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ASIA PRECIOUS

For States, By States

BenBella Books

It is essential for today's students to learn about science and engineering in order to make sense of the world around them and participate as informed members of a democratic society. The skills and ways of thinking that are developed and honed through engaging in scientific and engineering endeavors can be used to engage with evidence in making personal decisions, to participate responsibly in civic life, and to improve and maintain the health of the environment, as well as to prepare for careers that use science and

technology. The majority of Americans learn most of what they know about science and engineering as middle and high school students. During these years of rapid change for students' knowledge, attitudes, and interests, they can be engaged in learning science and engineering through schoolwork that piques their curiosity about the phenomena around them in ways that are relevant to their local surroundings and to their culture. Many decades of education research provide strong evidence for effective practices in teaching and learning of science and engineering. One of the effective practices that helps students learn is to engage in science investigation and engineering design. Broad implementation of science investigation and engineering design and other evidence-based practices in middle and high schools can help address present-day and future national challenges, including broadening access to science and engineering for communities who have traditionally been underrepresented and improving students' educational and life experiences. Science and Engineering for Grades 6-12: Investigation and Design at the Center revisits America's Lab Report: Investigations in High School Science in order to consider its discussion of laboratory experiences and teacher and school readiness in an updated context. It considers how to engage today's middle and high school students in doing

science and engineering through an analysis of evidence and examples. This report provides guidance for teachers, administrators, creators of instructional resources, and leaders in teacher professional learning on how to support students as they make sense of phenomena, gather and analyze data/information, construct explanations and design solutions, and communicate reasoning to self and others during science investigation and engineering design. It also provides guidance to help educators get started with designing, implementing, and assessing investigation and design.

The African American Experience National Academies Press

Careers in science, engineering, and medicine offer opportunities to advance knowledge, contribute to the well-being of communities, and support the security, prosperity, and health of the United States. But many women do not pursue or persist in these careers, or advance to leadership positions - not because they lack the talent or aspirations, but because they face barriers, including: implicit and explicit bias; sexual harassment; unequal access to funding and resources; pay inequity; higher teaching and advising loads; and fewer speaking invitations, among others. There are consequences from this underrepresentation of women for the nation as well: a labor shortage in many science, engineering, and medical professions that cannot

be filled unless institutions and organizations recruit from a broad and diverse talent pool; lost opportunities for innovation and economic gain; and lost talent as a result of discrimination, unconscious bias, and sexual harassment. Promising Practices for Addressing the Underrepresentation of Women in Science, Engineering, and Medicine reviews and synthesizes existing research on policies, practices, programs, and other interventions for improving the recruitment, retention, and sustained advancement into leadership roles of women in these disciplines. This report makes actionable recommendations to leverage change and drive swift, coordinated improvements to the systems of education, research, and employment in order to improve both the representation and leadership of women.

The Science of Effective Mentorship in STEMM

National Academies Press

America's research universities have undergone striking change in recent decades, as have many aspects of the society that surrounds them. This change has important implications for the heart of every university: the faculty. To sustain their high level of intellectual excellence and their success in preparing young people for the various roles they will play in society, universities need to be aware of how evolving conditions affect their ability to attract the most

qualified people and to maximize their effectiveness as teachers and researchers. Gender roles, family life, the demographic makeup of the nation and the faculty, and the economic stability of higher education all have shifted dramatically over the past generation. In addition, strong current trends in technology, funding, and demographics suggest that change will continue and perhaps even accelerate in academe in the years to come. One central element of academic life has remained essentially unchanged for generations, however: the formal structure of the professorial career. Developed in the mid-nineteenth and early twentieth centuries to suit circumstances quite different from today's, and based on traditions going back even earlier, this customary career path is now a source of strain for both the individuals pursuing it and the institutions where they work. The Arc of the Academic Research Career is the summary of a workshop convened by The Committee on Science, Engineering, and Public Policy in September 2013 to examine major points of strain in academic research careers from the point of view of both the faculty members and the institutions. National experts from a variety of disciplines and institutions discussed practices and strategies already in use on various campuses and identified issues as yet not effectively addressed. This workshop summary

addresses the challenges universities face, from nurturing the talent of future faculty members to managing their progress through all the stages of their careers to finding the best use of their skills as their work winds down. CRC Press

Next Generation Science Standards identifies the science all K-12 students should know. These new standards are based on the National Research Council's A Framework for K-12 Science Education. The National Research Council, the National Science Teachers Association, the American Association for the Advancement of Science, and Achieve have partnered to create standards through a collaborative state-led process. The standards are rich in content and practice and arranged in a coherent manner across disciplines and grades to provide all students an internationally benchmarked science education. The print version of Next Generation Science Standards complements the nextgenscience.org website and: Provides an authoritative offline reference to the standards when creating lesson plans Arranged by grade level and by core discipline, making information quick and easy to find Printed in full color with a lay-flat spiral binding Allows for bookmarking, highlighting, and annotating

Branches from the Same Tree

College of ScienceEngineering and

Food Science : Annual ReportPromising Practices for Addressing the Underrepresentation of Women in Science, Engineering, and MedicineOpening Doors Based primarily on a conference, this book examines the need for interventions to increase the number of U.S. students, both males and females, pursuing careers in the sciences and engineering and describes interventions supported by the private and public sectors at the undergraduate and graduate levels of education. The individually authored chapters also describe actions taken by employers of scientists and engineers to retain their technical work force. *A Review of H.R. 3007, the Advancement of Women in Science, Engineering, and Technology Development Act* Arcadia Publishing The field of computer science (CS) is currently experiencing a surge in undergraduate degree production and course enrollments, which is straining program resources at many institutions and causing concern among faculty and administrators about how best to respond to the rapidly growing demand. There is also significant interest about what this growth will mean for the future of CS programs, the role of computer science in academic institutions, the field as a whole, and U.S. society more broadly. Assessing and Responding to the Growth of Computer Science Undergraduate

Enrollments seeks to provide a better understanding of the current trends in computing enrollments in the context of past trends. It examines drivers of the current enrollment surge, relationships between the surge and current and potential gains in diversity in the field, and the potential impacts of responses to the increased demand for computing in higher education, and it considers the likely effects of those responses on students, faculty, and institutions. This report provides recommendations for what institutions of higher education, government agencies, and the private sector can do to respond to the surge and plan for a strong and sustainable future for the field of CS in general, the health of the institutions of higher education, and the prosperity of the nation. **Issues and Implications for U.S. Science and Engineering Leadership: Summary of a Workshop** National Academies Press "This edited volume includes eighteen chapters and discusses various research challenges in science, engineering and technology. Topics discussed include learning methods of artificial intelligence, computerized medical image processing, human-computer interaction for detection of hand gestures, community energy storage, e-learning, prediction of diabetic risk, hydrogen fuel cells for automobiles, solar cells, and more"--

Academic Science/engineering National Academies Press "I was fortunate in having an instructor at the University of Minnesota who was looking after me," recalled one electrical engineering graduate of 1949. "When I said, 'What's next?' he said, 'If I were you, I'd just go down the street here to Engineering Research Associates, and I'd think you'd like what they're doing there'." That was Seymour Cray, and his computer designs helped create a notable computer industry in the Twin Cities. Another Minnesota graduate, Earl Bakken (class of 1948), founded Medtronic and the core of a nationally renowned medical devices industry. For 75 years the Institute of Technology, now the College of Science and Engineering, has pioneered in research, innovation, and technology transfer to Minnesota and the world. The people behind this unique institution are revealed in this concise illustrated history, prepared by its own team of professional historians. *College of Science and Engineering* National Academies Press Your alarm goes off, and you head to the kitchen to make yourself some toast and a cup of coffee. Little do you know, as you savor the aroma of the steam rising from your cup, that your ordinary morning routine depends on some of the weirdest phenomena ever discovered. The world of quantum physics is generally thought of as hopelessly esoteric. While classical physics gives us

the laws governing why a ball rolls downhill, how a plane is able to fly, and so on, its quantum cousin gives us particles that are actually waves, "spooky" action at a distance, and Schrodinger's unlucky cat. But, believe it or not, even the most mundane of everyday activities is profoundly influenced by the abstract and exotic world of the quantum. In Breakfast with Einstein, Chad Orzel illuminates the strange phenomena lurking just beneath the surface of our ordinary lives by digging into the surprisingly complicated physics involved in his (and anyone's) morning routine. Orzel, author of How to Teach Quantum Physics to Your Dog, explores how quantum connects with everyday reality, and offers engaging, layperson-level explanations of the mind-bending ideas central to modern physics. From the sun, alarm clocks, and the red glow of a toaster's hot filaments (the glow that launched quantum mechanics) to the chemistry of food aroma, a typical day is rich with examples of quantum weirdness. Breakfast with Einstein reveals the hidden physics all around us, and after reading this book, your ordinary mornings will never seem quite as ordinary again.

The Integration of the Humanities and Arts with Sciences, Engineering, and Medicine in Higher Education

National Academies Press
Science, engineering, and technology permeate nearly every facet of

modern life and hold the key to solving many of humanity's most pressing current and future challenges. The United States' position in the global economy is declining, in part because U.S. workers lack fundamental knowledge in these fields. To address the critical issues of U.S. competitiveness and to better prepare the workforce, A Framework for K-12 Science Education proposes a new approach to K-12 science education that will capture students' interest and provide them with the necessary foundational knowledge in the field. A Framework for K-12 Science Education outlines a broad set of expectations for students in science and engineering in grades K-12. These expectations will inform the development of new standards for K-12 science education and, subsequently, revisions to curriculum, instruction, assessment, and professional development for educators. This book identifies three dimensions that convey the core ideas and practices around which science and engineering education in these grades should be built. These three dimensions are: crosscutting concepts that unify the study of science through their common application across science and engineering; scientific and engineering practices; and disciplinary core ideas in the physical sciences, life sciences, and earth and space sciences and for engineering, technology, and the applications of

science. The overarching goal is for all high school graduates to have sufficient knowledge of science and engineering to engage in public discussions on science-related issues, be careful consumers of scientific and technical information, and enter the careers of their choice. A Framework for K-12 Science Education is the first step in a process that can inform state-level decisions and achieve a research-grounded basis for improving science instruction and learning across the country. The book will guide standards developers, teachers, curriculum designers, assessment developers, state and district science administrators, and educators who teach science in informal environments.

Where are Women and Girls in Science, Engineering and Technology? MIT Press

Gender Differences at Critical Transitions in the Careers of Science, Engineering, and Mathematics Faculty presents new and surprising findings about career differences between female and male full-time, tenure-track, and tenured faculty in science, engineering, and mathematics at the nation's top research universities. Much of this congressionally mandated book is based on two unique surveys of faculty and departments at major U.S. research universities in six fields: biology, chemistry, civil engineering, electrical engineering, mathematics, and physics. A departmental

survey collected information on departmental policies, recent tenure and promotion cases, and recent hires in almost 500 departments. A faculty survey gathered information from a stratified, random sample of about 1,800 faculty on demographic characteristics, employment experiences, the allocation of institutional resources such as laboratory space, professional activities, and scholarly productivity. This book paints a timely picture of the status of female faculty at top universities, clarifies whether male and female faculty have similar opportunities to advance and succeed in academia, challenges some commonly held views, and poses several questions still in need of answers. This book will be of special interest to university administrators and faculty, graduate students, policy makers, professional and academic societies, federal funding agencies, and others concerned with the vitality of the U.S. research base and economy.

Mastering Complexity

Nova Science Publishers

In the United States, broad study in an array of different disciplines â€"arts, humanities, science, mathematics, engineeringâ€" as well as an in-depth study within a special area of interest, have been defining characteristics of a higher education. But over time, in-depth study in a major discipline has come to dominate the curricula at many institutions. This

evolution of the curriculum has been driven, in part, by increasing specialization in the academic disciplines. There is little doubt that disciplinary specialization has helped produce many of the achievement of the past century. Researchers in all academic disciplines have been able to delve more deeply into their areas of expertise, grappling with ever more specialized and fundamental problems. Yet today, many leaders, scholars, parents, and students are asking whether higher education has moved too far from its integrative tradition towards an approach heavily rooted in disciplinary "silos". These "silos" represent what many see as an artificial separation of academic disciplines. This study reflects a growing concern that the approach to higher education that favors disciplinary specialization is poorly calibrated to the challenges and opportunities of our time. The Integration of the Humanities and Arts with Sciences, Engineering, and Medicine in Higher Education examines the evidence behind the assertion that educational programs that mutually integrate learning experiences in the humanities and arts with science, technology, engineering, mathematics, and medicine (STEMM) lead to improved educational and career outcomes for undergraduate and graduate students. It explores evidence regarding the value of

integrating more STEMM curricula and labs into the academic programs of students majoring in the humanities and arts and evidence regarding the value of integrating curricula and experiences in the arts and humanities into college and university STEMM education programs.

Engineering and Food Science : Annual Report

National Academies Press

The United States economy relies on the productivity, entrepreneurship, and creativity of its people. To maintain its scientific and engineering leadership amid increasing economic and educational globalization, the United States must aggressively pursue the innovative capacity of all its people—women and men. However, women face barriers to success in every field of science and engineering; obstacles that deprive the country of an important source of talent. Without a transformation of academic institutions to tackle such barriers, the future vitality of the U.S. research base and economy are in jeopardy. Beyond Bias and Barriers explains that eliminating gender bias in academia requires immediate overarching reform, including decisive action by university administrators, professional societies, federal funding agencies and foundations, government agencies, and Congress. If implemented and coordinated across public, private, and government sectors, the recommended actions will

help to improve workplace environments for all employees while strengthening the foundations of America's competitiveness.

Fulfilling the Potential of Women in Academic Science and Engineering

National Academies Press

This report presents strategies for ensuring full participation and achievement in the sciences by women and girls, calling upon all adults to support the interest and persistence of females in science, engineering, and technology. After two introductory special reports, "International Efforts through Beijing +5" and "Toward Equity in the European Union," there are six parts. Part 1, "K-12: Training the Nation's Girls and Young Women," includes "Intel Prize Winners: Working with Resources at Hand" and "Funding: Sara Lee Schupf--Making Science Irresistible for Girls." Part 2, "The Undergraduate Experience," includes "Affirmative Action: Controversy and Opportunity" (Carol Hollenshead and Angela Ginorio) and "Congresswoman Connie Morella--Educating Tomorrow's Workforce." Part 3,"Academia: Graduate School and Beyond," includes "Interventions To Advance Women on Science Faculties in Europe and Canada." Part 4, "Business and Industry," includes "Peer Review in Sweden and the Netherlands" and "Funding: Sloan Foundation--Altering a Male-Centric Work Environment." Part 5,

"Conversations about the Future," includes interviews with female education administrators and special reports: "Fatimah Jackson: A Critique of the Human Genome Project" and "A Call for Future Research" (Barbara Lazarus). Part 6, "Resource Guide," includes a directory of resources, science and technology programs of National Council for Research on Women member centers, and organizations and Web sites. (Contains 142 references.) (SM)

Practices, Crosscutting Concepts, and Core Ideas Elsevier

The historian and author of Lillian Gilbreth examines the “Great Man” myth of science with profiles of women scientists from Marie Curie to Jane Goodall. Why is science still considered to be predominantly male profession? In The Madame Curie Complex, Julie Des Jardin dismantles the myth of the lone male genius, reframing the history of science with revelations about women’s substantial contributions to the field. She explores the lives of some of the most famous female scientists, including Jane Goodall, the eminent primatologist; Rosalind Franklin, the chemist whose work anticipated the discovery of DNA’s structure; Rosalyn Yalow, the Nobel Prize-winning physicist; and, of course, Marie Curie, the Nobel Prize-winning pioneer whose towering, mythical status has both empowered and stigmatized future

generations of women considering a life in science. With lively anecdotes and vivid detail, The Madame Curie Complex reveals how women scientists have changed the course of science—and the role of the scientist—throughout the twentieth century. They often asked different questions, used different methods, and came up with different, groundbreaking explanations for phenomena in the natural world.

Gender Differences at Critical Transitions in the Careers of Science, Engineering, and Mathematics Faculty The Feminist Press at CUNY Tools to make hard problems easier to solve. In this book, Sanjoy Mahajan shows us that the way to master complexity is through insight rather than precision. Precision can overwhelm us with information, whereas insight connects seemingly disparate pieces of information into a simple picture. Unlike computers, humans depend on insight. Based on the author's fifteen years of teaching at MIT, Cambridge University, and Olin College, The Art of Insight in Science and Engineering shows us how to build insight and find understanding, giving readers tools to help them solve any problem in science and engineering. To master complexity, we can organize it or discard it. The Art of Insight in Science and Engineering first teaches the tools for organizing complexity, then distinguishes the two paths for discarding

complexity: with and without loss of information. Questions and problems throughout the text help readers master and apply these groups of tools. Armed with this three-part toolchest, and without complicated mathematics, readers can estimate the flight range of birds and planes and the strength of chemical bonds, understand the physics of pianos and xylophones, and explain why skies are blue and sunsets are red. The Art of Insight in Science and Engineering will appear in print and online under a Creative Commons Noncommercial Share Alike license.

The Art of Insight in Science and Engineering National Academies Press

Science, technology, engineering and mathematics (STEM) professionals generate a stream of scientific discoveries and technological innovations that fuel job creation and national economic growth. Ensuring a robust supply of these professionals is critical for sustaining growth and creating jobs growth at a time of intense global competition. Undergraduate STEM education prepares the STEM professionals of today and those of tomorrow, while also helping all students develop knowledge and skills they can draw on in a variety of occupations and as individual citizens. However, many capable students intending to major in STEM later switch to another field or drop out of higher education altogether, partly because

of documented weaknesses in STEM teaching, learning and student supports. Improving undergraduate STEM education to address these weaknesses is a national imperative. Many initiatives are now underway to improve the quality of undergraduate STEM teaching and learning. Some focus on the national level, others involve multi-institution collaborations, and others take place on individual campuses. At present, however, policymakers and the public do not know whether these various initiatives are accomplishing their goals and leading to nationwide improvement in undergraduate STEM education. Indicators for Monitoring Undergraduate STEM Education outlines a framework and a set of indicators that document the status and quality of undergraduate STEM education at the national level over multiple years. It also indicates areas where additional research is needed in order to develop appropriate measures. This publication will be valuable to government agencies that make investments in higher education, institutions of higher education, private funders of higher education programs, and industry stakeholders. It will also be of interest to researchers who study higher education.

A Study of the Regional Role of Engineering Colleges National Academies Press

Earthen levees are extensively used to protect the population

and infrastructure from periodic floods and high water due to storm surges. The causes of failure of levees include overtopping, surface erosion, internal erosion, and slope instability. Overtopping may occur during periods of flooding due to insufficient freeboard. The most problematic situation involves the levee being overtopped by both surge and waves when the surge level exceeds the levee crest elevation with accompanying wave overtopping. Overtopping of levees produces fast-flowing, turbulent water velocities on the landward-side slope that can potentially damage the protective grass covering and expose the underlying soil to erosion. If overtopping continues long enough, the erosion may eventually result in loss of levee crest elevation and possibly breaching of the protective structure. Hence, protecting levees from erosion by surge overflow and wave overtopping is necessary to assure a viable and safe levee system. This book presents a cutting-edge approach to understanding overtopping hydraulics under negative free board of earthen levees, and to the study of levee reinforcing methods. Combining soil erosion test, full-scale laboratory overtopping hydraulics test, and numerical modeling for the turbulent overtopping hydraulics. It provides an analysis that integrates the mechanical and hydraulic processes governing levee overtopping occurrences

and engineering approaches to reinforce overtopped levees. Topics covered: surge overflow, wave overtopping and their combination, full-scale hydraulic tests, erosion tests, overtopping hydraulics, overtopping discharge, and turbulent analysis. This is an invaluable resource for graduate students and researchers working on levee design, water resource engineering, hydraulic engineering, and coastal engineering, and for professionals in the field of civil and environmental engineering, and natural hazard analysis.

Minority Serving Institutions National Academies Press

College of ScienceEngineering and Food Science : Annual ReportPromising Practices for Addressing the Underrepresentation of Women in Science, Engineering, and MedicineOpening DoorsNational Academies Press

Technology, the University and the Community National Academies Press

Mentorship is a catalyst capable of unleashing one's potential for discovery, curiosity, and participation in STEMM and subsequently improving the training environment in which that STEMM potential is fostered. Mentoring relationships provide developmental spaces in which students' STEMM skills are honed and pathways into STEMM fields can be discovered. Because mentorship can be so influential in shaping the future STEMM

workforce, its occurrence should not be left to chance or idiosyncratic implementation. There is a gap between what we know about effective mentoring and how it is practiced in higher education. The Science of Effective Mentorship in STEMM studies mentoring programs and practices at the undergraduate and graduate levels. It explores the importance of mentorship, the science of mentoring relationships, mentorship of underrepresented students in STEMM, mentorship structures and behaviors, and institutional cultures that support mentorship. This report and its complementary interactive guide present insights on effective programs and practices that can be adopted and adapted by institutions, departments, and individual faculty members.