

Appendix D

Appendix D. Appendix Table 1.1

Recommendation 1. Use Multiple Measures to Assess Postsecondary Readiness and Place Students.

Evidence Summary of Studies that Investigate the Effects of Colleges' Use of Multiple Measures to Assess Postsecondary Readiness and Place Students					
Study and design	**Participants**	**Setting**	**Intervention condition as implemented in the study**	**Comparison condition as implemented in the study**	**Outcome domain and effect size**
Marwick (2002a)[1]; Marwick (2002b); Marwick (2004) Randomized controlled trial (RCT) Does not meet WWC Group Design Standards	304 students (90 were placed in college-level courses, and 214 were placed in developmental level courses). Of the students placed in developmental education, placement condition made a difference for 43% of them.[2] From the developmental education sample for whom placement method made a difference, the analysis presented here had 53 students. Of the students placed in college-level courses, placement condition made a difference for 49% of them. From the college-level sample for whom placement method made a difference, the analysis presented here had 39 students.	One community college in Illinois	Students in the intervention condition were placed according to one of three methods: (a) the number of math courses taken in high school,[3] (b) "balancing" number of high school math courses and ACCUPLACER score, or (c) student choice, but with advisor input and constrained by the number of high school math courses and ACCUPLACER score. Note that 71% of the 304 students were assigned to course level (developmental or college-level) by one of these three experimental conditions.	Students in the comparison condition were placed on the basis of a test score alone (ACCUPLACER) Note that 29% of the 304 students were assigned to course level (developmental or college-level), by test score alone.	Developmental education sample Academic achievement (passed developmental level math): 52.4% weighted average completion rate for intervention groups vs. 69% completion rate in test score only comparison group[ns] Credit accumulation (enrolled in the subsequent math course the next semester): 64.3% weighted persistence rate for the intervention groups vs. 58.6% persistence rate for the test score only comparison group[ns] College-level sample Academic achievement (grade in college level math): 2.5 weighted average course GPA in intervention groups vs. 3.13 average course GPA in test score only comparison group[*4] Academic achievement (passed college level math): 88.9% weighted average completion rate for intervention groups vs. 88.2% completion rate in test score only comparison group[ns]

Study and design	Participants	Setting	Intervention condition as implemented in the study	Comparison condition as implemented in the study	Outcome domain and effect size
Ngo & Kwon (2014)[5]; Kwon (2014) Quasi-experimental design (QED) Does not meet WWC Group Design Standards	12,854 first-time college students	Two community colleges in southern California	In both colleges, additional points on the ACCUPLACER (multiple measures "boost" points) were awarded based on high school math experiences. College H awarded boost points based on self-reported high school GPA. College A awarded boost points based on highest level of math taken with a "C" or better, the number of years of math taken in high school, the length of time since math was last taken, and whether or not the student took algebra.	Students in the comparison condition were placed using the ACCUPLACER.	Progress through developmental education: NA Credit accumulation: NA[6]

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[1] This study did not meet standards because attrition exceeded WWC thresholds, and the WWC was unable to assess the comparability of the analytic sample at baseline.

[2] This means that assignment to treatment condition placed the student in a different course level, compared to the traditional placement measure (i.e., ACCUPLACER score).

[3] While this group was not assigned by multiple measures to courses, this intervention group is included as an intervention with an alternate placement method.

[4] * indicates a statistically significant result ($p < .05$). The author reported that students placed into college-level courses by both high school preparation and test scores received higher grades than the students placed into college-level courses by test score alone. However, college-level students placed by high school preparation alone performed equally as well as students placed via the placement test on the measures of academic success in the study. Among students placed at the developmental level, there were no differences in academic success outcomes for the multiple or alternate measures interventions, compared to students placed by test score alone. The author found that single-measure methods may over-select students into developmental education (including students who could have succeeded in college-level courses).

[5] This study did not meet WWC standards because the WWC was unable to assess baseline equivalence on socioeconomic status and academic achievement. The authors do use baseline achievement in their estimation models, but do not have a measure of socioeconomic status.

[6] This study did not present information in a way that allows standardized effect sizes to be reported. According to the authors, none of these effects were statistically significant, indicating that "boosted" students did as well as students placed traditionally.

Appendix D. Appendix Table 1.2

Recommendation 1. Use Multiple Measures to Assess Postsecondary Readiness and Place Students.

Correlational Studies Examining Multiple Measures for Readiness Assessment[7]			
Study	**Sample (size)**	**Placement Tests Examined**	**Highlighted findings**
Belfield & Crosta (2012) Correlational Study Does not have an eligible design for WWC review	First time community college students (specific sample sizes are not given, but likely are above 18,000)	ACCUPLACER and COMPASS subject specific tests (e.g., COMPASS algebra, pre-algebra, reading, writing)	The correlation between high school (HS) GPA and grades in developmental courses was much stronger than the correlation between scores on placement tests and grades in developmental courses (correlations were approximately +.12* for placement test to relevant subject grade, vs. +.35* for HS GPA vs. grade).[8]
Scott-Clayton (2012) Correlational Study Does not have an eligible design for WWC review	First time community college students ($n =$ 6,100 for math and 9,268 for English)	COMPASS subject specific tests (numerical skills/pre-algebra, algebra, English, and a writing test "adapted slightly from the COMPASS writing module" (p. 9)	The correlation between the math placement test and grades in college math was +.36*, and the correlation between the English placement test and grades in college English was +.13*. The correlation between an index of high school performance (created from HS GPA and other variables) and grades in college math was +.45*, and the correlation between the high school performance index and grades in English was +.31*.

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[7] No studies for this recommended practice met WWC evidence standards. Due to the rigor of these correlational studies, the expert panel decided to include them as evidence. However, the WWC did not conduct a thorough search for studies that examine relationships between alternative measures of college readiness and college success. The studies discussed here were uncovered during the search for interventions that assessed the effect of using multiple or alternative measures. As such, these results should be considered suggestive.

[8] * indicates a statistically significant result ($p < .05$)

Appendix D. Appendix Table 2

Recommendation 2. Require or Incentivize Students to Attend Enhanced Advising.

Summary of Evidence of Studies that Investigate the Effects of Enhanced Advising					
Study and design	**Participants**	**Setting**	**Intervention condition as implemented in the study**	**Comparison condition as implemented in the study**	**Outcome domain and effect size**
Cousert (1999) Randomized controlled trial (RCT) Meets WWC Group Design Standards Without Reservations	175 students enrolled in basic skills reading courses and identified as at-risk for dropping out (based on the College Student Inventory)	Ivy Tech State College in Central Indiana	The 1-semester New Dimensions program offered faculty mentoring to academically underprepared students, in which faculty mentors followed up with students' progress on their action plan and referred them to other support services (e.g., tutoring, career counseling). Students in the intervention received direct faculty mentoring contact, worked to create a written student action plan based on the College Student Inventory, and received follow-up monitoring on the actions outlined in the student's plan. Students were randomly selected for participation in the intervention, but were not required to participate in the mentoring program.	The comparison group did not receive any additional mentoring services. All traditional college counseling services were available, however, and thus the condition is considered business-as-usual.	Progress through developmental education $g = +0.12^{ns}$ Credit accumulation $g = +0.19^{ns}$

Appendix D. Appendix Table 2 *(continued)*

Recommendation 2. Require or Incentivize Students to Attend Enhanced Advising. *(continued)*

Study and design	Participants	Setting	Intervention condition as implemented in the study	Comparison condition as implemented in the study	Outcome domain and effect size
Scrivener & Weiss (2009); Scrivener & Pih (2007); Scrivener & Au (2007) RCT Meets WWC Group Design Standards Without Reservations	2,139 students who had experienced academic difficulties, operationalized as not passing courses, or withdrawing from courses. 65% of the full sample enrolled in developmental coursework in the first year.[9]	Two community colleges in Ohio	The Opening Doors program provided college counseling to students in a more "intensive, comprehensive, and personalized manner relative to traditional college standards" (p. ES-3). Students enrolled in the intervention received personalized counseling services on a range of topics, including course selection, registration, financial aid, tutoring, work-based learning efforts, juggling work and school, career aspirations, and personal issues. Intervention students were eligible to receive a small stipend per semester of $150, for a two-semester period.	The comparison group did not receive any additional benefits beyond those usually associated with community college enrollment. As such, all comparison group members were eligible to meet with a college counselor, but scheduling and activities were not assigned or regimented. The comparison group students did not receive a stipend.	Enrollment: $g = +0.07^{ns}$ Academic achievement: $g = -0.01^{ns}$ Credit accumulation: $g = +0.09^{*10}$ Degree attainment: $g = -0.28^{ns}$

[9] MDRC defined "academic difficulty" as earning no more than 75% of credits attempted. Other sample criteria included students being aged 18–34 years old; having family income below 250% of poverty level; being beginning or continuing students who completed fewer than 13 credits and had experienced academic difficulties (indicated by not passing courses or withdrawing from courses), having a high school diploma or GED, and did not have an associate's degree.

[10] * indicates a statistically significant result ($p < .05$)

Appendix D. Appendix Table 2 *(continued)*

Recommendation 2. Require or Incentivize Students to Attend Enhanced Advising. *(continued)*

Study and design	Participants	Setting	Intervention condition as implemented in the study	Comparison condition as imple-mented in the study	Outcome domain and effect size
Visher et al. (2010) RCT Meets WWC Group Design Stan-dards Without Reserva-tions	1,249 students enrolled in a devel-opmental, lower-level math course required for advance-ment toward a degree or certificate.	One com-munity col-lege in Texas	The Beacon Mentoring Program offered support for accessing enhanced advising in the context of students' required mathematics classes during students' second semester (i.e., Spring 2008). Program goals were to increase students' use of tutoring and advising in order to improve pass rates in high-failure math courses, credits earned, and semester-to-semester persistence. Mentors were college employ-ees who worked on campus and had previously participated in a training program to be mentors. In the intervention group classes, the mentors were required to arrange with math instructors to meet with their classes at least three times during the semester for 5–10 minutes at the beginning of class. The mentor provided information on campus resources and notified students of important dates. The mentor sometimes went with the class to the student success center, the financial aid office, or other useful areas on campus. The men-tors shared their email address, office location, and office number with students and encouraged them to contact or visit them if they needed anything. The mentors reminded students about registration toward the end of the semester.	Comparison group stu-dents did not receive men-toring ser-vice. As such, the students in this condi-tion could be considered business-as-usual because they had access to traditional college counselors.	Progress through develop-mental education: $g = +0.07^{ns}$ Academic achieve-ment: $g = +0.06^{ns}$ Credit accu-mulation: $g = +0.15^{*}$

Appendix D. Appendix Table 3.1

Recommendation 3. Offer Students Performance-Based Monetary Incentives.

Evidence Summary of Studies that Investigate Effects of Performance-Based Monetary Incentives Alone or Minimal Additional Support					
Study and design	**Participants**	**Setting**	**Intervention condition as implemented in the study**	**Comparison condition as implemented in the study**	**Outcome domain and effect size**
Brock & Richburg-Hayes (2006); Richburg-Hayes et al. (2009); Barrow et al (2012) Randomized controlled trial (RCT) Meets WWC Group Design Standards Without Reservations	1,019 low-income parents ages 18–34. 64% of the participants enrolled in at least one developmental education course within the first 2 years.	Two New Orleans, Louisiana-based community colleges: Delgado Community College and Louisiana Technical College-West Jefferson	In addition to any other financial aid for which students qualified for, the Louisiana Opening Doors program offered eligible low-income parents a $1,000 monetary award for each of two semesters ($2,000 total) for maintaining at least half-time enrollment and a 2.0 GPA. Students in the intervention group also received advising and monitoring support (i.e., dedicated program advisors, who helped verify enrollment and monitored students). The program required that intervention students meet with a counselor periodically.	The comparison group was considered "business as usual." Participants in the comparison group received the standard financial aid supports, including Pell Grants. They could access academic advising and counseling which was available to all students. They did not receive an Opening Doors scholarship and did not have counselors who monitored their academic performance.	Enrollment $g = +0.14^{*}$[11] Credit accumulation $g = +0.20^{ns}$ Academic achievement $g = +0.17^{ns}$

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[11] * indicates a statistically significant result ($p < .05$)

Appendix D. Appendix Table 3.1 *(continued)*

Recommendation 3. Offer Students Performance-Based Monetary Incentives.

Study and design	Participants	Setting	Intervention condition as implemented in the study	Comparison condition as implemented in the study	Outcome domain and effect size
Cha & Patel (2010); Mayer, Patel, & Gutierrez (2015) RCT Meets WWC Group Design Standards Without Reservations	2,285 students, required to (a) have an expected family contribution to college expenses of $0 and (b) be the parent of a minor child. Approximately 40% of the study sample enrolled in at least one developmental education course, during the study period.	Three community colleges in Ohio	Students were eligible for awards up to $1,800 per academic year for earning a C or better in 12 or more credits per term, or up to $900 for meeting that benchmark in 6–11 credits per term.	Comparison group students were eligible for services normally available to students.	Enrollment $g = +0.06^{ns}$ Credit accumulation $g = +0.07^{ns}$ Degree attainment $g = +0.06^{ns}$
Patel & Rudd (2012); Richburg-Hayes et al. (2011) RCT Meets WWC Group Design Standards Without Reservations	1,502 students between the ages of 22 and 35. Students were required to be living on their own, enrolled in at least 6 credit hours at intake, eligible for a federal Pell Grant, and required to take at least one remedial course.	Two community colleges in New York City	Need-based scholarships were paid directly to individual students conditionally upon meeting certain academic benchmarks; students could receive up to $2,600 (for 2 semesters) or $3,900 (for 2 semesters and a summer term).	Comparison group students were eligible for services normally available to students.	Enrollment $g = +0.07^{ns}$ Credit accumulation $g = +0.06^{ns}$ Academic achievement $g = +0.01^{ns}$ Degree attainment $g = +0.05^{ns}$

Appendix D. Appendix Table 3.2

Recommendation 3. Offer Students Performance-Based Monetary Incentives.

Evidence Summary of Studies that Investigate the Effects of Performance-Based Monetary Incentives Plus Other Supports					
Study and design	**Participants**	**Setting**	**Intervention condition as implemented in the study**	**Comparison condition as implemented in the study**	**Outcome domain and effect size**
Miller et al. (2011); Binder et al. (2015) RCT Meets WWC Group Design Standards Without Reservations	1,081 low income students (approximately 56% in developmental education courses)	One university in New Mexico	Conditional on earning a maintaining full time enrollment and a C average, students were eligible for $1,000 in financial aid per semester, for four semesters (this award is in addition to any other financial aid students receive). Students were also offered enhanced advising services. In the VISTA program, students in the intervention group were assigned an academic advisor to work with throughout the term, and were required to see their advisor at least twice. Students in the VISTA program saw their counselor an average of five times during their first semester. A student in the intervention group was more likely than a student in the comparison group to have holistic advising because he or she saw the same advisor multiple times during the academic term, rather than different advisors each time they came to advising (Binder et al., 2015).	Comparison group students were eligible for services normally available to students. Students in the comparison group received any available counselor when they went for advising, and were only required to see a counselor once. Comparison group students saw an advisor about three times their first semester (Binder et al., 2015).	Enrollment $g = -0.09^{ns}$ Credit accumulation $g = 0.00^{ns}$ Academic achievement $g = +0.18^{*}$[12] Degree attainment $g = +0.10^{ns}$

[12] * indicates a statistically significant result ($p < .05$)

Appendix D. Appendix Table 3.2 *(continued)*

Recommendation 3. Offer Students Performance-Based Monetary Incentives.

Study and design	Participants	Setting	Intervention condition as implemented in the study	Comparison condition as implemented in the study	Outcome domain and effect size
Patel & Valenzuela (2013) RCT Meets WWC Group Design Standards Without Reservations	1,028 low income, Latino male students (58% of the sample enrolled in developmental education courses by the end of first year)	Pima Community College in Tucson, AZ	The Adelante program is a 3-semester program, whereby all students receiving the intervention were eligible for performance-based awards up to $1,500 per semester. Students received $150 for attending an orientation, and $150 for meeting with an Adelante advisor twice during the semester. The remaining $1200 payment was based on academic performance and participation in academic tutoring, workshops, and platicas sessions (in which small groups of Latino men discuss challenges and issues they face). The Adelante program provided designated advisors to students in the intervention group for all three program semesters. Adelante program students were required to attend a minimum of two semi-structured advising sessions, focused on the development and follow-through of a personal education plan.	The comparison group did not receive an Adelante program orientation. They had the opportunity to have general advising offered at the college, but were not incentivized to do so. They could participate in tutoring and academic workshops, but had no scholarship incentive to do so. In the comparison group, general advising was provided as needed, as triaged through the college's online portal system.	Enrollment $g = +0.08^{ns}$ Credit accumulation $g = +0.10^{ns}$ Academic achievement $g = +0.03^{ns}$ Degree attainment $g = +.04^{ns}$

Appendix D. Appendix Table 3.2 *(continued)*

Recommendation 3. Offer Students Performance-Based Monetary Incentives.

Study and design	Participants	Setting	Intervention condition as implemented in the study	Comparison condition as implemented in the study	Outcome domain and effect size
Sommo et al. (2014) RCT Meets WWC Group Design Standards Without Reservations	1,075 low-income college students placed into developmental math	Multiple campuses of Hillsborough Community College in Tampa, FL	The Mathematics Access Performance Scholarship program provided performance-based monetary incentives of up to $1,800 for successfully completing a three-course sequence within three consecutive semesters plus a summer term. Low-income students in developmental math were eligible and received monetary awards for participation in an on-campus MathLab and passing grades in the course sequence through college-level math.	The comparison group received standard college services. The only thing that deviated from "business-as-usual" is that study participants (whether in the treatment or comparison groups) were allowed access to reserved spaces in the mathematics courses that were not available to non-participants.	Enrollment $g = +0.24$* Progress through developmental education $g = +0.18$* Credit accumulation $g = +0.01^{ns}$

Appendix D. Appendix Table 4

Recommendation 4. Compress or Mainstream Developmental Education with Course Redesign.

Evidence Summary of Studies that Investigate the Effects of Mainstreaming, Compression, and Course Redesign in Developmental Education					
Study and design	**Participants**	**Setting**	**Intervention condition as implemented in the study**	**Comparison condition as implemented in the study**	**Outcome domain and effect size**
Hodara & Jaggars (2014) Quasi-Experimental Design (QED) Meets WWC Group Design Standards With Reservations	7,148 students placed into developmental education courses	Three community colleges in New York City	The intervention was a shortened developmental writing sequence (6–7 credit hours), designed to prepare students for two college-level English composition courses, required of all degree programs. The shorter, accelerated sequence focused on students' writing in response to readings and class discussions. The curriculum did not emphasize a review of grammar or usage rules, or appear to teach writing through discrete skills instruction.	The comparison was the usual developmental writing sequence offered in these colleges (8–12 credit hours), designed to prepare students for two college-level English composition courses, required of all degree programs. In the traditional, longer sequence, the lower-level course emphasized grammar instruction and paragraph development, and the next level of the course sequence offered a review of grammar and emphasis on paragraph and essay writing.	Progress through developmental education: $g = +0.22$*[13] Credit accumulation: $g = +0.13$* Degree attainment: $g = +0.16$*

[13] * indicates a statistically significant result ($p < .05$)

Appendix D. Appendix Table 4 *(continued)*

Recommendation 4. Compress or Mainstream Developmental Education with Course Redesign.

Study and design	Participants	Setting	Intervention condition as implemented in the study	Comparison condition as implemented in the study	Outcome domain and effect size
Cho et al. (2012)[14]; Jenkins et al. (2010) QED Does not meet WWC Group Design Standards	1,184 students placed into developmental writing	One community college in the mid-Atlantic	Community College of Baltimore County's Accelerated Learning Program (ALP) mainstreamed developmental-level students into college-level English composition. The students also received supplemental instruction for an additional hour per course meeting. The college-level English and supplemental instruction course are taught by the same instructor with integrated syllabi and activities.	The ALP comparison group was composed of students who were only enrolled in the traditional, highest level developmental English course (ENGL 052).	ALP students outperformed non-ALP students on college-level coursework completion rates and persistence to the next year* (nr). There was not a difference on college-level course grades or on degree attainment/transfer (nr).[15]
Edgecombe et al. (2014)[16] QED Does not meet WWC Group Design Standards	3,529 students in developmental education	One community college in California	A one-semester accelerated course in English was offered as a preparatory course in a pilot learning community, and this group formed the pool for the intervention group in the study. Later, the accelerated option was offered to all students on campus.	The 2-semester traditional pathway consisted of three developmental courses, which was considered "business as usual." Students who enrolled in this course sequence and met propensity-score matching criteria with the intervention group participants formed the pool for the comparison group.	Over a 5-year follow-up period, accelerated course participants were more likely to complete college-level English* (nr), earn more college course credits* (nr), and more likely to earn a degree,* (nr).[17]

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[14] This study did not meet WWC standards because the authors used imputation for some covariates and outcomes; the WWC currently does not allow imputation for covariates.

[15] nr indicates not reported. This study did not present information in a way that allows standardized effect sizes to be reported. See Cho et al. (2012), Table 3, p. 10.

[16] This study did not meet WWC standards because an acceptable pre-intervention measure of academic achievement was not available. The authors did control for measures of college achievement and student socioeconomic status.

[17] nr indicates not reported. This study did not present information in a way that allows standardized effect sizes to be reported. See Edgecombe et al. (2014), Table A.2, p. 30.

Appendix D. Appendix Table 4 *(continued)*

Recommendation 4. Compress or Mainstream Developmental Education with Course Redesign.

Study and design	Participants	Setting	Intervention condition as implemented in the study	Comparison condition as implemented in the study	Outcome domain and effect size
Zeidenberg et al. (2010); Jenkins et al. (2009)[18] QED Does not meet WWC Group Design Standards	1,564 students in adult basic education and workforce development programs (i.e., enrolled in at least one career and technical education course)	14 community colleges in Washington	I-BEST is a model in which "a basic skills instructor and an occupational instructor team teach occupational courses with integrated basic skills content, and students receive college-level credit for the occupational coursework" (Zeidenberg et al., 2010, p. 1).	Students in the comparison condition were in workforce classes but did not participate in I-BEST.	Credit Accumulation: (25 vs. 17 credits over 3 years)* [19, 20] Degree attainment: $g = +1.12$*

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[18] These studies did not meet WWC standards because they did not use an acceptable pre-intervention measure of academic achievement in the estimation models.

[19] * indicates a statistically significant result ($p < .05$)

[20] This study did not present enough information for the computation of a standardized effect size for this outcome. See Zeidenberg et al. (2010), Table 6, p. 14.

Appendix D. Appendix Table 5

Recommendation 5. Teach Students How to Be Self-Regulated Learners.

Evidence Summary of Studies that Investigate the Effects of Interventions to Teach Developmental Education Students How to Be Self-Regulated Learners					
Study and design	**Participants**	**Setting**	**Intervention condition as implemented in the study**	**Comparison condition as implemented in the study**	**Outcome domain and effect size**
Zimmerman et al. (2011); Hudesman, Crosby, Flugman, Issac, Everson, & Clay (2013) Randomized controlled trial (RCT) Meets WWC Group Design Standards Without Reservations	140 students enrolled in developmental mathematics courses.	One comprehensive college in the United States	A semester-long classroom intervention designed to infuse instruction in self-regulated learning into the math course.	The comparison condition received conventional instruction in their respective developmental education courses.	Progress through developmental education $g = +0.49$*[21] Academic achievement $g = +0.54$*

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[21] * indicates a statistically significant result ($p < .05$)

Appendix D. Appendix Table 6

Recommendation 6. Implement Comprehensive, Integrated, and Long-Lasting Support Programs.

Evidence Summary of Studies that Investigate the Effects of Comprehensive, Integrated, and Long-Lasting Support Programs with Students Placed in Developmental Education					
Study and design	**Participants**	**Setting**	**Intervention condition as implemented in the study**	**Comparison condition as implemented in the study**	**Outcome domain and effect size**
Scrivener et al. (2015); Scrivener & Weiss (2013); Scrivener, Weiss & Sommo (2012) Randomized controlled trial (RCT) Meets WWC Group Design Standards Without Reservations	896 low income students (based on family income below 200% of poverty level, or Pell grant eligibility), who needed one or two developmental education courses. The study sample inclusion criteria also required that students be: New York City residents, a new student or continuing student with 12 or fewer credits, willing to attend college full time, and enrolled in an ASAP-eligible major.	Three community colleges in New York City	The ASAP program includes the following components: required full-time enrollment; consolidated block scheduling in the first year; a noncredit seminar covering topics such as goal-setting and academic planning; comprehensive student advising services, tutoring services, career and employment services; a tuition waiver; free public transportation vouchers; and free textbooks for classes.	Control group members received the college's standard services and courses. Although details are not provided about these standard services, it is stated that these standard college services are far less intensive than those offered by the ASAP program.	Postsecondary enrollment: $g = +0.12^{ns}$ Progress through developmental education: $g = +0.50^{*}$[22] Credit accumulation: $g = +0.28^{*}$ Academic achievement: $g = +0.18^{*}$ Upward transfer: $g = +0.29^{*}$ Degree attainment: $g = +0.53^{*}$

[22] * indicates a statistically significant result ($p < .05$)

References[23]

Al-Harthy, I., Was, C. A., & Issacson, R. M. (2010). Goals, efficacy, and metacognitive self-regulation. A path analysis. *International Journal of Education, 2*(1), 1–20.

American Association of Community Colleges. (2015). *2015 community college fast facts.* Washington, DC: Author. Retrieved from http://www.aacc.nche.edu/AboutCC/Documents/FactSheet2015.pdf

American Educational Research Association, American Psychological Association, & National Council on Measurement in Education. (1999). *Standards for educational and psychological testing.* Washington, DC: American Educational Research Association Publications.

Attewell, P., Lavin, D., Thurston, D., & Tania, L. (2006, September/October). New evidence on college remediation. *The Journal of Higher Education, 77*(5), 886–924.

Bailey, T., Jaggars, S. S., & Scott-Clayton, J. (2013). *Characterizing the effectiveness of developmental education: A response to recent criticism.* New York, NY: Community College Research Center, Teachers College, Columbia University. Retrieved from http://files.eric.ed.gov/fulltext/ED542142.pdf

Bailey, T. (2009, Spring). Challenge and opportunity: Rethinking the role and function of developmental education in community college. *New Directions for Community Colleges, 145*, 11–31.

Bain, K. (2004). *What the best college teachers do.* Cambridge, MA: Harvard University Press.

Barnett, E. A., Fay, M. P., Bork, R. H., & Weiss, M. J. (2013, May). *Reshaping the college transition: States that offer early college readiness assessments and transition curricula.* New York, NY: Community College Research Center, Teachers College, Columbia University. Retrieved from http://ccrc.tc.columbia.edu/media/k2/attachments/reshaping-the-college-transition-state-scan.pdf

Barrow, L., Richburg-Hayes, L., Rouse, C. E., & Brock, T. (2012). *Paying for performance: the education impacts of a community college scholarship program for low-income adults* (Working Paper Series: WP–09–13, 2009). Chicago, IL: Federal Reserve Bank of Chicago.

Belfield, C., & Crosta, P. (2012). *Predicting success in college: The importance of placement tests and high school transcripts* (CCRC Working Paper No. 42). New York, NY: Community College Research Center, Teachers College, Columbia University.

Bettinger, E. P., Boatman, A., & Long, B. T. (2013). Student supports: Developmental education and other academic programs. *The Future of Children, 23*(1), 93–115.

Bettinger, E. P., & Long, B. T. (2009). Addressing the needs of underprepared students in higher education: Does college remediation work? *Journal of Human Resources, 44*(3), 736–771.

Binder, M., Krause, K., Miller, C., & Cerna, O. (2015, June). *Providing incentives for timely progress toward earning a college progress: Results from a performance-based scholarship experiment.* New York, NY: MDRC.

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[23] Studies used to support a recommendation are indicated by bold text in the endnotes and references. For more information about these studies, see Appendix D.

Boatman, A., & Long, B. T. (2010). *Does remediation work for all students? How the effects of postsecondary remedial and developmental courses vary by level of academic preparation* (NCPR Working Paper). New York, NY: National Center for Postsecondary Research.

Boylan, H. R. (2002). *What works: Research-based best practices in developmental education*. Boone, NC: Continuous Quality Improvement Network with the National Center for Developmental Education, Appalachian State University.

Bracco, K. R., Austin, K., Bugler, D. & Finkelstein, N. (2015). *Reforming developmental education to better support students' postsecondary success in the Common Core era. Policy Brief.* San Francisco, CA: WestEd. Retrieved from https://www.luminafoundation.org/files/resources/reforming-dev-ed.pdf

Bracco, K. R., Dadgar, M., Austin, K., Klarin, B., Broek, M., Finkelstein, N., … Bugler, D. (2014). *Exploring the use of multiple measures for placement into college-level courses: Seeking alternatives or improvements to the use of a single standardized test* [Core to College Evaluation]. San Francisco, CA: WestEd. Retrieved from https://www.wested.org/wp-content/files_mf/1397164696product55812B.pdf

Brock, T., & Richburg-Hayes, L. (2006). Paying for persistence. *Early results of a Louisiana scholarship program for low-income parents attending community college.* New York, NY: MDRC. Retrieved from http://www.mdrc.org/sites/default/files/full_472.pdf

Brophy, J. E. (2004). Stimulating students' motivation to learn. *Motivating students to learn* (2nd ed., pp. 249–306). Mahwah, NJ: Lawrence Erlbaum.

Burdman, P. (2012). *Where to begin? The evolving role of placement exams for students starting college.* Cambridge, MA: Jobs for the Future and Achieving the Dream.

Cal-PASS Plus, & RP Group. (n.d.). *Multiple measures assessment project – Data match guide to Cal-PASS Plus.* Retrieved from the RP Group web site: http://rpgroup.org/system/files/DataMatch%20Guide_10.26.15.pdf

Cal-PASS Plus, & RP Group. (n.d). *Multiple measures assessment project – Pilot college – Developing a research plan.* Retrieved from the RP Group web site: http://rpgroup.org/system/files/MMAP-Sample%20Research%20Plan_10.31.15.pdf

Center for Education Policy Research, Harvard University. (2015). *Research project overview: The Study of pre-college math remediation programs in Tennessee.* Cambridge, MA: Author. Retrieved from http://cepr.harvard.edu/publications/research-project-overview-study-pre-college-math-remediation-programs-tennessee

Cha, P., & Patel, R. (2010). *Rewarding progress, reducing debt: Early results from Ohio's performance-based scholarship demonstration for low-income parents.* New York, NY: MDRC.

Cho, S., Kopko, E., Jenkins, D., & Jaggars, S. S. (2012, December). *New evidence of success for community college remedial English students: Tracking the outcomes of students in the Accelerated Learning Program (ALP).* New York, NY: Community College Research Center, Teachers College, Columbia University. Retrieved from http://ccrc.tc.columbia.edu/publications/ccbc-alp-student-outcomes-follow-up.html

City University of New York. (2015). *Inside ASAP (Accelerated Study in Associate Programs): A resource guide on program structure, components, and management.* New York, NY: Author. Retrieved from http://www1.cuny.edu/sites/asap/wp-content/uploads/sites/8/2015/05/Resource-Guide.pdf

Coalition on the Academic Workforce. (2012). *A portrait of part-time faculty members.* Retrieved from http://www.academicworkforce.org/CAW_portrait_2012.pdf

Complete College America. (2012). *Remediation: Higher education's bridge to nowhere.* Retrieved from http://www.completecollege.org/docs/CCA-Remediation-final.pdf

Cousert, D. (1999). *The effects of a mentoring intervention program on retention of students in a community college* (Doctoral dissertation). Available from ProQuest Dissertations and Theses database. (UMI No. 304550777)

Dinsmore, D. L., Alexander, P. A., & Loughlin, S. M. (2008). Focusing the conceptual lens on metacognition, self-regulation, and self-regulated learning. *Educational Psychology Review, 20*, 391–409.

Duffy, M., Schott, A., Beaver, J. K., & Park, E. (2014). *Tracing the development of multiple measures for college placement across states and systems: Analysis of three state systems: Phase I report.* Philadelphia, PA: Research for Action. Retrieved from http://www.researchforaction.org/wp-content/uploads/2015/02/RFA-Gates-Multiple-Measures-Phase-1-Report-March-2014.pdf

Edgecombe, N. (2011, February). *Accelerating the academic achievement of students referred to developmental education.* New York, NY: Community College Research Center, Teachers College, Columbia University. Retrieved from http://academiccommons.columbia.edu/catalog/ac:146646

Edgecombe, N., Cormier, M. S., Bickerstaff, S., & Barragan, M. (2013a). *Strengthening developmental education reforms: Evidence on implementation efforts from the Scaling Innovation project* (CCRC Working Paper No. 61). New York, NY: Community College Research Center, Teachers College, Columbia University. Retrieved from http://ccrc.tc.columbia.edu/publications/strengthening-developmental-education-reforms.html

Edgecombe, N., Jaggars, S. S., Baker, E. D., & Bailey, T. (2013b). *Acceleration through a holistic support model: An implementation and outcomes analysis of FastStart@CCD.* New York, NY: Community College Research Center, Teachers College, Columbia University. Retrieved from http://ccrc.tc.columbia.edu/publications/acceleration-through-holistic-support-model.html

Edgecombe, N., Jaggars, S. S., Xu, D., & Barragan, M. (2014, May). *Accelerating the integrated instruction of developmental reading and writing at Chabot College.* New York, NY: Community College Research Center, Teachers College, Columbia University. Retrieved from http://ccrc.tc.columbia.edu/publications/accelerating-integrated-instruction-at-chabot.html

Education Advisory Board and Complete College America. (2012). *Building guided pathways to success: A survey of innovative approaches for directing student choice and reducing time to graduation.* Washington, DC: Author. Retrieved from http://doingwhatmatters.cccco.edu/portals/6/docs/Building%20Guided%20Pathways%20to%20Success%20-%20EAB%20Report%20FINAL.pdf

Escobedo, G. (2007). A retention/persistence intervention model: Improving success across cultures. *Journal of Developmental Education, 31*(1), 12–14, 16–17, 37.

Fay, M. P., Bickerstaff, S. E., & Hodara, M. (2013, December). *Why students do not prepare for math placement exams: Student perspectives* (CCRC Research Brief No. 57). New York, NY: Community College Research Center, Teachers College, Columbia University. Retrieved from http://ccrc. tc.columbia.edu/media/k2/attachments/why-students-do-not-prepare.pdf

Finkelman, J., Hudesman, J., Flugman, B., & Crosby, S. (2014). An enhanced formative assessment and self-regulated learning program: From the classroom to the workplace. *Austin Journal of Psychiatry and Behavioral Science, 1*(1), 1002–9.

Fong, K., & Visher, M. G. (2013). *Fast forward: A case study of two community college programs designed to accelerate students through developmental math*. New York, NY: MDRC. Retrieved from http://www.mdrc.org/sites/default/files/fast_forward_es.pdf

Ford, S. S. (2007). *The essential steps for developing the content of an effective advisor training and development program*. Manhattan, KS: The National Academic Advising Association. Retrieved from https://www.nacada.ksu.edu/Resources/Clearinghouse/View-Articles/Advisor-Training-Steps.aspx

Gourgey, A. F. (1998). Metacognition in basic skills instruction. *Instructional Science, 26*(1), 81–96.

Green, D. W. (2007). Adjunct faculty and the continuing quest for quality. *New Directions for Community Colleges, 140*, 29–39.

Grubb, W. N. (2001). *"Getting into the world": Guidance and counseling in community colleges*. New York, NY: Community College Research Center, Teachers College, Columbia University. Retrieved from http://counselors.cccco.edu/Portals/2/assets/Documents/332_23CCRC Grubb Counseling 2001.pdf

Hodara, M., & Jaggars, S. S. (2014). An examination of the impact of accelerating community college students' progression through developmental education. *The Journal of Higher Education, 85*(2), 246–276.

Hodara, M., Jaggars, S. S., & Karp, M. M. (2012). *Improving developmental education assessment and placement: Lessons from community colleges across the country* (CCRC Working Paper No. 51). New York, NY: Community College Research Center, Teachers College, Columbia University. Retrieved from http://ccrc.tc.columbia.edu/publications/developmental-education-assessment-placement-scan.html

Howell, J. S., Kurlaender, M., & Grodsky, E. (2010). Postsecondary preparation and remediation: Examining the effect of the early assessment program at California State University. *Journal of Policy Analysis & Management, 29*(4), 726–748.

Hudesman, J., Crosby, S., Flugman, B., Issac, S., Everson, H., & Clay, D. B. (2013a). Using formative assessment and metacognition to improve student achievement. *Journal of Developmental Education, 37*(1), 3–13.

Hudesman, J., Crosby, S., Ziehmke, N., Everson, H., Issac, S., Flugman, B., … Moylan, A. (2014). Using formative assessment and self-regulated learning to help developmental math students achieve: A multi-campus program. *Journal on Excellence in College Teaching, 25*(2), 107–130.

Hudesman, J., Millet, N., Niezgoda, G., Han, H., & Flugman, B. (2013b). The use of self-regulated learning, formative assessment, and mastery learning to assist students enrolled in developmental mathematics: A demonstration project. *International Journal of Research and Review, 10*, 1–17.

Inside Track. (2015). *National study of non-first-time students shows full-time enrollment may not be appropriate for all.* Retrieved from http://www.insidetrack.com/2015/01/20/national-study-of-non-first-time-students-shows-full-time-enrollment-may-not-be-appropriate-for-all/

Jackson, C. C. (2014, October 28). *Enhanced advising at the University of Akron* [Video file]. Retrieved from https://www.youtube.com/watch?v=a1mZz2mz8ns

Jaggars, S. S., Hodara, M., Cho, S., & Xu, D. (2015). Three accelerated developmental programs: Features, student outcomes, and implications. *Community College Review, 43*(1), 3–26.

Jenkins, D., Speroni, C., Belfield, C., Jaggars, S. S., & Edgecombe, N. (2010). *A model for accelerating academic success of community college remedial English students: Is the Accelerated Learning Program (ALP) effective and affordable?* **(CCRC Working Paper No. 21). New York, NY: Community College Research Center, Teachers College, Columbia University.**

Jenkins, D., Zeidenberg, M., & Kienzl, G. S. (2009, May). *Educational outcomes of I-BEST, Washington State Community and Technical College System's Integrated Basic Education and Skills Training Program: Findings from a multivariate analysis* **(CCRC Working Paper No. 16). New York, NY: Community College Research Center, Teachers College, Columbia University. Retrieved from http://ccrc.tc.columbia.edu/publications/i-best-multivariate-analysis.html**

Kalamkarian, H. S., & Karp, M. M. (2015, August). *Student attitudes toward technology-mediated advising systems* (CCRC Working Paper No. 82). New York, NY: Community College Research Center, Teachers College, Columbia University. Retrieved from http://ccrc.tc.columbia.edu/media/k2/attachments/student-attitudes-toward-technology-mediated-advising-systems.pdf

Kaplan, A. (2008). Clarifying metacognition, self-regulation, and self-regulated learning: What's the purpose? *Educational Psychology Review, 20*, 477-484. doi:10.1007/s10648-008-9087-2

Katiraie, F. (2007). *Effectiveness of fast track and advanced fast track programs at Montgomery College and feasibility of expansion to other colleges and universities* (Doctoral dissertation). ProQuest Dissertations and Theses database. (UMI No. 3305792)

Klempin, S. (2014, September). *Redefining full-time in college: Evidence on 15-credit strategies*. New York, NY: Community College Research Center, Teachers College, Columbia University. Retrieved from http://ccrc.tc.columbia.edu/publications/redefining-full-time-in-college.html

Kosiewicz, H., Ngo, F., & Fong, K. (2016). Alternative models to deliver developmental math: Issues of use and student access. *Community College Review, 44*(3), 205–231.

Kwon, W. (2014). *Essays on education: From Indonesia to Los Angeles, CA* **(Doctoral dissertation). Retrieved from ProQuest Dissertations and Theses database. (UMI No. 3644661)**

Ley, K., & Young, D. B. (2001). Instructional principles for self regulation. *Educational Technology Research and Development, 49*(2), 93–103.

Linder, K. E. (2012). Creating space for adjunct faculty: The multiple roles of centers for teaching and learning. *Journal on Centers for Teaching & Learning, 4*, 33–59.

Long, B. T., & Boatman, A. (2013). The role of remedial and developmental courses in access and persistence. In A. Jones and L. Perna (Eds.), *The state of college access and completion: Improving college success for students from underrepresented groups.* London, England: Routledge International Studies in Higher Education.

Lynch-Holmes, K. B., Troy, A. B., & Ramos, I. (n.d.). *Early alert & intervention: Top practices for retention.* Retrieved from https://issuu.com/connectedu/docs/early_alert_white_paper

Marwick, J. D. (2002a). *Charting a path to success: How alternative methods of mathematics placement impact the academic success of community college students* **(Doctoral dissertation). Retrieved from ProQuest Dissertations and Theses database. (UMI No. 3070381)**

Marwick, J. (2002b). Alternative methods of mathematics placement. The *Community College Enterprise, 8***(2), 41–50.**

Marwick, J. D. (2004). Charting a path to success: The association between institutional placement policies and the academic success of Latino students. *Community College Journal of Research & Practice, 28***(3), 263–280.**

Mayer, A. K., Patel, R., & Gutierrez, M. (2015a, April). *Four-year effects on degree receipt and employment outcomes from a Performance-Based Scholarship Program in Ohio.* **New York, NY: MDRC.**

Mayer, A. K., Patel, R., Rudd, T., Ratledge, A., & Blake, S. (2015b, November). *Designing scholarships to improve college success: Final report on the performance-based scholarship demonstration.* New York, NY: MDRC.

McClellan, J. L. (2007). *Content components for advisor training: Revisited.* Manhattan, KS: National Academic Advising Association. Retrieved from http://www.nacada.ksu.edu/Resources/ Clearinghouse/View-Articles/Advisor-Training-Components.aspx

MDRC. (2015). *Frequently asked questions about CUNY's Accelerated Study in Associate Programs* (ASAP). Retrieved from http://www.mdrc.org/sites/default/files/FAQs_ASAP.pdf

Melguizo, T., Kosiewicz, H., Prather, G., & Bos, J. (2014). How are community college students assessed and placed in developmental math? Grounding our understanding in reality. *Journal of Higher Education, 85*(5), 691–722.

Miller, C., Binder, M., Harris, V., & Krause, K. (2011). *Staying on track: Early Findings from a Performance-Based Scholarship Program at the University of New Mexico.* **New York, NY: MDRC.**

National Center for Education Statistics. (2013). *First-year undergraduate remedial coursetaking: 1999-2000, 2003-04, 2007-08 – Statistics in Brief.* (NCES 2013-013). Washington, DC: U.S. Department of Education, National Center for Education Statistics. Retrieved from http://nces.ed.gov/pubs2013/2013013.pdf

Ngo, F., & Kwon, W. W. (2014). Using multiple measures to make math placement decisions: Implications for access and success in community colleges. *Research in Higher Education, 56*(5), 442–470.

Ngo, F., Kwon, W., Melguizo, T., Bos, H., & Prather, G. (2013). *Course placement in developmental mathematics: Do multiple measures work?* (Policy Brief 4). Los Angeles, CA: University of Southern California.

Nodine, T., Dadgar, M., Venezia, A., & Bracco, K. R. (2013). *Acceleration in developmental education.* San Francisco, CA: WestEd. Retrieved from http://www.wested.org/online_pubs/resource1281.pdf

Patel, R., Richburg-Hayes, L., de la Campa, E., & Rudd, T. (2013). *Performance-based scholarships: What have we learned? Interim findings from the PBS demonstration. Policy brief.* New York, NY: MDRC.

Patel, R., & Rudd, T. (2012). *Can scholarships alone help students succeed? Lessons from two New York City community colleges.* New York, NY: MDRC.

Patel, R., & Valenzuela, I. (2013). *Moving forward: Early findings from the performance-based scholarship demonstration in Arizona.* New York, NY: MDRC.

Radford, A., Pearson, J., Ho, P., Chambers, E., & Ferlazzo, E. (2012). *Remedial coursework in postsecondary education: The students, their outcomes, and strategies for improvement.* Washington, DC: MPR Associates, Inc.

Research for Action. (2015). *Development and implementation of multiple measures for college placement across states and systems: Phase 1 and Phase 2 report summary.* Philadelphia, PA: Author.

Richburg-Hayes, L., Brock, T., LeBlanc, A., Paxson, C., Rouse, C. E., & Barrow, L. (2009). *Rewarding persistence: Effects of a performance-based scholarship program for low-income parents.* New York, NY: MDRC.

Richburg-Hayes, L., Sommo, C., & Welbeck, R. (2011). *Promoting full-time attendance among adults in community college: Early impacts from the performance-based scholarship demonstration in New York.* New York, NY: MDRC.

Robbins, R. (2013). Implications of advising load. In Carlstrom, A., *2011 national survey of academic advising* (Monograph No. 25). Manhattan, KS: National Academic Advising Association. Retrieved from http://www.nacada.ksu.edu/tabid/3318/articleType/ArticleView/articleId/94/article.aspx

RP Group, & Cal-PASS Plus. (n.d.). *Multiple measures assessment project pilot college – Getting started guide.* Sacramento, CA: Author. Retrieved from: http://rpgroup.org/projects/multiple-measures-assessment-project

Schmitt, N., Billington, A., Keeney, J., Reeder, M., Plesac, T. J., Sinha, R., & Zorzie, M. (2011). *Development and validation of measures of noncognitive college student potential*. Washington, DC: The College Board.

Scott-Clayton, J. (2012). *Do high-stakes placement exams predict college success?* (CCRC Working Paper No. 41). New York, NY: Community College Research Center, Teachers College, Columbia University.

Scrivener, S., & Au, J. (2007) *Enhancing student services at Lorain County Community College: Early results from the Opening Doors demonstration in Ohio*. New York, NY: MDRC. Retrieved from http://files.eric.ed.gov/fulltext/ED496600.pdf

Scrivener, S., & Coghlan, E. (2011). *Opening doors to student success: A synthesis of findings from an evaluation at six community colleges. Policy brief*. New York, NY: MDRC.

Scrivener, S., & Weiss, M. J. (2013). *More graduates: Two-year results from an evaluation of Accelerated Study in Associate Programs (ASAP) for developmental education students. Policy brief*. New York, NY: MDRC.

Scrivener, S., Weiss, M. J., Ratledge, A., Rudd, T., Sommo, C., & Fresques, H. (2015). *Doubling graduation rates: Three-year effects of CUNY's Accelerated Study in Associate Programs (ASAP) for developmental education students*. New York, NY: MDRC.

Scrivener, S., Weiss, M. J., & Sommo, C. (2012). *What can a multifaceted program do for community college students? Early results from an evaluation of Accelerated Study in Associate Programs (ASAP) for developmental education students*. New York, NY: MDRC.

Scrivener, S., & Weiss, M. J., & Teres, J. J. (2009). *More guidance, better results? Three-year effects of an enhanced student services program at two community colleges*. New York, NY: MDRC.

Scrivener, S., & Pih, M. (2007). *Enhancing student services at Owens Community College: Early results from the Opening Doors Demonstration in Ohio*. New York, NY: MDRC.

Self, C. (2008). Advising delivery: Professional advisors, counselors, and other staff. In V. N. Gordon, W. R. Habley, T. J. Grites, & Associates (Eds.), *Academic advising: A comprehensive handbook* (pp. 142–56). San Francisco, CA: Jossey-Bass.

Shults, C. (2000). *Institutional policies and practices in developmental education: A national study of community colleges.* Washington, DC: American Association of Community Colleges.

Sommo, C., Boynton, M., Collado, H., Diamond, J., Gardenhire, A, Ratledge, A., ... & Weiss, M. J. (2014). *Mapping success: Performance-based scholarships, student services, and developmental math at Hillsborough Community College*. New York, NY: MDRC.

Sperling, R. A., Howard, B. C., Staley, R. & DuBois, N. (2004). Metacognition and self-regulated learning constructs. *Educational Research and Evaluation, 10*(2), 117–139.

Tierney, W. G., & Garcia, L. D. (2011). Remediation in higher education: The role of information. *American Behavioral Scientist, 55*(2), 102–120. Retrieved from http://abs.sagepub.com/content/55/2/102

Title 5 §55502, California Code of Regulations.

Two-Year College English Association. (2014). *TYCA white paper on developmental education reforms.* Urbana, IL: National Council of Teachers of English.

Visher, M. G., Butcher, K. F., & Cerna, O. S. (2010). *Guiding developmental math students to campus services: An impact evaluation of the Beacon Program at South Texas College.* **New York, NY: MDRC.**

Weinstein, C. E., Meyer, D. K., Husman, J., Van Mater Stone, G., & McKeachie, W. J. (2006). Teaching students how to become more strategic and self-regulated learners. In W. J. McKeachie, & M. Svinicki (Eds.), *McKeachie's Teaching Tips* (pp. 300–317). Boston, MA: Houghton Mifflin.

Welbeck, R., Ware, M., Cerna, O., & Valenzuela, I. (2014). *Paying it forward: A technical assistance guide for developing and implementing performance-based scholarships.* New York, NY: MDRC.

Westrick, P. A., & Allen, J. (2014). *Validity evidence for ACT Compass tests.* Iowa City, IA: ACT.

Willett, T. (2013). *Student transcript-enhanced placement study (STEPS) technical report.* Retrieved from the RP Group web site: https://rpgroup.org/sites/default/files/STEPSTechnicalReport.pdf

Willett, T., Hayward, C., Nguyen, A., Newell, M., Bahr, P., Hetts, J., … Duran, D. (2015). *Multiple measures assessment project (MMAP) Spring 2015 technical report.* Sacramento, CA: Research and Planning Group (RP Group) for California Community Colleges.

Yamada, H. (2014). *Community College Pathways' Program success: Assessing the first two years' effectiveness of Statway.* Stanford, CA: Carnegie Foundation for the Advancement of Teaching.

Young, D. B., & Ley, K. (2003). Self-regulation support offered by developmental educators. *Journal of Developmental Education, 27*(2), 2–4, 6, 8, 10.

Zachry Rutschow, E., & Diamond, J. (2015, April). *Laying the foundations: Early findings from the New Mathways project.* New York, NY: MDRC.

Zachry Rutschow, E., & Schneider, E. (2011, June 1). *Unlocking the gate: What we know about improving developmental education.* New York, NY: MDRC.

Zeidenberg, M., Cho, S., & Jenkins, D. (2010). *Washington State's Integrated Basic Education and Skills Training Program (I-BEST): New evidence of effectiveness* **(CCRC Working Paper No. 20). New York, NY: Community College Research Center, Teachers College, Columbia University.**

Zimmerman, B. J., Moylan, A., Hudesman, J., White, N., & Flugman, B. (2011). Enhancing self-reflection and mathematics achievement of at-risk urban technical college students. *Psychological Test and Measurement Modeling, 53***(1), 141–160.**

Zimmerman, B. J. (2002). Becoming a self-regulated learner: An overview. *Theory into Practice, 41,* 64–70.

Please note that there will still be some footnotes in the guide. Studies used as evidence in support of a recommendation are indicated by **bold text** in the endnotes and references pages.

1. Among all first-year undergraduates in the United States, about one-third enrolled in at least one developmental course, and among community college students, this proportion is higher (approximately 40 percent) (National Center for Education Statistics, 2013). See also: Bailey, 2009; Bettinger, Boatman, & Long, 2010; Bettinger & Long, 2009; Long & Boatman, 2013; Zachry Rutschow & Schneider, 2011.
2. Attewell, Lavin, Domina, & Levy, 2006; Table 2, p. 904. See also Radford et al., 2012.
3. Zachry Rutschow & Schneider, 2011.
4. Remedial education was a term initially used to describe the function that junior and community colleges performed by offering courses that were not at a college level. Students and faculty who taught pre-college level courses found "remedial education" to be stigmatizing. "Developmental education" became the more favored term to emphasize how faculty work to developmentally and incrementally help "underprepared college students attain their academic goals," (Boylan, 2002, pg. 3). As the U.S. college completion agenda and college readiness standards have gained prominence, "college ready" is a term used to keep the focus on students succeeding in college and completing their degree. See also: Bailey, Jaggars, & Scott-Clayton, 2013.
5. National Center for Education Statistics, 2013.
6. Howell, Kurlaender, & Grodsky, 2010; Center for Education Policy Research, 2015.
7. Barnett, Fay, Bork, & Weiss, 2013; Tierney & Garcia, 2011.
8. **Scott-Clayton, 2012; Belfield & Crosta, 2012.**
9. **Scrivener et al., 2015**.
10. It is typical in WWC reviews of research for only a relatively small proportion of the eligible studies to be rated as meeting standards (overall, about 23% of eligible studies that the WWC has reviewed meet standards at some level). Consistent with previous WWC experiences, the most likely reason a study did not meet standards is that it had issues with group comparability at baseline (e.g., the groups were too far apart on important pretest measures; see the WWC Procedures and Standards Handbook, Version 3.0).
11. This includes randomized control trials (RCT) and quasi-experimental design studies (QED). Studies not contributing to levels of evidence include single-case designs (SCD) evaluated with WWC pilot SCD standards and regression discontinuity designs (RDD) evaluated with pilot RDD standards.
12. The research may include studies generally meeting WWC design standards and supporting the effectiveness of a program, practice, or approach with small sample sizes or other conditions of implementation or analysis that limit generalizability. The research may include studies that support the generality of a relation but do not meet WWC design standards; but, they have no major flaws related to internal validity other than lack of demonstrated equivalence at pretest for QEDs. QEDs without equivalence must include a pretest covariate as a statistical control for selection bias. These studies must be accompanied by at least one relevant study meeting WWC design standards.
13. American Educational Research Association, American Psychological Association, and National Council on Measurement in Education (1999).
14. E.g., Scott-Clayton, 2012.
15. Complete College America, 2012.
16. According to Ngo, Kwon, Melguizo, Bos, and Prather (2013), a lawsuit filed by the Mexican-American Legal Defense and Educational Fund provided the impetus for California's policy change. In 1991, the Fund challenged the inequity of the Matriculation Act of 1986, which mandated placement

testing as a part of enrollment and matriculation services in community colleges. Ngo et al. (2013) reported: "The lawsuit claimed that the California Community College Chancellor's Office failed to monitor appropriate use of placement tests, resulting in large proportions of Latino students being placed in remediation. The lawsuit was settled outside of court, but Title 5 of the California Code of Regulations was revised in 1992 to mandate the use of multiple measures in placement decisions. The goal was to reduce the "disproportionate impact" of placement tests on different racial and ethnic groups" (p. 2, footnote).

17. E.g., Westrick & Allen, 2014.
18. **Marwick, 2002a; Ngo & Kwon, 2014.**
19. **Marwick, 2002a.**
20. **Ngo & Kwon, 2014.**
21. **Belfield & Crosta, 2012; Scott-Clayton, 2012.**
22. See "Using multiple measures" on the Bill and Melinda Gates Foundation website: www.gatesfoundation.org; Bracco et al., 2014; Burdman, 2012; Research for Action, 2015; Two-Year College English Association, 2014.
23. See: http://rpgroup.org/projects/multiple-measures-assessment-project. The RP Group is a membership organization of individual California community colleges and districts, focused on providing research, evaluation, professional development, and technical assistance to support evidence-based decision-making. Individuals, colleges, and organizations not in California's community college system may join as associate members. See also the Education Commission of the States' (ECS) national scan of states' implementation of multiple measures for course placement: http://www.ecs.org/moving-from-single-to-multiple-measures-for-college-course-placement. ECS also refers to resources from Research for Action and WestEd, also cited in this guide.
24. Hodara, Jaggars, & Karp, 2012.
25. Duffy, Schott, Beaver, & Park, 2014.
26. "LBCC Promise Pathways," 2014.
27. Willett, 2013. Willett (2013) investigated the relative effectiveness of various placement indicators on two main outcomes: 1) the students' placement level of first English course, and first math course attempted; and 2) receiving a passing grade in the students' first attempted English and math courses (English and math analyzed separately). The predictors that were used in regression models were: a) the most recent California Standards test in English or math; b) count of "A-G" or college preparatory courses completed (a set of seven categories of high school courses to be eligible for admission to the University of California or California State University); c) level of most recent high school course in English or math; d) grade point in most recent high school course in English or math; e) high school grade point average excluding English (or math); and f) level of first college course attempted in English (or math), used only for regressions predicting passing grades in those courses).
28. Willett et al., 2015.
29. Melguizo et al., 2014.
30. Adapted from: Cal-PASS Plus, & RP Group. (n.d) *Multiple measures assessment project – Pilot college – Developing a research plan.* Retrieved from the RP Group web site: http://rpgroup.org/system/files/MMAP-Sample%20Research%20Plan_10.31.15.pdf and Cal-PASS Plus, & RP Group. (n.d.). *Multiple measures assessment project – Data match guide to Cal-PASS Plus.* Retrieved from the RP Group web site: http://rpgroup.org/system/files/DataMatch%20Guide_10.26.15.pdf
31. Grubb, 2001.
32. **Scrivener & Weiss, 2009**.
33. Escobedo, 2007.
34. Jackson, 2014.
35. Robbins, 2013; Education Advisory Board, Complete College America, 2012.

36. Kalamkarian & Karp, 2015.

37. **Scrivener & Weiss, 2009; Visher et al., 2010**.

38. **Cousert, 1999; Visher et al., 2010**.

39. **Scrivener & Weiss, 2009**.

40. **Cousert, 1999**.

41. Ford, 2007; McClellan, 2007.

42. Self, 2008; Kalamkarian & Karp, 2015.

43. Kalamkarian & Karp, 2015.

44. **Scrivener & Weiss, 2009**.

45. **Visher et al., 2010**.

46. **Scrivener & Weiss, 2009**.

47. **Scrivener & Weiss, 2009**.

48. Lynch-Holmes, Troy, & Ramos, 2012.

49. Sample enhanced advising planning tool from Ivy Tech State College (p. 118) from: **Cousert, D. (1999).** The effects of a mentoring intervention program on retention of students in a community college (Doctoral dissertation). Available from ProQuest Dissertations and Theses database. (UMI No. 304550777). This study meets WWC standards without reservations.

50. **Visher, Butcher, & Cerna, 2010, p. 13**.

51. **Scrivener & Weiss, 2009**.

52. **Scrivener & Weiss, 2009, p. 27**.

53. **Visher et al., 2010**.

54. Patel, Richburg-Hayes, de la Campa, & Rudd, 2013; Mayer, Patel, Rudd, Ratledge, & Blake, 2015.

55. **Brock & Richburg-Hayes, 2006; Cha & Patel, 2010; Patel & Rudd, 2012**. The effectiveness of performance-based monetary incentives alone were evaluated in two Ohio colleges in Cha & Patel (2010) and in two New York colleges in Patel & Rudd (2012). Note that in the Louisiana Opening Doors program (Brock & Richburg-Hayes, 2006), counseling was primarily focused on monitoring students' compliance with program requirements and not on providing academic advising or supports to work through personal challenges to their academic progress. The Louisiana Opening Doors intervention differed from the coupling of enhanced advising, with performance-based monetary incentives, in the VISTA program studied by Miller et al. (2011) and the Adelante program studied by Patel & Valenzuela (2013).

56. **Brock & Richburg-Hayes, 2006; Patel & Rudd, 2012**.

57. **Cha & Patel, 2010**.

58. **Brock & Richburg-Hayes, 2006; Patel & Rudd, 2012**.

59. **Cha & Patel, 2010; Patel & Rudd, 2012**.

60. **Miller, Binder, Harris, & Krause, 2011; Patel & Valenzuela, 2013; Sommo et al., 2014**.

61. **Miller et al., 2011; Patel & Valenzuela, 2013**.

62. **Patel & Valenzuela, 2013**.

63. Welbeck, Ware, Cerna, & Valenzuela, 2014.

64. Adapted from source: How to Budget a Performance-Based Scholarship, Box 2 (p. 15) from Welbeck, R., Ware, M., Cerna, O., & Valenzuela, I. (2014, February). *Paying it forward: A technical assistance guide for developing and implementing performance-based scholarships*. New York, NY: MDRC.

65. Mayer et al., 2015b.

66. **Patel & Rudd, 2012**.

67. Welbeck et al., 2014.

68. **Sommo et al., 2014**.

69. Adapted from: Welbeck, R., Ware, M., Cerna, O., & Valenzuela, I. (2014). *Paying it forward: A technical assistance guide for developing and implementing performance-based scholarships*. New York, NY: MDRC.

70. Jaggars, Hodara, Cho, & Xu, 2015; Kosiewicz, Ngo, & Fong, 2016; Bracco, Austin, Bugler, & Finkelstein, 2015.
71. Edgecombe, 2011, p. 4.
72. Zachry Rutschow & Schneider, 2011.
73. **Hodara & Jaggars, 2014**.
74. Edgecombe, Jaggars, Xu, & Barragan, 2014.
75. Edgecombe, Jaggars, Baker, & Bailey, 2013b; This study does not meet WWC evidence standards because the preintervention equivalence of the intervention and comparison groups could not be assessed. Additionally, footnote 12 indicated that 16% of students were both the intervention and comparison groups, which is a confounding factor in the analysis.
76. Fong & Visher, 2013; This study does not meet WWC evidence standards because the pre-intervention equivalence of the intervention and comparison groups could not be assessed.
77. Zachry Rutschow & Schneider, 2011.
78. **Cho, Kopko, Jenkins, and Jaggars (2012)** evaluated the effectiveness of the Accelerated Learning Program (ALP), however, the study did not meet WWC standards because the authors used imputation for some covariates and outcomes; the WWC currently does not allow imputation for covariates.
79. Zachry Rutschow & Diamond, 2015; This study does not meet WWC evidence standards because the intervention and comparison groups could not be established as equivalent at baseline on both a continuous measure of prior academic achievement and a measure of students' socioeconomic status.
80. **Zeidenberg, Cho, & Jenkins, 2010; Jenkins, Zeidenberg, & Kienzl, 2009.**
81. Yamada, 2014; This study does not meet WWC evidence standards because the intervention and comparison groups could not be established as equivalent at baseline, due to the use of a binary measure of prior academic achievement. Additionally, the comparison group was drawn from a prior cohort, rather than comparing two groups from the same time period, which is a confounding factor in the analysis.
82. **Hodara & Jaggars, 2014**.
83. **Hodara and Jaggars (2014)** also investigated the effects of an accelerated math course compared to the traditional length developmental math course, the comparison group for this analysis had only one college in contrast to five colleges in the intervention group. In this situation, the effects of the intervention cannot solely be attributed to accelerated math instruction, because the college in the comparison group may have unique characteristics affecting the results.
84. **See also Jenkins, Zeidenberg, & Kienzl, 2009.**
85. Adapted from: Nodine, T., Dadgar, M., Venezia, A., & Bracco, K. R. (2013) Acceleration in developmental education. San Francisco, CA: WestEd. Retrieved from http://www.wested.org/online_pubs/resource1281.pdf.
86. Adapted from: Nodine, T., Dadgar, M., Venezia, A., & Bracco, K. R. (2013) Acceleration in developmental education. San Francisco, CA: WestEd. Retrieved from http://www.wested.org/online_pubs/resource1281.pdf.
87. Jaggars et al., 2015.
88. Jaggars et al., 2015.
89. Fay, Bickerstaff, & Hodara, 2013.
90. Zachry Rutschow & Diamond, 2015; Katiraie, 2007.
91. Boylan, 2002; Shults, 2000.
92. Bain, 2004; Coalition of Academic Workforce, 2012; Green, 2007; Linder, 2012.
93. Edgecombe, Cormier, Bickerstaff, & Barragan, 2013a; Bracco, Austin, Bugler, & Finkelstein, 2015; Kosiewicz, Ngo, & Fong, 2016.
94. Adapted from: Nodine, T., Dadgar, M., Venezia, A., & Bracco, K. R. (2013) Acceleration in

developmental education. San Francisco, CA: WestEd. Retrieved from http://www.wested.org/online_pubs/resource1281.pdf.

95. This is called self-regulated learning in the research literature; it has been well-researched among K–12 students. Many scholars consider self-regulated learning to be one aspect of metacognition and have discussed the interrelationships of metacognition, self-regulation, and self-regulated learning (e.g., Al-Harthy, Was, & Issacson, 2010; Dinsmore, Alexander, & Loughlin, 2008; Kaplan, 2008; Sperling, Howard, Staley, & DuBois, 2004). See also Gourgey (1998) for a discussion of teaching metacognition and self-regulated learning in basic skills instruction.

96. See for example, Zimmerman, 2002.

97. Zimmerman, Moylan, Hudesman, White, & Flugman, 2011.

98. Zimmerman et al., 2011.

99. Weinstein, Meyer, Husman, Van Mater Stone, & McKeachie, 2006.

100.   Zimmerman et al., 2011.

101.   Weinstein et al., 2006, p. 304.

102.   Weinstein et al., 2006.

103.   Brophy, 2004.

104.   Hudesman et al., 2013b, p. 17.

105.   Hudesman et al., 2014.

106.   In Hudesman et al. (2014), the log form contained the following questions: What was your goal for your students and/or yourself this period? What were the mathematics content and metacognitive strategies your students and/or you were planning to use to achieve this goal? What actually happened? How will the results of this cycle inform your instruction in the future? What worked that you will continue? What adjustments do you make?

107.   Adapted with permission from: Hudesman, J. & Crosby, S. (2014). *Self-regulated learning (SRL) student workbook*. Prepared for Essex County College. Unpublished manuscript. Contact: John.Hudesman@ret.citytech.cuny.edu. See also: Finkelman, J., Hudesman, J., Flugman, B., & Crosby, S. (2014). An enhanced formative assessment and self-regulated learning program: From the classroom to the workplace. *Austin Journal of Psychiatry and Behavioral Science, 1*(1), 1002–1009.

108.   Quiz adapted with permission from: Finkelman, J., Hudesman, J., Flugman, B., & Crosby, S. (2014). An enhanced formative assessment and self-regulated learning program: From the classroom to the workplace. *Austin Journal of Psychiatry and Behavioral Science, 1*(1), 1002–1009. First cited in: **Zimmerman, B. J., Moylan, A., Hudesman, J., White, N., & Flugman, B. (2011).** Enhancing self-reflection and mathematics achievement of at-risk urban technical college students. Psychological Test and Measurement Modeling, 53(1), 141–160.

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113. Adapted from: Hudesman, J., & Crosby, S. (2014). *Self-regulated learning (SRL) student workbook*. Prepared for Essex County College. Unpublished manuscript.; Hudesman, J., & Crosby, S. (2014). Self-regulated learning (SRL) supplemental instructor's lesson plans. Prepared for Essex County College. Unpublished manuscript. Contact: John.Hudesman@ret.citytech.cuny.edu.

114. Scrivener & Weiss, 2013.

115. Scrivener et al., 2015.

116. Source: **Scrivener, S., Weiss, M. J., Ratledge, A., Rudd, T., Sommo, C., & Fresques, H. (2015)**. *Doubling graduation rates: Three-year effects of CUNY's Accelerated Study in Associate Programs (ASAP) for developmental education students*. New York, NY: MDRC. Supplemental citations: Scrivener, S., & Weiss, M. J. (2013). *More graduates: Two-year results from an evaluation of Accelerated Study in Associate Programs (ASAP) for developmental education students*. Policy Brief. New York: MDRC; and Scrivener, S., Weiss, M. J., & Sommo, C. (2012). *What can a multifaceted program do for community college students? Early results from an evaluation of Accelerated Study in Associate Programs (ASAP) for developmental education students*. New York: MDRC. Disposition: Meets WWC Group Design Standards Without Reservations.

117. Bailey, 2009.

118. Scrivener et al., 2015.

119. Scrivener et al., 2015.

120. A survey of students administered approximately 1 year into the program found that 90% of ASAP participants believed that they had "most or all of the services and supports that they needed to succeed in school" (Scrivener et al., 2015, p. ES–9). Study authors speculate that it would be unlikely that a full-time requirement paired with far more limited supports would be as productive.

121. Scrivener et al., 2015, p. ES–9.

122. Scrivener et al., 2015.

123. Scrivener et al., 2015, p. 23.

124. Scrivener et al., 2015.

125. U.S. Department of Education, 2014.

126. Scrivener et al., 2015.

127. Scrivener et al., 2015.

128. Scrivener et al., 2015.

129. Scrivener et al., 2015, p. 31.

130. Scrivener et al., 2015.

131. Scrivener et al., 2015.

132. Scrivener et al., 2015.

133. CUNY, 2015.

134. MDRC, 2015.

135. Scrivener et al., 2015.

136. American Association of Community Colleges, 2015.

137. Inside Track, 2015.

138. Klempin, 2014.

139. Adapted with permission from: City University of New York. (2015). *Inside ASAP, Accelerated Study in Associate Programs: A resource guide on program structure, components, and management*. New York, NY: Author. (p. 17) Retrieved from http://www1.cuny.edu/sites/asap/wp-content/uploads/sites/8/2015/05/Resource-Guide.pdf Copyright © 2015 by Office of Academic Affairs, City University of New York.

Intervention
Report

Practice
Guide

Quick
Review

Single Study

A **practice guide** presents recommendations for educators to address challenges in their classrooms and schools. It is based on reviews of research, the experiences of practitioners, and the expert opinions of a panel of nationally recognized experts.