Providing Advanced Coursework in High Schools

National High School Center

The availability of and participation in Advanced Placement and International Baccalaureate programs and advanced courses in science, technology, engineering, and mathematics (STEM) disciplines are integral to preparing high school students for college and the workforce. Students are more likely to stay in school (Archambault, Janosz, Morizot, & Pagani, 2009) and perform at high levels (Cole, Kennedy, & Ben-Avie, 2009) if they are engaged with a challenging curriculum that helps them develop the college- and career-ready skills they need to succeed after high school.

Advanced Placement (AP) programs are designed to provide students with college-level courses and exams. Many colleges throughout the nation reward students who score a 3 or higher on Advanced Placement tests with college credit or access to higher level college courses. Research shows that students who take the AP course and the AP exam earn higher GPAs and more credits in college and are more likely to graduate from college than students who took only the AP course or a non-AP course in the same subject (e.g., Hargrove, Godin, & Dodd, 2008; Dougherty, Mellor, & Jian, 2006).

In recent years the number of students taking Advanced Placement courses has increased (College Board, 2009). The largest gains in Advanced Placement course taking are among groups of students previously underrepresented in these courses, with minority participation having increased by 106% between 2007 and 2008 (Wakelyn, 2009). However, despite these gains, African American, Hispanic, and American Indian students are still underrepresented in Advanced Placement courses.

The *International Baccalaureate (IB)* program is designed as an academically challenging two-year program for highly motivated juniors and seniors that prepares them for success in college and beyond. Recognized across the world as a demanding high school curriculum, the IB program includes a set of rigorous written and oral examinations that culminates in an IB diploma. Over the past decade, the number of IB programs in North America grew from 227 to 624, increasing by about 10% annually, and the program continues to expand into urban high schools throughout the nation (Byrd et. al., 2007).

Like AP students, those who participate in an IB program enjoy significant advantages for college admittance and have greater success in postsecondary settings than their non-IB peers (International Baccalaureate Organization, 2007). Furthermore, research suggests that an IB program can help urban schools attract and retain African American, Hispanic, and American Indian students, as well as students from disadvantaged backgrounds (Mayer, 2008).

Science, Technology, Engineering, and Mathematics (STEM). Both AP and IB, along with other programs, provide students with rigorous, challenging courses in core subjects, including advanced science and mathematics. As changes in the global economy call for a diverse cadre of innovators in STEM fields, a dwindling number of students in the United States are entering these fields. Moreover, American high schools are failing to equip their graduates with the knowledge and skills they need to excel in STEM fields in college and in the workforce (Seymour & Hewitt 1997; Taningco, Mathew, & Pachon, 2008).

Many states, districts, and schools are implementing programs designed to expose all students to a rigorous STEM curriculum and keep students—particularly underrepresented minority and female students—in the STEM "pipeline" through and beyond college. High quality curriculum and instruction, supported with ongoing professional development for STEM teachers, are keys to ensuring that students graduate with the skills they need to excel in the high-demand STEM fields (Leinwand, 2008). Furthermore, schools and districts that partner with the local scientific and business communities, as well as with institutions of higher education, can focus their resources to enhance STEM learning opportunities (Coppola & Malyn-Smith, 2006) and provide hands-on work-based opportunities for students to explore STEM in the real world.

Action Principles

For State

1. Develop a STEM task force and a statewide strategic action plan for accelerating education in STEM disciplines.
2. Seek federal and private grant funding to enhance STEM education.
3. Provide incentives for districts to partner with local institutions of higher education and the business and scientific communities to enhance STEM education.
4. Dounay (2006) offers additional action principles for states.

For District

1. Ensure that all students have access to advanced coursework. For example, provide online programs for students who attend rural schools that have limited ability to offer advanced courses.
2. Develop strategies to increase enrollment of students who are underrepresented in advanced courses. Maintain records on enrollment in advanced coursework, disaggregated by school and subgroup. Use these data to track underrepresented students' enrollment patterns in advanced courses.
3. Provide teachers with the appropriate training and professional development to deliver advanced instruction.
4. Engage local institutions of higher education, STEM industry members, and other agencies in enhancing STEM education programs.
5. Apply for a grant from the National Science Foundation (NSF) to enhance STEM education. Partner with local institutions of higher education to develop and implement comprehensive K-20 STEM programs that specifically target minority and female students.

For School

1. Develop strategies and provide appropriate supports to increase access to, enrollment in, and completion of advanced courses for groups of students who historically have not been given the opportunity to participate.
2. Design needed support systems.
3. Support teachers of AP, IB, and other advanced courses who pursue professional development.
4. Foster student engagement in STEM learning through hands-on and inquiry-based opportunities.
5. Provide financial assistance for test fees to low-income students.
6. Provide opportunities for interdisciplinary teaming among teachers, so that, for example, science and reading teachers can collaborate to design course modules for students.
7. Implement innovative school structures to encourage STEM enrollment, including ninth grade academies, catch-up courses, and extended learning time.

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