genetic mutation pogil

genetic mutation pogil is a crucial topic for students, educators, and professionals in biology and genetics. This article offers a comprehensive overview of genetic mutations, their types, causes, and consequences, while exploring the Process Oriented Guided Inquiry Learning (POGIL) approach as an effective educational strategy. Readers will learn the fundamental concepts behind genetic mutations, including how they occur, their biological significance, and their impact on organisms. The article also delves into the structure and methodology of POGIL activities, emphasizing their value in promoting active learning and critical thinking in genetics education. By examining real-world examples and applications, this resource will help readers understand genetic mutation pogil in depth, whether for academic purposes, classroom teaching, or personal interest. Stay informed and empowered with this detailed guide as you explore the fascinating world of genetic mutations and POGIL.

Understanding Genetic Mutation Pogil

Genetic mutation pogil combines the study of genetic mutations with the active-learning POGIL methodology. In genetics, mutations refer to changes in the DNA sequence, which can impact how genes function. POGIL, or Process Oriented Guided Inquiry Learning, is a student-centered instructional approach that encourages learners to construct their understanding through collaborative investigation and analysis. When integrated into genetics education, POGIL activities help students explore the mechanisms behind genetic mutations, analyze mutation examples, and develop problem-solving skills. This section provides a foundation for understanding both the scientific and educational aspects of genetic mutation pogil.

Types and Causes of Genetic Mutations

Point Mutations

Point mutations are among the most basic genetic mutations, involving changes to a single nucleotide base in the DNA sequence. These mutations can be silent, missense, or nonsense, depending on their impact on the encoded protein. Point mutations may result from errors during DNA replication or exposure to mutagens.

- Silent Mutation: No change in the protein’s amino acid sequence.
- Missense Mutation: Alters one amino acid in the protein.
- Nonsense Mutation: Introduces a premature stop codon, truncating the protein.

Frameshift Mutations

Frameshift mutations occur when nucleotides are inserted or deleted from the DNA sequence, causing a shift in the reading frame. This can result in the production of nonfunctional proteins and severe genetic disorders. Frameshift mutations are commonly caused by errors during DNA replication or repair mechanisms.

Chromosomal Mutations

Chromosomal mutations involve structural changes in chromosomes, such as deletions, duplications, inversions, and translocations. These mutations often have significant effects on an organism’s phenotype and can lead to conditions like Down syndrome or cancer. Chromosomal mutations typically arise due to errors during cell division.

Environmental and Spontaneous Causes

Genetic mutations may be triggered by external factors (mutagens) such as radiation, chemicals, or viruses. Spontaneous mutations also occur naturally due to random errors in DNA replication. Both environmental and spontaneous causes contribute to genetic diversity and evolution.

Effects and Consequences of Genetic Mutations

Beneficial Mutations

Not all genetic mutations are harmful; some confer advantages to organisms. Beneficial mutations

can lead to adaptations that improve survival or reproduction. These changes drive evolution and natural selection, resulting in the development of new traits over generations.

Harmful Mutations

Harmful mutations can disrupt normal biological processes, leading to genetic disorders, diseases, or reduced fitness. Examples include cystic fibrosis, sickle cell anemia, and some cancers. The impact of a mutation depends on its type, location, and effect on protein function.

Neutral Mutations

Some mutations have no noticeable effect on the organism. These neutral mutations may persist in populations without influencing fitness or phenotype. Over time, they contribute to genetic variation and may become significant under changing environmental conditions.

1. Beneficial: Increase evolutionary fitness.
2. Harmful: Cause disease or dysfunction.
3. Neutral: No immediate impact.

Application of POGIL in Genetics Education

The POGIL methodology transforms traditional genetics education by fostering active engagement and collaboration. In a genetic mutation pogil classroom, students work in small groups to explore questions, analyze data, and construct explanations related to genetic mutations. The instructor serves as a facilitator, guiding students through the process and encouraging critical thinking. This interactive approach enhances comprehension of complex topics like mutation types, mechanisms, and consequences.

POGIL Structure and Roles

POGIL activities follow a structured format, with clearly defined roles for each group member, such as manager, recorder, and spokesperson. This role-based system ensures accountability, promotes participation, and helps students develop communication and leadership skills. Each POGIL activity is designed to build understanding incrementally, moving from basic concepts to application and analysis.

Inquiry-Based Learning Advantages

Inquiry-based learning encourages students to ask questions, investigate phenomena, and draw evidence-based conclusions. In the context of genetic mutation pogil, this approach enables learners to grasp the complexity of genetic changes and their biological effects. Inquiry activities may include analyzing DNA sequences, predicting mutation outcomes, or simulating genetic inheritance patterns.

Examples of Genetic Mutation POGIL Activities

Analyzing DNA Sequences

POGIL activities often involve examining DNA sequences to identify mutations, classify their types, and predict their impact on protein synthesis. Students may work with real or simulated genetic data, fostering hands-on experience in genetic analysis.

Modeling Mutation Effects

Students use models to visualize how mutations alter gene expression or protein structure. By manipulating genetic information, learners can observe the consequences of point, frameshift, and chromosomal mutations, deepening their understanding of genetic mechanisms.

Case Studies of Genetic Disorders

Case studies are a powerful tool in genetic mutation pogil, allowing students to explore real-world examples such as sickle cell disease, Huntington’s disease, or color blindness. Through guided inquiry, students analyze the genetic basis of these conditions and consider potential treatments or interventions.

- DNA sequence analysis exercises
- Mutation modeling with hands-on materials
- Genetic disorder case studies
- Group presentations on mutation impacts

Benefits of Using POGIL for Learning Genetics

Enhanced Critical Thinking

POGIL activities foster higher-order thinking skills by requiring students to analyze, synthesize, and evaluate information. This approach is particularly effective for complex topics like genetic mutations, where understanding mechanisms and consequences is essential.

Improved Collaboration and Communication

Working in POGIL groups enhances teamwork, communication, and leadership abilities. Students learn to articulate their ideas, listen actively, and build consensus, all of which are valuable skills in scientific research and professional environments.

Long-Term Retention of Concepts

Research indicates that students who engage in guided inquiry retain genetic concepts longer than those taught through traditional lectures. POGIL's emphasis on active learning and peer interaction contributes to deeper comprehension and application of genetic mutation principles.

Real-World Applications of Genetic Mutation Concepts

Medical and Health Implications

Understanding genetic mutations is vital for diagnosing, treating, and preventing genetic disorders. Advances in gene therapy, personalized medicine, and genetic screening rely on the accurate identification and interpretation of mutations in patient DNA.

Evolutionary Biology and Adaptation

Genetic mutations drive evolutionary change and adaptation in populations. By studying mutation patterns, scientists can trace the origins of species, understand evolutionary relationships, and predict responses to environmental pressures.

Biotechnology and Genetic Engineering

Modern biotechnology utilizes genetic mutations to develop new traits in plants, animals, and microorganisms. Techniques such as CRISPR gene editing harness mutation processes to improve crop yields, enhance disease resistance, and advance scientific research.

- Medical advancements: gene therapy, diagnostics
- Evolutionary studies: speciation, adaptation
- Biotechnology: genetic modification, research tools

Summary and Key Takeaways

Genetic mutation pogil integrates the scientific study of DNA mutations with the active-learning POGIL methodology, offering an effective strategy for mastering genetics concepts. By exploring mutation types, causes, and consequences through collaborative inquiry, students develop a comprehensive understanding of genetic variation and its significance. POGIL activities enhance critical thinking, communication, and long-term retention, making them a valuable addition to genetics education. The principles and applications of genetic mutations extend beyond the classroom, influencing medicine, evolution, and biotechnology. Whether you are a learner, educator, or professional, understanding genetic mutation pogil will enrich your knowledge and support your success in the field of genetics.

Q: What is genetic mutation pogil?

A: Genetic mutation pogil refers to the use of Process Oriented Guided Inquiry Learning (POGIL) activities to teach students about genetic mutations, helping them understand mutation mechanisms, effects, and real-world implications through collaborative, inquiry-based learning.

Q: What are the main types of genetic mutations covered in pogil activities?

A: The main types include point mutations (silent, missense, nonsense), frameshift mutations (insertions, deletions), and chromosomal mutations (deletions, duplications, inversions, translocations).

Q: How does POGIL benefit genetics education compared to traditional teaching?

A: POGIL promotes active engagement, teamwork, and critical thinking, resulting in deeper understanding and better retention of genetic concepts than traditional lecture-based methods.

Q: Can genetic mutations be beneficial?

A: Yes, some genetic mutations are beneficial, providing organisms with adaptive traits that enhance survival and reproduction, driving the process of evolution.

Q: What role do environmental factors play in causing genetic mutations?

A: Environmental factors such as radiation, chemicals, and viruses act as mutagens, increasing the likelihood of DNA changes and contributing to genetic diversity.

Q: How are genetic mutations detected and analyzed in POGIL activities?

A: Students typically analyze DNA sequences, use models, and study case examples, enabling them to identify mutations and predict their effects on gene expression and protein function.

Q: What skills do students develop through genetic mutation pogil activities?

A: Students develop critical thinking, collaboration, communication, data analysis, and problem-solving skills, all essential for scientific inquiry and professional success.

Q: What are some real-world applications of genetic mutation concepts?

A: Applications include medical diagnostics, gene therapy, evolutionary research, and biotechnology such as genetic engineering and crop improvement.

Q: What is a frameshift mutation?

A: A frameshift mutation is a genetic alteration caused by the insertion or deletion of nucleotides in DNA, which shifts the reading frame and often leads to nonfunctional proteins.

Q: Why is POGIL considered effective for teaching complex topics like genetic mutations?

A: POGIL’s inquiry-based and collaborative approach helps students actively construct understanding, making it easier to grasp complex concepts and apply them in real-world contexts.

Genetic Mutation Pogil

Decoding the Mystery: A Deep Dive into Genetic Mutation POGIL Activities

Introduction:

Have you ever wondered how variations in traits arise within a population? The answer often lies in genetic mutations – the subtle changes in our DNA that drive evolution and, unfortunately, can also contribute to genetic disorders. This blog post delves into the world of genetic mutations, specifically focusing on how POGIL (Process Oriented Guided Inquiry Learning) activities can effectively teach and reinforce this complex topic. We'll explore the different types of mutations, their mechanisms, and how POGIL's interactive approach fosters a deeper understanding. Get ready to unlock the secrets of genetic mutation through active learning!

What are Genetic Mutations?

Genetic mutations are permanent alterations in the DNA sequence of an organism. These changes can be as small as a single nucleotide substitution (a point mutation) or as large as a chromosomal rearrangement involving thousands of base pairs. Mutations can occur spontaneously during DNA replication or be induced by external factors such as radiation or certain chemicals. The consequences of a mutation can range from inconsequential to severely detrimental, depending on the location and type of alteration.

Types of Genetic Mutations:

We can categorize genetic mutations into several key types:

Point Mutations: These are single nucleotide changes, including substitutions (one base is replaced by another), insertions (a base is added), and deletions (a base is removed). Substitutions can be synonymous (no change in amino acid sequence) or nonsynonymous (leading to a different amino acid). Insertions and deletions can cause frameshift mutations, dramatically altering the amino acid sequence downstream.

Chromosomal Mutations: These involve larger-scale changes affecting entire chromosomes or significant portions thereof. Examples include deletions (loss of a chromosome segment), duplications (extra copies of a segment), inversions (a segment is reversed), and translocations (a

segment moves to a different chromosome).

The Power of POGIL in Understanding Genetic Mutations:

POGIL activities offer a powerful pedagogical approach to teaching the intricacies of genetic mutations. Unlike traditional lectures, POGIL employs a student-centered, collaborative learning model. Students work in small groups to solve problems, analyze data, and construct their understanding through guided inquiry. This active learning process significantly enhances comprehension and retention.

How POGIL Activities Enhance Learning about Genetic Mutations:

Active Engagement: POGIL activities encourage students to actively participate in the learning process, rather than passively receiving information. This hands-on approach boosts engagement and makes learning more enjoyable.

Collaborative Learning: Working in groups fosters peer learning and allows students to learn from each other's perspectives and problem-solving approaches. This collaborative environment promotes critical thinking and communication skills.

Inquiry-Based Learning: POGIL activities challenge students to explore concepts through guided inquiry, promoting deeper understanding than simply memorizing facts. Students learn to analyze data, draw conclusions, and formulate their own explanations.

Problem-Solving Skills: POGIL activities often involve real-world scenarios and problems, helping students apply their knowledge to practical contexts. This enhances problem-solving skills and reinforces learning.

Designing Effective Genetic Mutation POGIL Activities:

Creating a successful POGIL activity on genetic mutations requires careful planning and consideration of learning objectives. Here are some key elements to incorporate:

Clear Learning Objectives: Define specific, measurable, achievable, relevant, and time-bound (SMART) learning objectives.

Engaging Scenarios: Start with a relevant and engaging scenario to capture student interest.

Guided Inquiry Questions: Develop a series of carefully structured questions that guide students through the learning process.

Data Analysis: Incorporate opportunities for students to analyze data and interpret results.

Collaborative Discussion: Encourage group discussions and peer learning.

Assessment: Include opportunities to assess student understanding, either through group activities or individual assignments.

Beyond the Basics: Advanced Applications of Genetic Mutation POGIL

POGIL activities can be tailored to various levels of complexity. Advanced activities might delve into topics such as:

The role of mutations in evolution and adaptation.
The molecular mechanisms of DNA repair.
The relationship between mutations and genetic disorders.
The ethical implications of genetic engineering and gene therapy.

Conclusion:

Genetic mutations are fundamental to the understanding of life's diversity and the causes of many diseases. POGIL activities provide a robust and engaging method to teach this complex topic. By fostering active learning, collaboration, and guided inquiry, POGIL helps students develop a deeper and more lasting understanding of genetic mutations, empowering them to analyze data, solve problems, and contribute to scientific advancement. Utilizing the principles outlined above, educators can create effective POGIL activities that transform the learning experience and leave a lasting impact on students' comprehension of this vital area of biology.

FAQs:

1. What is the difference between a germline mutation and a somatic mutation? Germline mutations occur in reproductive cells and are heritable, meaning they can be passed on to offspring. Somatic mutations occur in non-reproductive cells and are not heritable.

2. Can all mutations be detected using current technology? No, some mutations are very small or occur in regions of the genome that are difficult to sequence, making detection challenging.

3. Are all mutations harmful? No, many mutations are neutral, having no discernible effect on the organism. Some mutations can even be beneficial, providing an advantage in certain environments.

4. How can POGIL activities be adapted for different learning styles? POGIL activities can be adapted to accommodate various learning styles by incorporating diverse methods such as visual aids, hands-on experiments, and group discussions tailored to individual needs.

5. Where can I find resources to develop my own genetic mutation POGIL activities? Numerous online resources offer POGIL activity templates and examples. Additionally, professional development workshops often provide training on designing effective POGIL activities.

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and details a list of components-including diversity of species, genetic variability within and among species, distribution of species across the ecosystem, the aesthetic satisfaction derived from diversity, and the duty to preserve and protect biodiversity. The book also recommends that more information about the role of biodiversity in sustaining natural resources be gathered and summarized in ways useful to managers. Acknowledging that decisions about biodiversity are necessarily qualitative and change over time because of the nonmarket nature of so many of the values, the committee recommends periodic reviews of management decisions.

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accompanied by definitions for openness, wet lab, dry lab, virtual lab and cookbook lab. Each key term is defined both with a short entry designed to provide immediate access following by a more extensive discussion, with extensive references and examples where appropriate. Experienced readers will recognize the majority of terms included, but the developing discipline of science education demands the consideration of new words. For example, the term blended science is offered as a better descriptor for interdisciplinary science and make a distinction between project-based and problem-based instruction. Even a definition for science education is included. The Language of Science Education is designed as a reference book but many readers may find it useful and enlightening to read it as if it were a series of very short stories.

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analyzing real data Features qualitative and quantitative problems at the end of each chapter All art available for download online and on CD-ROM

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clarifying this complex subject by focusing on the big picture of genetics concepts. The new edition features an emphasis on problem-solving and relevant applications, while incorporating the latest trends in genetics research.

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genetic mutation pogil: Eukaryotic Gene Expression Ajit Kumar, 2013-03-09 The recent surge of interest in recombinant DNA research is understandable considering that biologists from all disciplines, using recently developed mo lecular techniques, can now study with great precision the structure and regulation of specific genes. As a discipline, molecular biology is no longer a mere subspeciality of biology or biochemistry: it is the new biology. Current approaches to the outstanding problems in virtually all the traditional disci plines in biology are now being explored using the recombinant DNA tech nology. In this atmosphere of rapid progress, the role of information exchange and swift publication becomes quite crucial. Consequently, there has been an equally rapid proliferation of symposia volumes and review articles, apart from the explosion in popular science magazines and news media, which are always ready to simplify and sensationalize the implications of recent dis coveries, often before the scientific community has had the opportunity to fully scrutinize the developments. Since many of the recent findings in this field have practical implications, quite often the symposia in molecular biology are sponsored by private industry and are of specialized interest and in any case quite expensive for students to participate in. Given that George Wash ington University is a teaching institution, our aim in sponsoring these Annual Spring Symposia is to provide, at cost, a forum for students and experts to discuss the latest developments in selected areas of great significance in biology. Additionally, since the University is located in Washington, D. C.

genetic mutation pogil: *Rising Above the Gathering Storm, Revisited* Institute of Medicine, National Academy of Engineering, National Academy of Sciences, 2005 "Rising Above the Gathering Storm" Committee, 2010-10-23 In the face of so many daunting near-term challenges, U.S. government and industry are letting the crucial strategic issues of U.S. competitiveness slip below the surface. Five years ago, the National Academies prepared Rising Above the Gathering Storm, a book that cautioned: Without a renewed effort to bolster the foundations of our competitiveness, we can expect to lose our privileged position. Since that time we find ourselves in a country where much has changed-and a great deal has not changed. So where does America stand relative to its position

of five years ago when the Gathering Storm book was prepared? The unanimous view of the authors is that our nation's outlook has worsened. The present volume, Rising Above the Gathering Storm, Revisited, explores the tipping point America now faces. Addressing America's competitiveness challenge will require many years if not decades; however, the requisite federal funding of much of that effort is about to terminate. Rising Above the Gathering Storm, Revisited provides a snapshot of the work of the government and the private sector in the past five years, analyzing how the original recommendations have or have not been acted upon, what consequences this may have on future competitiveness, and priorities going forward. In addition, readers will find a series of thought- and discussion-provoking factoids-many of them alarming-about the state of science and innovation in America. Rising Above the Gathering Storm, Revisited is a wake-up call. To reverse the foreboding outlook will require a sustained commitment by both individual citizens and government officials-at all levels. This book, together with the original Gathering Storm volume, provides the roadmap to meet that goal. While this book is essential for policy makers, anyone concerned with the future of innovation, competitiveness, and the standard of living in the United States will find this book an ideal tool for engaging their government representatives, peers, and community about this momentous issue.

genetic mutation pogil: *On the Origin of Species Illustrated* Charles Darwin, 2020-12-04 On the Origin of Species (or, more completely, On the Origin of Species by Means of Natural Selection, or the Preservation of Favoured Races in the Struggle for Life),[3] published on 24 November 1859, is a work of scientific literature by Charles Darwin which is considered to be the foundation of evolutionary biology.[4] Darwin's book introduced the scientific theory that populations evolve over the course of generations through a process of natural selection. It presented a body of evidence that the diversity of life arose by common descent through a branching pattern of evolution. Darwin included evidence that he had gathered on the Beagle expedition in the 1830s and his subsequent findings from research, correspondence, and experimentation.

genetic mutation pogil: *Process Oriented Guided Inquiry Learning (POGIL)* Richard Samuel Moog, 2008 POGIL is a student-centered, group learning pedagogy based on current learning theory. This volume describes POGIL's theoretical basis, its implementations in diverse environments, and evaluation of student outcomes.

genetic mutation pogil: *DNA Science* David A. Micklos, Greg A. Freyer, 2003 This is the second edition of a highly successful textbook (over 50,000 copies sold) in which a highly illustrated, narrative text is combined with easy–to–use thoroughly reliable laboratory protocols. It contains a fully up–to–date collection of 12 rigorously tested and reliable lab experiments in molecular biology, developed at the internationally renowned Dolan DNA Learning Center of Cold Spring Harbor Laboratory, which culminate in the construction and cloning of a recombinant DNA molecule. Proven through more than 10 years of teaching at research and nonresearch colleges and universities, junior colleges, community colleges, and advanced biology programs in high school, this book has been successfully integrated into introductory biology, general biology, genetics, microbiology, cell biology, molecular genetics, and molecular biology courses. The first eight chapters have been completely revised, extensively rewritten, and updated. The new coverage extends to the completion of the draft sequence of the human genome and the enormous impact these and other sequence data are having on medicine, research, and our view of human evolution. All sections on the concepts and techniques of molecular biology have been updated to reflect the current state of laboratory research. The laboratory experiments cover basic techniques of gene isolation and analysis, honed by over 10 years of classroom use to be thoroughly reliable, even in the hands of teachers and students with no prior experience. Extensive prelab notes at the beginning of each experiment explain how to schedule and prepare, while flow charts and icons make the protocols easy to follow. As in the first edition of this book, the laboratory course is completely supported by quality–assured products from the Carolina Biological Supply Company, from bulk reagents, to useable reagent systems, to single–use kits, thus satisfying a broad range of teaching applications.

genetic mutation pogil: Molecular Structure of Nucleic Acids , 1953

genetic mutation pogil: Neuroscience British Neuroscience Association, Richard G. M. Morris, Marianne Fillenz, 2003

genetic mutation pogil: The Cell Cycle and Cancer Renato Baserga, 1971

genetic mutation pogil: Translational Control of Gene Expression Nahum Sonenberg, John W. B. Hershey, Michael B. Mathews, 2001 Since the 1996 publication of Translational Control, there has been fresh interest in protein synthesis and recognition of the key role of translation control mechanisms in regulating gene expression. This new monograph updates and expands the scope of the earlier book but it also takes a fresh look at the field. In a new format, the first eight chapters provide broad overviews, while each of the additional twenty-eight has a focus on a research topic of more specific interest. The result is a thoroughly up-to-date account of initiation, elongation, and termination of translation, control mechanisms in development in response to extracellular stimuli, and the effects on the translation machinery of virus infection and disease. This book is essential reading for students entering the field and an invaluable resource for investigators of gene expression and its control.

genetic mutation pogil: Botany Illustrated Janice Glimn-Lacy, Peter B. Kaufman, 2012-12-06 This is a discovery book about plants. It is for students In the first section, introduction to plants, there are sev of botany and botanical illustration and everyone inter eral sources for various types of drawings. Hypotheti ested in plants. Here is an opportunity to browse and cal diagrams show cells, organelles, chromosomes, the choose subjects of personal inter. est, to see and learn plant body indicating tissue systems and experiments about plants as they are described. By adding color to with plants, and flower placentation and reproductive the drawings, plant structures become more apparent structures. For example, there is no average or stan and show how they function in life. The color code dard-looking flower; so to clearly show the parts of a clues tell how to color for definition and an illusion of flower (see 27), a diagram shows a stretched out and depth. For more information, the text explains the illus exaggerated version of a pink (Dianthus) flower (see trations. The size of the drawings in relation to the true 87). A basswood (Tifia) flower is the basis for diagrams size of the structures is indicated by X 1 (the same size) of flower types and ovary positions (see 28). Another to X 3000 (enlargement from true size) and X n/n source for drawings is the use of prepared microscope (reduction from true size). slides of actual plant tissues.

genetic mutation pogil: Study Guide 1 DCCCD Staff, Dcccd, 1995-11

genetic mutation pogil: Growing Diverse STEM Communities Leyte L. Winfield, Gloria Thomas, Linette M. Watkins, Zakiya S. Wilson-Kennedy, 2020-10-22 Role of the MSEIP grant in the success of STEM undergraduate research at Queensborough Community College and beyond -- Enhancing student engagement with peer-led team learning and course-based undergraduate research experiences -- Aiming toward an effective Hispanic serving chemistry curriculum -- Computational chemistry and biology courses for undergraduates at an HBCU : cultivating a diverse computational science community -- NanoHU : a boundary-spanning education model for maximizing human and intellectual capital -- Design and implementation of a STEM student success program at Grambling State University -- The role of the ReBUILDetroit Scholars Program at Wayne State University in broadening participation in STEM -- Using scholars programs to enhance success of underrepresented students in chemistry, biomedical sciences, and STEM -- The MARC U*STAR Program at University of Maryland Baltimore County (UMBC) 1997-2018 -- Pathways to careers in science, engineering, and math -- Leadership dimensions for broadening participation in STEM : the role of HBCUs and MSIs -- Bloom where you are planted : a model for campus climate change to retain minoritzed faculty scholars in STEM fields -- Maximizing mentoring : enhancing the impact of mentoring programs and initiatives through the Center for the Advancement of Teaching and Faculty Development at Xavier University of Louisiana -- Mentors, mentors everywhere : weaving informal and formal mentoring into a robust chemical sciences mentoring quilt -- Using technology to foster peer mentoring relationships : development of a virtual peer mentorship model for broadening participation in STEM.