The Critical Middle
A reason for hope

Maryland Middle School
Steering Committee

JUNE **20 08**

MARYLAND STATE DEPARTMENT OF
EDUCATION
Achievement Matters Most

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Acknowledgements

The Steering Committee wishes to thank Maryland State Department of Education staff who contributed to this report.

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Introduction

The Middle School Challenge

In Maryland and across the country, it is in middle school that students' progress slows, performance declines, and gaps persist. On the 2007 National Assessment of Educational Progress (NAEP), just 34 percent of U.S. 8th-graders were proficient or better in reading, 7 percentage points below the 4th-grade average. Thirty-nine percent were proficient or better in math, a 6-point drop from 4th grade. Across the board, poor and minority 8th-graders do worse than their 4th-grade counterparts. Just 13 percent of African-American 8th-graders and 16 percent of low-income 8th-graders have reached reading proficiency. They post similarly poor numbers in math: 12 and 17 percent, respectively. [1][2]

Maryland middle schools are home to a similar performance challenge. On the Maryland School Assessment (MSA), 86 percent of 4th-graders are proficient in reading and math. But once they reach 8th grade, reading proficiency drops 18 points to 68 percent of students, and math proficiency drops 29 points to 57 percent. [3]

2007 Maryland School Assessments

(percent of students at or above Proficient; Reading and Math; Grade 3, Grade 5, Grade 8)

This achievement challenge is largely attributable to the achievement gap. A 16-point math gap between low-income 4th-graders and their wealthier classmates grows to 34 points in 8th grade. A 15-point reading gap between White and African-American 4th-graders nearly doubles to 29 points by the time they reach grade 8.[4]

Certainly, this does not mean there has been no improvement in middle school achievement. In fact, Maryland is making better progress in the middle grades than most states. Maryland is #1 in the nation for improving 8th-graders' NAEP reading scores, and #4 in improving their math scores.[5] [a] But as the statistics indicate, we have come so far in middle school precisely because that is where we have the farthest to go.

The Critical Middle

Decades after the high school reform movement was launched—a movement to increase course rigor and requirements; improve graduation, college-enrollment, and college-completion rates; and prepare students for high-skill, high-demand jobs—weaknesses in middle school threaten its success. Too many 8th-graders are leaving middle school without the knowledge and skills they need to do high-school-level work.
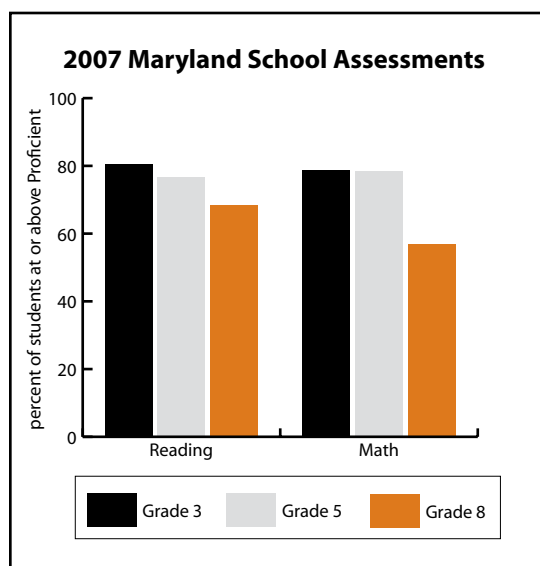
Teachers of high school freshmen report that one-quarter to one-third of their classroom time is dedicated to re-teaching skills and content that students should already have learned.[6] So it is not surprising that 30 percent of Maryland high school students who complete a core curriculum (four years of English, and three years of math, science, and social studies) need remediation in math once they get to college, or that 12 percent need remediation in English.[7]

Nor is it surprising that 45 percent of high school dropouts attribute their leaving—at least in part—to the fact that they started high school already academically behind.[8] In fact, we know well before high school which students will likely drop out. Poor attendance, poor behavior, a failing grade in math, and a failing grade in

English are all powerful risk indicators. A 6th-grader exhibiting *any one of them* has only a 10-percent chance of graduating on time and only a 20-percent chance of graduating a year late.[9]

We simply will not solve the *college*-readiness problem without solving the precipitating problem of *high school* readiness.

A Reason for Hope

The middle years do offer many promising opportunities. It is in middle school that students move from concrete to abstract thinking, refine their self-concept and social skills, develop lasting attitudes about learning and work, and begin taking responsibility for their education.[10] It is in middle school that students can understand complex career information and evaluate their course-taking decisions in those terms.

Middle school students are still optimistic about their chances for success. In a 2007 poll, 93 percent of middle-schoolers said there was no chance they would drop out of high school, and 92 percent said they definitely or probably would go to college.[11]

Our job is to close the gap between these sunny expectations and a rather dimmer reality. Nationwide, seven in ten 9th-graders will graduate on time,[12] and about two-thirds of graduates will enroll in college that fall.[13] While Maryland's on-time graduation rate (75 percent) outpaces the national average,[14] the state's immediate-college-enrollment rate (59 percent) falls short.[15] According to the National Center for Public Policy and Higher Education, that puts students' chance for college entry by age 19 at about 41 percent.[16]

The Way Ahead

If we do not boost these numbers, today's middle schoolers will later find themselves at a serious disadvantage. They will graduate—or not—into a global economy fueled by technological innovation and populated by a highly competitive international workforce. If they are not adequately prepared for high-wage, high-demand careers—emerging and mutating faster now than ever before—they will struggle to find their place in the world labor market.

Maryland is far from insulated from 21st-Century priorities. The federal Base Realignment and Closure plan will soon bring tens of thousands of science, information technology, and engineering jobs to Maryland—jobs that today's elementary- and middle-schoolers will have to fill.

It is clear that we must begin students' preparation for college and careers in middle school—by fostering academic achievement, supporting parent involvement, and providing postsecondary planning support.[17] With students more immediately and directly connected to and affected by different cultures, economies, political systems, and world events, we must instill in them a responsiveness to change, an ability to collaborate, a capacity for creative thinking and nimble problem-solving, and a willingness to be active managers of their own lifelong learning. Surely, teachers who are themselves creative thinkers and committed learners will be much better equipped to imbue these skills in their students.

Stuck in the Middle No More

Middle-schoolers have long been caught in an ideological tug-of-war between those who want to approximate the rigor of high school and those who want to replicate the environment of elementary school; between those who want to tend to students' affective needs and those who want to satisfy their cognitive growth.

We can acknowledge that the middle school years are a critical time in adolescent development and that social, emotional, and physical health is inextricably linked to academic success. At the same time, we can refuse to treat middle school as a waiting room for high school or let our very real concern for students' sense of identity and self-esteem undermine our academic urgency. In short, we can balance high standards with high support. Our middle-schoolers— about half-a-dozen years removed from college and the job market—deserve nothing less. ∎

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[a] NAEP improvement is from 2003 to 2007.

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[1] Jihyun Lee, Wendy S. Grigg, and Gloria S. Dion. (2007). *The Nation's Report Card: Mathematics 2007*. National Center for Education Statistics, U.S. Department of Education.

[2] Jihyun Lee, Wendy S. Grigg, and Patricia L. Donahue. (2007). *The Nation's Report Card: Reading 2007*. National Center for Education Statistics, U.S. Department of Education.

[3] Maryland State Department of Education. (2007). The Maryland Report Card. (http://mdreportcard.org/). Author.

[4] ibid.

[5] Christopher D. Swanson. (2008). "Grading the States." *Quality Counts 2008: Tapping into Teaching*. Editorial Issues in Education.

[6] ACT. (2007). *Rigor At Risk: Reaffirming Quality in the High School Core Curriculum*. Author.

[7] Maryland Higher Education Commission. (2006). College Performance of New High School Graduates. *Maryland Student Outcome and Achievement Report*. Author.

[8] John M. Bridgeland, John J. Dilulio, and Karen Burke Morison. (2006). *The Silent Epidemic: Perspectives of High School Dropouts.* Civic Enterprises.

[9] Robert Balfanz and Liza Herzog. (2006). "Keeping Middle Grades Students on Track to Graduation." Johns Hopkins University & Philadelphia Education Fund.

[10] Wendy Schwartz. (1994). *Vocational Education in the Middle School: Digest No. 155*. ERIC Clearinghouse on Adult, Career, and Vocational Education.

[11] National Association of Secondary School Principals/Phi Delta Kappa International. (2007). *A Voice from the Middle: Highlights of the 2007 NASSP/PDK Middle School Student Poll*. Authors.

[12] Christopher D. Swanson. op cit.

[13] U.S. Department of Labor, Bureau of Labor Statistics. (2007). "College Enrollment and Work Activity of 2006 High School Graduates." Author.

[14] Christopher D. Swanson. op cit.

[15] National Center for Higher Education Management Systems. (2004). "College-Going Rates of High School Graduates—Directly from High School." (http://www.higheredinfo.org/dbrowser/index.php?measure=32).

[16] National Center for Public Policy and Higher Education. (2006). *Measuring Up: State Reports*. Author.

[17] George L. Wimberly and Richard J. Noeth. (2005). *College Readiness Begins in Middle School: ACT Policy Report*. ACT.

Background

The Charge

State Superintendent of Schools Nancy S. Grasmick established the Middle School Steering Committee in September 2006 to improve teaching and learning in the middle grades. The Steering Committee was co-chaired by the Maryland State Department of Education's (MSDE's) Ilene Swirnow (Director of Elementary and Middle School Initiatives) and Mary Gable (Director of Instructional Programs), and by Harford County Public Schools' Gerald Scarborough (Assistant Superintendent for Curriculum and Instruction). It was composed of teachers, administrators, parents, college faculty, MSDE staff, and members of the business community.

The Committee was asked to review the previous work on middle schools and establish a list of issues where transforming practice offers the greatest impact on student learning; recommend ways to put those practices into effect; and report to the State Board on those recommendations. In charging the Committee, Dr. Grasmick asked that members consider not only practices whose effectiveness has been proved over many decades, but that they consider, too, bold new practices that will forever transform the middle school and what we expect of students there—practices that will prepare students for college and for 21st-Century careers.

Areas of Focus

The Steering Committee conducted extensive study into the research on middle-level education. Acknowledging that they could not address every aspect of middle-grades reform, the members assembled into workgroups focused on five areas where transformational change is needed and where such change could effect the greatest result: 1) curriculum and instruction, 2) professional development, 3) leadership, 4) teacher quality, and 5) school structure. Not every condition that breeds and supports academic achievement is addressed in this report. For example, all students deserve to learn in a safe and orderly environment. School staff must create a climate that stimulates intellectual development and establish nurturing relationships in a caring community of shared educational purpose. The Committee accepted these as absolutes and made no recommendations based on them.

The Gifted, the Struggling & Those In Between

The Committee understands that all students need a rigorous, relevant education that provides them opportunities to expand their knowledge and extend their study through engaging instruction and real-world applications. However, it understands, as well, that these students have different interests and abilities. Some will succeed easily, some will master content with time and effort, and some will struggle to do so. Students in one category need something fundamentally different than those in the others, and so the Committee dedicated itself to serving them all, neglecting neither the students who have mastered middle school skills and content and need more rigorous programming to challenge their intellectual curiosity, nor those who struggle with middle schools' increasingly complex curricular content and need more intensive support to master it.

English Language Learners

Over the last 10 years, the number of English language learners in Maryland's public schools has jumped 40 percent. In addition to the performance and social challenges faced by their English-speaking peers, English language learners face the additional challenges of learning a new language and negotiating a new culture. Their teachers, in turn, are challenged to teach students whose backgrounds are marked by different circumstances, different educational and

cultural experiences, and, of course, different languages. Meeting the needs of middle school English language learners through specialized English language instruction is only part of the equation. Another critical part is ensuring that they interact with content teachers who understand second-language acquisition and create a safe and supportive environment in which they may learn.

Students in Special Education

Middle school students with disabilities deserve rigorous content delivered by highly qualified teachers. They deserve differentiated instruction to meet their unique needs; to be included, as appropriate, in the regular education classroom; and, of course, the faithful implementation of their Individualized Education Programs. To facilitate the sharing of instructional strategies—strategies that enhance learning for *all* students—special education teachers should be included on content teams, and professional development should be provided to all teachers on topics such as using technology to differentiate instruction, alternative means of assessment, meaningfully engaging the parents of students with disabilities, and fair and scrupulous accountability for all students.

Caring Relationships

Success in middle school, maintain the experts, is built not only on curricular rigor and relevance but also on the *relationships* adolescents form with teachers and other school-based adults. Caring relationships foster students' emotional and intellectual growth, and improve students' transition from elementary to middle school.

Research shows that students' perceptions of the school environment can buffer negative changes often associated with the middle school transition, such as disengagement and a drop in performance. Students who have a negative perception of teacher support tend to value the subject less, whereas those who have a positive view of teacher support value the subject more.[1] In high-performing schools, relationships between students and staff—built on respect, responsibility, honesty, civility, and tolerance—are deliberately nurtured. "Students believe the

staff genuinely cares about them and encourages them to achieve."[2]

While a connection to caring adults *alone* has been shown insufficient to promote achievement gains in the middle grades, a balance between supportive relationships and academic demands promotes both achievement and social/emotional well-being—a balance that is particularly important for the adolescent learner.

Review and Funding

The Committee shared its recommendations with superintendents, assistant superintendents for instruction, the Principals' Advisory Council, and many other stakeholder groups, and has made revisions based on their feedback.

Finally, the Committee recognizes that there is a finite amount of money available to education and therefore suggests that districts continue to assess the needs of their schools and their students in light of the resources available and consider reconfiguring their budgets so that these practices may supplant—rather than supplement—existing ones. ■

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[1] Jaana Juvonen, Vi-Nhuan Le, Tessa Kaganoff, Catherine Augustine, and Louay Constant. (2004). *Focus on the Wonder Years*. Prepared by the Rand Corporation for the Edna McConnell Clark Foundation.

[2] Raymond J. McNulty and Russell J. Quaglia. (2007). "Rigor, Relevance and Relationships." *The School Administrator*. American Association of School Administrators.

It is easy for those who don't work with middle-level students to forget that 6th-graders are only five or six years removed from their teddy bears; those who do work with middle-level students sometimes forget that, by the time students leave "the middle," the rigors of college are only four short years away.

Breaking Ranks in the Middle
National Association of
Secondary School Principals

Goal

Before developing a set of specific recommendations to improve Maryland's middle school programs, the Middle School Steering Committee determined exactly what those recommendations should accomplish. This middle school goal appears in the box below. Following the goal statement are brief descriptions of the terms used.

Goal

All middle school students will be provided a rigorous and relevant core academic program that engages them in learning, develops critical literacy skills, and prepares them for high school success, postsecondary enrollment, and 21st-Century careers.

A "core academic program" includes English/Language Arts, Mathematics, Science, Social Studies, World Languages, Fine Arts, Health, and Physical Education.

Rigor

Academic rigor "helps students develop the capacity to understand content that is complex, ambiguous, provocative, and personally or emotionally challenging."[1] Delivering a rigorous middle school program is central to the goal of preparing all students for success in and after high school.

Relevance

Curriculum, instruction, and assessment in the middle years must have meaning, must be developmentally responsive, and must make connections to students' lives and the world around them. Middle school students need relevance in *how* they learn—that is, they must have ample opportunities to engage in different modes of learning and expression, such as talking together and with a teacher, listening, writing, designing, and carrying out projects. Students also need relevance in what they learn. The curriculum must help students make sense of and prepare them to participate in the rapidly changing world into which they will graduate.[2]

Engagement

Adolescent learners must be meaningfully connected to their learning. They "must believe in themselves, be excited about their learning, and see the link between what they learn today and who they want to become tomorrow. When these pieces are in place, students are more likely to participate in the learning process. And when they participate, they are more likely to achieve."[3]

Literacy Skills

Reading and writing are critical processes allowing students to learn and communicate content across all curricular areas. All disciplines rely heavily on text to store and communicate knowledge. Thus, reading and writing proficiency are critical determinants of students' overall academic success.[4] Certainly, sophisticated reading and writing skills vary among disciplines; however, literacy—the ability to interpret, evaluate, and make use of information—is essential to each.

Core Academic Program

The courses identified on the next pages are important to students' cognitive, social, and emotional development. Therefore, depriving any student instruction in any one subject—to remediate him or her in another, for example—is counterproductive.

English/Language Arts
The content of English instruction in the middle school is literature, language, and oral and written composition. The study of literature includes comprehension, analysis, and evaluation of

short stories, novels, poetry, drama, biography, autobiography, and literary nonfiction. Through these literary types, students explore theme and author's craft. Through the study of language, including grammar concepts and skills, students learn to manipulate and control language to improve both their oral and written expression. The study of oral and written composition refines and extends the stages of the writing process and provides opportunities for students to write in a variety of forms, for a variety of purposes, and for diverse audiences. It is through the language arts of reading, writing, speaking, and listening that students acquire the content of English and refine these skills.

Reading is an essential receptive tool that helps students locate information and comprehend complex text. It helps students analyze and appreciate print and non-print text. It helps them think critically, evaluate their own work and the work of others, and find enjoyment in popular media. Writing is an essential expressive tool for sharing information, interpreting text, offering opinion, and presenting persuasive argument. Through writing, middle school students develop their own voices—refining and extending their knowledge of writing correctness, effectiveness, and appropriateness.

Mathematics

Mathematics provides students a foundation for logic and problem-solving through the study of algebra, geometry, measurement, statistics, probability, and number sense. Mathematics instruction builds quantitative literacy—the ability to interpret data and make well-founded mathematical judgment. These skills are essential for navigating the 21st Century's competitive, global marketplace. While Maryland's Voluntary State Curriculum explicitly outlines the math content critical for adolescent learners, these students can benefit from a coordinated approach common in STEM (science, technology, engineering, and mathematics) programs.

Science

Science education provides students the skills and processes critical to the study of Earth/ space science, life science, chemistry, physics, and environmental science. High-quality science instruction will prove key to a thriving economy, to strengthened national defense and security, and to the population's health and quality of life. The fundamental elements of scientific inquiry—observation, research, communication, understanding how theories are constructed, developing hypotheses, experimentation, analysis of data, and the formulation of appropriate conclusions—have important applications that transcend the science setting. (Science instruction would also benefit from STEM programming's transdisciplinary approach.)

Social Studies

Social studies instruction addresses content knowledge, skills, and beliefs in political science, history, geography, and economics. Social studies also draws on the humanities, literature, art, music, drama, and philosophy to enrich the exploration of what it means to be human in this time and culture—as well as in times past. The humanities within the social studies support students' intellectual and social development as thoughtful humans able to contribute to civil society—through inquiry, analysis, critical understanding, reflection, creativity, and interpretation. The goal of social studies is to create young people capable of being informed, engaged, and participatory citizens of the state, nation, and world.

World Languages

World-language study offers students practical benefits in a global, multilingual society in which cultures, customs, and languages converge. Language instruction provides students the social and linguistic prerequisites for effective cross-cultural interaction and understanding. Students who learn a second language gain an academic edge as well. Students with long sequences of world-language experience earn higher scores on college-placement exams than those with none.

Fine Arts

Fine-arts study provides students multiple lenses for viewing the world. Instruction in dance, music, theatre, and the visual arts bolsters critical thinking and creative problem-solving; cultivates skill, discipline, flexibility, and innovation; seeds motivation, perseverance, and self-awareness; and fosters tolerance. Engagement in the arts has a demonstrable and sustained effect on students' achievement in other subjects. This effect is particularly strong among young children, students from low-income households, and students needing remedial instruction. Moreover, fine-arts programs correlate strongly with a positive school climate and students' sense of connection and belonging.

Health

A comprehensive health education program helps students adopt and sustain behaviors that promote a healthy lifestyle and reduce health risks. Health instruction guides students through topics like physical, social, and emotional wellness; nutrition and exercise; safety and violence prevention; mental health and conflict resolution; and the effects of risky behavior. At a time when students are developing rapidly, when relationships with peers and families irrevocably change, and when the transitions faced are untested and the temptations unfamiliar, health education strengthens adolescents' ability to make healthy choices in school and long thereafter.

Physical Education

Physical education develops in students healthy habits and general fitness; shapes positive attitudes toward physical activity; and gives students the physical skills and conditioning they need to enjoy these activities and sustain them throughout their lives. Physical education increases fitness (cardiovascular endurance, strength, flexibility, and coordination); improves attention and mood; cultivates social skills like sportsmanship, teamwork, leadership, and tolerance; boosts self-esteem; and strengthens students' inclination and capacity to pursue other challenges, including academic ones. ∎

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[1] Richard W. Strong, Harvey F. Silver, and Matthew J. Perini. (2001). *Teaching What Matters Most: Standards and Strategies for Raising Student Achievement*. Association for Supervision and Curriculum Development.

[2] Dan French. (2003). "Addressing the Middle Grades Gap." *The Term Paper*. The Piton Foundation.

[3] Raymond J. McNulty and Russell J. Quaglia. (2007). "Rigor, Relevance and Relationships." *The School Administrator*. American Association of School Administrators.

[4] Jacy Ippolito, Jennifer L. Steele, and Jennifer F. Samson. (2008). "Introduction: Why Adolescent Literacy Matters Now." *Harvard Educational Review*. Harvard Education Publishing Group.

Executive Summary

The middle grades are an exciting time of significant change for the adolescent learner. Middle schoolers are in the process of refining their social skills and their self-concept. They begin taking responsibility for their education and making decisions about their own learning. They start planning for college and careers, understanding for the first time how their academic choices now will affect their goals later.

However, many students struggle in the middle—with a more challenging curriculum and sharply rising expectations; with a more imposing, less nurturing environment; and with more non-school interests competing for their time and attention. All these things take an academic toll. Not surprisingly, it is in middle school that academic progress slows, performance declines, and achievement gaps persist.

The Middle School Steering Committee

In September 2006, State Superintendent of Schools Nancy S. Grasmick convened the Middle School Steering Committee to improve teaching and learning in the middle grades. The Steering Committee was asked to identify areas where transforming practice offers the greatest impact on student learning, and to recommend ways to put those practices into effect.

Before setting about the work of issuing recommendations, the Steering Committee drafted a singular goal that every recommendation must support:

All middle school students will be provided a rigorous and relevant core academic program that engages them in learning, develops critical literacy skills, and prepares them for high school success, postsecondary enrollment, and 21st-Century careers.

The Recommendations

The recommendations supporting this goal are based in substantial research proving their benefit. Each is essential to the mission of improving middle school practice and, ultimately, preparing students for a century marked by global competition, rapidly advancing technologies, leaner workplaces, and steeper learning curves.

The recommendations compel educators and institutions to cultivate the attributes that will help students navigate this complex, competitive climate—for instance, competence in math, science, and technology; global awareness and fluency in languages other than English; technology and information literacy; and a capacity for those skills that predict lifelong success, such as creative and critical thinking, nimble problem-solving, productive collaboration, and persuasive communication.

Informed by these needs and more, the Committee's recommendations will help us rethink what we do in middle school, and re-imagine what we expect of middle-schoolers, so that we can better support their success—in the classroom and, more importantly, well beyond it.

Recommendation 1: Instructional Time

Extend the middle school day and school year as dictated by the needs of the learner.

- Extend the middle school day to address this report's programmatic recommendations and the needs of the middle-level learner.
- Provide extended-day, extended-year, and summer programs, as well as virtual schools, to meet the acceleration, remediation, and enrichment needs of middle-level learners.

Preparing all students for 21st-Century success means providing them individualized instruction. Instruction that is driven by student performance gives struggling learners the chance to master content, and gifted learners the chance to take on additional challenges. Neither outcome will be accomplished without more time in the middle school day and/or year and more flexible scheduling of it.

The Steering Committee encourages local districts to create flexible work schedules for staff, use online learning applications, and employ part-time personnel in the early morning and late afternoon to bookend the student day (allowing the provision of acceleration and intervention services without removing students from core courses). Summer programming also offers opportunities to support both struggling and advanced learners.

Increased instructional time for students should be met with increased learning time for teachers, so that interdisciplinary teams may engage in collaborative work, plan instruction, and monitor their use of a transdisciplinary curriculum, and so that content teams may schedule subject-specific professional development, collaborate on lesson design, examine student work, and analyze assessment data.

Recommendation 2: Algebra

Prepare students to complete algebra by the end of 8th grade.

- Compress the preK–8 Voluntary State Curriculum so that instruction in pre-algebra is completed by the end of grade 7.
- Analyze math achievement data, starting in the earliest grades, to identify students who are not performing at grade level, and immediately put into place programs and practices that develop students' proficiency.
- Offer students who complete algebra before grade 8 opportunities to engage in advanced mathematics in age-appropriate settings.

The best preparation for the 21st Century's global economy is a strong background in math, for today's science and technical subjects require advanced mathematics, and algebra is the gatekeeper course for it. Therefore, all students should take a significant course in algebra by the end of grade 8—one that uses the Algebra/Data Analysis Core Learning Goals as the course basis.

Success in algebra by the end of grade 8 requires planning and preparation throughout the elementary grades. While the preK–8 Voluntary State Curriculum (VSC) in Mathematics was back-mapped directly from the Algebra Data/Analysis Core Learning Goals, the VSC was meant to be delivered over 10 years. Therefore, the VSC must be compacted into nine years, so that all students have had the opportunity to learn—by the end of grade 7—the prerequisite skills for algebra in grade 8. Furthermore, teachers must be provided additional math content training so that they can manage the new curricular challenges facing them.

Every year that students' math deficiencies are not caught, their struggle to reach grade-level standards is compounded. Therefore, student data should be carefully monitored, and remediation programs immediately begun should that data show a need.

Recommendation 3: Integrated STEM Instruction

Provide students integrated math, science, and technology instruction with a focus on problem-solving and real-world application.

- Provide cross-disciplinary experiences in the STEM subjects.
- Encourage and support partnerships with businesses to allow students to apply their learning and interact with scientists, engineers, and information technology experts, among others.

The STEM disciplines—science, technology, engineering, and mathematics—are receiving intense focus because 1) the global economy is driven by innovations in these fields, and 2) the U.S. faces a critical shortage of STEM professionals. With rapid STEM program development in high school, middle schools must provide their students integrated, problem-based experiences in these subjects. These experiences not only provide students the foundation they will need for more in-depth high school study, they also develop students' problem-solving skills—skills that are critical in all subjects.

A high-quality STEM curriculum should also enrich students' career-exploration activities and broaden their perceived career options. Thus, middle school programs should include opportunities for students (and teachers and parents and counselors) to learn about STEM-dependent jobs, and allow students to interact with professionals employed in the STEM fields.

Recommendation 4: World Languages

Enroll every student in a sequential world-language course in 6th grade.

- Provide a variety of language choices for students.
- Provide programs that allow students to improve their heritage-language skills while learning and mastering English.

Producing internationally literate graduates—graduates who are culturally aware and proficient in languages other than English—is

critical to U.S. security, to global collaboration and competition, and to personal and national prosperity. Research shows that virtually all students can learn a second or third language and that world-language programs benefit all students: Across student subgroups, language learning correlates with higher standardized test scores.

Therefore, middle schools should provide a sequential language program for all students beginning in grade 6. This sequence should articulate with elementary and high school programs, so that students making the transition from one school level to the next can advance smoothly, without repeating the language skills and vocabulary they have already learned.

Additionally, expanding heritage-language programs offers an opportunity to improve heritage speakers' language skills and amplify their cultural literacy, while protecting the nation's linguistic resources.

Recommendation 5: Disciplinary Literacy

Stress the reading, writing, and thinking skills in each discipline as an integral component of the subject.

- Throughout all courses, engage students in learning activities in reading and writing.
- Emphasize the Voluntary State Curriculum's disciplinary literacy skills in each content area.
- Provide content-specific exemplars through the Voluntary State Curriculum toolkit.

Because literacy skills are so essential, reading and writing cannot be isolated in the language-arts classroom; it must be the cornerstone of instruction in every subject. Furthermore, disciplinary literacy is not a skill set to be addressed once students have grasped curricular content; it is a vehicle for helping them do so.

Given that teachers in each discipline must emphasize certain kinds of reading and writing over others, they need their own opportunities to learn the literacy skill content particular to their subject, incorporate it into their academic lessons, and review student work in cross-curricular teams to ensure that expectations are consistent.

Recommendation 6: Fine Arts

Provide all students fine-arts instruction that develops their literacy in music, dance, theater, and visual arts.

- Provide adequate resources, including highly qualified arts teachers, to support discipline-based arts education.
- Provide teachers professional development in integrating the arts into their content areas.
- Engage community arts and cultural organizations to provide arts enrichment for all students.

While the fine arts—music, theater, dance, and visual arts—have intrinsic value as intellectual disciplines, they also have a significant impact on achievement across the curriculum. High-quality arts education raises test scores, improves motivation and attendance, enhances students' social interactions, and boosts teacher retention and parent involvement.

High-quality arts instruction also correlates with positive habits of mind—envisioning, empathy, inventiveness, critical thinking, creative problem-solving, and exercise of judgment—as well as overarching intellectual capacities such as spatial-temporal reasoning, observation, perception, and memory.

To capitalize on the promise of high-quality instruction in the arts, adequate resources must be dedicated to fine-arts programs, and highly qualified teachers must teach them. Teachers must be provided professional development in integrating the arts into their content areas, and schools and school systems must engage with community arts and cultural organizations to provide arts enrichment for all students.

Recommendation 7: Technology & Information Literacy

Teach information literacy and use technology in all subjects.

- Use technology and, where appropriate, online courses for all students, including those not demonstrating mastery and those exceeding grade-level expectations.
- Provide all students technology experiences, such as Web design, podcasting, computer graphic arts, and multimedia production.

When technology is used in direct support of the curriculum, it can improve students' content-area learning and increase their interest in that content. Technology refines students' research and organizational skills; builds their higher-order thinking and problem-solving capacity; facilitates emotionally meaningful curricula and authentic learning; helps students apply their learning to real-world situations; and prepares them for the 21st-Century workplace. Information literacy, often reliant upon technology, helps students create and gather information as well as analyze its validity and use it to solve problems.

Given the saturating use of technology in communications and production; the interconnected, globalized marketplace; and the intense focus on STEM competitiveness, it is essential that all students be able to use current technologies in their everyday learning and understand their creative and problem-solving applications. Likewise, given the proliferation of information absorbed every day, and the similar proliferation of technologies used to access, create, and manipulate it, students need to be literate producers and consumers of information. Their success in school—and long after—depends on it.

Recommendation 8: Skills for Lifelong Success

Teach those skills that, in addition to content mastery, are essential for school success.

- Integrate critical thinking, problem solving, organization, communication, and other skills into the core content areas.
- Provide opportunities for students to learn and apply these skills through in-school, after-school, and/or summer school programs.

For 21st-Century success, core content mastery is essential but insufficient. Success will go to competent critical thinkers and problem solvers; those who are innovative and creative, able to communicate and collaborate, and adept in the use of information, media, and technology.

In core academic classes, students need meaningful exposure to 21st-Century themes, such as civic literacy; global awareness and cross-cultural skills; and financial, economic, and entrepreneurial literacy. Students also need time and opportunities to practice life and career skills: flexibility, initiative, self-direction, productivity, accountability, and leadership.

Finally, students must know how to be successful. They need instruction in study and organizational skills, such as note-taking and time management. And they need experience and practice with habits of mind—habits that compel intelligent behavior when the answer is not known (for example, persisting, communicating with clarity and precision; managing impulsivity; gathering data through all senses; listening with understanding and empathy; imagining, innovating, and thinking flexibly).

Recommendation 9: Advanced Learners

Provide accelerated and enriched instructional pathways for advanced learners.

- Identify those advanced/gifted and talented learners who perform, or show the potential to perform, at remarkably high levels when compared to their same-age peers.
- Create a system for accelerating instruction, including curriculum compacting, curriculum telescoping, subject acceleration, and grade-level acceleration.
- Provide instructional enrichment through authentic inquiry, research, creative production, and the real-world application of knowledge.

Students who have already mastered grade-level content, or are capable of mastering it faster than their classmates, must be able to embark on accelerated and enriched curricular pathways. Acceleration—one of the most efficient ways to match curricular complexity to the advanced student's readiness and motivation—progresses students through an educational program at a faster rate or younger age than is typical. Enrichment deepens students' understanding through authentic inquiry, research, creative production, and the real-life application of knowledge. Enrichment and acceleration challenge advanced learners and protect them from the boredom that plagues many highly capable students made to follow the curriculum delivered to their same-age peers.

Providing an appropriately challenging education for advanced middle school students will prove critical to Maryland's economy. Base Realignment and Closure (BRAC) will soon bring tens of thousands of high-skill, high-wage jobs to the state—jobs that will require more education and more expertise. Maryland's current workforce gaps will only widen if we fail to provide accelerated and enriched pathways for the students who have demonstrated their ability to succeed in them.

Recommendation 10: Teacher Preparation

Ensure that teachers are prepared to work specifically with the middle-level learner.

- Establish an *ad hoc* middle-level work group within the Division of Certification and Accreditation to:
  - Refine elementary and secondary preparation programs based on the National Middle School Association standards and the instructional recommendations in this report; and
  - Identify the courses necessary for the recertification of middle-level teachers.
- Establish partnerships between local school systems and colleges/universities to create programs to prepare teachers specifically for middle-level education.

Research identifies needs that are specific to early adolescent learners and strategies that are specifically effective in meeting them. However, few Maryland middle school teachers come to their classrooms prepared to teach the middle-level learner; virtually all complete either elementary or secondary preparation programs.

This preparation gap requires a two-part solution. First, elements of middle school pedagogy, attributes of the middle-level learner, and curricular threads should be infused into current elementary and secondary preparation programs. This will help prepare elementary and high school teachers who go on to teach in middle schools, and will give all elementary and secondary teachers greater knowledge of the contiguous landscape in which their students learn. This work should also include identifying courses that teachers in the middle grades must take for recertification.

Second, colleges and universities should work individually with local school systems to develop preparation programs specifically for middle school teachers. This admittedly complex work will have the added benefit of enhancing the professional development colleges currently offer middle-level educators.

Recommendation 11: Professional Development

Provide all middle school teachers high-quality professional development.

- Establish an *ad hoc* middle-level workgroup within the Professional Development Coordinators' Network and the Leadership Development Coordinators' Network to:
  - Identify the in-depth knowledge all middle-level educators need in terms of content, pedagogy, and the characteristics (cognitive, emotional, and social) of middle school students;
  - Build educator capacity by engaging administrators, teachers, and central office staff in ongoing, job-embedded, data-driven, systemic professional development;
  - Include in recertification, in-service and college courses, and school-based learning opportunities the topics addressed in this report; and
  - Provide consistent, embedded support to teachers at the school and school-system levels.
- Provide educators strategies to address the needs of advanced students, students with special needs, English language learners, and students of diverse international backgrounds.

High-quality professional development is critical to improving performance among teachers and students alike. That professional development is most effective when it is sustained and continuous; when it is based on documented student needs, and identifies the specific knowledge and skills teachers must have to address those needs; when it is content-specific, includes content-specific teaching strategies, and aligns with Maryland's curriculum; when it addresses the cognitive, emotional, and social characteristics of middle schoolers; when it includes strategies to differentiate instruction for advanced students, students with special needs, and English language learners; when it extends over a period of time long enough to accommodate learning, reflection, practice, and feedback; when it is embedded in the regular school schedule; and when it is evaluated to measure teachers' learning outcomes, the application of skills, and their impact on student learning.

The topics addressed throughout this report—e.g., disciplinary literacy; technology and information literacy; integrated STEM instruction; data analysis and use; characteristics of the middle-level learner; skills for lifelong success—should be included in the learning opportunities provided teachers.

Recommendation 12: School Leadership

Establish a leadership team in every middle school, led by a principal who is an instructional leader.

- Staff each middle school with a highly qualified principal who is the instructional leader.
- Build the capacity of the leadership team to improve student achievement and adult learning.

Instructional leaders provide direction, resources, and support to teachers and students. They focus on helping teachers improve their classroom performance and make academic achievement their schools' top priority. School leadership teams are discretionary teams selected by and including the principal, consisting of professional personnel who hold designated leadership positions in the school and are charged with improving classroom instruction.

The leadership team can transform a school into a learning community by supporting the school vision, modeling what is valued, facilitating collaborative planning, providing ongoing, job-embedded professional development, and monitoring progress toward goals. Team members can stimulate change by serving as instructional coaches, role models, and mentors to teachers. Ensuring that every middle school in Maryland has a high-quality, collaborative leadership team is essential to increasing student achievement and is a pivotal piece of continuous school improvement.

Recommendation 13: Assessment & Feedback

Regularly assess student learning and use assessment results to guide instructional, course-taking, and organizational decisions.

- Administer and analyze aligned formative and summative assessments to provide teachers and administrators accurate and comprehensive data on student progress.
- Provide timely, descriptive feedback to guide students' learning and improve their performance.

Research demonstrates that assessment can dramatically increase student achievement if four conditions are met: 1) assessment feedback gives students a clear picture of their progress on learning goals and how they might improve; 2) assessment feedback actually encourages students to improve; 3) classroom assessments are formative; and 4) formative assessments are frequent.

Formative assessments facilitate continuous feedback, which—when clear, explanatory, and encouraging—is among the most powerful tools for enhancing students' performance, especially those whose performance lags the most. While the Steering Committee does not recommend a specific number of assessments to administer during instruction, research indicates that frequency of assessment is closely related to achievement. Therefore, teachers should systematically use formative assessments to facilitate students' content mastery and summative assessments to measure it.

Recommendation 14: Skill Mastery

Emphasize students' mastery of essential skills.

- Differentiate instruction, provide multiple learning opportunities, and offer acceleration, enrichment, and remediation as needed so that students may fully demonstrate content mastery.
- Identify essential learning skills by grade and use them to prioritize instructional decisions.
- Provide students and parents frequent reports that explicitly describe students' progress in mastering content in each subject.
- Use these mastery reports to inform teaching, re-teaching, extending, and enriching.

In middle school, the educational emphasis should be on skill mastery. That is, students must meet or exceed grade-level standards, and understand why course mastery is non-negotiable. Mastery among all students relies on differentiated instruction and programming, as well as scrupulous documentation and communication of students' progress. Frequent reports will allow students to assess their own academic progress and keep parents informed of their child's academic strengths and weaknesses as measured against articulated learning goals and performance standards. These reports and the communication they engender will also help shape the instructional strategies used for each student.

In some instances, ensuring content mastery will entail prioritizing the curriculum to deal with the dilemma of abundant objectives and limited time. Prioritizing does not eliminate curricular objectives, but codes them, allowing all content-specific teachers within a school to emphasize the same essential learning.

Recommendation 15: Parent & Student Partnerships

Partner with students and parents, using student data to guide educational decisions.

- Develop for each student a unique learning profile—accessible to the student and his/her parents—that indicates mastery of course content; documents acceleration, remediation, and enrichment activities; informs course selection; and influences preparatory activities for high school, college, and careers.
- Schedule a minimum of three transition conferences with students and parents—one during grade 5, one during grade 6 or 7, and one during grade 8—to review assessment data and school performance.
- Use student data to make instructional and programmatic decisions at the classroom, school, and school-system levels.

Regular, meaningful communication with parents and students is a key contributor to student success. Active engagement with parents helps keep them involved in their child's education past the elementary years; helps redefine that involvement for each school level; and helps parents become comfortable partners with the school and its staff. Engaging students—letting them take a leadership role in parent/teacher conferences, and encouraging goal-setting and decision-making—helps students develop confidence in their own learning and take responsibility for it.

A seamless transition among school levels depends on routine conferencing. Learning profiles—containing the assessment, benchmark, and goal data needed to develop the best educational program for each student—are a key resource for these conferences. The profiles must be accessible to families and to schools, so that both can use the data to make instructional, programmatic, and course-taking decisions and monitor student progress. Student profiles should also include college and career planning information, so students may better understand the real work required to meet their goals.

Recommendation 16: Organizational Structures

Develop flexible schedules that provide adequate time for students to master concepts and skills and for teachers to collaborate.

- Establish transition programs between elementary and middle school, and middle and high school.
- Create opportunities for feeder system staff (personnel from elementary and middle schools, and middle and high schools) to meet and share information.
- Establish after-school, summer school, and extended learning opportunities to support identified programs and to meet students' individual needs.
- Develop a master schedule that allows planning time for interdisciplinary and content teams.

Given that school structure is a local decision best based on the needs of the students and communities served, and given that the research offers no one organizational model as the most effective, the Steering Committee has not recommended one. However, it is clear that those grades broadly considered the "middle" must be responsive to the unique and diverse needs of the middle-level learner. Organizational flexibility and feeder-school collaboration must overcome the division that any school structure—any grade configuration—naturally imposes.

School-day and extended-day/year programs must help middle-schoolers master core academic content and, at the same time, accommodate their social habits and emotional needs. Transition programs must support students and parents and bring school personnel together to learn about one another's curriculum and requirements, as well as the needs of the students in transition. Sufficient time must be provided to teachers for interdisciplinary and content teaming, and the scheduling infrastructure must be flexible enough to provide time for accelerated or intensive instruction within the school day. ∎

Recommendations Overview

The Middle School Steering Committee has issued 16 recommendations to support its goal (see box). The recommendations, rooted in research and best practices, will help Maryland improve middle school teaching and learning and, ultimately, prepare students to compete and cooperate globally for jobs that we can only imagine, in industries that do not yet exist.

Preparing students for a transformative century requires transformational recommendations—recommendations aligned with 21st-Century realities: global competition, rapidly advancing technologies, leaner workplaces, and steeper learning curves. This already demanding climate will grow only more challenging over time and, to thrive in it, students will need very different skills than they did just 15 or 20 years ago.

With strong mathematical knowledge and experience providing the foundation for global competitiveness, and with scientific and technological literacy heavily dependent upon them, we need graduates who can succeed in the full complement of math subjects—algebra, geometry, trigonometry, and calculus—and who have access to high-quality, integrated STEM instruction.

With one-quarter of the U.S. economy attributable to international commerce, and one-quarter of new jobs the result of foreign trade, we need graduates who are fluent in world languages and who are globally aware, who understand the connectedness of nations—historically, politically, economically, and ideologically—and the implications of those connections and interactions.

We need graduates who are digitally literate, who can use technology to increase productivity, solve complex problems, and communicate powerfully and persuasively. We need students who are inventive thinkers, who can adapt to their environment and manage its complexity; who can set goals independently and meet them; who can reason, compare, infer, and interpret; who can take risks and tackle problems without

Goal

All middle school students will be provided a rigorous and relevant core academic program that engages them in learning, develops critical literacy skills, and prepares them for high school success, postsecondary enrollment, and 21st-Century careers.

obvious solutions. And we need to meaningfully support those students who can do all these things and more. We need accelerated pathways and enriched opportunities for gifted learners so that they experience neither neglect nor frustration and can pursue their interests and talents at their own pace.

Informed by these needs and more, the Steering Committee's recommendations will help us rethink what we do in middle school, and re-imagine what we expect of middle-schoolers, so that we can better support their success—in the classroom and, more importantly, well beyond it. ∎

Extend the middle school day and school year as dictated by the needs of the learner.

Strategy 1
Extend the middle-school day to address this report's programmatic recommendations and the needs of the middle-level learner.

Strategy 2
Provide extended-day, extended-year, and summer programs, as well as virtual schools, to meet the acceleration, remediation, and enrichment needs of middle-level learners.

"Time is learning's warden. Our time-bound mentality has fooled us into believing that schools can educate all of the people all of the time in a school year of 180 six-hour days. The consequence of our self-deception has been to ask the impossible of our students. We expect them to learn as much as their counterparts abroad in only half the time."[1]

Collectively, the Steering Committee's middle school recommendations focus on providing all students the rigorous, relevant curriculum they will need for 21st-Century success. The recommended curriculum includes an emphasis on disciplinary literacy; the use of technology to support and extend learning; intensive, problem-based math and science education; world-language instruction; and the teaching of 21st-Century skills. Then, of course, there are the state's and the nation's challenging core-curriculum mastery requirements. It is naïve to believe that most students can succeed in all these competencies in the time allotted; it is ludicrous to believe that all of them can.

Preparing all students for 21st-Century success means providing them individualized instruction. Instruction that is driven by student performance gives struggling learners the chance to master content, and gifted learners the chance to take on additional challenges. Neither outcome will be accomplished without more time in the middle school day and more flexible scheduling of it.

Increased instructional time for students should be met with increased learning time for teachers. Teachers need time during the school day to engage in collaborative work. Interdisciplinary teams need time to plan instruction and monitor their use of a transdisciplinary curriculum. Content teams need time for subject-specific professional development, lesson design, the examination of student work, and the analysis of assessment data.

The Steering Committee encourages local districts to create flexible work schedules for staff, use online learning strategies, and employ part-time personnel in the early morning and late afternoon to bookend the student day (allowing the provision of acceleration and intervention services without removing students from core courses).

Summer programming also offers opportunities to support both struggling and advanced learners. Researchers conducting long-term studies in Baltimore City schools have attributed much of the achievement gap between low- and middle-income students to what happens over the summer. While disadvantaged students start school with lower achievement scores than their wealthier peers, during the school year, they all tend to progress at the same rate. Over the summer, however, the poorer students stay where they are—or, worse, fall behind—while the wealthier students (who are more likely to visit libraries and museums, take out-of-town trips, and play organized sports, among other things) build their skills steadily.[2][a] Given the nature of these skill-building activities, the research supports summer programs that focus as much on enrichment as they do on remediation—programs that tend to students' social, emotional, and physical needs, as well as their academic development.

This holistic approach to summer programming works for advanced learners, too. Summer programs offer gifted students more time for intellectual challenge, the chance to interact with other gifted learners, and opportunities to nurture their existing interests and develop new ones.

Fourteen years ago, the National Education Commission on Time and Learning wrote, "Time is the missing element in our great national debate about learning … "[3] Given that increased time and flexible scheduling are still the middle-school exception rather than the rule, it is incumbent upon us to bring these issues to the forefront of our reform agenda.

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[a] These setbacks pile up. Ultimately, researchers attributed two-thirds of the difference in students' probability of pursuing a college-prep path in high school to summer learning opportunities—or the lack thereof.

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[1] National Education Commission on Time and Learning. (1994). *Prisoners of Time.* Author.

[2] Karl L. Alexander, Doris R. Entwisle, Linda S. Olson. (2007). "Lasting Consequences of the Summer Learning Gap." *American Sociological Review.* American Sociological Association.

[3] National Education Commission on Time and Learning. op cit.

Prepare students to complete algebra by the end of 8th grade.

Strategy 1
Compress the preK–8 Voluntary State Curriculum so that instruction in pre-algebra is completed by the end of grade 7.

Strategy 2
Analyze math achievement data, starting in the earliest grades, to identify students who are not performing at grade level, and immediately put into place programs and practices that develop students' proficiency.

Strategy 3
Offer students who complete algebra before grade 8 opportunities to engage in advanced mathematics in age-appropriate settings.

In October 1957, the Soviet Union launched Sputnik I. The launch initiated not just the Space Age, but the U.S./U.S.S.R. space race—a race America was obviously losing. For the first time, schools were told to raise the bar in math and science. Over the years, pressure to improve math and science achievement has not abated: *A Nation at Risk* (1983),[1] *Before It's Too Late* (2000),[2] and *Rising Above the Gathering Storm* (2006)[3] have chronicled students' continued math and science deficiencies. With a globalized marketplace and developing nations' exploding stake in it; with rapidly advancing (and rapidly obsolete) technologies; and with well-educated international workers commanding comparably low wages, the urgency to reclaim U.S. dominance in economy-driving disciplines—math, science, engineering, and technology—has peaked.

The best preparation for this competitive climate is a strong background in mathematics. The National Center for Education Statistics has identified algebra as the gatekeeper course for advanced math, given the sequential nature of the content.[4] Mastery of algebra is a prerequisite for the study of algebra II, geometry, trigonometry, statistics, and calculus. Additionally, today's science and technical subjects require advanced math course-taking. Therefore, all students should take a significant course in algebra by the end of grade 8—one that uses the Algebra/Data Analysis Core Learning Goals as the course

basis.[a] This course will enable students to pass the Algebra/Data Analysis High School Assessment and advance to a higher math course upon entering grade 9.

Clearly, success in algebra by the end of grade 8 requires planning and preparation throughout the elementary grades. While the preK–8 Voluntary State Curriculum (VSC) in Mathematics was back-mapped directly from the Algebra/Data Analysis Core Learning Goals, the VSC was meant to be delivered over 10 years. Therefore, two steps must be taken: 1) Compact the VSC into nine years; and 2) Provide teachers additional mathematics content training. Compacting the curriculum will ensure that all students have had the opportunity to learn—by the end of grade 7—the prerequisite skills for algebra in grade 8. Additional training for elementary and middle school teachers will help them manage the new curricular challenges facing them.[b]

Every year that students' math deficiencies are not caught, their struggle to reach grade-level standards is compounded. Therefore, student data should be carefully monitored, and remediation programs immediately begun should that data show a need. The data analyzed should include results from the Maryland School Assessment (MSA) in mathematics, first administered in 3rd grade. Students not reaching proficiency on the assessment should be provided intensive programs that will develop proficiency by the next MSA administration.

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1   The National Commission on Excellence in Education. (1983). *A Nation At Risk: The Imperative for Educational Reform*. Author.
2   National Commission on Mathematics and Science Teaching for the 21st Century. (2000). *Before It's Too Late*. Author.
3   Committee on Prospering in the Global Economy of the 21st Century. (2006). *Rising Above the Gathering Storm: Energizing and Employing America for a Brighter Economic Future*. Author.
4   Robert Atanda. (1999). "Do Gatekeeper Courses Expand Educational Options?" *Education Statistics Quarterly*. National Center for Education Statistics.
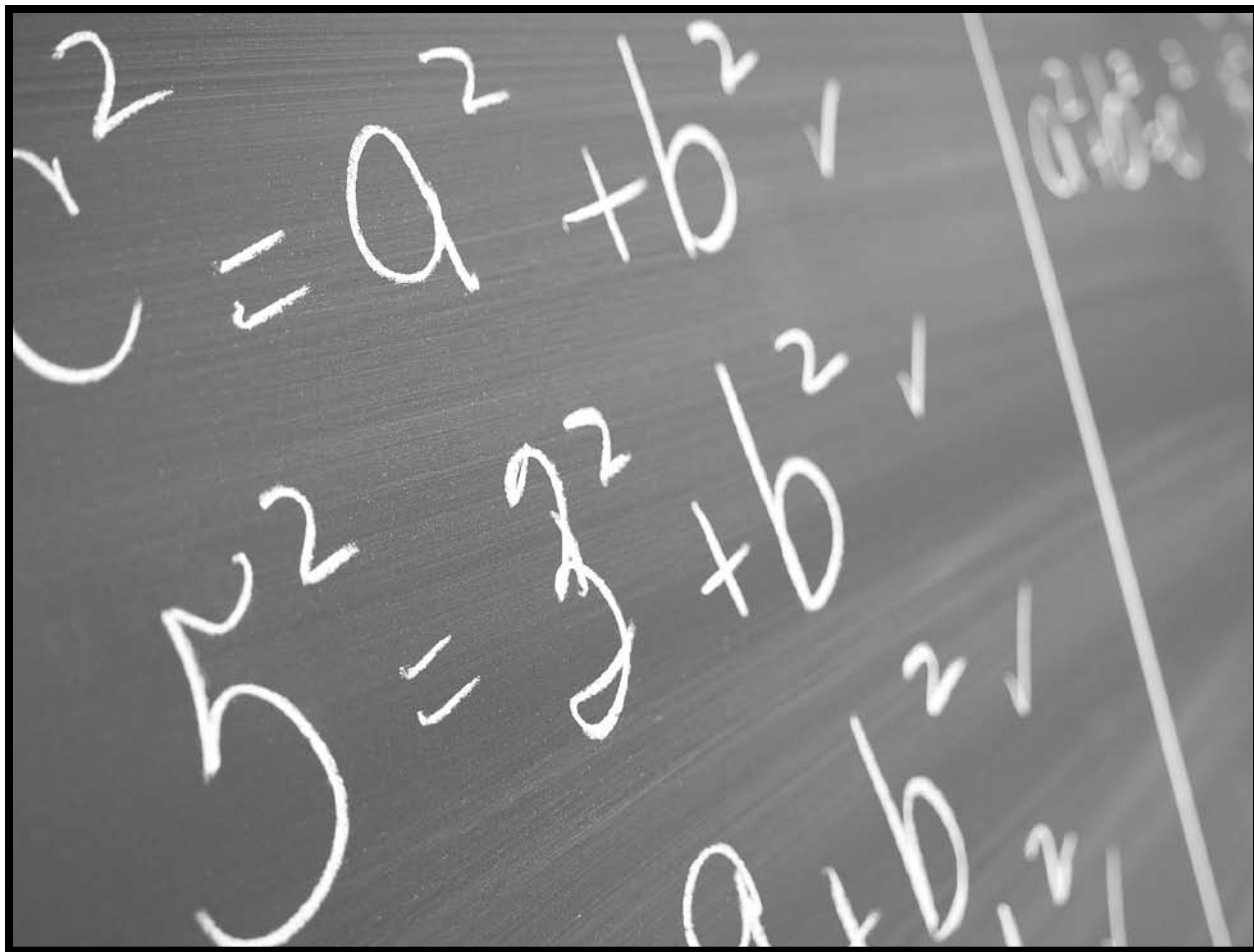
Provide students integrated math, science, and technology instruction with a focus on problem-solving and real-world application.

Strategy 1
Provide cross-disciplinary experiences in the STEM subjects.

Strategy 2
Encourage and support partnerships with businesses to allow students to apply their learning and interact with scientists, engineers, and information technology experts, among others.

The STEM subjects—science, technology, engineering, and mathematics—are receiving intense focus in high school because 1) the global economy is driven by innovations in these fields, and 2) the U.S. faces a critical shortage of STEM professionals. Nationwide, states are proposing four years of high school math and science (including laboratory sciences) and encouraging more students to enroll in rigorous STEM courses. With rapid STEM program development in high school, middle schools must provide their students an opportunity to experience integrated, problem-based learning in science, mathematics, and technology.[a] This learning not only provides students the foundation they will need for more in-depth STEM study in high school, but also develops students' problem-solving skills—skills that are critical in all subjects.

It is important to note that STEM is an interdisciplinary area of study. Therefore, STEM literacy is not achieved in each of the four subjects but in all four together. A STEM classroom shifts the focus away from instruction in discrete content and procedures and toward the investigation of their interrelated facets. By breaking down the traditional walls between the subjects and ask-

ing students to apply the knowledge and skills typically learned in one subject to the others, students are given a deeper understanding of each.

Moreover, it is in middle school that students begin to explore career interests and connect those interests to the courses they take. A high-

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STEM Literacy

- **Scientific Literacy:** The ability to use scientific knowledge and processes (in physics, chemistry, biological sciences, and earth/space sciences) to understand the natural world and to participate in decisions that affect it.

- **Technological Literacy:** The ability to use, manage, and assess technology; understand how new technologies are developed; and analyze their effect on us, our nation, and the world.

- **Engineering Literacy:** The understanding of how technologies are developed via the engineering-design process.

- **Mathematical Literacy:** The ability to formulate solutions to a variety of mathematical problems, analyze those solutions, and communicate them effectively. ■

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quality STEM curriculum enriches the career-exploration process and broadens the career options that students envision for themselves. High school and college students enrolled in challenging courses often say that elementary and middle school experiences influenced their current academic paths. Thus, middle school programs should also include opportunities for students (and teachers and parents and counselors) to learn about STEM professions.

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[a] Technology education is more than instruction in the use of technological tools. It is the innovation, change, or modification of the natural environment to satisfy human wants and needs.

Enroll every student in a sequential world-language course in 6th grade.

Strategy 1
Provide a variety of language choices for students.

Strategy 2
Provide programs that allow students to improve their heritage-language skills while learning and mastering English.

The notion that instruction in world languages should be reserved for advanced or college-bound students is not supported by research. In fact, the research shows that virtually all students—students with different learning needs and styles—can learn a second or third language in today's interactive world-language classroom. The research also shows that world-language programs benefit all students: Across student subgroups, language learning correlates with higher standardized test scores.[1]

Therefore, beginning as early as possible, all Maryland students should have the opportunity to learn languages in extended, uninterrupted sequences, enabling language mastery. While elementary schools may provide exploratory language programs, middle schools should begin a sequential language program in 6th grade. This sequence should articulate with elementary and high school programs, so that students may smoothly transition from one school level to the next, without being made to repeat what they have already learned. State and national language program standards—emphasizing communication, culture, connections, comparisons, and communities—note that language should be used in meaningful, communicative contexts from the first day of class.

Of course, not all language programs look alike, nor serve precisely the same students. Nearly

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A **heritage language** is one learned at home or in the community that is different from the region's or nation's dominant language.

A **heritage speaker** is a person who speaks or simply understands that language.

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one in five people over age 5 living in the U.S. speaks a language other than English in his or her home.[2] Heritage speakers—who are neither typical students of a foreign language nor fully fluent in it—require a different kind of instruction that enhances the language skills they already have, and amplifies their cultural literacy. Expanding heritage-language programs benefits the nation as well, as it helps the U.S. maintain its existing linguistic resources.

Producing internationally literate graduates—graduates who are culturally aware and proficient in languages other than English—has never been more important. The Bush Administration has acknowledged how critical world-language capability is to national security. In 2006, the Secretaries of Education, State, and Defense, and the Director of National Intelligence launched the National Security Language Initiative, a plan to expand U.S. foreign-language education beginning in early childhood and continuing throughout—and even after—formal schooling. An essential component of U.S. national security is the ability to engage foreign governments and their people, to encourage reform, promote understanding, convey respect for other cultures, and invite respect for our own. "To do this," said the Secretaries, "Americans must be able to communicate in other languages, a challenge for which most citizens are totally unprepared."[3]

According to the National Governors Association and the Council on Competitiveness, foreign-language fluency is also key to personal and national prosperity. Noting that a strong foundation in the STEM disciplines is essential, the organizations go on to say that "collaboration and cooperation that are hallmarks of innovation demand additional skill sets in areas like writing, communications, and languages."[4]

A study by the Committee for Economic Development reported that a chief concern of many U.S. employers is hiring workers who are comfortable conducting business in a cross-cultural environment and working on international teams.[5] As companies continue to expand

globally, there will be an increasing demand for employees who speak more than one language, and who are knowledgeable about and respectful of cultural differences, says Vivien Stewart, vice president of education for the Asia Society. "We definitely need to ramp up math and science," says Stewart, "but we also need mathematicians and scientists who can function in this new global environment."[6]

By choosing a language of study in the middle grades or earlier, and continuing that study in an articulated sequence throughout high school, Maryland students will graduate with practical proficiency in that language and with the cross-cultural experiences needed to collaborate and compete in a dynamic, global marketplace.

[1] Elizabeth L. Webb. "The Effect of Second Language Learning on Test Scores, Intelligence and Achievement: An Annotated Bibliography." Georgia Department of Education. Retrieved March 24, 2008, from www.uwyo.edu/fled/documents/FLAnnotatedBibliography.pdf.
[2] Shelly Lowe. (2007). "New Census Bureau Data Reveal More Older Workers, Homeowners, Non-English Speakers." U.S. Census Bureau, U.S. Department of Commerce.
[3] U.S. Department of Education, U.S. Department of State, U.S. Department of Defense, and Office of the Director of the National Intelligence. (2006). National Security Language Initiative. Retrieved March 24, 2008, from http://exchanges.state.gov/NSLI/fact_sheet.htm.
[4] National Governors Association and the Council on Competitiveness. (2007). "Innovation America: A Partnership." Authors.
[5] Committee for Economic Development. (2006). "Education for Global Leadership." Authors.
[6] Corey Murray. (2007). "NASA to Focus on Educational Partnerships: Agency Summit Brings Stakeholders Together to Improve STEM Education." *eSchool News*.

Stress the reading, writing, and thinking skills in each discipline as an integral component of the subject.

Strategy 1
Throughout all courses, engage students in learning activities in reading and writing.

Strategy 2
Emphasize the Voluntary State Curriculum's disciplinary literacy skills in each content area.

Strategy 3
Provide content-specific exemplars through the Voluntary State Curriculum toolkit.[a]

Because literacy skills are so essential to college and career readiness and to participatory citizenship, and because students must demonstrate *advanced* literacy skills to master academic content, reading and writing cannot be isolated in the language-arts classroom. They must be the cornerstone of instruction in every subject.

The challenge is to connect the teaching and learning of reading and writing to the rest of the middle school content areas. This is a challenge because the type of reading and writing employed in one subject will differ from that employed in another. "Moving from one subject area to the next, [students] must tap into entirely different sets of vocabulary and background knowledge. They must learn to write well in many genres, as well as realize that chemists, historians, mathematicians, journalists, and members of every other profession have their own unique ways of sharing information, getting people's attention, debating, responding to criticism, reporting facts and establishing authority … Every discipline, or content area, has its own set of characteristic literacy practices."[1]

Teachers, then—in every discipline—must emphasize certain kinds of reading and writing over others, depending on the nature of the content and skills they want their students to learn. To do that, teachers of all subjects need opportunities to learn the literacy skill content, incorporate it into their lessons, and review

student work in cross-curricular teams to ensure that expectations are consistent.

Teachers in high-performing schools report that, indeed, they have these opportunities; they engage in substantial literacy integration and cross-disciplinary work. This work occurs in average-performing schools, too, but teachers there tend to consider disciplinary literacy a skill set to be addressed once students have grasped curricular content. Teachers in high-performing schools, on the other hand, consider disciplinary literacy a vehicle for helping students grasp it.[2]

Of course, a student's attainment of disciplinary literacy is demonstrated by his or her mastery of the subject in question. Thus, for content area teachers "… a key challenge is to articulate and make concrete the [literacy] skills, knowledge, and concepts they may take for granted but that many students need to be shown explicitly. If students are to succeed in the content areas, teachers will need to demystify the reading and writing that go on there."[3]

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[a] The Voluntary State Curriculum (VSC) toolkit is an online compendium of resources—such as clarifications, prerequisite skills, lesson plans, and sample assessments—designed to help educators teach the skills and content contained in Maryland's preK–8 VSC. Visit the toolkit at MdK12.org.

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[1] Rafael Heller and Cynthia L. Greenleaf. (2007). *Literacy Instruction in the Content Areas: Getting to the Core of Middle and High School Improvement*. Alliance for Excellent Education.

[2] Kristen Campbell Wilcox and Janet I. Angelis. (2007). *What Makes Middle Schools Work*. University at Albany, State University of New York.

[3] ibid.

Provide all students fine-arts instruction that develops their literacy in music, dance, theater, and visual arts.

Strategy 1
Provide adequate resources, including highly qualified arts teachers, to support discipline-based arts education.

Strategy 2
Provide teachers professional development in integrating the arts into their content areas.

Strategy 3
Engage community arts and cultural organizations to provide arts enrichment for all students.

Many believe that the arts are what define us as a species. Attributes engaged through the arts—self-awareness, a capacity for individual and collective expression, and appreciation of others—are among humans' highest achievements.

Certainly, the arts have intrinsic value as intellectual disciplines containing valuable content, skills, and processes that help students understand their own and others' cultures. However, numerous studies show that the arts also have a positive influence on learning across the curriculum, student motivation, social interactions, attendance, teacher retention, and parent involvement.[1] Consequently, high-performing secondary schools tend not only to have strong arts programs, but to integrate the arts across the curriculum.[2]

New research examining brain function—how memory is triggered and associative patterns stimulated—reveals that human brains are fundamentally hardwired for the arts. High-quality arts instruction is associated with positive habits of mind—envisioning, empathy, and inventiveness, critical thinking and creative problem-solving, exercise of judgment, and finding multiple solutions—as well as overarching intellectual capacities such as spatial-temporal reasoning, observation, perception, and memory.[3] Moreover, attributes that individuals need to be competitive in the global economy—such as simultaneous thinking, creativity, and aesthetic sophistication—are supported most effectively through arts education.[4]

The arts are identified as core academic subjects under the federal No Child Left Behind Act and in Maryland policy, which requires fine-arts instruction for all students in grades K–8. In 1995, the Maryland State Board of Education approved an ambitious fine-arts goal: 100 percent of Maryland's students will participate in fine-arts programs that enable them to meet the state's fine-arts content and achievement standards. In 2003, State Superintendent of Schools Nancy S. Grasmick reinforced the State Board's policy by defining priorities for program improvement, including grade-by-grade preK–8 Voluntary State Curricula for the fine arts; a tool kit to inform instructional practice and to enhance educators' understanding of assessment processes and tools; and a comprehensive assessment program to measure program and student success.

However, Maryland will not capitalize on the promise of high-quality arts instruction unless adequate resources are dedicated to fine-arts programs and highly qualified teachers teach them; unless teachers are provided professional development in integrating the arts into their content areas; and unless schools and systems engage with community arts and cultural organizations to provide arts enrichment for all students.

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1. Richard J. Deasy, ed. (2002). *Critical Links: Learning in the Arts and Student Academic and Social Development.* Arts Education Partnership.
2. Richard J. Deasy and Lauren M. Stevenson. (2005). *Third Space: When Learning Matters.* Arts Education Partnership.
3. Michael Gazzaniga. (2008). *Learning, Arts, and the Brain.* The Dana Foundation.
4. Daniel H. Pink. (2005). *A Whole New Mind: Moving from the Information Age to the Conceptual Age.* Berkeley Publishing Group.

Teach information literacy and use technology in all subjects.

Strategy 1

Use technology and, where appropriate, online courses for all students, including those not demonstrating mastery and those exceeding grade-level expectations.

Strategy 2

Provide all students technology experiences, such as Web design, podcasting,[a] computer graphic arts, and multimedia production.

Technology literacy enables students to use technology to access, create, manage, evaluate, and communicate information. When technology is used in direct support of the curriculum, it can improve students' learning in all subjects and increase their interest in them. Technology refines students' research and organizational skills; increases their capacity for higher-order thinking and problem-solving; helps them apply their learning to real-world situations; and prepares them for the 21st-Century workplace.

Technology facilitates emotionally meaningful curricula and authentic learning, both of which are essential for the adolescent learner.[1] In every content area, technology enables students to engage in real-life research, identify problems and potential solutions, and participate in projects that make a difference in their communities. Technology also allows exposure to positive role models. Through technology, students can interact with forensic scientists, local and national politicians, human rights activists—anyone at all. Together, these activities help middle-schoolers in their quest for identity and self-worth, and therefore should be provided within the school day, and as after-school, summer, and magnet offerings.

The Maryland Technology Literacy Standards for Students, outlining the digital literacy skills students must acquire by grade 8, emphasizes the importance of showing students how technology relates to them and to society, how it helps them learn and collaborate with others, and how it can be used to express ideas, research issues, solve problems, and make decisions.[2]

Closely related to technology literacy is information literacy, which enables students to create and gather information as well as analyze its validity and use it to solve problems. Because information literacy frequently involves technology, these two vital skill sets complement each other.

Given the saturating use of technology in communications and production; the interconnected, globalized marketplace; and the intense focus on STEM competitiveness, it is essential that all students be able to use current technologies to amplify their everyday learning. Likewise, given the proliferation of data absorbed every day, and the similar proliferation of technologies used to access, create, and manipulate it, students need to be proficient producers and consumers of information. Their success in school—and long after—depends on it.

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[a] A podcast is a non-music audio broadcast that has been converted to an audio file format for playback in a digital player such as an iPod or MP3 Player.

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[1] Thomas Armstrong. (2006). *The Best Schools: How Human Development Research Should Inform Educational Practice*. Association for Supervision and Curriculum Development.
[2] Technology Literacy by Eighth Grade Consortium. (2007). Maryland Technology Literacy Standards for Students. Author.

Teach those skills that, in addition to content mastery, are essential for school success.

Strategy 1
Integrate critical thinking, problem solving, organization, communication, and other skills into the core content areas.

Strategy 2
Provide opportunities for students to learn and apply these skills through in-school, after-school, and/or summer school programs.

Through the Partnership for 21st Century Skills, employers, educators, and policymakers joined forces to identify skills that students will need to work in a global economy, and developed a framework and standards to guide the requisite educational reform. The group, funded by the U.S. Department of Education, found that core content mastery is *essential* but *insufficient*. Successful citizens and workers in the 21st Century must be competent critical thinkers and problem solvers, they must be innovative and creative, able to communicate and collaborate, and adept in the use of information, media, and technology.[1]

In core academic classes, students need exposure to 21st-Century themes, and they need time and opportunities to practice life and career skills: flexibility, initiative, self-direction, productivity, accountability, and leadership.[2] To help students achieve these competencies, states and school districts must regularly give students the chance to apply their knowledge and skills through meaningful tasks. In fact, the State Education Technology Directors Association, the International Society for Technology in Education, and the Partnership for 21st Century Skills underscore the importance of using more rigorous, relevant, and engaging learning opportunities to develop students' creative and analytical capabilities and integrating technology throughout them.[3]

Students must also know *how* to be successful. They need instruction in study and organizational skills, such as note-taking and time management.[a] And they need experience and practice with habits of mind—habits that compel intelligent behavior when the answer is not known: persisting, thinking, and communicating with clarity and precision; managing impulsivity; gathering data through all senses; listening with understanding and empathy; creating, imagining, and innovating; thinking flexibly and interdependently; thinking *about* thinking; responding with wonderment and awe; taking responsible risks; striving for accuracy; questioning and posing problems; applying past knowledge to new situations; and remaining open to continuous learning. These habits precipitate "certain patterns of intellectual behavior that produce powerful results."[4] Middle school students need help to develop and refine these skills as they prepare to become successful lifelong learners.

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[a] Programs such as Advancement Via Individual Determination (AVID) and pre-AVID support the development of these skills. For more information on the programs, go to www.AVIDonline.org.

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1. Martha Vockley. (2006). *Results That Matter: 21st Century Skills and High School Reform*. Partnership for 21st Century Skills.
2. Partnership for 21st Century Skills. Framework for 21st Century Learning. Retrieved March 30, 2008, at http://www.21stcenturyskills.org/index.php?option=com_content&task=view&id=254&Itemid=120.
3. Martha Vockley. (2007). *Maximizing the Impact: The Pivotal Role of Technology in a 21st Century Education System*. Partnership for 21st Century Skills.
4. Arthur L. Costa and Bena Kallick. (2000). *Habits of Mind: A Developmental Series.* Association for Supervision and Curriculum Development.

Provide accelerated and enriched instructional pathways for advanced learners.

Strategy 1
Identify those advanced/gifted and talented learners who perform, or show the potential to perform, at remarkably high levels when compared to their same-age peers.

Strategy 2
Create a system for accelerating instruction, including curriculum compacting, curriculum telescoping, subject acceleration, and grade-level acceleration.

Strategy 3
Provide instructional enrichment through authentic inquiry, research, creative production, and the real-world application of knowledge.

Middle schools must tend to the full range of adolescent learners, including those whose needs are the easiest to neglect: advanced or gifted learners. Advanced students differ from their age-level peers in some important ways: They learn rapidly, think abstractly, have extensive memory, and identify patterns readily.[1] They may be highly creative, emotionally sensitive, or artistic, and they need unique supports and opportunities to reach their full potential.

Of course, teachers must identify high-performance capabilities before they can help students capitalize on them. There are several qualitative and quantitative assessments that identify high-ability learners from diverse populations.

Students who have already mastered grade-level content, or are capable of mastering it faster than their classmates, benefit from enrichment and acceleration. *Enrichment* is a range of instructional activities that deepen students' understanding through authentic inquiry, research, and creative production. The focus of enrichment is the real-world application of knowledge that is characteristic of professionals in the discipline. *Acceleration* is progressing students through an educational program at a faster rate or at a younger age than is typical. Acceleration occurs in various forms, including curriculum compacting, curriculum telescoping,[a] subject acceleration, and grade-level acceleration.

Despite social concerns, research demonstrates the positive impact of various forms of acceleration, which is considered to be among the most effective ways to match curricular level and complexity to the gifted student's readiness and motivation. Students who are moved ahead tend to be more ambitious and earn graduate degrees at higher rates than other students. Interviewed years later, an overwhelming majority of accelerated students say that acceleration helped them feel academically challenged and socially accepted, and protected them from the boredom that plagues many highly capable students who are forced to follow the curriculum delivered to their same-age peers.[2]

Acceleration not only addresses the gifted student's learning profile, it can "buy time" for students to develop their talent area. For example, middle school students who take required high school courses for credit are then free to pursue more advanced opportunities once formally enrolled in high school—opportunities such as Advanced Placement or International Baccalaureate courses, magnet programming, internships, or dual enrollment.

Providing an appropriately challenging education for advanced middle school students will prove critical to Maryland's economy. By 2011, the military's Base Realignment and Closure (BRAC) plan will bring tens of thousands of high-skill, high-demand jobs to the state—jobs that will require more education and more expertise.[b] Our current workforce gaps will only widen if we fail to provide accelerated and enriched pathways for the students who have demonstrated their ability to succeed in them.

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a   *Curriculum compacting* reduces the time dedicated to
    review and practice activities, and streamlines objec-
    tives to gain time for advanced content and enrichment.
    Curriculum telescoping is the completion of a course in less
    time than typical, such as a one-year course completed in
    a semester or a three-year sequence of courses completed
    in two years.
b   Eighty-three percent of BRAC-generated jobs will require
    a bachelor's degree. The number requiring at least some
    graduate work will jump more than 30 percent, and the
    number requiring a doctorate will double.

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1   Eric Jensen. (2006). *Enriching the Brain: How to Maximize
    Every Learner's Potential*. Jossey–Bass.
2   Nicholas Colangelo, Susan G. Assouline, and Miraca U.
    Gross, eds. (2004). *A Nation Deceived: How Schools Hold
    Back America's Brightest Students*. The Connie Belin &
    Jacqueline N. Blank International Center for Gifted Educa-
    tion and Talent Development.

Ensure that teachers are prepared to work specifically with the middle-level learner.

Strategy 1

Establish an *ad hoc* middle-level work group within the Division of Certification and Accreditation to:

- Refine elementary and secondary preparation programs based on the National Middle School Association standards and the instructional recommendations in this report;
- Identify the courses necessary for the recertification of middle-level teachers.

Strategy 2

Establish partnerships between local school systems and colleges/universities to create programs to prepare teachers specifically for middle-level education.

Few Maryland middle school teachers come to their classrooms specifically prepared to teach the middle-level learner, because, while Maryland has adopted certification regulations for the middle grades, only one college in the state has developed a preparation program leading to middle school certification.[a] Consequently, virtually all middle school teachers complete either elementary or secondary preparation programs. However, that preparation is often insufficient, for research identifies needs that are specific to early adolescent learners and strategies that are specifically effective in meeting them.[b]

Preparing teachers for the middle grades requires two steps. First, elements of middle school pedagogy, attributes of the middle-level learner, and curricular threads should be infused into current elementary and secondary preparation programs. Such programmatic refinement will provide a degree of readiness for elementary and high school teachers should they go on to teach in middle schools. Additionally, this cross-level approach will give new elementary and secondary teachers greater knowledge of the contiguous landscape in which their students learn, for the middle level actually spans the late elementary to early high school years. This enhancement of elementary and secondary programs can be accomplished through collaboration among higher education faculty, school system leaders, school administrators, teachers, and staff in MSDE's Program Approval and Assessment Branch. This work will also include identifying courses that teachers in the middle grades must take for recertification.

The second step is to design preparation programs specifically for middle school teachers. The development of such programs is complex and is dependent to some degree on marketplace demands. However, the statewide Professional Development School Network offers a strong foundation for the creation of middle-school-specific preparation programs drawing on National Middle School Association standards. Colleges and universities may work with local school systems individually to develop these programs. Such activity will also help enhance the professional development that colleges currently offer middle school teachers.

Through this two-fold approach—involving the entire preK–20 community—teachers in *all* grades will be better equipped to serve the needs of the middle-level learner.

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[a] In fall 2008, Villa Julie College in Baltimore County will launch its Middle School Teacher Preparation program, the first preparation program in Maryland specifically for teachers in the middle grades. The program, training teachers for grades 4–9, will focus on middle-level course content as well as middle-schoolers' unique learning needs. The college will offer one preparation track in English/Language Arts and Social Studies and another in Math and Science.

[b] These needs and strategies are contained in the National Middle School Association's standards, research, and best practices. Go to www.NMSA.org.

Provide all middle school teachers high-quality professional development.

Strategy 1

Establish an *ad hoc* middle-level workgroup within the Professional Development Coordinators' Network and the Leadership Development Coordinators' Network[a] to:

- Identify the in-depth knowledge all middle-level educators need in terms of content, pedagogy, and the characteristics (cognitive, emotional, and social) of middle school students;
- Build educator capacity by engaging administrators, teachers, and central office staff in ongoing, job-embedded, data-driven, systemic professional development;
- Include in recertification, in-service and college courses, and school-based learning activities the topics addressed in this report; and
- Provide consistent, embedded support to teachers at the school and school-system levels.

Strategy 2

Provide educators strategies to address the needs of advanced students, students with special needs, English language learners, and students of diverse international backgrounds.

Researchers and educators agree that high-quality professional development is critical to improving performance among teachers and students alike. Unfortunately, the professional development historically provided teachers was not, in fact, "high quality." Professional development traditionally consisted of discrete, day-long—or even hours-long—workshops provided off-site by vendors or central office personnel. Short-term professional development activities—especially those offered by people with limited knowledge of staff and student needs—rarely offer educators the deep learning required to improve practice. To promote rigorous learning among teachers—learning that improves their teaching and enhances their skills throughout their careers—professional development must be sustained and continuous, not short-term and episodic.

Professional development for middle school teachers is most effective when it:

- Is based on identified student needs and/or learning gaps.
- Identifies the specific knowledge and skills teachers must have to address those needs.
- Is content-specific and aligns with the Voluntary State Curriculum.
- Includes teaching strategies and methods specific to each teacher's subject(s).
- Provides opportunities to learn the cognitive, emotional, and social characteristics of middle school students.
- Includes strategies to differentiate instruction for advanced students, students with special needs, and English language learners.
- Extends over a period of time long enough to accommodate teachers' initial learning, their reflection and practice, and the receipt of feedback.
- Is embedded in the regular school schedule.
- Is evaluated to measure teachers' learning outcomes, the application of skills, and their impact on student learning.[b]

To implement the recommendations issued in this report, the topics addressed throughout [c] should be included in all learning opportunities provided to teachers, including recertification requirements, school-based professional development, and in-service and college courses.

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[a] The Professional Development Coordinators' Network consists of local school systems' professional development coordinators and MSDE staff. The Leadership Development Coordinators' Network consists of local school systems' leadership development coordinators and MSDE staff. Both groups meet four times a year.

[b] Maryland's model for professional development is the Maryland Teacher Professional Development Standards and the Maryland Teacher Professional Development Planning Guide: MarylandPublicSchools.org/MSDE/divisions/ instruction/prof_standards.htm.

[c] These topics include disciplinary literacy; technology and information literacy; integrated STEM instruction; data analysis and use; characteristics of the middle-level learner; and skills for lifelong success.
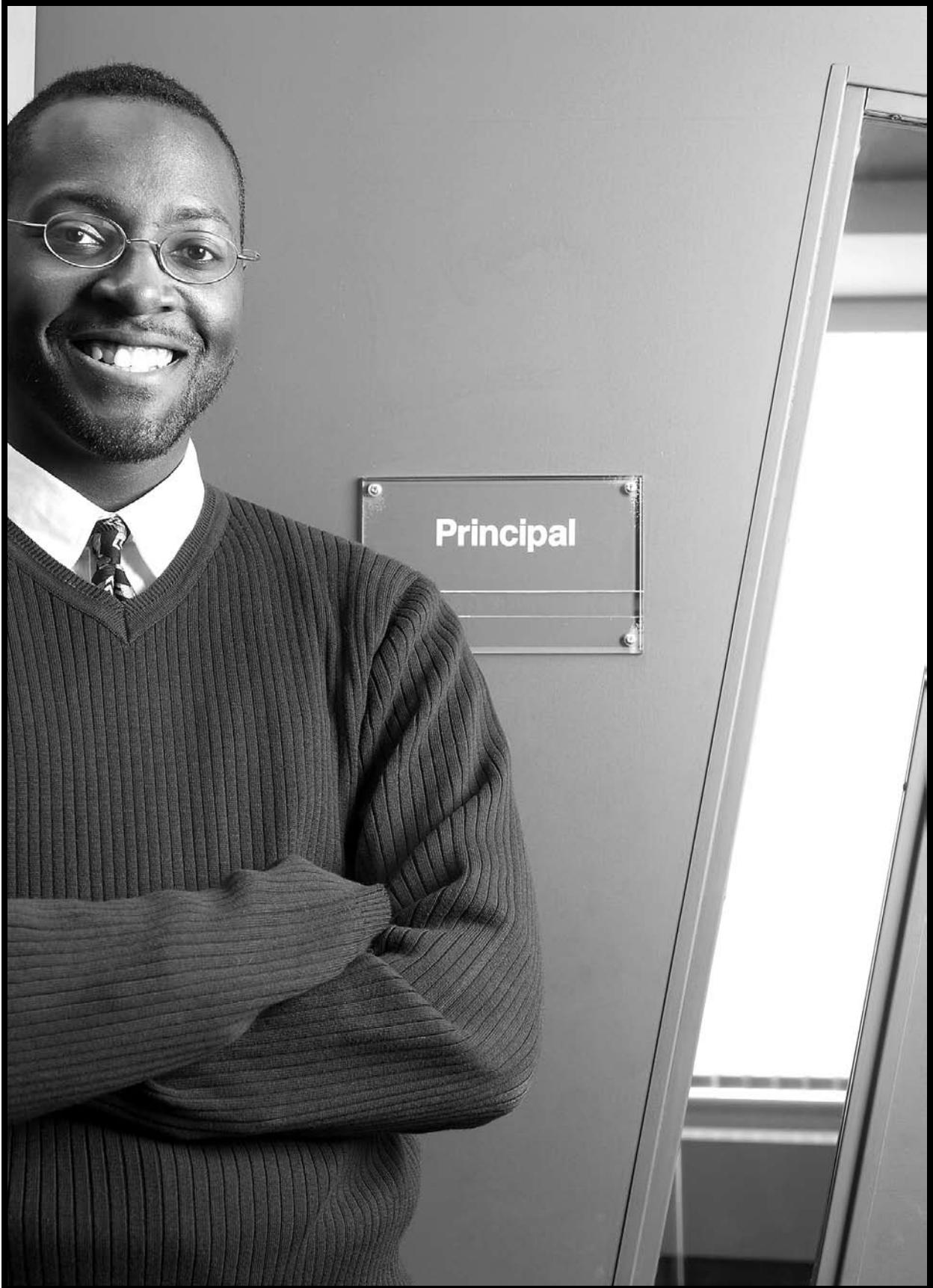
Establish a leadership team in every middle school, led by a principal who is an instructional leader.

Strategy 1
Staff each middle school with a highly qualified principal who is the instructional leader.

Strategy 2
Build the capacity of the leadership team to improve student achievement and adult learning.

The Maryland Instructional Leadership Framework identifies the role of the principal as instructional leader,[1] a role that continues to be key to school improvement. Instructional leaders provide direction, resources, and support to teachers and students. They focus on helping teachers improve their classroom performance and make academic achievement their school's top priority.[2]

The school leadership team is a discretionary team selected by and including the principal, consisting of professional personnel who hold designated leadership positions in the school and are charged with improving classroom instruction to increase student achievement.[3] Research supports the importance of such a team: "If school leadership is the responsibility of a leadership team within a school, as opposed to the principal acting as a lone leader, the multiple responsibilities of the principal can be addressed."[4]

Transforming a school into a learning community, one with the belief,[a] drive, and capability to accomplish goals, is a necessary condition for—and a critical first step in—the complex task of leadership. The second step is distributing responsibilities.[5] To support academic achievement, leadership team members can support the school vision, model what is valued, facilitate collaborative planning, provide ongoing, job-embedded professional development, and monitor progress toward goals. Leadership team members can stimulate change in multiple classrooms by serving as instructional coaches, role models, and mentors to teachers.[6] Spending time

up-front building the leadership team's capacity to take on these critical functions yields faster, more effective, and, most importantly, more *committed* action later in the school-improvement process.[7]

Ensuring that *every* middle school in Maryland has a high-quality, collaborative leadership team is essential to increasing student achievement and is a pivotal piece of continuous school improvement.

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[a] The collective belief among a group of people that they can "make a difference" in student learning is a better predictor of student success than is the students' socio-economic status. [Roger D. Goddard, Wayne K. Hoy, and Anita Woolfolk Hoy. (2004). "Collective Efficacy Beliefs: Theoretical Developments, Empirical Evidence, and Future Directions." *Educational Researcher*. Vol. 33. No. 3.]

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[1] Maryland State Department of Education. (2005). Maryland Instructional Leadership Framework. Author.
[2] National Staff Development Council. (2000). *Learning to Lead, Leading to Learn.* Author.
[3] Maryland State Department of Education. op cit.
[4] Brian A. McNulty, Robert J. Marzano, and Timothy Waters. (2005). *School Leadership That Works: From Research to Results.* Association for Supervision and Curriculum Development.
[5] ibid.
[6] National Association of Secondary School Principals. (2006). *Breaking Ranks in the Middle: Strategies for Leading Middle Level Reform.* Author.
[7] Kerry Patterson, Joseph Grenny, Ron McMillan, and Al Switzler. (2002). *Crucial Conversations: Tools for Talking When Stakes Are High.* McGraw–Hill.

Regularly assess student learning and use assessment results to guide instructional, course-taking, and organizational decisions.

Strategy 1
Administer and analyze aligned formative and summative assessments to provide teachers and administrators accurate and comprehensive data on student progress.

Strategy 2
Provide timely, descriptive feedback to guide students' learning and improve their performance.

While the research on classroom assessments does not specify a certain number that should be administered during a unit of instruction, the research *does* indicate that frequent, systematic assessment can have a profound effect on student achievement.[1] Formative assessments are particularly important because, while summative assessments *measure* students' skill or concept mastery, formative assessments actually *facilitate* it.[a] A formative assessment is any activity undertaken by teachers and students that provides diagnostic information that can be used to modify teaching and learning.[2]

Formative assessments can significantly boost achievement, especially among the poorest performers, who record the largest gains on standardized tests.[3] In fact, studies have shown that the effect of frequent formative assessments used to modify instruction is four to five times greater than the effect of reduced class size.[4] However, assessment frequency is key. "The kinds of formative assessment that profoundly impact student achievement cannot wait until the end of the marking period, or even the end of the instructional unit. If students have left the classroom before teachers have made adjustments on the basis of what they have learned about students' achievement, they are already playing catch-up. If teachers do not make adjustments before students come back the next day, it

is probably too late. This is why the most important formative assessments are those that occur minute-by-minute and day-to-day."[5]

Formative assessments allow teachers to provide students continuous feedback, which is tremendously important, given that a meta-analysis of nearly 8,000 studies found that "the most powerful single modification that enhances achievement is feedback."[6] However, not all forms of feedback are equally effective: Simply telling students their answers are correct or incorrect tends to have a negative effect on their learning, whereas explaining the correct answer and / or asking students to continue to refine their

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Effective assessment has the potential to dramatically increase student achievement if four conditions are met:
- Assessment feedback gives students a clear picture of their progress on learning goals and how they might improve.
- Assessment feedback actually encourages students to improve.
- Classroom assessments are formative.
- Formative assessments are frequent.[7]

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answers yields achievement gains.[8] Additionally, when assessment feedback is discouraging to students, their achievement actually decreases.[9] Encouraging feedback must help students realize that effort on their part will result in better learning and higher scores, through opportunities to resubmit work.[10]

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[a] Summative assessments—described as assessments *of* learning—are administered following a unit of instruction. They include standardized tests, as well as unit and benchmark testing. Formative assessments—assessments *for* learning—are administered during instruction so that teaching modifications can be continually made.

1. Robert Bangert-Drowns, James A. Kulik, Chen-Lin C. Kulik, and Mary Theresa Morgan, (1991). "Effects of Classroom Testing." *Journal of Educational Research*. Heldref Publications.
2. Paul Black and Dylan Wiliam. (1998). "Inside the Black Box: Raising Standards Through Classroom Assessment." *Phi Delta Kappan*. Phi Delta Kappa International.
3. Richard J. Stiggins, Judith A. Arter, Jan Chappuis, and Stephen Chappuis. (2004). *Classroom Assessment for Student Learning: Doing It Right—Using It Well*. Assessment Training Institute.
4. Ronald Gordon Ehrenberg, Dominic J. Brewer, Adam Gamoran, and J. Douglas Willms. (2001). "Class Size and Student Achievement." *Psychological Science*. Blackwell Publishing.
5. Siobhan Leahy, Christine Lyon, Marnie Thompson, and Dylan Wiliam. (2005). "Classroom Assessment: Minute by Minute, Day by Day." *Educational Leadership*. Association for Supervision and Curriculum Development.
6. John Hattie. (1992). "Measuring the Effects of Schooling." *Australian Journal of Education*. Australian Council for Educational Research.
7. Robert J. Marzano. (2007). "The Last Frontier: Tackling the Grading Dilemma." *Ahead of the Curve: The Power of Assessment to Transform Teaching and Learning*. Douglas Reeves, ed. Solution Tree.
8. Robert Bangert-Drowns, James A. Kulik, Chen-Lin C. Kulik, and Mary Theresa Morgan. op cit.
9. Avraham N. Kluger and Angelo A. DeNisi. (1996). "The Effects of Feedback Interventions on Performance: A Historical Review, Meta-analysis, and a Preliminary Intervention Theory." *Psychological Bulletin*. American Psychological Association.
10. Robert J. Marzano. (2006). *Classroom Assessment and Grading That Work*. Association for Supervision and Curriculum Development.

Emphasize students' mastery of essential skills.

Strategy 1

Differentiate instruction, provide multiple learning opportunities, and offer acceleration, enrichment, and remediation as needed so that students may fully demonstrate content mastery.

Strategy 2

Identify essential learning skills by grade and use them to prioritize instructional decisions.

Strategy 3

Provide students and parents frequent reports that explicitly describe students' progress in mastering content in each subject.

Strategy 4

Use these mastery reports to inform teaching, re-teaching, extending, and enriching.

In middle school, as students are being prepared—and preparing themselves—for success in high school, the educational emphasis should be on skill mastery. That is, students must meet or exceed grade-level standards, and understand *why* course mastery is non-negotiable. If middle-schoolers realize that they can fail to do the work required, just barely pass their courses, and nevertheless advance to the next grade, it is unlikely they will be prepared for the academic rigor of high school or acquire better discipline and study habits once there.

Middle school students are in transition—not just physically and emotionally but academically as well. That academic growth needs to be documented and communicated. Schools and school systems should develop for students and parents a detailed and explicit progress reporting system that indicates students' mastery of course concepts and skills. Given that middle-schoolers should already have acquired the developmental and foundational skills necessary to move toward complex thinking, these progress reports should indicate mastery at the highest levels of cognition: analysis, synthesis, and evaluation.

Frequent progress reporting takes time, but studies show the results are worth it. In Tennessee's highest performing schools,[a] researchers found that principals receive frequent reports on

individual student progress toward curriculum standards. Composed of several data indicators, the reports are generated at least three times a year for all students, and every two weeks for at-risk students. Teachers receive these same reports, as well as weekly reports whose data is culled from a number of formative and summative assessments. The reporting frequency allows teachers and principals to identify early each student's learning challenges and to take action—in a variety of ways—before he or she falls behind. Additionally, parents are regularly informed about their child's progress, and are asked to help when the child shows signs of struggling.[1]

In some instances, ensuring content mastery will first entail determining which content most *requires* mastery. Prioritizing the curriculum—for instance, by what *all* students must master; what it would be *nice* for all students to master; and what, perhaps, only *some* students will master[2]—helps teachers deal with the dilemma of abundant objectives and limited time. Prioritizing does not eliminate curriculum, but codes it, allowing all content-specific teachers within a school to emphasize the same essential learning standards.[3] The practice has worked in high-performing schools, most effectively when the prioritized curriculum clearly communicates what each standard means and how important it is.[4]

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[a]   The Tennessee schools studied were elementary and middle schools that won the Education Consumers Foundation's Value-Added Achievement Award for two consecutive years. The six schools—which produced some of the state's largest reading/language arts and math gains—are located in both rural communities and large cities, and most have a large proportion of children from low-income families.

1   Guy S. Bruce. (2007). *Educational Practices of Six Effective Tennessee Schools: Executive Summary*. Education Consumer Foundation.

2   Kristen Campbell Wilcox and Janet I. Angelis. (2007). *What Makes Middle Schools Work*. University at Albany, State University of New York.

3   Learning Focused Solutions. "Prioritizing and Mapping the Curriculum." PowerPoint presentation retrieved March 31, 2008, from http://www.caiu.org/43833812384144/lib/43833812384144/_files/LF-Schools_Curr._Overview.ppt.

4   Southern Regional Education Board. "Prioritizing, Mapping, and Monitoring the Curriculum: Leadership Module Summary." Retrieved March 31, 2008, from http://www.sreb.org/main/Leadership/Modules/descriptions/Prioritizing%20the%20Curriculum.pdf.
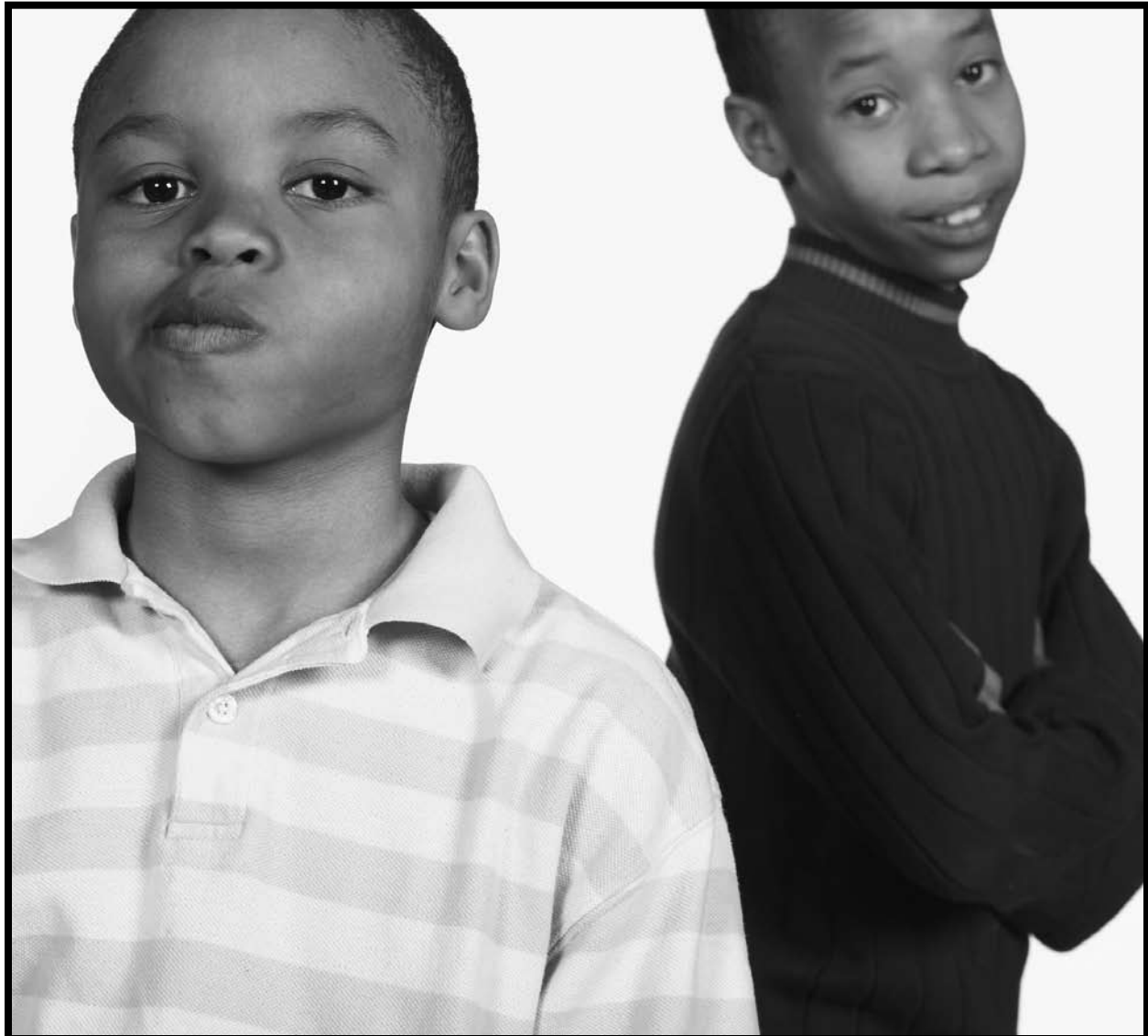
Partner with students and parents, using student data to guide educational decisions.

Strategy 1

Develop for each student a unique learning profile—accessible to the student and his/her parents—that indicates mastery of course content; documents acceleration, remediation, and enrichment activities; informs course selection; and influences preparatory activities for high school, college, and careers.

Strategy 2

Schedule a minimum of three transition conferences with students and parents—one during grade 5, one during grade 6 or 7, and one during grade 8—to review assessment data and school performance.

Strategy 3

Use student data to make instructional and programmatic decisions at the classroom, school, and school-system levels.

Regular, meaningful communication with parents and students is a key contributor to student success. Principals and teachers must believe in it, initiate it, and sustain it.

Engaging parents helps keep them involved in their child's education past his or her elementary years; helps redefine that involvement for each school level; and helps parents—at each stage—become comfortable partners with the school and its staff. Engaging students—letting them take a leadership role in parent/teacher conferences, encouraging goal-setting and decision-making—helps them develop confidence in their own learning and take responsibility for it. "When students have a voice in how and what they learn, they become more aware of themselves as learners. They become more motivated and engaged in their learning, thus making classroom interactions between teachers and students more productive and enjoyable."[1]

Students benefit when schools broker successful family partnerships—especially in middle school. For it is in middle school that students first encounter multiple teachers, making regular communication on expectations and achievement critical. Of course, the middle grades are also the juncture between elementary and high school, and a seamless transition from one level to the next depends on routine conferencing.

Learning profiles—containing the assessment, benchmark, and goal data needed to develop the best educational program for each student—are a key resource for these conferences. For this partnership to truly work, the profiles must be accessible to families and to schools, so that *both* can use the data to make instructional, programmatic, and course-taking decisions and to monitor student progress. Using technology to create, update, and share these profiles will enhance their usability and relieve some of the burden on teachers and administrators that report generation typically entails.

Student profiles will play a critical role in career planning as well. Career exploration must begin in middle school if students are to be ready for the requisite high school courses. Middle-schoolers have already begun to make connections between what they learn in school and what they will do with it thereafter. They have begun charting their career plan and choosing a high school program that will prepare them for it. Putting all of this information in the profile will make students' goals and aspirations—and the real work required to meet them—all the more concrete.

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[1] Mary Atkinson and Jeanne Sturges. (2003). "At the Turning Point—The Young Adolescent Learner." *Turning Points: Transforming Middle Schools*. Center for Collaborative Education.

Develop flexible schedules that provide adequate time for students to master concepts and skills and for teachers to collaborate.

Strategy 1
Establish transition programs between elementary and middle school, and middle and high school.

Strategy 2
Create opportunities for feeder system staff (personnel from elementary and middle schools, and middle and high schools) to meet and share information.

Strategy 3
Establish after-school, summer school, and extended learning opportunities to support identified programs and to meet students' individual needs.

Strategy 4
Develop a master schedule that allows planning time for interdisciplinary and content teams.

By the mid-20th Century, junior high schools (created just 50 years earlier) were falling out of favor.[a] Despite their many benefits, they were criticized—for their size, for their impersonal climate, for curricula and grading systems that were more appropriate for older students. The time was right for middle schools. Whatever their grade configuration,[b] middle schools had one goal: to smooth the transition between elementary and high school and provide the most appropriate learning environment for young adolescents.

Given that school structure is a local decision best based on the needs of the students and communities served, and given that the research offers no one organizational model as the most effective, the Steering Committee has not recommended one. However, it is clear that those grades broadly considered the "middle" (regardless of the schools in which they are housed)

must be responsive to the unique and diverse needs of the middle-level learner. Organizational flexibility and feeder-school collaboration must overcome the division that *any* school structure—*any* grade configuration—naturally imposes.

Middle schools must support structures and practices that are responsive to adolescents' learning—how they learn and why they learn. School-day and extended-day/year programs must help middle-schoolers master core academic content and, at the same time, accommodate their social habits and emotional needs. In fact, the most beneficial after-school and summer programs are *not* those focused strictly on remediation, but rather those that attend to children's developmental outcomes (e.g., confidence and self-esteem), offer relationship- and skill-building experiences, provide both intellectual and physical challenges, and supply a wide variety of enrichment activities.[1] Well-designed programs improve achievement, help keep children safe and healthy, strengthen connections to the workforce and the community, increase motivation for and engagement in learning, and nurture new skills and talents.[2][3]

Transition programs should be designed to prepare students academically and socially as they move from elementary to middle school and from middle to high school. Additionally, they should offer a variety of activities that 1) provide students and parents information about the new school; 2) provide students social support during the transition; and 3) bring school personnel together to learn about one another's curriculum and requirements, as well as the needs of the students in transition.[4]

While the middle school structure typically allows for interdisciplinary teaming—a critical scheduling component—sufficient time must be provided as well for content-specific collaboration, for this enables vertical teaming; focused, subject-specific professional development; and intensive instructional planning. Special educators and ESOL teachers must be included, as appropriate, in both planning structures. Moreover, the scheduling infrastructure should be flexible enough to provide time for accelerated or intensive instruction within the school day.

a   In the late 1800s, the National Education Association
    Committee felt that adolescents needed earlier exposure
    to more advanced courses. The structure was therefore
    changed from eight years of elementary school and four
    years of high school to an elementary span of grades
    1–6 and a secondary span of grades 7–12. Grades 7–9
    gradually came to be considered intermediate or "junior"
    grades. By the early 1900s, more than half of all adoles-
    cents attended junior high schools, which offered a more
    substantial and differentiated curriculum.

b   most commonly grades 5–8, grades 7 and 8, or grades 6–8

1   Jennifer Birmingham, Ellen M. Pechman, Christina A.
    Russell, and Monica Mielke. (2005). *Shared Features of
    High-Performing After-School Programs: A Follow-up to the
    TASC Evaluation*. Policy Studies Associates.

2   Geoffrey D. Borman and N. Maritza Dowling. (2006).
    Longitudinal Achievement Effects of Multiyear Summer
    School: Evidence From the Teach Baltimore Random-
    ized Field Trial. *Educational Evaluation and Policy Analysis*.
    American Educational Research Association.

3   Duncan Chaplin and Jeffrey Capizzano. (2006). *Impacts of
    a Summer Learning Program: A Random Assignment Study of
    Building Educated Leaders for Life (BELL)*. Urban Institute.

4   Douglas J. Mac Iver. (1990). "Meeting the Needs of Young
    Adolescents: Advisory Groups, Interdisciplinary Teaching
    Teams, and School Transition Programs. *Phi Delta Kappan.*
    Phi Delta Kappa International.

Conclusion
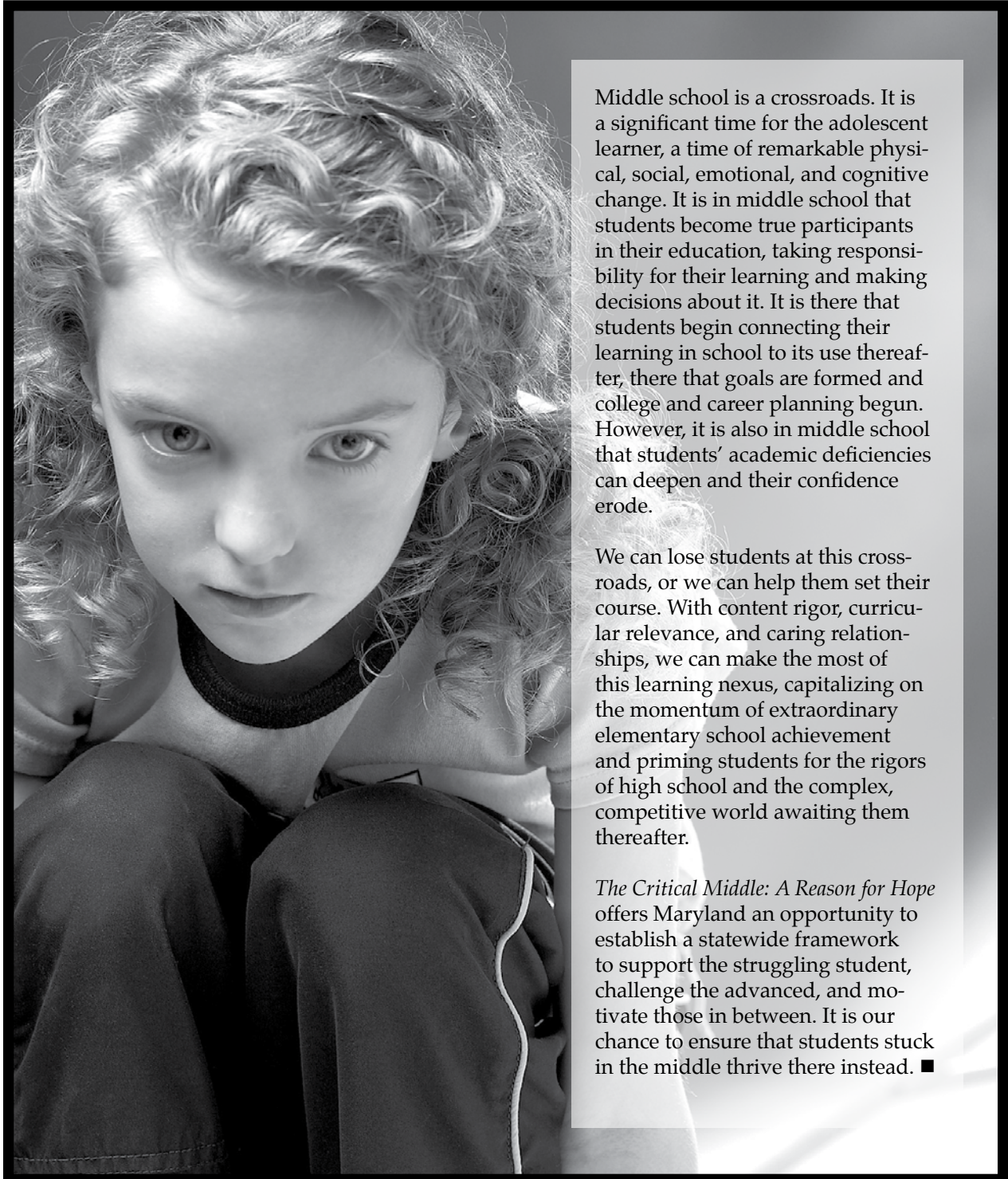
Middle school is a crossroads. It is a significant time for the adolescent learner, a time of remarkable physical, social, emotional, and cognitive change. It is in middle school that students become true participants in their education, taking responsibility for their learning and making decisions about it. It is there that students begin connecting their learning in school to its use thereafter, there that goals are formed and college and career planning begun. However, it is also in middle school that students' academic deficiencies can deepen and their confidence erode.

We can lose students at this crossroads, or we can help them set their course. With content rigor, curricular relevance, and caring relationships, we can make the most of this learning nexus, capitalizing on the momentum of extraordinary elementary school achievement and priming students for the rigors of high school and the complex, competitive world awaiting them thereafter.

The Critical Middle: A Reason for Hope offers Maryland an opportunity to establish a statewide framework to support the struggling student, challenge the advanced, and motivate those in between. It is our chance to ensure that students stuck in the middle thrive there instead. ∎

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