A McREL Report Prepared for

Stupski Foundation's Learning System

College Readiness

About McREL

Mid-continent Research for Education and Learning (McREL) is a nationally recognized, private, nonprofit organization dedicated to improving education for all students through applied research, product development, and service. Established in 1966, McREL now maintains a staff of around 110 in its Denver, Colorado, office.

This report is part of a larger set of reports prepared by McREL for the Stupski Foundation. The views, findings, conclusions, and recommendations expressed herein are those of the authors and do not necessarily express the viewpoint of the Foundation. Please e-mail any inquiries to Linda Brannan at info@mcrel.org.

Contact

McREL
4601 DTC Blvd., Ste. 500
Denver, CO 80237
Web site: www.mcrel.org • E-mail: info@mcrel.org
P: 303.337.0990 • F:303.337.3005

Acknowledgements

Many people contributed their time and expertise to this report. The authors would like to express their gratitude to the following McREL staff members: Maura McGrath, who lent her library expertise to identifying and collecting the literature reviewed for this report; Carolyn Woempner, who coded every article; Clorissa Fontenot, who diligently supported our efforts to catalog and record the articles collected; Vicki Urquhart, who provided her keen editorial oversight; and Natalie Voltes, who is responsible for the striking design and layout. In addition, we would like to thank Jean Williams and Helen Apthorp for offering their research expertise on research methodology and to Jackie Kearns for her tireless project management efforts.

We also thank the staff at the Stupski Foundation for their vision, ongoing support of, and valuable input into the creation of this document and for their unwavering commitment to improving the life options of all students, especially disadvantaged urban students of color, whom, like the Foundation, we also have come to call "Our Kids."

Authors

Laura Lefkowits, M.P.A.
Carolyn Woempner, Ph.D.
John Kendall, M.A.
David Frost, J.D.

20091030

Table of Contents

Executive Summary

This document is one of eight reports prepared to support the development of a new learning system, a development effort that is the first step in a major initiative undertaken by the Stupski Foundation. The Foundation endeavors to improve the life options of all students, especially underserved urban youth of color, whom we refer to as "Our Kids," by fundamentally redesigning the education system.

This report was created collaboratively by researchers from McREL with guidance from officers of the Stupski Foundation. Its purpose is to provide a summary review of the literature contributing to the definition of "college readiness." The review aimed to identify the strategies, knowledge, behaviors, and skills needed before students are considered college ready upon graduation from high school. The definition of college readiness will provide members of a "Design Collaborative" team— consisting of researchers, practitioners, parents, and students—with a knowledge base from existing literature to support their efforts to develop a learning system that will bring all students high levels of achievement and readiness for college.

Research methodology

McREL researchers, in collaboration with the Stupski Foundation, generated the following research question to guide this review:

What strategies, knowledge, behaviors, and skills are essential before students are judged to be college ready at graduation from high school?

To complete this report, a team of researchers at McREL reviewed a total of 230 books and articles, of which 214 were ultimately coded in a database. In some cases, this literature was based on surveys of post-secondary academics, business people, or other stakeholders whose opinions are valued in defining the expectations of a well-qualified college graduate. In other cases, the literature reported the findings from quantitative studies correlating certain student characteristics and elements of college success. Thirty-five articles were summarized and further categorized into four essential areas: cognitive strategies, content knowledge, academic behaviors, and contextual skills. These areas were taken from the Stupski Foundation's document, *Strategy and Program Overview July 2008*, and were based on Conley's (2007) previous work on college readiness. The complete search methodology is described in the Appendix.

Key findings

There were five main findings from the literature review.

Content knowledge matters

Across the literature, there was strong agreement that completion of a rigorous, comprehensive, college preparatory curriculum throughout one's K–12 education is a prerequisite for college readiness. A majority of authors identified content knowledge and the cognitive skills required to process that knowledge to be the most important factors in determining readiness for college.

There is lack of agreement about the specific content that matters most

Despite agreement about the importance of completing a college-preparatory curriculum, there was disparity among authors as to what constitutes that curriculum. A deeper look at the curricular requirements of, for example, the America Diploma Project (2004) and the Knowledge and Skills for Student Success (Conley, 2003a) shows only 25 percent agreement on English language arts content and only 57 percent agreement on mathematics content (Kendall, Pollack, Schwols, & Snyder, 2007) across two seminal college-readiness documents, each of which is guiding states and school districts across the country today. This leads to, at best, confusion for school system leaders and, at worst, discouragement and disenfranchisement for students.

Metacognitive and self-system thinking are critical but under-emphasized or absent

Many authors identified skills beyond the content domains as critical. Such skills include metacognitive thinking, or the ability to set learning goals and monitor one's learning progress. Only one definition of college readiness explicitly addressed metacognitive skills as key for the mastery of important academic behaviors. More critical, according to the authors we studied, is students' capacity to engage in self-system thinking, which includes the attitudes, beliefs, and emotions students hold about themselves as learners and about what they are learning. Indeed, students' motivation is a key factor that authors identified as being perhaps most important, yet it was the aspect of student learning that was least addressed in the college readiness standards.

College, career, and life readiness require similar knowledge and skills

In the debate regarding the differences between college readiness and career readiness, most authors agreed that, in the 21st century, the skills required for success in the high-skills workplace or in advanced training that leads to a rewarding career matched those required for success in college.

Higher education is on the sidelines

Although there was evidence in the literature of involvement by higher education in the determination of the knowledge and skills needed by entering college freshman (America Diploma Project, 2004; Conley, 2007), by and large, the evidence in this review shows higher education to be on the sidelines in this debate. Due to the lack of uniformity of American institutions of higher education, it is nearly impossible for the K–12 community to engage with them at the policy level in order to ensure that a definition of college readiness will be uniformly accepted at any college or university Our Kids might choose to attend.

Recommendations

This report provides one primary recommendation with associated options for approaching the task. It is recommended that the Stupski Foundation *develop its own definition of college readiness specifically designed for Our Kids.* This recommendation is based on the following insights drawn from the literature review.

The literature was clear regarding the importance of access to and completion of a rigorous and comprehensive college preparatory curriculum as a prerequisite for college readiness. Researchers also found a number of reports documenting the importance of self-system thinking, particularly the capacity for motivation, as well as metacognitive skills for a student's ability to finish a preparatory curriculum and benefit from it in a college setting. The literature also was clear regarding the lack of opportunity many underserved students have to acquire these skills in the normal course of their development. Definitions that do not articulate these skills appear to assume that such skills are present in students who meet the stated criteria for college readiness. Although that may be a reasonable assumption for many students, it may not be reasonable for Our Kids. A definition to be used as the targeted outcome of the Learning System should make such skills explicit in order to ensure that they are taught, along with the important content knowledge.

This report offers three possible approaches to this task.

Option 1: The Cafeteria approach, or choosing an existing definition that best suits multiple situations in which the Learning System will be applied

The *Cafeteria* approach would offer districts working with the Stupski Learning System a menu of existing definitions from which to choose with some modifications to ensure that the essential content for Our Kids is emphasized. This approach recognizes the significant and empirically based efforts that already have been made in identifying rigorous, subject-area standards, which include content associated with student success in post-secondary institutions. In addition, it allows districts to choose an approach based on their own context. The challenge of the Cafeteria approach is establishing a set of guidelines to ensure that adopted programs include those attributes of the self-system that have been identified as critical in helping Our Kids succeed.

Option 2: The Conversion approach, or choosing from among the extant definitions the one that will best meet all possible situations

The *Conversion* approach means directing all districts that are working with Stupski to adopt, or convert to, the same approach. For example, all districts might become International Baccalaureate (IB) schools, or all districts might adopt the Knowledge and Skills for University Success (KSUS) standards and a program that supports them. This approach assumes that the foundation can identify a single, existing program that best meets its criteria and then supplement it, where needed, to ensure that students will receive the support they need in developing metacognitive and self-system thinking. The advantage of this approach is consistency across the system and the associated economies of scale. Also, the districts may receive support from the program provider in terms of resources and in making the case to others—in the community as well as in higher education—that the program adequately prepares students for college. The disadvantage is that any contextual considerations of individual districts might be ignored in the adoption process.

Option 3: The Composition approach, or, by drawing from the extensive work that has gone before, building a definition that best suits the goals and objectives of the Learning System as it is envisioned

In the *Composition* approach, college readiness is defined by Stupski for its partner districts, and the curriculum and program of instruction are custom-built or adapted from extant curricula to ensure that students will meet the requirements of the new definition. The label for this approach, *Composition*, reflects identifying and bringing together standards and programs from across organizations. The work begins by identifying the best of current thinking across all academic subjects, synthesizing content specifics across standards, and identifying the strengths of each, with attention to the cognitive strategies that ensure student success. The work reviews the set of academic behaviors in order to establish a common language, making clear the types of skills and capacities that define the successful student.

The advantage of this approach is that it is innovative, yet capitalizes on work already done, and that it realizes economies of scale by developing common goals across the Learning System and ensures that every curriculum used across every district and grade helps prepare students for college. In this approach, any curriculum could be reviewed for its suitability in promoting all aspects of the Stupski–established definition, although not every curriculum may be acceptable.

There are, of course, significant challenges to this approach. The fact that districts must meet state requirements remains an issue, unless all Stupski schools become charter schools and negotiate the means for accountability state by state. This effort also requires considerable time, effort, and expense.

Final thoughts

Defining college readiness for all students in the 21st century in America today is a formidable task. This report identifies strong areas of agreement in the literature—the importance of content knowledge and of metacognitive and self-system thinking —but also highlights the paucity of definitions and associated programs that successfully articulate all attributes. Thus, the Foundation should consider adopting one or more of the three approaches described here, with the expectation that the depth and scope of the definition they develop will vary depending on the approach or approaches they endorse for Our Kids. Ultimately, the Learning System and Our Kids will best be served by a definition that is generated from the same spirit and fervor upon which the entire mission of the Foundation is based.

Introduction

Purpose of this document

This document is one of eight reports prepared to support the development of a new learning system, a development effort that is the first step in a major initiative undertaken by the Stupski Foundation. The Foundation endeavors to improve the life options of all students, especially underserved urban youth of color, by fundamentally redesigning the education system.

This report was created collaboratively by researchers from McREL and officers of the Stupski Foundation. Its purpose is to provide members of the Design Collaborative team with a review of key findings from the existing literature regarding critical research questions related to the College Readiness component of the Learning System and to offer recommendations for the development of this component. Together, the reports cover these topics:

- Assessment
- Curriculum
- Pedagogy
- Student Supports
- Systems Diagnostics
- Leadership
- College Readiness
- Our Kids

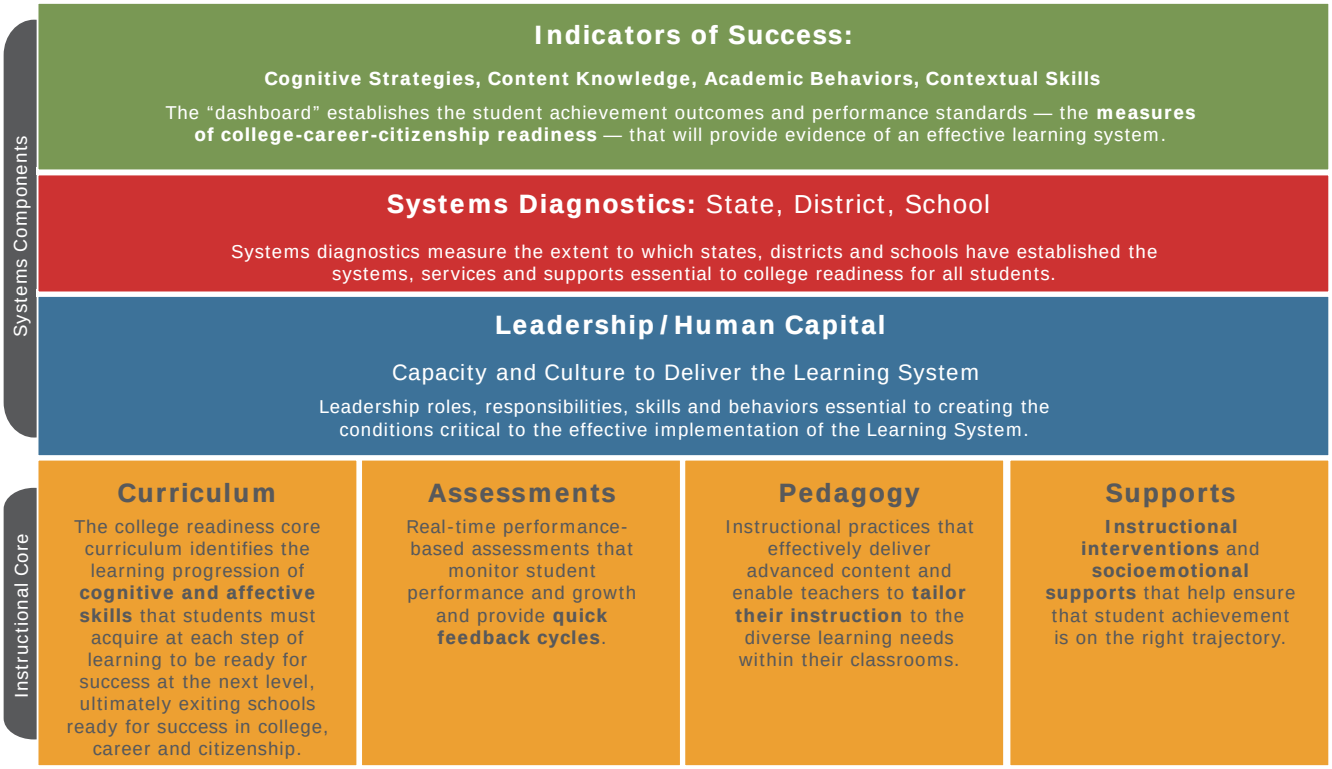
The first section of this report provides salient findings that emerged from the literature review. The second section offers a discussion of the findings along with one primary recommendation and three implementation options for how the Design Collaborative might proceed. A brief concluding discussion follows. Summaries of the studies and literature reviewed for this report were provided as separate documents.

About the Learning System

The Learning System is the product of the Stupski Foundation's extensive examination of research, best practices, and theories of action for improving education opportunities for all children. It is deeply rooted in the Foundation's mission to foster innovation in public school systems so that all students graduate ready for college, career, and success—as well as the notion that the United States' education system, in its current state, is incapable of accomplishing this goal. As stated on the Foundation's Web site, "The basic components of what public education systems need to teach all students to world-class standards, particularly those students for whom public schools are their only option, do not exist in any coherent, accessible or evidence-based way" (Stupski Foundation, n.d.).

Thus, the Foundation has focused its philanthropic efforts on supporting the "fundamental reinvention" of the American system of public education into one that prepares all children for the challenges of life, career, and citizenship in the 21st century. To accomplish this objective, the Foundation launched a multi-year, cross-sector collaboration among researchers and practitioners from inside and outside education to develop a new and comprehensive learning system. In its June 2008 *Strategy and Program Overview*, the Foundation posited that this system includes seven components, shown in Figure 1 (see p. 6). The indicators of success are dependent on a definition of college readiness, which is addressed in this report. Although Our Kids is not an explicit component of the Learning System, it is the foundation for the work the foundation is committed to in the education sector. As such, the populations of students of color and students of poverty warranted a separate report.

Figure 1: The Learning System



About "Our Kids"

The Stupski Foundation is committed to addressing the academic needs of underserved populations, in particular, students who are of color *and* in poverty (which comprises 42% of African American students and 37% of Hispanic students) (Duncan & Magnuson, 2005). Despite a dramatic rise in minorities enrolling in college (a 50% increase from 1995–2005), fewer minorities appear to be graduating. As shown in Figure 2 (see p. 7), in 2006, fewer minorities aged 25–29 reported having obtained an associate degree or higher than their older peers (aged 30 and over) (American Council on Education, 2008). This trend marks an important reversal in advances in educational opportunities for minorities and may mark the first time in history that a generation of students has demonstrated less educational attainment than its predecessors (American Council on Education, 2008).

Overview of methodology

This study was conducted to inform the specific needs of the Design Collaborative, a cross-sector group of researchers, practitioners, and designers from inside and outside education, to "define, develop and continually improve" (Design Collaborative, n.d.) all of the components of the Learning System. As such, this study does not represent an exhaustive review of all literature relating to a definition of college readiness. Rather, the search was conducted, and the quality of literature evaluated, using an inclusive approach that focused on relevance to meeting these specific needs (see Appendix for a thorough discussion of methodology). Following is an analysis of selected literature deemed best suited to the study's objectives.

McREL researchers followed a five-step process for translating findings into recommendations.

Step 1: Identification of key hypothesis

After conducting an initial survey of relevant literature, McREL researchers, along with Stupski Foundation staff members, identified the following hypothesis to guide the literature review for the College Readiness component:

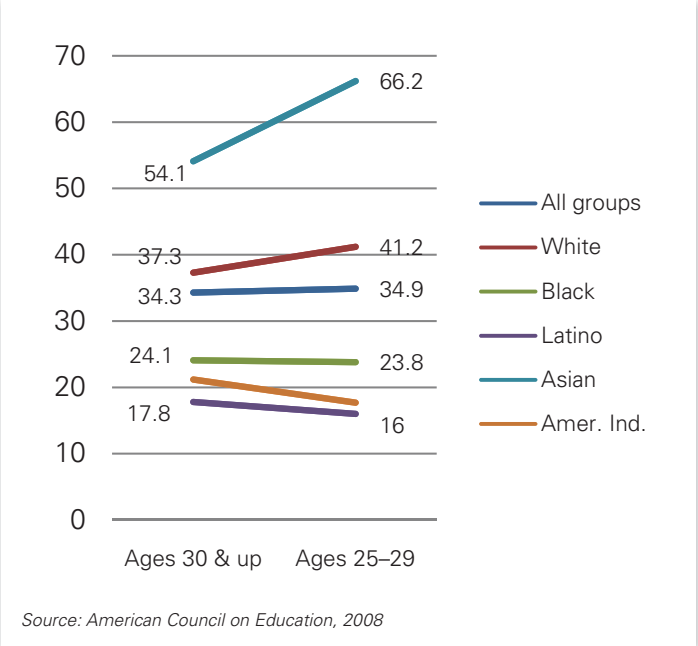
If students implement certain cognitive strategies, possess defined levels of content knowledge, exhibit specified academic behaviors, and perform appropriate contextual skills, they will be able to perform satisfactorily in college.

Step 2: Identification of research questions

McREL researchers, in collaboration with Stupski Foundation staff members, generated this question:

What strategies, knowledge, behaviors, and skills are essential before students are judged to be college ready at graduation from high school?

Figure 2: Percentage of U.S. adults with associates degree or higher, 2006



Source: American Council on Education, 2008

Step 3: Literature search

Initially, the college readiness search began with a gathering of research reports and information provided by seminal college-readiness organizations such as Achieve, ACT, and College Board. Researchers also explored the Web sites of organizations known to provide quality educational research such as WestEd, IES, Fordham Institute, and the National Governor's Association. Most searches were limited to articles and reports more recent than 1998.

Once seminal documents were gathered, researchers began to search academic databases for articles and additional research relating to the definition of college readiness and cognitive strategies, context knowledge, academic behaviors, and contextual skills needed to prepare students for college. The databases used to conduct the initial searches were ERIC, Proquest, Education

Research Complete, and Academic Search Premier. Although the search centered on materials addressing an overview of college readiness, researchers also took a special interest in documents that addressed children of poverty. The search focused on documents with claims supported by evidence rather than those that advocated an unsupported opinion. Sources were searched by the following keywords:

- College bound students
- College preparation
- College readiness
- College ready
- Low income
- Nontraditional education
- School readiness
- Urban population
- Workforce readiness

Articles identified were retrieved and skimmed with particular attention to research methods, outcomes, and recommendations for future study due to gaps in knowledge. Throughout the coding of the documents, researchers identified and retrieved additional articles and reports that were frequently referenced or addressed an unexplored facet of the definition. As the direction of the report began to take shape, the search included articles suggested by internal experts Monette McIver and John Kendall. As a result of discussions regarding the interconnectivity of workforce readiness and technical education with the concept of college readiness, the search expanded to include these topics. Also, press releases from various organizations were scanned for the latest relevant materials. In total, 230 articles were retrieved, and 214 of those were recommended for further coding. Ultimately, the team summarized 35 articles related to College Readiness, which are in a separate annotated bibliography.

Step 4: Identification and cataloging of findings

The research team cataloged findings from the summarized articles into four essential areas: Cognitive Strategies, Content Knowledge, Academic Behaviors, and Contextual Skills. These areas were taken from the Stupski Foundation's document, *Strategy and Program Overview July 2008*, and were based on Conley's (2007) previous work on college readiness.

Step 5: Generation of recommendations

In the final phase, research team members collectively reviewed key findings from the literature review in light of the following questions:

- What are the critical unmet needs related to this component of the Learning System?

- What is missing in current practices within this component of the Learning System?
- What is working and why?
- What is *not* working and why?
- What are the biggest misalignments between research and current practice?
- What things should educators do differently in light of the research findings?
- Where is the knowledge base too inconclusive to guide education innovation?
- Where is more research needed to advance practice?

Responses to these questions were synthesized into recommendations, presented here as options for further action.

Overview of the literature base examined

The Stupski Foundation's document, *Strategy and Program Overview July 2008*, provided an initial organizing framework for the literature search based on Conley's (2007) previous work on college readiness. Relevant literature was identified and categorized into four essential areas: Cognitive Strategies, Content Knowledge, Academic Behaviors, and Contextual Skills (see p. 11). These categories accommodated the variety of knowledge, behaviors, strategies, and skills identified in the research literature.

A key assumption for this project was that there is a set of strategies, knowledge, behaviors, and skills that students should possess in order to be college ready upon graduation from high school. This key assumption led to the development of one foundational question that guided the search process: *What strategies, knowledge, behaviors, and skills are essential before students are judged to be college ready at graduation from high school?*

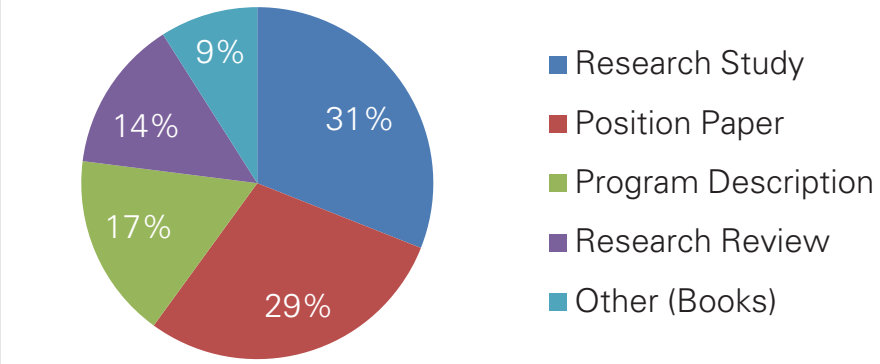
Several authors and organizations were identified during the search process whose work is highlighted in this report:

- ACT is a non-profit organization with a mission to help people achieve education and workplace success. Though perhaps best known for its college-ready assessments, ACT has conducted research in college- and workplace-readiness.
- The American Diploma Project (ADP), a partnership of Achieve, Inc., The Education Trust, and the Thomas B. Fordham Foundation, defines English and mathematics benchmarks of college and workplace success for high school graduates. ADP's 2004 seminal report, *Ready or Not: Creating a High School Diploma That Counts*, is used as the basis of high school reform efforts in 34 states.
- David T. Conley is the director of the Center for Educational Policy Research at the University of Oregon. Dr. Conley directed the Standards for Success project, which defined knowledge and skills students need to succeed in entry-level university courses. Dr. Conley's 2007 report, *Toward a More Comprehensive Conception of College Readiness,* prepared for the Bill & Melinda Gates Foundation, has been extensively used by the Stupski Foundation to guide this work.
- Steven B. Robbins is lead author of two reports focusing on the psycho-social aspects of college readiness. Mr. Robbins' and his coauthors' contributions are notable in an area marked for its importance to college-readiness but relatively lacking in high-quality information. Mr. Robbins is in the Research Division at ACT.
- The College Board is best known for its programs, the SAT and the Advanced Placement (AP) programs. The College Board also facilitates original research to support the transition from high school to college.

Articles that specifically included explicit definitions of college readiness were identified for further analysis. This select group of the

coded articles was then summarized to capture key points about, and salient contributions to, the definition of college readiness. These summaries were compiled into a separate annotated bibliography. Summarized literature was broadly categorized into five types of literature: research studies (quantitative and qualitative), research reviews, program descriptions, position papers (papers that advocated a particular point of view), and other (books in popular press). As shown in Figure 3, the majority of college readiness literature was composed of research studies and position papers.

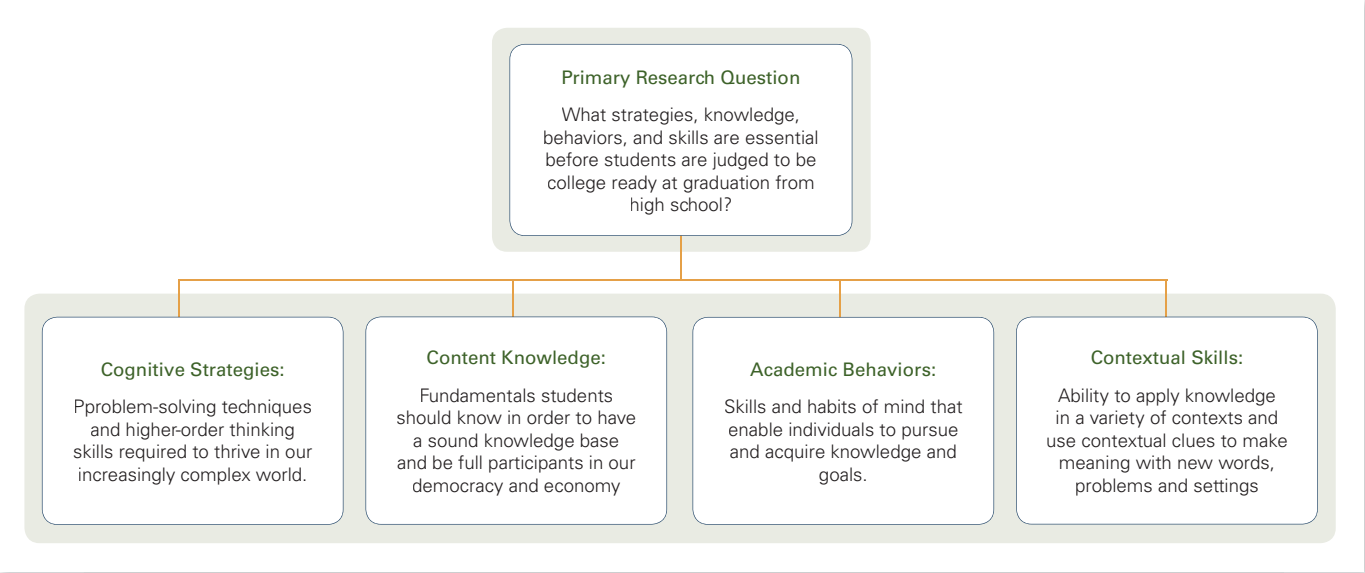
Figure 3: Types of literature summarized



Introduction to the concept map

The following concept map (see Figure 4, p. 11) illustrates the hypothesized relationship of the essential areas and the research question. The remainder of this report discusses research insights about the four essential areas of the college readiness definition identified by Conley and adapted by the Foundation, additional attributes identified by other researchers, and options that more clearly describe the target outcomes of a learning system for Our Kids. These findings and options are foundational to the successful fulfillment of all components of a learning system designed to prepare Our Kids, and all kids, for college.

Figure 4: Concept map



Findings

Content knowledge matters

The seminal documents reviewed for the literature search (ACT, 2005; American Diploma Project, 2004; Conley, 2007; The College Board, 2006a; The College Board, 2006b), either explicitly or implicitly defined as college-ready those high school graduates who are able and likely to succeed in college without the need for remediation. Much of the relevant literature addressed college readiness as the accumulation of a set of cognitive strategies and content knowledge. There was general agreement that students must be exposed to rigorous content and must have opportunities to develop complex cognitive processes.

Content knowledge

A wide range of the college readiness articles (Achieve, 2008; ACT, 2005; Adelman, 1999; Adelman, 2006; Allen & Sconing, 2005; American Diploma Project, 2004; Conley, 2003b; Conley, 2007; Haycock & Huang, 2001; Kuh, Kinzie, Buckley, Bridges, & Hayek, 2006; Martinez & Klopott, 2005; The College Board, 2006a & 2006b) reported evidence that high school graduates who undertake a four-year regimen of rigorous coursework in mathematics, science, and English are more likely to succeed in college than those who do not.

It is not enough for high school graduates simply to pass through these courses in some sort of *pro forma* sequence and expect to do well in college. Rather, they must meet high academic expectations and accomplish a series of courses with increasing degrees of difficulty. Kuh et al. (2006) found that 87 percent of students who completed four high school years of mathematics, science, and English stayed "on track" to graduate from college, compared with 62 percent of those students who did not complete that panoply of high school coursework. With respect to Our Kids, Adelman (1999) claimed that the high academic intensity and quality of high school curricula influenced college degree completion to a far greater degree for African American and Latino students than for white students.

One of the salient conclusions among the authors of this literature is the significant role of higher level mathematics in preparing high school graduates for college-level courses. High school students who master Algebra I & II, geometry, trigonometry, pre-calculus, and calculus–especially the latter three–have considerably improved odds of completing a bachelor's degree. Further, the American Diploma Project (2004) and The College Board (2006b) stressed the increasing importance of proficiency in statistics and probability in becoming an informed citizen of the 21st century. Kuh et al. (2006), in particular, argued vigorously that, in order for high school students to perform well academically in high school, particularly on the mathematics courses, they also must experience rigorous academic preparation in grade school and middle-school—especially in mathematics and reading.[1]

[1]After the College Readiness database had been prepared and parsed, its articles summarized, and drafting of the final report begun, a study was published (and is now widely reported) suggesting that a 1997 Chicago Public Schools initiative requiring all of its 9th graders to enroll in algebra may have failed to heighten mastery of algebra or to encourage students to take more advanced mathematics courses (Allensworth & Nomi, 2009). In light of the recommendations included in the college-ready literature urging high school students to take higher mathematics courses after algebra II, the factual circumstances of this study deserve further examination to determine what caused the results reported. At least two issues worthy of further analysis are the extent to which both [to help make clear what the two issues are] student supports and classroom instruction may have influenced the student outcomes found by these researchers.

Contextual skills

Contextual skills, expressed by the Foundation as the ability to apply knowledge in a variety of contexts, appeared with varying levels of description and emphasis across the literature related to college readiness. The American Diploma Project, for example, described contextual skills in terms of the content knowledge related to "associated workplace tasks" and "associated post-secondary assignments." The College Board defined contextual skills in terms of their significance at six different performance levels.

Cognitive strategies

Cognitive strategies–such as problem-solving techniques and higher order thinking skills–were also identified in the literature as important for the college readiness of high school graduates (Achieve, 2008; Barton & Lapointe, 1995; Conley, 2007; Hill, 2008; Levine, 2007; Organisation for Economic Co-operation and Development [OECD], 2005; Partnership for 21st Century Skills, 2006), although there is little agreement on how to describe those skills. Barton & Lapointe (1995), for example, identified communication, critical thinking, and abstract reasoning as influential faculties for college success. Conley (2007) articulated "key cognitive strategies" necessary for college success, which he states are "always developed within the ways of knowing a particular content area" (p. 16). These cognitive strategies are manifest through, among other things, intellectual openness and curiosity, as well as through reasoning and analysis. Levine (2007) wrote of a "cognitive backpack" of soft skills necessary for college and career success, including "interpretation, instrumentation, interaction, and inner direction" (p.16). The North Central Regional Educational Laboratory (2003), in discussing skills required for 21st century tasks, posited that there are four categories of skills essential for success: digital-age literacy, inventive thinking, effective communication, and high productivity skills.

The cognitive skills needed for both 21st-century tasks and college readiness were qualitatively described with varying degrees of precision across a broad continuum of literature, including best-selling authors. For example, Thomas Friedman (2006) and Daniel Pink (2005) expressed their views on attributes students must exhibit to engage 21st century challenges. Friedman stressed the importance of the ability to learn how to learn, individual passion and curiosity, and skillful personal interaction; Pink defined six new "senses" 21st century students must acquire—design, story, symphony, empathy, play, and meaning—which include affective qualities.

There is lack of agreement about the specific content that matters most

Definitions vary in scope and detail

The organizations advocating comprehensive definitions and associated college preparation programs varied in scope and level of detail when defining content knowledge. For example, The College Board has defined college readiness through a set of standards in English language arts that includes six levels of performance and through objectives for mathematics that range from middle school to Algebra II and pre-calculus. ACT has described multiple levels of proficiency for both English language arts and mathematics in college readiness standards stratified by score ranges. These ranges have been established based upon the test performances of middle school and high school students who later proved themselves successful in post-secondary work.

In contrast, the standards from ADP and Knowledge and Skills for Student Success (KSUS) were summary descriptions developed principally from surveys of professors in higher education and/or industry representatives of the high-skills workplace. The descriptions of student knowledge and skills represent what students should acquire by the end of their high school experience to be college-ready.

Especially problematic in understanding "college readiness" is the differing expectations these organizations have for students. Although both KSUS and ADP identified English language arts and mathematics as significant content for post-secondary work, one study comparing the standards from these organizations showed they shared just 25 percent of the English language arts content and 57 percent of the mathematics content (Kendall, Pollack, Schwols, & Snyder, 2007). A contributing factor to this discrepancy was the nature of the specifics emphasized in the reports—the emphasis on literature in the KSUS set of standards, for example, as opposed to the importance of oral presentation in the ADP set. This difference, however, also indicates that the knowledge and skills required for college readiness (KSUS) might not be identical to those needed for post-secondary and the high-skills workplace (ADP). Yet, as troubling as such apparent lack of agreement may be, it is a welcome alternative to vague and nearly useless prescriptions for college readiness, such as "students should master algebra II." It is clear that merely identifying requirements by course name is no solution (Achieve, 2004).

Despite these discrepancies, there appears to be agreement that rigorous and specific standards in the English language arts and mathematics are essential to college success. Yet, it is not clear whether these organizations consider the mastery of other academic content important, as well. Of the four organizations (ADP, KSUS, SAT, The College Board) that have articulated standards for college readiness, just two address science standards—KSUS and SAT— and only one, KSUS, addresses standards for the arts, second languages, and the social sciences.

Finally, to add to the confusion, the literature even lacks common agreement about the term "college ready." Kuh et al. (2006), for example, found that "college ready" meant ready to be accepted at a post-secondary institution in one case and ready to earn a baccalaureate degree in another, as well as acquisition of specific content knowledge at certain points in time and more general acquisition of non-academic skills at others. Kuh et al. found that the direct interests of those defining the term influenced the elements that were added or emphasized, thus exacerbating inconsistencies.

"Common Core" standards a de facto *definition?*

The No Child Left Behind Act left it up to states to determine their own content standards and to also set their own bar for what should constitute proficiency against those standards. As a result,

the nation now has 50 different sets of standards and 50 different levels of proficiency. This has led to a vast discrepancy among state content standards and highly variable results of state standardized assessments compared with the National Assessment of Educational Progress (NAEP) examinations, further complicating definitions of college readiness. The Common Core State Standards Initiative of the National Governors Association, the Council of Chief State School Officers, and Achieve, Inc., which seeks to get states to adopt a common set of national standards (Hoff, 2009), may signal a movement toward reconciliation among the variety of definitions of the content students should know in order to be college-ready. The draft standards in English language arts and mathematics were released for comment on September 21, 2009.[2]

Metacognitive and self-system thinking are critical but under-emphasized or absent

"Academic behaviors"—in this study defined as the critical student behaviors that depend upon the effective use of metacognitive and self-system skills—appeared less commonly in the literature, and often were not clearly distinguished from the types of cognitive strategies described in the previous section. Metacognitive skills relate to students' attention to their own learning as well as their goals for learning. Self-system skills, as defined in a recent taxonomy of educational objectives (Marzano & Kendall, 2007) encompass the "interrelationship of attitudes, beliefs, and emotions students hold about themselves as learners and are the prime determiner in the motivation they bring to a task" (p. 12). Conley most clearly distinguished academic behaviors from cognitive strategies "by the fact that they tend to be more completely independent of a particular content area" (p. 16). He described academic behaviors as primarily study skills, such as time management and effective note taking; and self-monitoring skills, such as persistence through difficult tasks, the ability to diagnose one's own lack of understanding, and the ability to devise plans to achieve competency. Such skills are commonly associated with the metacognitive, in that they focus on student's attention to their own learning and learning goals.

The two elements of academic behavior—metacognitive and self-system thinking —received disparate attention in the literature. Some aspects of metacognition appeared very rarely and only indirectly in most standards documents, such as the College Board standards in the language arts, which focus on students identifying a goal for reading. Conley's definition was the only work to attend specifically to metacognitive skills. No definitions of college readiness identified in this search, however, clearly included self-system processes; rather, most definitions only indirectly alluded to the importance of student motivation. This is not especially surprising

[2]See www.commoncore.org for the draft standards.

because self-system processes, such as examining the importance of a task and one's emotional response to it, "probably represents a level of introspection and conscious thought not normally engaged in" (Marzano & Kendall, p. 60). Yet, research suggests that students' attention to motivation is critical.

Adelman (2006) concluded that individual student responsibility stands out as an important qualitative feature of college preparedness, saying that students "are partners in their own education fate" (p. xxvi). Similarly, anecdotal reports of success stories of students "at risk for poor performance" identified as a critical feature students' understanding that they are responsible for their own success (Goldberger & Bayerl, 2008).

More specifically, two studies (Robbins et al., 2004; Robbins, Allen, Casillas, Peterson, & Le, 2006) found that motivational constructs were associated with college performance, and that academic discipline and general motivation were strongly related to academic outcomes. In a third study, Levine (2007) advocated that, in addition to traditional academic and technological skills required for college- and life-readiness, students should be equipped with a "cognitive backpack" of skills, among them a developed *inner direction* that assures that one's decisions are informed by authentic insights into one's own strengths, weaknesses, and affinities.

A concept closely related to the "self-system" was further identified by Friedman (2006), Hill (2008), and OECD (2005) as a critical element of college readiness and educational success. Hill, in particular, in his description of the International Baccalaureate program, described a learner who is open-minded, balanced, an inquirer and a thinker. The various attributes described by these authors may be taken together to define a set of skills beyond the academic that a fully college-ready student must possess.

The lack of attention to metacognition and the self-system is not only common among definitions of college readiness. In their study to identify thinking and learning skills described in standards documents from a variety of state departments of education, national subject-area organizations, and from organizations concerned about adequate student preparation for post-secondary work, Kendall et al. (2008) found that general cognitive skills—such as recall and comprehension—were commonplace across all documents and subject areas. However, more complex cognition, classified as "knowledge utilization" and including such processes as decision making and investigation, were not well-represented in the standards. Expectations that students should engage in metacognition were even less commonly addressed in the standards; any references to self-system thinking—"the attitudes, beliefs, and emotions that students hold about themselves as learners and about what they are learning"—were less common still (p. 3). To reiterate, when these more complex processes related to self-system thinking were addressed in the literature, they were presented as equally important as content knowledge in definitions of college readiness.

Our Kids fall short

The literature was clear that there is no substitute for completion of a rigorous college preparatory curriculum and attainment of the associated content knowledge and cognitive skills if one is to be truly prepared for the academic requirements of higher education. However, the literature also revealed a number of areas in which the education of Our Kids falls short.[3] For example, even before they apply to college, Our Kids lack access to higher mathematics and otherwise rigorous high school curricula due to the misconception among K–12 practitioners that Our Kids don't possess the intellectual capacity to master an intense academic

[3]More detailed information about issues related to the elements of a college-preparatory curriculum and how to overcome the historical impediments to accomplishing its requirements for Our Kids is contained in the other component reports in this series.

sequence of high school curriculum, particularly higher level mathematics courses (Achieve, Inc., 2008; Goldberger & Bayerl, 2008; Kuh et al., 2006).

College, career, and life readiness require the same skills

Many of the articles reviewed emphasized the importance of a rigorous high school education in preparing not only for college but also for challenging and rewarding 21st century careers. Typical of this aspect of the literature was Achieve's (2005) finding that employers report that high school graduates they hire for high-skilled, well-paying jobs need the same skills and knowledge that colleges and universities claim enrolling students should possess. ACT (2006) reported similar findings in its analysis of workforce readiness. Haycock and Huang (2001) noted that graduating students are currently not fulfilling the literacy and mathematics demands of employers, and that the skills required in 70 percent of new jobs will require at least some post-secondary education. Similarly, The College Board (2006ab) asserted that the knowledge and skills in mathematics and English that are needed for college success are the same as those required for entry-level jobs that can lead to a rewarding career.

Higher education is on the sidelines

Though an agreed-upon definition of college readiness is necessary in creating a system that prepares all students for post-secondary success, it must also be noted that such a definition can only go so far without agreed-upon expectations from institutions of higher education. The perspective of these institutions was noticeably "missing in action" in the literature on college readiness. Though certain projects specifically attempted to collect input from higher education (American Diploma Project, 2004; The College Board, 2006ab; Conley, 2003a), little has been done to ascertain the degree to which the reported perspectives of higher education are reasonable and uniform. Olson (2006) found that it is unknown if perspectives of college professors on necessary "college-ready" qualities reflect the professors' insights on the characteristics of a "perfect" student or insights on what is needed to prepare students to complete coursework with a passing grade. Olson also found inconsistencies in requirements for admission and placement without remediation. In most states, individual colleges and universities select their own placement tests and their own standards for how well students must perform to avoid remediation, sending "mixed messages" to incoming students (p.4). This leaves high schools to develop their own graduation criteria, which may or may not be aligned with the expectations of higher education. Without agreement from at least some colleges about what they will and will not accept as college-level work, on a consistent and reliable basis, and throughout a student's four-year college experience, the architects of the Learning System will have difficulty constructing a learning progression for Our Kids that results in the desired outcome.

Discussion & Recommendations

Discussion

This study followed the practice of Kuh et al. (2006) by not limiting examination to a specific narrow definition of college readiness; rather, it included all studies that defined elements of college readiness. The findings, therefore, represent a broad sweep of existing definitions of college readiness. Perhaps it is because of this that the inconsistencies are so readily apparent. Whether the literature offers definitions, or elements of definitions related to content, metacognition, or the self-system, there is little agreement among researchers as to the specifics within the definitions they assert. A Learning System requires concrete details in the areas of standards and curriculum. Many of the extant definitions do not provide these specifications; others provide them but in too little detail to be of use; and those that do provide them are sufficiently mismatched with one another so as to offer confusion, rather than guidance, to system developers trying to learn from previous work.

Our findings reveal that the majority of definitions focus on the importance of content knowledge. The area of skills and attributes that support essential academic behaviors is far less well developed in the extant literature base. However, given the level of content knowledge required by most definitions, it does not appear reasonable to conclude that metacognitive and self-system thinking could be absent in a learner who succeeds at attaining that knowledge. It may be that content-heavy definitions of college readiness include a *tacit* assumption that college-ready students already possess these more reflective skills and, therefore, they need not be explicated in the definition.

Although there are cases where such an assumption may be valid, the authors question whether this applies to Our Kids. Many children have opportunities to develop such skills outside of school in their interpersonal interactions, life experiences, and upbringing. Rich developmental experiences facilitate the growth of a child's capacities to learn how to learn and to develop the intrinsic motivation necessary to support academic success, so that schooling can focus on content and cognition. For Our Kids, developmental experiences outside of school may be absent, requiring them to be included in the Learning System itself if Our Kids are to acquire these associated attributes.

There are many impediments to the development of healthy perspectives for children who live in poor, urban environments. In such environments, the rich and stimulating developmental experiences common for middle-class youth are often replaced by basic survival experiences, rife with developmentally inappropriate stimulation.[4] While a student with fully developed capacities related to self-understanding may well be able to access and realize a content- and cognitive-laden definition of college readiness, a less well-equipped student may not. Further, if the development of these capacities is not explicitly articulated in the definition of college readiness, they are unlikely to be present and developed in the associated Learning System and, as a result, Our Kids' opportunities to become college-ready are diminished.

When students are recognized as academically deficient, too often the current education system tries to force content-heavy expectations on them by replacing intellectual rigor with rote learning,

[4]See the report on the Our Kids component for more on the challenges to proper psycho-social development.

interaction with scripted response, and intrinsic engagement with external mandates. When the defined outcomes of a content-driven Learning System fail to acknowledge the need to develop metacognitive and self-system thinking, the system is left with inequities between students who are, and who are not, prepared to succeed. Too often, as described by Beers (2009), those not prepared to succeed are relegated to schooling that not only is less demanding in terms of content, but also eliminates the educational experiences necessary for the development of the capacities necessary for college readiness—thus perpetuating the cycle.

Promising practice

An integrated approach to college readiness may be exemplified currently in the modern International Baccalaureate (IB) Program. Although there was no evidence in the literature of the IB program serving Our Kids, on a broad scale, the program does intentionally incorporate self-system outcomes into its education mission, and that intentionality has resulted in a program that explicitly develops those skills in its students.

> IB programmes promote the education of the whole person, emphasizing intellectual, personal, emotional and social growth through all domains of knowledge. By focusing on the dynamic combination of knowledge, skills, independent critical and creative thought and international-mindedness, the [International Baccalaureate Organization] espouses the principle of educating the whole person for a life of active, responsible citizenship. (International Baccalaureate Organization, 2006, p. 1)

Opportunity

Given the literature on the criticality of self-understanding related to learning and motivation, and the evidence that Our Kids are unlikely to experience life situations that promote the development of these capacities, including these aspects in the definition of college readiness is an opportunity to recognize their importance to the success of Our Kids. In addition, inclusion might ensure that instruction that will further academic behaviors is included in a college readiness learning system. If not explicitly stated as a defined outcome, the development of metacognitive and self-system thinking, which are much harder to teach and harder to measure than content knowledge, may be given less attention in education systems under heavy content-specific assessment and accountability structures.

Recommendations

The findings from this report lead the researchers to one overarching recommendation with several tactical options for implementation. In order to capitalize on the strong work that has already been done in the area of

defining college readiness and to shore up those areas that are most critical for Our Kids, *the Stupski Foundation should develop its own definition of college readiness for Our Kids that acknowledges the critical nature of content knowledge and also articulates the role of metacognition and development of the self-system as components for successful preparation for college.*

To maximize this opportunity, the findings presented in this report and the options discussed should form the foundational criteria for a definition of college readiness for Our Kids. One or more of three approaches described below may be taken in defining college readiness, based on the impact on schools and districts. They are referred to as the *Cafeteria*, the *Conversion*, and the *Composition* approaches.

Option 1: The Cafeteria approach

The Cafeteria approach recognizes the significant and empirically-based efforts that have already been made in identifying rigorous, subject-area standards which include content associated with student success in post-secondary institutions. In addition, at least one program, the International Baccalaureate, has strong historical evidence to show that its graduates are prepared for post-secondary work, although this evidence is not specific to Our Kids. In the Cafeteria approach, districts engaged in implementing the Stupski Foundation's Learning System would be permitted to adopt programs and standards from a "menu" of those the Foundation has determined have either shown promise or reflect a strong research base, and to which they have added any metacognitive and self-system components deemed essential for Our Kids.

Potential benefit of this option

The strength of such an approach is that it recognizes that districts, regardless of the similarities among their students, are situated in different political environments. Each state has its own standards and assessment and accountability requirements, which impacts a district's choices. For example, the district may have little or no choice about the textbooks used.

Potential drawback of this option

The challenge of the Cafeteria approach is establishing a set of guidelines to ensure that adopted programs are viable and worthwhile in helping Our Kids succeed. This means examining all potential programs or sets of available standards, and making sure the adopted curriculum includes those personal attributes of students that have been identified as critical.

Option 2: The Conversion approach

The Conversion approach means that all Stupski partner districts would be directed to adopt, or convert to, the same approach. For example, all districts might become IB schools, or all districts might adopt the KSUS standards and a program that supports them. This approach assumes that the chosen program has been reviewed in-depth prior to its adoption; appropriate supplementation to ensure that Our Kids are well-served has been developed; and that it is supported by districts, schools, and stakeholders.

Potential benefit of this option

The advantage of this approach is consistency across the system and the associated economies of scale. Also, the districts may receive support from the program provider in terms of resources and in making the case to others—in the community as well as in higher education—that the program adequately prepares students for college.

Potential drawback of this option

The disadvantage is that the chosen approach might not adequately reflect the district's unique context.

Option 3: The Composition approach

In the Composition approach, college readiness is defined by Stupski for its partner districts, and the curriculum and program of instruction are custom-built or adapted from extant curricula to ensure that students will meet the requirements of the new definition. The name for this approach, Composition, reflects identifying and bringing together standards and programs from across organizations. The work begins by identifying the best of current thinking across all academic subjects, synthesizing content specifics across standards, and identifying the strengths of each, with attention to the cognitive strategies that ensure student success. The work reviews the set of academic behaviors in order to establish a common language, making clear the metacognitive and self-system skills that characterize the successful student.

The recent announcement from the U.S. Department of Education regarding proposed uses of the Race to the Top grant funds (Race to the Top Fund, 2009) provides a strong signal regarding the importance of the Common Core State Standards Initiative of the CCSSO and NGA, in that for states to be competitive for this funding they must indicate that they intend to adopt a common set of K–12 standards. Given this, it might be possible to build the Composition approach upon the framework of national standards, and then add those metacognitive and self-system components essential to the success of Our Kids.

Potential benefit of this option

The advantage of this approach is that it is innovative yet capitalizes on work already done; that it realizes economies of scale by developing common goals across the Learning System; and it ensures that every curriculum used across every district and grade is designed to help prepare students for college. In this approach, any curriculum could be reviewed for its suitability in promoting all aspects of the Stupski–established definition, although not every curriculum may be acceptable.

Potential drawbacks of this option

There are, of course, significant challenges to this approach. In the event that national standards are not a sufficient default foundation, developing an entirely new set of content standards requires considerable time, effort, and expense. In addition, the Foundation may need to accommodate variable accountability frameworks in place for the different states with which it works. There will be uncertainty about the program's viability, as well, given its newness. Although there may be proxies to check the soundness of the approach, it will take time for a cohort of students to succeed in the first year of college and confirm the viability of the definition.

The path forward

Whatever approach or variant of an approach is taken—Cafeteria, Conversion, or Composition—it is necessary to determine the aspects of college readiness that must be present, including content knowledge, cognitive strategies, contextual skills, academic behaviors and the metacognitive and self-system thinking that underlie such behaviors. The approach taken will affect the level of work required to satisfactorily address the needs of districts and schools so that they can ensure that Our Kids are college ready.

At one end of the continuum, this work may mean that the definition of college readiness entails specifying guidelines to ensure that districts and schools have adopted essential components (standards and programs) that will meet specified criteria for each of the four categories of content knowledge, cognitive strategies, academic behaviors, and contextual skills. In such a case, the operational definition is the establishment of criteria for evaluating whether each category is fully addressed. At the other end of the continuum, the work is to identify and specify content, the set of cognitive strategies, academic behaviors, and related metacognitive and self-system thinking expected of each student, as well as the extent and depth of contextual skills, and the curriculum and supports needed to implement the program.

Regardless of the approach, the Foundation must identify the critical elements from the literature, and from this report, that it deems most important to include in its definition and then ensure that those elements appear in the definition developed.

Final Thoughts

Defining college readiness for all students in the 21st century in America today is a formidable task. This report identified strong areas of agreement in the literature—the importance of content knowledge and metacognitive and self-system thinking—but also highlighted a dilemma for the Foundation in attempting to identify an existing definition upon which to rely. No single definition appears to provide all of the essential ingredients for Our Kids.

A satisfactory definition of college readiness for Our Kids can only be *informed* by research. Ultimately, the Learning System and Our Kids will best be served by a definition that is generated from the same spirit and fervor upon which the entire mission of the Foundation is based. It will be, after all, the target toward which the "campaign" will point. It will frame the work of those currently involved, those yet to join, and the lives of thousands who depend upon the success of the effort.

References

Achieve, Inc. (2004). *The expectations gap: A 50-state review of high school graduation requirements.* Washington, DC: Author.

Achieve, Inc. (2005). *Rising to the challenge: Are high school graduates prepared for college and work?* Washington, DC: Author.

Achieve, Inc. (2008). *The building blocks of success: Higher-level mathematics for all students.* Washington, DC: Author.

ACT. (2005). *Courses count: Preparing students for postsecondary success.* Iowa City, IA: Author.

ACT. (2006). *Ready for college and ready for work: Same or different?* Iowa City, IA: Author.

Adelman, C. (1999). *Answers in the tool box: Academic intensity, attendance patterns, and bachelor's degree attainment. Washington*, DC: U.S. Department of Education, Office of Educational Research and Improvement.

Adelman, C. (2006). *The toolbox revisited: Paths to degree completion from high school through college.* Washington, DC: U.S. Department of Education, Office of Vocational and Adult Education.

Allen, J., & Sconing, J. (2005). *Using ACT assessment scores to set benchmarks for college readiness*. Iowa City, IA: ACT.

American Council on Education. (2008). *Minorities in higher education 2008 twenty-third status report.* Washington, DC: Author.

American Diploma Project. (2004). *Ready or not? Creating a high school diploma that counts.* Washington, DC: Achieve, Inc.

Barton, P. E., & Lapointe, A. (1995). *Learning by degrees: Indicators of performance in higher education.* Princeton, NJ: Educational Testing Service.

Beers, K. (2009). *The genteel unteaching of America's poor.* Urbana, IL: National Council of Teachers of English. Retrieved from http://www.ncte.org.

Conley, D. T. (2003a). *Understanding university success: A report from Standards for Success.* Retrieved from http://www.s4s.org/03_viewproducts/ksus/pdf/Understanding_Success.pdf.

Conley, D. T. (2003b, April 22). *What is the alignment between knowledge and skill for university success and state academic content standards?* Paper presented at the annual meeting of the American Educational Research Association, Chicago, IL.

Conley, D. T. (2007). *Toward a more comprehensive conception of college readiness.* Eugene, OR: Educational Policy Improvement Center.

Design Collaborative. (n.d.). Retrieved from http://www.stupski.org/design_collaborative.htm

Duncan, G. J. & Magnuson, K. A. (2005). Can family socioeconomic resources account for racial and ethnic test score gaps? *The Future of Children, 15*(1), 35–54.

Friedman, T. L. (2006). *The world is* f *at: A brief history of the twenty-first century.* (2nd ed.). New York: Farrar, Straus and Giroux.

Goldberger, S., & Bayerl, K. (2008). *Beating the odds: The real challenges behind the mathematics achievement gap—and what high-achieving schools can teach us about how to close it*. Boston: Jobs for the Future.

Haycock, K., & Huang, S. (2001, Winter). Are today's high school graduates ready? *Thinking K–16, 5*(1), 3–22.

Hill, I. (2008, January/February). Bac to the future: The International Baccalaureate. *Edge, 3*(3), 1–20.

Hoff, D. J. (2009). National standards gain steam: Governors' embrace rooted in competitiveness concern. *Education Week, 28*(23), 1–20.

International Baccalaureate Organization. (2006). *IB learner profile booklet.* Cardiff, Wales: Author.

Kendall, J. S., Pollack, C., Schwols, A., & Snyder, C. (2007). *High school standards and expectations for college and the workplace.* (Issues & Answers Report, REL 2007–No. 001). Washington, DC: U.S. Department of Education, Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance, Regional Educational Laboratory Central.

Kendall, J. S., Ryan, S., Weeks, S., Alpert, A., Schwols, A., & Moore, L. (2008). *Thinking & learning skills: What do we expect of students?* Denver, CO: Mid-continent Research for Education and Learning.

Kuh, G. D., Kinzie, J., Buckley, J. A., Bridges, B. K., & Hayek, J. C. (2006). *What matters to student success: A review of the literature.* Washington, DC: National Postsecondary Education Cooperative.

Levine, M. (2007, April). The essential cognitive backpack. *Educational Leadership, 64*(7), 16–22.

Martinez, M., & Klopott, S. (2005). *The link between high school reform and college access and success for low-income and minority youth.* Washington, DC: American Youth Policy Forum and Pathways to College Network.

Marzano, R. J. & Kendall, J. S. (2007). *The new taxonomy of educational objectives.* (2nd ed.) Thousand Oaks, CA: Corwin Press.

North Central Regional Educational Laboratory. (2003). *enGauge: 21st century skills for 21st century learners.* Naperville, IL: Author.

Olson, L. (2006). Views differ on defining college prep. *Education Week, 25*(33), 1–29.

Organisation for Economic Co-operation and Development. (2005). *The definition and selection of key competencies: Executive Summary.* Paris: Author.

Partnership for 21st Century Skills. (2006). *Results that matter: 21st century skills and high school reform.* Tucson, AZ: Author.

Pink, D. H. (2005). *A whole new mind: Why right-brainers will rule the future*. New York: Riverhead Books.

Race to the Top Fund, RIN 1810-AB07, 55 Fed. Reg. 74, 144 (July 29, 2009).

Robbins, S. B., Lauver, K., Le, H., Davis, D., Langley, R., & Carlstrom, A. (2004). Do psychosocial and study skill factors predict college outcomes? A meta-analysis. *Psychological Bulletin, 130*(2), 261–288.

Robbins, S. B., Allen, J., Casillas, A., Peterson, C. H., & Le, H. (2006). Unraveling the differential effects of motivational and skills, social, and self-management measures from traditional predictors of college outcomes. *Journal of Educational Psychology, 98*(3), 598–616.

Stupski Foundation. (n.d.). *R & D for innovation in public education.* Retrieved from http://www.stupski.org/rdforinnovation.htm.

Stupski Foundation. (2008). *Strategy and program overview.* San Francisco: Author.

The College Board. (2006a). *College Board standards for college success: English language arts.* New York: Author.

The College Board. (2006b). *College Board standards for college success: Mathematics and statistics.* New York: Author.

References Reviewed but Not Cited in This Report

Achieve, Inc. (2004). *Do graduation tests measure up? A closer look at state high school exit exams.* Washington, DC: Author.

Achieve, Inc. (2006). *Closing the expectations gap 2006.* Washington, DC: Author.

Achieve, Inc. (2006). *Identifying potential dropouts: Key lessons for building an early warning data system.* Washington, DC: Author.

Achieve, Inc. (2007). *Aligned expectations? A closer look at college admissions and placement tests.* Washington, DC: Author.

Achieve, Inc. (2007). *Aligning high school graduation requirements with real world: A road map for states.* Washington, DC: Author.

Achieve, Inc. (2007). *Closing the expectations gap 2007.* Washington, DC: Author.

Achieve, Inc. (2007). *Creating a world-class education system in Ohio.* Washington, DC: Author.

Achieve, Inc. (2008). *Algebra II end-of-course exam: 2008 annual report.* Washington, DC: Author.

Achieve, Inc. (2008). *Closing the expectations gap.* Washington, DC: Author.

Achieve, Inc. (2008). *Out of many, one: Toward rigorous common core standards from the ground up.* Washington, DC: Author.

Achieve, Inc. (2008). *Risk reversal?* Washington, DC: Author.

Achieve, Inc. (2008). *The Perkins Act of 2006: Connecting career and technical education with the college and career readiness agenda.* Washington, DC: Author.

Achieve, Inc. (n.d.). *Creating a high school diploma that counts.* Washington, DC: Author.

Achieve, Inc. (n.d.). *Preparing today's high school students for tomorrow's opportunities.* Washington, DC: Author.

Achieve, Inc., and National Governors Association. (2005). *An action agenda for improving America's high schools.* Washington, DC: Author.

ACT. (2005). *Crisis at the core: Preparing all students for college and work.* Iowa City, IA: Author.

ACT. (2005). *On course for success: A close look at selected high school courses that prepare all students for college.* Iowa City, IA: Author.

ACT. (2006). *Developing the STEM education pipeline.* Iowa City, IA: Author.

ACT. (2006). *Reading between the lines: What the ACT reveals about college readiness in reading.* Iowa City, IA: Author.

ACT. (2006). *Ready to succeed: All students prepared for college and work.* Iowa City, IA: Author.

ACT. (2007). *ACT national curriculum survey 2005–2006.* Iowa City, IA: Author.

ACT. (2007*). Aligning postsecondary expectations and high school practice: The gap defined. Policy implications of the ACT national curriculum survey results 2005–2006*. Iowa City, IA: Author.

ACT. (2007). *Family firsts: Reach for your dreams.* Iowa City, IA: Author.

ACT. (2007). *Rigor at risk: Reaffirming quality in the high school core curriculum.* Iowa City, IA: Author.

ACT. (2007). *State of college readiness for Latino students.* Iowa City, IA: Author.

ACT. (2007). *The role of nonacademic factors in college readiness and success.* Iowa City, IA: Author.

ACT. (2007). *Using EXPLORE and PLAN data to evaluate GEAR UP programs.* Iowa City, IA: Author.

ACT. (2008). *Making the dream a reality: Action steps for states to prepare all students for college and career.* Iowa City, IA: Author.

ACT. (2008). *The economic benefits of academic and career preparation.* Iowa City, IA: Author.

ACT. (2008). *The forgotten middle: Ensuring that all students are on target for college and career readiness before high school.* Iowa City, IA: Author.

ACT. (2008). *What we know about college success: Using ACT data to inform educational issues.* Iowa City, IA: Author.

Ad Hoc Committee on Planning for NAEP 12th Grade Assessments in 2009. (2006). *The future of 12th grade NAEP: Report of the Ad Hoc Committee on Planning for NAEP 12th Grade Assessments in 2009*. Washington, DC: National Assessment Governing Board.

Adelman, C. (2004). *Principal indicators of student academic histories in postsecondary education, 1972–2000.* Washington, DC: U.S. Department of Education, Institute of Education Sciences.

Allensworth, E. M., & Nomi, T. (2009). *College-preparatory curriculum for all: The consequences of raising mathematics graduation requirements on students' course taking and outcomes in Chicago*. Chicago: Consortium on Chicago School Research at the University of Chicago.

Allensworth, E., Correa, M., & Ponisciak, S. (2008). *From high school to the future: ACT preparation—too much, too late.* Chicago: Consortium on Chicago School Research at the University of Chicago.

Alvarez, D., & Mehan, H. (n.d.). Whole school detracking: A strategy for equity and excellence. *Theory into Practice, 45*(1), 82–89.

Arkansas Department of Education. (2007). *Combined research report of business leaders and college professors on preparedness of high school graduates.* Little Rock, AR: Author.

Atkinson, R. C., & Pelfrey, P. A. (2004). *Rethinking admissions: U.S. public universities in the post-Affirmative Action age.* Berkeley, CA: University of California Center for Studies in Higher Education.

Baird, L. L. (1983). *Predicting predictability: The inf uence of student and institutional characteristics on the prediction of grades*. New York: Educational Testing Service.

Balloon, E. G. (2008). Racial differences in high school math track assignment. *Journal of Latinos and Education, 7*(4), 272–287.

Bangser, M. (2008). *Evaluating the impact of interventions that promote successful transitions from high school.* Washington, DC: National High School Center.

Bangser, M. (2008). *Preparing high school students for successful transitions to postsecondary education and employment.* Washington, DC: National High School Center.

Barth, P. (2003, Winter). A common core curriculum for the new century. *Thinking K–16, 7*(1), 3–31.

Barton, P. E. (2005). *One-third of a nation: Rising dropout rates and declining opportunities.* Princeton, NJ: Educational Testing Service.

Barton, P. E. (2006). *High school reform and work: Facing labor market realities.* Princeton, NJ: Educational Testing Service.

Bayerl, K. (2007). *Rigor plus support: How science teachers use literacy techniques to get students ready for college.* Boston: Jobs for the Future.

Bill and Melinda Gates Foundation. (2003). *Closing the graduation gap: Toward high schools that prepare all students for college, work, and citizenshi*p. Seattle, WA: Author.

Biswas, R. R. (2005). *Our success is our graduates: Case study of Year Up: A career advancement model for low-income young adults.* Boston: Jobs for the Future.

Bloom, J. L. (2007). (Mis)reading social class in the journey towards college: Youth development in urban America. *Teachers College Record, 109*(2), 343–368.

Borman, G. D., Stringfield, S. & Rachuba, L. (2000). *Advancing minority high achievement: National trends and promising programs and practices.* New York: The College Board.

Boser, U., & Burd, S. (2009). *Bridging the gap: How to strengthen the Pk–16 pipeline to improve college readiness.* Washington, DC: New America Foundation.

Bottoms, G. & Young, M. (2008). *Lost in transition: Building a better path from school to college and careers.* Atlanta, GA: Southern Regional Education Board.

Bozick, R., & Ingels, S. J. (2008). *Mathematics coursetaking and achievement at the end of high school: Evidence from the Education Longitudinal Study of 2002.* Washington, DC: National Center for Education Statistics, Institute of Education Sciences, U.S. Department of Education.

Cabrera, A. F., Deil-Amen, R., Prabhu, R., Terenzini, P. T., Lee, C., & Franklin, Jr., R. E. (2006). Increasing the college preparedness of at-risk students. *Journal of Latinos and Education, 5*(2), 79–97.

Callan, P. M., Finney, J. E., Kirst, M. W., Usdan, M. D., & Venezia, A. (2006). *Claiming common ground: State policymaking for improving college readiness and success*. San Jose, CA: The National Center for Public Policy and Higher Education.

Cannon, J. S., & Lipscomb, S. (2008). *Changing the kindergarten cutoff date: Effects on California students and schools*. San Francisco, CA: Public Policy Institute of California.

Carnevale, A. P. & Desrochers, D. M. (n.d.). *Connecting education standards and employment: Course-taking patterns of young workers.* Washington, DC: Achieve, Inc., American Diploma Project.

Cavanagh, S. (2004). Barriers to college: Lack of preparation vs. financial need. *Education Week, 23*(19), 1–13.

Cech, S. J., & Holovach, R. (2008). AP trends: Tests soar, scores slip. *Education Week, 27*(24), 1–13.

Center for an Urban Future. (2006). *Ready or not.* New York: Author.

Center for Higher Education Policy Analysis. (2002). *Making the grade in college prep: A guide for improving college preparation programs*. Los Angeles: Center for Higher Education Policy Analysis, University of Southern California.

Center for the Study of Education Policy. (2005). *Improving chances for college success for low income and minority high school students.* Normal, IL: Author.

Committee for Economic Development. (2005). *Cracks in the education pipeline: A business leader's guide to higher education reform.* Washington, DC: Author.

Conley, D. (2003). *Mixed messages: What state high school tests communicate about student readiness for college.* Eugene, OR: Center for Education Policy Research, University of Oregon.

Conley, D. T. (2003). Connecting the dots: Linking high schools and postsecondary education to increase student success. *PeerReview, 5*(2), 9–12.

Conley, D. T. (2005). College knowledge: Getting in is only half the battle. *Principal Leadership, 6*(1), 16–21.

Conley, D. T. (2006). What we must do to create a system that prepares students for college success. *Policy Perspectives.* San Francisco: WestEd.

Conley, D. T. (2007, April). The challenge of college readiness. *Educational Leadership, 64*(7), 23–29.

Conley, D. T. (2008, Spring). Rethinking college readiness. *The New England Journal of Higher Education*, *22*(5), 24–26.

Conley, D. T., & Venezia, A. (2003). *High school transitions: State of the art and views of the future.* Paper presented at the Annual Meeting of the American Educational Research Association, Chicago, IL.

Consortium for Policy Research in Education. (2000). *Bridging the K–12/postsecondary divide with a coherent K–16 system.* Philadelphia: Author.

Corrallo, S. (1996). *The National Assessment of College Student Learning: An inventory of state-level assessment activities.* Washington, DC: National Center for Education Statistics.

Crist, C., Jacquart, M., & Shupe, D. A. (2002). *Improving the performance of high school students: Focusing on connections and transitions taking place in Minnesota.* Washington, DC: Office of Vocational and Adult Education.

Darling-Hammond, L., & Friedlaender, D. (2008). Creating excellent and equitable schools. *Educational Leadership, 65*(8), 14–21.

Dougherty, C., & Zavadsky, H. (2007, November). Giving all students the keys to college and skilled careers: One district's approach. *Phi Delta Kappan, 89*(3), 194–199.

Dounay, J. (2006). *Ensuring rigor in the high school curriculum: What states are doing.* Denver, CO: Education Commission of the States.

Editorial Projects in Education Research Center. (2008). S*chool to college: Can state P–16 councils ease the transition?* Retrieved January 15, 2009, from www.edweek.org/rc

Education Commission of the States. (2005, May). Dual enrollment. *The progress of education reform 2005, 6*(3).

Epstein, K. K. (2004, June). Small schools—Miracle school: A child of the civil rights movement. *Phi Delta Kappan, 85*(10), 773–776.

Ewell, P. & Wellman, J. (2007). *Enhancing student success in education: Summary Report of the NPEC Initiative and National Symposium on Postsecondary Student Success.* Washington, DC: National Postsecondary Education Cooperative.

Fadigan, K. A., & Hammrich, P. L. (2004). A longitudinal study of the educational and career trajectories of female participants of an urban informal science education program. *Journal of Research in Science Teaching, 41*(8), 835–860.

Farmer-Hinton, R. L. (2008). Creating opportunities for college access: Examining a school model designed to prepare students of color for college. *Multicultural Perspectives, 10*(2), 73–81.

Field, K. (2008). Education Department to end controversial study of Upward Bound. *Chronicle of Higher Education, 54*(26), A20–A23.

Finkelstein, N. D., & Fong, A. B. (2008). *Course taking patterns and preparation for postsecondary education in California's public university systems among minority youth.* Washington, DC: U.S. Department of Education, Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance, Regional Education Laboratory West.

Gandara, P. (2005). *Fragile futures: Risk and vulnerability among Latino high achievers.* Princeton, NJ: Educational Testing Service.

George, P., & Aronson, R. (2003). *How do educators' cultural belief systems affect underserved students' pursuit of postsecondary education?* Honolulu, HI: Pacific Resources for Education and Learning (PREL).

Gewertz, C. (2009, January 13). Redouble high school improvement push, states told. *Education Week.* Retrieved January 14, from http://www.edweek.org/ew/articles/2009/01/13/18readiness.h28.html

Glassman, P., & Roelle, R. J. (2007, November). Singling black boys to close the gaps. *School Administrator, 64*(10), 26–31.

Gomoran, A., Porter, A. C., Smithson, J., & White, O. A. (1997). Upgrading high school mathematics instruction: Improving learning opportunities for low-achieving, low-income youth. *Educational Evaluation and Policy Analysis, 19*(4), 325–338.

Gong, Y., & Presley, J. B. (2006). *The demographics and academics of college going in Illinois.* Edwardsville, IL: Illinois Education Research Council.

Greene, J. P., & Winters, M. A. (2003). *Public high school graduation and college readiness rates: 1991–2002.* New York: Center for Civic Innovation at the Manhattan Institute.

Greene, J. P., & Winters, M. A. (2005). *Public high school graduation and college readiness rates: 1991–2002.* New York: Center for Civic Innovation at the Manhattan Institute.

Greenwood, A. (1994). *The National Assessment of College Student Learning: Identification of skills to be taught, learned, and assessed.* Washington, DC: National Center for Education Statistics.

Hauptman, A. M. (2007). *Strategies for improving student success in postsecondary education.* Boulder, CO: Western Interstate Commission for Higher Education.

Haycock, K., & Gerald, D. (2007). Trend: Shrinking opportunity. *Connection: The Journal of the New England Board of Higher Education, 2*1(5), 15–16.

Heisel, M. (2005). *Preparing New Jersey students for college and careers: Evaluation of New Jersey GEAR UP.* Trenton, NJ: New Jersey Commission on Higher Education.

Hoachlander, G. (2008, May). Bringing industry to the classroom. *Educational Leadership, 65*(8), 22–27.

Howard-Vital, M. (n.d.). *Untangling our web: A statewide approach is needed to improve/judge college readiness and to increase college success.* Chapel Hill, NC: University of North Carolina.

Huber, L. P., Huidor, O., Malagon, M. C., Sanchez, G., & Solorzano, D. G. (2006). *Falling through the cracks: Critical transitions in the Latino/a educational pipeline.* Los Angeles: UCLA Chicano Studies Research Center.

Huebner, T. A. (2007). *Rethinking high school: Preparing students for success in college, career, and life.* Seattle, WA: Bill and Melinda Gates Foundation.

Huebner, T. A., & Corbett, G. C. (2004). *Rethinking high school: Five profiles of innovative models for student success.* San Francisco: WestEd.

Karp, M. M., & Hughes, K. L. (2008, April). Supporting college transitions through collaborative programming: A conceptual model for guiding policy. *Teachers College Record, 110*(4), 838–866.

Karp, M. M., Calcagno, J. C., Hughes, K. L., Jeong, D. W., & Bailey, T. R. (2007). *The postsecondary achievement of participants in dual enrollment: An analysis of student outcomes in two states.* St. Paul, MN: National Research Center for Career and Technical Education.

Kendall, J. S., & Snyder, C. (2005). *Challenging standards in English: Are high schools missing essential content?* Denver, CO: Mid-continent Research for Education and Learning.

Kendall, J. S., & Williams, J. (2004). C*hallenging standards in mathematics: What are high schools missing?* Denver, CO: Mid-continent Research for Education and Learning.

Kentucky Developmental Education Task Force. (2007). *Securing Kentucky's future: A plan for improving college readiness and success.* Frankfort, KY: Author.

Kirst, M., & Venezia, A. (2001, September). Bridging the great divide between secondary schools and postsecondary education. *Phi Delta Kappan, 83*(1), 92–97.

Lopez, D. (2009, January/February). College readiness for all: What's the alternative? *Principal,* 50–51.

Lundell, D. B., Higbee, J. L., Duranczyk, I. M., & Goff, E. (Eds.) (n.d.). S*tudent standpoints about access programs in higher education.* Minneapolis, MN: Center for Research on Developmental Education and Urban Literacy.

Manzo, K. K., & Cavanagh, S. (2008, April 23). America scouts overseas to boost education skills. *Education Week, 27*(34), 14–16.

Mayer, A. P. (2008, Winter). Expanding opportunities for high academic achievement: An International Baccalaureate diploma program in an urban high school. *Journal of Advanced Academics, 19*(2), 202–235.

McLendon, M., Heller, D. E., & Lee, S. (2009). High school to college transition policy in the American states: Conceptual and analytic perspectives on conducting across-state study. *Educational Policy, 23*(2), 385–418.

McNeil, M. (2008, March 12). Benchmarks momentum on increase. *Education Week, 27*(27), 1, 12–13.

Meeder, H., & Solares, G. (2006). *Perspectives on English and math skills needed for work readiness.* Idel, IA: Visions Unlimited, Inc.

Minnesota Higher Education Coordinating Board. (1986). *Defining college-level skills.* St. Paul, MN: Author.

Muraskin, L. (2003). *National evaluation of GEAR UP: A summary of the first two years.* Rockville, MD: Westat, Inc.

National Association of System Heads. (2002). *Aligning K–12 and postsecondary expectations: State policy in transition.* Washington, DC: Author.

National Center for Higher Education Management Systems. (1994). *A preliminary study of the feasibility and utility for national policy of instructional "good practice" indicators in undergraduate education.* Washington, DC: National Center for Education Statistics.

National Commission on NAEP 12th Grade Assessment and Reporting. (2004). *12th grade student achievement in America: A new vision for NAEP.* Washington, DC: Author.

National Governors Association, Council of Chief State School Officers, & Achieve, Inc. (2008). *Benchmarking for success: Ensuring U.S. students receive a world-class education.* Washington, DC: National Governors Association.

National Governors Association. (2003). *Ready for tomorrow: Helping all students achieve secondary and postsecondary success.* Washington, DC: Author.

Nevarez, C., & Rico, T. (2007). *Latino education: A synthesis of recurring recommendations and solutions in P–16 education.* New York: The College Board.

Noble, J. P., & Sawyer, R. L. (2004). Is high school GPA better than admission test scores for predicting academic success in college? *College and University (79)*4, 17–22.

Noeth, R. J., & Wimberly, G. L. (2002). *Creating seamless educational transitions for urban African American and Hispanic students.* Iowa City, IA: ACT, Inc.

Olson, L. (2006). States push to align policies from pre-K to postsecondary. *Education Week, 25*(41), 1–20.

Oswald, K. J. (2002). *The AVID program in AISD, 1999-2002*. Austin, TX: Austin Independent School District, Office of Program Evaluation.

Parsad, B., Lewis, L., & Greene, B. (2003). *Remedial education at degree-granting postsecondary institutions in Fall 2000.* Washington, DC: National Center for Education Statistics.

Pathways to College Network, Institute for Higher Education Policy, & Social Science Research Council. (2007). *Questions that matter: Connecting research, policy, and practice to improve college access and success.* Boston: Authors.

Perna, L. W., & Thomas, S. L. (2006). *A framework for reducing the college success gap and promoting success for all.* Washington, DC: National Postsecondary Education Cooperative.

Planty, M., Provasnik, S., & Daniel, B. (2007). *High school coursetaking: Findings from the Condition of Education 2007.* Washington, DC: U.S. Department of Education, Institute of Education Sciences.

Quint, J., Thompson, S. L., & Bald, M. (2008). *Relationships, rigor, and readiness: Strategies for improving high schools.* New York: MDRC.

Ramist, L., Lewis, C., & McCamley-Jenkins, L. (1994). *Student group differences in predicting college grades: Sex, language, and ethnic groups.* New York: College Entrance Examination Board.

Richburg-Hayes, L. (2008). *Helping low-wage workers persist in education programs.* New York: MDRC.

Roderick, M. (2006). *Closing the aspirations-attainment gap: Implications for high school reform.* New York: MDRC.

Roderick, M., Nagoaka, J., Coca, V., Moeller, E., Roddie, K., Gilliam, J., & Patton, D. (2008). *From high school to the future: Potholes on the road to college.* Chicago: Consortium on Chicago School Research at the University of Chicago.

Sawyer, R. (2008). *Benefits of additional high school course work and improved course performance in preparing students for college.* Iowa City, IA: ACT.

Schmidt, P. (2008). New twists mark the debate over Texas' top 10-percent plan. *Chronicle of Higher Education, 54*(39), A20–A24.

Seftor, N. S., Mamun, A., & Schirm, A. (2008). *The impacts of regular Upward Bound on postsecondary outcomes 7–9 years after scheduled high school graduation.* Princeton, NJ: Mathematica Policy Research, Inc.

Silva, E. (2008). *Measuring skills for the 21st century.* Washington, DC: Education Sector.

Smith, A. (n.d.). *Equity within reach: Insights from the front lines of America's achievement gap.* New York: Teach for America.

Snipes, J. C., Holton, G. I., Doolittle, F., & Sztejnberg, L. (2006). *Striving for student success: The effect of Project GRAD on high school student outcomes in three urban school districts.* New York: MDRC.

Society for Human Resource Management. (2007). *SHRM 2007 symposium on the workforce readiness of the future U.S. labor pool.* Washington, DC: Author.

Southern Regional Education Board. (2005). *Creating college opportunity for all: Prepared students and affordable colleges.* Atlanta, GA: Author.

Southern Regional Education Board. (2006). *Getting students ready for college and careers.* Atlanta, GA: Author.

Southern Regional Education Board. (2007). *High school to college and careers: Aligning state policies.* Atlanta, GA: Author.

Sparks, S. D. (2007, May 30). International group faults U.S. schools. *Education Daily, 40*(101), 1–4.

St. Jarre, K. (2008, October). They knew calculus when they left: The thinking disconnect between high school and university. *Phi Delta Kappan*, *90*(2),123–126.

Standing, K., Judkins, D., Keller, B., & Shimshak, A. (2008). *Early outcomes of the GEAR UP program*. Rockville, MD: Westat.

State Higher Education Executive Officers. (2003). *Student success: Statewide P–16 systems.* Denver, CO: Author.

State University of New York. (1995). *College expectations: Knowledge & skills.* Albany, NY: Author.

Stein, M., Robinson, S., Haycock, K., Vitale, D., & Schmeiser, C. (2005, September). College Prep 101. *Principal Leadership, 6*(1), 22.

Stringer, N. (2008). Aptitude tests versus school exams as selection tools for higher education and the case for assessing educational achievement in context. *Research papers in education, 23*(1), 53–68.

Strong American Schools. (2008). *Diploma to nowhere*. Washington, DC: Author.

Terenzini, P. T., Cabrera, A. F., & Bernal, E. M. (2001). *Swimming against the tide: The poor in American higher education.* New York: The College Board.

The College Board. (2007). *The college keys compact: Getting ready, getting in, and getting through college: Expanding options for low-income students.* New York: Author.

The College Board. (2008). *Resources for increasing Latino participation and success in higher education.* New York: Author.

The Conference Board, the Partnership for 21st Century Skills, Corporate Voices for Working Families, & the Society for Human Resource Management. (2006). *Are they really ready to work? Employers' perspectives on the basic knowledge and applied skills of new entrants to the 21st century U.S. workforce.* New York: Author.

The Education Trust-West. (2004). *Are California high schools ready for the 21st century?* Oakland, CA: Author.

The New Commission on the Skills of the American Workforce. (2008). *Tough choices or tough times.* Washington, DC: National Center on Education and the Economy.

The Secretary's Commission on Achieving Necessary Skills. (1991). *What work requires of schools: a SCANS report for America 2000.* Washington, DC: U.S. Department of Labor.

Tierney, W. G., & Jun, A. (2001). A university helps prepare low income youths for college. *The Journal of Higher Education, 72*(2), 205–225.

Tinto, V. (2008). *When access is not enough.* Stanford, CA: The Carnegie Foundation for the Advancement of Teaching.

Trent, W. T., Orr, M. T., Ranis, S. H., & Holdaway, J. (2007, October). Transitions to college: Lessons from the disciplines. *Teachers College Record, 109*(10), 2207–2221.

Turner, P. R. (2008). A predictor-corrector process with refinement for first-year calculus transition support. *Primus, 18*(4), 370–393.

U.S. Department of Education, Office of Vocational and Adult Education. (2003). *The high school leadership summit: Issue papers.* Washington, DC: Author.

Uy, E. (2008, September 9). Education groups spearhead international benchmarking. *Education Daily, 41*(165), 1-3.

Van Noy, M., Jacobs, J., Korey, S., Bailey, T., & Hughes, K. L. (2008, Apr/May). The rise of noncredit workforce education. *Community College Journal, 78*(5), 54–59.

Venezia, A. (2003, Winter). Connecting the systems: What can postsecondary education do to work with K–12 to help students better prepare for college? *PeerReview*, *5*(2), 27–30.

Venezia, A. (2006, Winter). Levers for change: Steps states can take to improve college readiness. *Connection: The Journal of the New England Board of Higher Education, 20*(4), 16–18.

Venezia, A., Callan, P. M., Finney, J. E., Kirst, M. W., & Usdan, M. D. (2005). *The governance divide: A report on a four-state study on improving college readiness and success.* Washington, DC: The National Center for Public Policy and Higher Education.

Venezia, A., Kirst, M. W., Antonio, A. L. (n.d.). *Betraying the college dream: How disconnected K-12 and postsecondary education systems undermine student aspirations*. Stanford, CA: The Stanford Institute for Higher Education Research.

W. K. Kellogg Foundation. (n.d.). *ENLACE: Creating college-focused centers in the schools: Learning from the ENLACE experience*. Battle Creek, MI: Author.

Wagner, A. (2006). *Measuring up internationally: Developing skills and knowledge for the global knowledge economy.* San Jose, CA: The National Center for Public Policy and Higher Education.

Ward, N. L. (2006). Improving equity and access for low-income and minority youth into institutions of higher education. *Urban Education, 41*(1), 50–70.

Warner, C. B., & Phelps, R. E. (n.d.). The relationship between motivational orientation & educational aspirations in urban, African American youth. *Middle Grades Research Journal, 3*(2), 71–85.

Washington Higher Education Coordinating Board. (2008). *Passport to college: Promise Scholarship Program status report.* Olympia, WA: Author.

Weissberg, N. C., & Owen, D. R. (2005). Do psychosocial and study skill factors predict college outcomes? Comment on Robbins et al. (2004). *Psychological Bulletin 131*(3), 407–409.

White Ho use Initiative on Educational Excellence for Hispanic Americans. (2008). *A summary of activities, accomplishments and Hispanic education attainment: 2001–08.* Washington, DC: Author.

Williams, N. J., & Noble, J. P. (2005). *School-level benefits of using PLAN over time.* Iowa City, IA: ACT.

Wilson, B. J. (2006, Summer). Preparing urban scholars for college: A best practice in college readiness. *Connection: The New Journal of the New England Board of Higher Education. 21*(1), 15–16.

Wimberly, G. L., & Noeth, R. J. (2005). *College readiness begins in middle school.* Iowa City, IA: ACT.

Wright, D., & Bogotch, I. (2006, Fall). High school: Erasing borders. *Journal of College Admission, 193*, 18–24.

Appendix

Literature review method

In June 2008, the Stupski Foundation created a conceptual framework for the reinvention of American education. The framework identified seven essential components and focused on delivering 21st century college readiness for all students, but especially for "Our Kids," children of color and poverty. The Foundation explained that "graduating all students from high school with the knowledge and skills that qualify them as 'college ready' is the most meaningful and measurable way to increase life choices and options for all children, but most especially children of color and poverty" (About the Foundation, para. 3).

The Learning System includes four core teaching and learning components: Curriculum, Assessments, Pedagogy, and Supports. Surrounding these components, are three organizational components necessary to support the core: Leadership/Human Capital, Systems Diagnostics, and a Dashboard of College Readiness Indicators (College Readiness Learning System, n.d.).

The Foundation envisions convening a Design Collaborative, a cross-sector group of researchers, practitioners, and designers from inside and outside education, to "define, develop and continually improve" (Design Collaborative, n.d.) all of the components. To orient Design Collaborative members to the accumulated and maturing knowledge base related to each of the components and to children of color and poverty, the Foundation contracted with Mid-continent Research for Education and Learning (McREL). McREL conducted eight literature reviews—one on each of the components plus one on Our Kids—to identify and integrate theories and philosophical perspectives, issues, scientifically based research practices, unmet needs, and innovations relevant to designing one or more of the system components to accelerate learning for Our Kids.

This Appendix contains a description of the review method, including a general explanation of McREL's approach and descriptions of the particular procedures used for each phase of the review: identification of key hypotheses and research questions, literature search, identification and cataloguing of finds, and generating and communicating recommendations.

McREL's overall approach

Since the primary users of the reviews are the members of the Design Collaborative, the qualitative, iterative approach taken for the literature reviews sought to achieve the multiple goals of identifying emerging ideas, counterproductive orthodoxies, and promising practices relevant to the reinvention of the Learning System. Thus, eight research teams were assembled, each with one or more researchers familiar with the respective topic areas.

Qualitative approach. A *qualitative approach* shares several practices with those of *systematic reviews*, including comprehensive searches and transparency to reduce bias, but it differs with respect to inclusion/exclusion criteria. Systematic reviews emphasize explicit and a priori inclusion/exclusion criteria and criteria for evaluating the methodological quality of individual studies, carefully limiting the sources of evidence to support inferences about cause and effect relationships (Cooper, Hedges, & Valentine, 2009). The qualitative approach emphasizes diverse sources and types of evidence and knowledge to support a broader base of inferences (Pope, Mays, & Popay, 2007; Suri & Clarke, 2009).

The qualitative approach is particularly well-suited to the review's purpose and audience because the Design Collaborative needs both empirical studies and other literature to identify possible innovations for the current education system. An assumption underlying the Foundation's work to fundamentally reinvent American education is that the current system fails to deliver college readiness for all students, especially Our Kids. This assumption is supported by research indicating that students of color and in poverty have low high school and college graduation rates, and research from the last two years shows that college graduation rates for minority and poor students have further declined (American Council on Education, 2008). Therefore, a priority for the Foundation's work is to identify innovations that have not yet been studied, with the intent to evaluate their effectiveness. Literature specific to innovations is found outside the traditional scientific or academic journals.

Inclusive approach. McREL researchers adopted an inclusive approach, searching for and including phenomenological reports describing the experiences of Our Kids in and out of school and documenting the challenges and successes of their teachers and educational leaders. The researchers included literature on innovative, emerging models and untested ideas, as well as reports on mature, well-specified models with experimental evidence of effectiveness. Relevant quantitative research literature included correlational and experimental studies and meta-analytic reviews. Narrative reviews of research were included, as were policy briefs and position papers produced by opinion leaders and professional organizations. Literature sources included the World Wide Web, peer-reviewed journals, and practitioner magazines. Each document was identified by type of literature and evaluated in terms of the quality of the supporting evidence. Care was taken to draw only those inferences appropriate to the quality of the evidence.

McREL researchers judged the quality of the evidence in the context of the type of literature or study design and in relation to its relevance to answering particular questions. Guidance from Pope, Mays, and Popay (2007) on conducting reviews in the field of health research supports this approach:

> The inclusion of diverse sources of evidence in a review does not mean abandoning the rigor of a systematic review, but it does mean judging the quality of evidence in context and defining the relevance of evidence to answering specific questions, rather than defining some forms of evidence as intrinsically, and universally, of lower quality than others. (p. 1)

Each research team followed the five or six phases of any review process relevant to a quality knowledge synthesis (Cooper, Hedges & Valentine, 2009; Suri & Clarke, 2009). Table 1 (see p. 45) provides a side-by-side comparison of the phases of a systematic review of research (Cooper, Hedges & Valentine, 2009), a qualitative review (Suri & Clarke, 2009), and McREL's approach to this review.

Each team began by drawing from pertinent philosophical and theoretical literature and preliminary discussions with the Foundation to formulate hypotheses and research questions. Each team conducted extensive searches to find as much relevant literature as possible in order to include literature from the scientific and academic journals as well as literature from harder-to-find, cutting edge innovators. Additionally, teams revisited databases and alternative sources to purposefully search for additional literature written by authors identified by one or more stakeholders or to fill conceptual gaps that became apparent during the identification and cataloguing of findings and generating and communicating recommendations phases.

The phased process was iterative (Cooper, 2009) ref ecting new understanding and insights as the search, analysis, interpretation, and discussions between component teams and between the Foundation and McREL progressed toward conceptual clarity and the exhaustion of new search hits.

Table 1: Phases of a literature review

Phase	Cooper, Hedges & Valentine (2009, p. 8)	Suri & Clarke (2009, p. 414)	McREL's approach
1	Problem formulation	Drawing from pertinent philosophical and theoretical discussions	Identification of key hypotheses
2		Identifying an appropriate purpose	Identification of research questions
3	Data collection	Searching for relevant evidence	Literature search
4	Data evaluation	Evaluating, interpreting, and distilling evidence	Identification and cataloguing of findings
5	Analysis and interpretation	Constructing connected understanding	Generating and communicating recommendations
6	Public presentation	Communicating with an audience	

The number of documents included in each team's review was extensive, and the types of literature varied representing the experiential knowledge of a diverse group of stakeholders, including researchers, teachers, administrators, program developers, and leaders and scholars at the local and national levels.

Team approach. Teams were composed of researchers and practitioners with different areas of expertise. Teams met weekly, and team leaders from across teams met biweekly. Meetings were used to update other individuals and teams and share resources, pose and address questions, challenge assumptions, provide guidance on interpretation of evidence, open up new areas of consideration, clarify boundaries and overlap between system components, consider alternative perspectives, and develop connected understanding.

Identification of key hypotheses and research questions

McREL teams began by clarifying terms, relationships, and the conceptual scope of each review. Teams read and discussed a document produced during the Foundation's strategy definition process, *Research Guide for CRLS: Outline of Research Questions for Each Component of the CRLS* (n.d.). Included in this guide were preliminary questions for each literature review. Teams previewed relevant literature, confirmed that the questions could be answered by the extant knowledge base, and posed additional questions when important issues related to accelerating learning for students of color and poverty were identified in the literature but missing in the guide. The revised set of questions for each system component and Our Kids was reviewed and refined during ongoing dialogue between the Foundation and McREL.

Literature search

Multiple searches were conducted in a phased approach to identify as much literature as possible related to each system component and Our Kids. Teams conducted searches using multiple

bibliographic databases: Academic Onefile, Academic Search Premier, Educators Reference Complete, ERIC, JSTOR, Proquest, and PsychInfo. Teams also conducted manual searches of journal and book tables of contents and reference lists of articles. Additional searches were conducted specifically to identify recent experimental and other research and reviews on the efficacy of interventions for accelerating learning of students of color and poverty. These searches were conducted by visiting the U.S. Department of Education What Works Clearinghouse Web site (http://ies.ed.gov/ncee/wwc/reports/) and the Campbell Collaboration Library of Systematic Reviews Web site (http://www.campbellcollaboration.org/library.php). Relevant documents were identified on state education agency (SEA) Web sites, and SEA officials were interviewed or named as seminal authors or sources of models that had been developed and implemented to monitor and accelerate learning of Our Kids.

Each team identified and used key terms and synonyms relevant to the topic for searching. Searches were conducted for literature published in the most recent 10 years (1998–2008); however, works by seminal authors and other recommended literature were included from outside these years. The search landscape varied for each team based on the topic and relevant sources; for example, while What Works Clearinghouse was a relevant source for the Pedagogy team, it was not a relevant source for the Leadership/Human Capital team. Internal review of search records and results led to additional leads on sources. Searching continued until all recommendations had been implemented and/or few new hits were identified.

Identification and cataloguing of findings

A coding protocol was developed and implemented to categorize the literature. Each team used the same protocol, adding categories and decision rules, as needed to organize the particular literature relevant to their topic. Each team leader and one or more members of each team were trained on the decision rules in the coding protocol and provided follow-up support to resolve uncertainties in its application. Team leaders periodically conducted quality assurance reviews of completed coding sheets and updated the protocol as needed during weekly team leader meetings or discussions with the Foundation. The coding protocol included identifying the following information:

- Full APA reference citation
- Category of literature (i.e., primary and secondary relevance)
- Type of literature (e.g., quantitative study, policy brief, program description)
- Locale
- Outcome
- Grade level
- Program or innovation name and description
- Main findings or points
- A recommendation for or against summarizing and including the selection in an annotated bibliography.

In addition, component teams added to the protocol by categorizing relevance to particular parts of their conceptual model or concept map.

Guidelines were developed and used by teams to identify counterproductive orthodoxies, unmet needs, next practices, promising practices, and best practices based on type of literature and quality of evidence. These were defined in the following ways:

- *Counterproductive orthodoxies*: Conventional ways of providing education which may be impeding success of Our Kids
- *Unmet needs:* Areas where Our Kids are not yet well served by the current system of education
- *Next practices:* A program or practice that needs to developed, adapted, invented, and tested in response to an unmet need related to accelerating learning for Our Kids
- *Promising practices:* Practices based on research but not supported by rigorous efficacy data from randomized controlled trials
- *Best practices:* Practices demonstrated by one or more randomized controlled trials to be effective in improving outcomes for Our Kids

The research team reviewing the college readiness component of the Learning System employed a slightly different process. Rather than using the categories above, this team reviewed literature on college readiness and categorized findings into four essential areas as defined by the Foundation and Conley (2007): cognitive strategies, content knowledge, academic behaviors, and contextual skills.

Component teams met weekly to discuss and categorize findings and to develop a conceptual map of the insights gained from the literature summaries and review. Teams used different conceptual mapping tools (e.g., SmartArt) to organize the insights (findings) and presented and discussed their respective maps at cross-team meetings. Features common across teams' concept maps were identified and a standard framework developed. Teams arranged findings onto the concept maps, identifying conceptual gaps and conf icting or discrepant findings, and returned to searching and reviewing to fill in the gaps and resolve or explain discrepant findings. The conceptual maps served as an organizing framework for report construction.

Generating and communicating recommendations

Working collaboratively, component teams drew conclusions from the insights (findings) derived from the review and identified potential options and recommendations for each component of the system. Teams used an iterative process of identification, reviewing for validity against the knowledge base, and further refinement until they determined they had identified the most promising options and that each was informed by the existing knowledge base.

Team leaders used the outcomes of team discussions and cross-team discussions, literature summaries, and the researcher's own review and integration of the literature to write a draft report of the findings. Draft reports were reviewed by knowledgeable internal experts and revisions in search strategies, interpretations of findings, and/or conclusions were made. Revised reports were reviewed by the Foundation and other outside reviewers prior to final revisions and production.

Although the wide-ranging literature searches produced reports on extensive baseline information related to Our Kids and each system component, the reports are living documents. As living documents, they bridge the creative and scientific enterprises of the past and present, and we envision the need to return to some of them for updating, extending, and drilling-down in the future.

References

About the Foundation. (n.d.). Retrieved from http://www.stupski.org/about_the_foundation.htm

American Council on Education. (2008). *Minorities in higher education 2008 twenty-third status report*. Washington, DC: Author.

College Readiness Learning System. (n.d.). Retrieved from http://www.stupski.org/college_readiness.htm

Conley, D. T. (2007). *Toward a more comprehensive conception of college readiness.* Eugene, OR: Educational Policy Improvement Center.

Cooper, H. (2009). Hypotheses and problems in research syntheses. In H. Cooper, L. Hedges, & J. Valentine (Eds.), *The handbook of research synthesis and meta-analysis* (pp. 19–35). New York: Russell Sage Foundation.

Cooper, H., Hedges, L., & Valentine, J. (2009). *The handbook of research synthesis and meta-analysis.* New York: Russell Sage Foundation.

Design collaborative. (n.d.). Retrieved from http://www.stupski.org/design_collaborative.htm

Pope, C., Mays, & Popay, J. (2007). *Synthesizing qualitative and quantitative health research: A guide to methods.* New York: McGraw Hill Education.

Research guide for CRLS: Outline of research questions for each component of the CRLS. (n.d.). San Francisco: Stupski Foundation.

Suri, H. & Clarke, D. (2009). Advancements in research synthesis methods: From a methodologically inclusive perspective. *Review of Educational Research, 79*(1), 395–430.

Stupski Foundation

101 2nd Street, Suite 1100
San Francisco, CA 94105
Tel: 415.644.4800
Fax: 415.644.4801