

**The Inequity of K-12 STEM Education in the Commonwealth of the Northern  
Mariana Islands**

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## **History of the Department of Education in K-12 Settings**

The relationship between Science, Technology, Engineering, and Mathematics (STEM) education and public education first appeared in the Morrill Act of 1862 in the United States. This act gave land grant universities funding to focus on promoting agricultural science and later onto engineering programs. The US slowly began shifting into an industrial society, and STEM training was required in the workforce. Today, national policies addressing STEM education in K-12 includes STEM enrichment programs, increased teacher education, and after-school activities that have been a response to increase students engaging in STEM education (Falconer, 2022). These STEM programs are largely unavailable to Pacific Islander (PI) K-12 students.

## **Department of Education K-12 Education in the Pacific Region**

Executive Order 14109 and the later Amendment 14031 were created to be more effective and work towards advancing equity, justice for Asian Americans, Native Hawaiians, and Pacific Islanders (AANHPI). This is an executive order that created a commission to make recommendations to hold public meetings, and to advance and include Pacific Islanders in all areas of the American fabric.

As a rural US territory surrounded by the Pacific Ocean, the Commonwealth of the Northern Mariana Islands (CNMI) has a distinct relationship with the US. The history of the CNMI and Department of Education have continued to impact funding and supporting education systems in insular areas of the US and freely associated states in the Pacific. This includes Guam, the CNMI, American Samoa, Federated States of Micronesia, Republic of Palau, and the Republic of the Marshall Islands. There has been a movement to support PI in STEM education to improve this population's lives and commit to social justice.

There has been a movement through federal and state policymakers, legislators, and educators broadening STEM education at the K-12 level. These efforts include promoting

elementary grade participation in STEM, raising overall student achievement, increasing advanced high school course taking, reducing performance gaps among demographic groups, and improving college and career readiness in mathematics and science.

Oceania STEM is a PI specific network comprised of educators, non-profit organizations, community colleges and universities committed to increasing PI in STEM fields and careers.

Oceania STEM programs incorporates indigenous knowledge and/or cultural connections that make STEM topics relevant to PI students (Troy, 2017). It is clear that there has been a movement to improve K-12 STEM education in the Pacific.

### **STEM Inequity Starts in the Pacific Islands**

Native Hawaiians and Pacific Islanders (NHPI) are the least acknowledged of four ethnic groups recognized by U.S. government agencies as being underrepresented in the fields of STEM. The inclusion of PI and Hawaiians with Asians in most federal agency initiatives makes it impossible to obtain accurate statistics on the severity of the lack of Pacific Islanders in STEM education programs (Kerr et. al. 2018). To improve STEM education in K-12 settings in the CNMI, the literature suggests the importance of early preparation in K-12 STEM classwork. This suggests improving mathematical experiences through the integration of STEM disciplines, forms knowledge and skills that prepare students for postsecondary STEM education and careers (Hoeg & Bencze, 2017). Increasing access to STEM programs, continual and social support for students with diverse backgrounds engaging in STEM education, and a strong commitment to leadership would promote STEM diversity and inclusion (Institute of Medicine, 2011). These are just a few solutions to combat the inequity Pacific Islanders face in all areas found in the STEM field.

### **Defining Inequity in the CNMI and Previous Policies**

The Workforce Innovation and Opportunity Act 2020-2023 State Plan for the CNMI reported 25% of 16-24-year-olds are unemployed in the CNMI and have a potential labor force of PI of 43%. This suggests more needs to be done to offer STEM workforce training in this

region. Science, Technology, Engineering and Mathematics (STEM) programs offered to students would increase job opportunities for this age group.

The Authorization for Technical Education Program (P.L. 14-54, section 2) enacted in 2005, is aimed to increase education and/or employment through on-the-job training in the field of computer science for students when reaching high school. Initially, this public law began implementation in three high schools in Rota, Tinian, and Marianas High schools. In 2024, the CNMI public school system has expanded to six high schools: Kangman, Saipan Southern, and Mount Carmel High Schools. However, while this growth is evident, STEM program are still not prioritized.

This education policy in the CNMI has not been updated or replaced for over 19 years. Education reform is necessary to continue with society's progress and development. The knowledge and skills required in 2005 were vastly different from what is required today.

With the integration of STEM, in a K-12 setting in-formal programs, after-school, and out of school learning options impact student outcomes and it is strongly recommended that STEM research focuses on addressing inequity (Honey & Schweingruber, 2014).

### **Next Generation Science Standards for Student Learning in K-12**

Diverse representation in STEM education, as well as a student's limited interest of STEM fields, are complex multifaceted problems throughout K-12 schools (Scott & White, 2013). In the CNMI, Next Generation Science Standards (NGSS) have been implemented to address this inequity (A. Ogumoro, personal communication, March 12, 2024). These NGSS are designed to integrate STEM concepts and provide a globally competitive STEM education for K-12 students. The NGSS are incorporated in all 1-12 grade classrooms in the PSS and has the ability to close the inequity gap when the learning becomes more relevant and accessible to diverse students (Hoeg & Bencze, 2017).

### **Challenges and Opportunities in the CNMI in the K-12 setting**

Some of the barriers or challenges with racial and ethnic minorities engagement with STEM education involve how this group is nested within society, and institutions. Some of the concepts in STEM education focus on a linear and sequential process, building on a strong academic foundation in K-12 settings. This includes having interest and access to meaningful math and science experiences beginning in elementary school (Ladson-Billings, 1997). The importance of a STEM pipeline accounts for the timing for STEM coursework necessary for students to progress through and promotes scaffolding for students to re-learn or supplement missing skills which begin in secondary classes (Plasman et al., 2020). The Public School System (PSS) in the CNMI lacks a clear STEM pipeline. According to PSS Office of Curriculum & Instruction Course Catalogue courses in math lack a 10th grade math course, and in high school science coursework, environmental science, biology, chemistry, and physics have no clear pipeline to route students to enroll. Also, course descriptions lack foundational concepts necessary for science classes. This progression of course offerings a does not connect skills in a logical manner. For example, if a student enrolls in environmental science as a freshman, they have only one choice (biology) to enroll in as a sophomore. A series of high school coursework that fosters the development of future scientists; and students pursuing STEM careers (Gonzalez & Kuenzi, 2012).

### **STEM Education Success for Pacific Islanders beyond K-12**

In New Zealand, Richardson et al. (2018) found a successful model to support PI entering STEM coursework in college through financial support. Although this model is geared at the college level, the CNMI K-12 PSS could adapt to support students by spending the funding that could be put towards the curriculum and other supportive measures to increase PI enrollment in STEM education.

In conclusion, the inequity of Pacific Islanders in STEM education is significant. In the Commonwealth Northern Mariana Islands (CNMI) STEM education has been largely unavailable to PI K-12 students. The Department of Education in the Pacific has brought

awareness to the specific needs of this population to improve college and career readiness. In the CNMI, barriers have been addressed to prepare students access to STEM education.

However, previous educational policies that aim to address STEM education in K-12 settings have not been reformed since 2005. Next Generation Science Standards (NGSS) attempt to close equity gaps in STEM education for Pacific Islanders and have been incorporated by the Public School Systems (PSS) in the CNMI. Although this is a step in the right direction, educational solutions are still needed to address this gap and provide PIs with skills that are in-demand within the job market that begin in K-12 education.

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