

# Science and Technology Plan for the U.S. Virgin Islands (2025-2030)

Building A Brighter Future For The Territory



## Virgin Islands Established Program to Stimulate Competitive Research Governing Committee Members

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April 4, 2024

**VIA EMAIL**

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Dear Dr. Waddell,

I would like to extend my sincere gratitude for providing me with a copy of the Territory's Science and Technology Plan. I commend both the University of the Virgin Islands and VI-EPSCoR for their dedication and initiative in crafting such a vital document.

The goals delineated within this plan resonate deeply with the overarching vision of my administration, which prioritizes the enhancement of education and the cultivation of technical proficiency among our youth. The profound impact of the 2017 hurricanes underscored critical technical vulnerabilities within our economy, underscoring the urgent necessity for substantial investment in STEM education. Strengthening STEM education is imperative to cultivate the expertise necessary for addressing these vulnerabilities, devising innovative solutions, and fortifying our economy against future challenges.

The VI-EPSCoR Science and Technology Plan astutely acknowledges the pivotal role of workforce development in fostering economic growth. A collaborative partnership between UVI and the Virgin Islands Department of Education is not only desirable but essential, as outlined in the plan. By enhancing STEM education within our Territory, we can better equip our workforce to navigate the evolving job market, thereby facilitating both short-term recovery efforts and long-term economic resilience.

As the U.S. Virgin Islands endeavors to implement effective measures for our community's recovery, I firmly believe that this comprehensive plan will serve as a cornerstone, catalyzing meaningful and sustainable impacts within our communities.

Sincerely,

A handwritten signature in blue ink, appearing to read "Albert Bryan, Jr.", with a stylized flourish at the end.

Albert Bryan, Jr.  
Governor

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# Executive Summary

The U.S. Virgin Islands are geographically isolated—approximately 1100 miles southeast of the US mainland—and our economy, much like that of many of our neighbors in the region, is highly dependent on tourism. Low industry diversification, fiscal constraints, and our modest population size—approximately 88,000 citizens—hinder economic growth. Unfortunately, there has not been adequate drive or determination from the government or other relevant parties to deviate from our economic dependence on tourism in the past 40 years. However, given the degradation and depletion of our natural resources—exacerbated by the impacts of climate change and other anthropogenic activities—there is no better time to develop a plan that could potentially shift our fortunes and prepare a better future for our economy, our communities, and especially our young people.

The Science and Technology (S&T) Plan offers potential solutions to expand scientific education and research, particularly through the University of the

Virgin Islands (UVI). UVI, a Historically Black College/University (HBCU), is a Science, Technology, Engineering, and Mathematics (STEM) education, research, and innovation hub. The Virgin Islands Established Program to Stimulate Competitive Research (VI-EPSCoR), funded by the National Science Foundation (NSF), enhances research and education capacity at the university, focusing on environmental sciences. To prepare for the future, VI-EPSCoR plans to support core research opportunities, enhance teacher training, and collaborate with government agencies and local industries.

The overarching vision is to empower the territory's future through STEM, fostering collaboration and ensuring a prosperous future. To achieve this vision, stakeholders identified six themes and corresponding goals: research expansion, awareness building, K-12 STEM education enhancement, teacher preparation improvement, improved academic support, and career-focused education programs.



The Mangroves in the Classroom project at Charlotte Amalie High School (CAHS) extends learning beyond textbooks, through a curriculum developed by UVI graduate student Laura Bloem, CAHS Science teacher Vernon Callwood, and GRROE (Growing Research, Restoration, Outreach, and Education) USVI Mangroves, a UVI Center for Marine & Environmental Studies program. In addition to weekly mangrove lessons and in-class experiments, students have the opportunity to outplant their mangrove saplings for restoration at degraded sites. In this photo, students plant their mangroves in Hull Bay, St. Thomas.

On the cover, a student plants one of his mangrove saplings.

Photos: Dan Mele.

**Goal 1: Strengthen and Expand Science, Technology Research, and Education Initiatives at UVI.** This goal aligns academic offerings with science and technology-based, economic development priorities. With a history of securing federal grants, the university aims to increase investment to enhance research capabilities, improve facilities, and introduce new courses to address environmental challenges and contribute to economic growth. UVI will expand STEM research and its academic offerings to make science more actionable.

**Goal 2: Building Awareness of the Science, Technology Research, Education, and Innovation at UVI.** Addressing limited awareness of UVI's scientific research and technology education requires that the university embark on a comprehensive awareness-building initiative. This involves developing a comprehensive communication plan that lays out actions for engaging government leaders, education officials, and private industry. It should also focus on translating and simplifying scientific and research content through various communication channels for public understanding. This goal seeks to increase awareness and appreciation of UVI's endeavors and will help build trust in the university as a valuable community resource.

**Goal 3: Provide Urgent and Sustained Investments to Better Structure K-12 STEM Education in the Territory.** This goal focuses on enhancing STEM education through collaborative efforts between UVI and the Virgin Islands Department of Education (VIDE). The role of STEM in fostering critical thinking is recognized, and a comprehensive assessment of K-12 curricula should be performed to identify areas for improvement. UVI's expertise can be leveraged to help VIDE with grant writing, specifically focusing on securing

funding for VIDE's STEM office. A strategic pay system for teachers, incentivization for teachers' professional development, and an overarching Information and Communication Technology (ICT) policy for education are proposed to achieve this goal.

**Goal 4: Strengthen UVI's Education Programs to Cultivate Skilled Teachers and Support the Territory's General Education and STEM Needs.** A major challenge the territory faces is recruiting qualified math and science teachers. This goal focuses on strengthening the School of Education and pedagogical collaboration to address this issue. Under this goal, UVI is encouraged to enhance the curriculum and flexibility of the School of Education offerings to boost teacher certification. VIDE will need to also provide financial compensation and incentives to impact teacher outcomes positively. This goal also aims to create a STEM concentration in education and encourage math and science majors to explore teaching as a career. Under this goal, UVI hopes to work collaboratively with VIDE to improve standards, enhance K-12 student outcomes, and ensure a positive impact on math and science education in the territory.



Swimming is a fundamental skill many Virgin Islanders lack. To address this Virgin Islands Marine Advisory Service's (VIMAS) summer programs Youth Ocean Explorers and Junior Ocean Explorers teach these skills in a safe and supportive environment. Photo: Howard Forbes, Jr.

**Goal 5: Improve Student Support Programs at UVI to Enhance Retention and Prepare for STEM Education.**

Strengthening student support mechanisms at UVI will improve graduation and retention rates, especially for academically challenged students. The goal advocates a multifaceted approach, incorporating data-driven assessments to identify challenges, collaborating with other Minority serving institutions (MSIs) and HBCUs and effectively enhancing support services to address students' unique needs. Through these comprehensive measures, actions under this goal aim to create an inclusive and supportive environment to ensure the success of a diverse student body at UVI.

**Goal 6: Develop a Community-Centered Education Program at UVI Aligned with the Territory's Human Capital and Workforce Needs.** This goal set forth actions for establishing a Career and Technical Education (CTE) center at UVI. Developing a CTE at UVI will help to address workforce challenges and contribute to long-term economic growth. The plan envisions aligning CTE programs with UVI's existing academic offerings, fostering an integrated approach that encourages students to transition seamlessly into degree programs. These actions need careful consideration and

close coordination with stakeholders to assess the viability and impact of the proposed community-centered education program at UVI.

Finally, implementation and review arrangements are outlined to serve as a strategic blueprint for the execution and evaluation of the territory's S&T Plan (2025-2030) by the VI-EPSCoR leadership and Governing Committee in collaboration with key VI Government decision-makers, an action committee will orchestrate the implementation efforts, ensuring a seamless translation of the plan's objectives into tangible activities. Rigorous assessments, guided by an action matrix, will be conducted regularly by the VI-EPSCoR Governing Committee (soon to become the Jurisdictional Steering Committee) to guarantee the plan's efficacy. Formal reviews are slated for 2026 through 2030 to provide crucial checkpoints for evaluating progress, fostering a continuous cycle of refinement and optimization. Through these concerted initiatives, the collaborative efforts of UVI and VI-EPSCoR aspire to instigate transformative improvements in STEM education, research, and workforce development, thereby contributing substantively to the territory's economic growth and resilience.



One of the new and exciting advances in oceanographic monitoring equipment is taking place in the arena of ocean glider technology. Ocean gliders are a type of autonomous underwater vehicle. These unmanned remote-controlled ocean gliders provide real-time data on ocean temperatures, salinity, dissolved carbon and many other ocean properties across a depth range from the surface to 3,000 feet underwater. The Slocum glider seen here was launched by Ocean and Coastal Observing Virgin Islands as part of a project to better understand hurricane intensification.

*Photo: Dan Mele.*

# 1.0 Introduction

## Background

The U.S. Virgin Islands (USVI) are in the heart of the Caribbean, approximately 45 miles east of Puerto Rico and about 1,100 miles southeast of Florida. The USVI is an unincorporated U.S. territory consisting of three main islands, St. Croix, St. Thomas, St. John, and many other small surrounding islands. St. Croix is the largest island, but the territory's capital, Charlotte Amalie, is located on St. Thomas. According to the 2020 US Census, these islands have roughly 87,146 inhabitants. Twenty-one percent (21.3%) were aged 65 or over, and nineteen percent (19.6%) were between 0 and 17. The median age of USVI's population was 45.9 years.<sup>1</sup> This represents a significant decrease in the population identified in community surveys conducted in 2015 before the catastrophic hurricanes of 2017 devastated the northeastern Caribbean. At that time, a 2015 USVI Community Survey by the Eastern Caribbean Center estimated the total population to be about 100,000, with 52,266 people on St. Thomas and St. John and 48,502 on St. Croix.<sup>2</sup>

The territory's economy follows policies deployed after the Second World War, promoting manufacturing and tourism. With forays with manufacturing, namely watch assembly, bauxite, oil, and rum, the economy performed fairly well. Early forays into tourism were another success, especially after the closing of Cuba to American tourism after the 1959 Cuban Revolution.<sup>3</sup> The economy is heavily dependent on tourism as its

primary source of revenue. For example, trade, transportation, utilities, leisure, and hospitality comprise a large portion of private-sector employment, which can be inferred to be tied directly to Tourism. Tourism, however, is vulnerable to the vicissitudes of the world economy, and outside adverse events can reduce revenues and negatively impact the territory's economy.

The territory's economy is characterized by low industry diversification, particularly within its key sector—tourism. As a result, the territory's economic performance has been weak over the past couple of decades. Damage caused by two powerful hurricanes in 2017—Irma and Maria—made matters worse and created additional economic and social challenges. USVI fiscal data estimates show that public revenues were halved after the two hurricanes. Revenues have since rebounded as the US Government Accountability Office reported that the territory's Gross Domestic Product (GDP) had increased to \$4.2 billion in fiscal year 2020.<sup>4</sup> While revenue has increased, the territory faces many economic and fiscal challenges. Revenues are flat, and the level of public debt has reached levels that have limited the territory's ability to access capital markets.<sup>5</sup> The territory continues to face difficulties with a dwindling population, reliance on the unpredictable tourism sector, and fiscal constraints.

While tourism has spurred economic development in the territory, it has not brought widespread prosperity. Disparities in wealth exist, as do elevated poverty

<sup>1</sup> <https://www.census.gov/newsroom/press-releases/2023/2020-dhc-summary-file-usvi.html>

<sup>2</sup> Eastern Caribbean Center, 2015 United States Virgin Islands Community Survey, University of the Virgin Islands, c. 2018.

<sup>3</sup> Congressional Research Service, 2020, Economic and Fiscal Conditions in the U.S. Virgin Islands, <https://crsreports.congress.gov>, R45235

<sup>4</sup> <https://www.gao.gov/products/gao-23-106045>

<sup>5</sup> <https://www.gao.gov/products/gao-23-106045>

levels.<sup>6</sup> Tourism brought additional challenges including pressures on natural resources and on the environment. The territory's natural resources and ecosystems face growing vulnerability to local human activities and global stressors like poor physical development, land-use practices, and climatic changes.<sup>7</sup> Coastal and marine ecosystems, like mangroves and coral reefs, are areas of particular concern. These critically important resources are threatened by development pressures and climate change, characterized by rising sea levels, the warming of oceans, and the proliferation of extreme weather events. These conditions can potentially harm the environment, the economy, and people.

In this regard, science and technology research and education hold the potential to tackle many of the economic, social, and environmental challenges that the territory faces. The territory can identify new economic opportunities and diversify its industries in sustainable technology and renewable energy by building research capacity and harnessing research power, particularly at UVI. UVI stands as a beacon for the territory's educational and economic transformation, with a particular focus on science and technology education.<sup>8</sup> Scientific research at the university can contribute to more informed development decisions, helping balance economic growth with social and environmental goals. It can help guide and inform policymakers and planners on the best options for economic diversification and support the establishment and attraction of new industries to the territory. Research and education can also empower individuals to advocate for sound policies that address economic,

social, environmental, and climate issues, fostering a more sustainable and prosperous future for the territory.

Use-inspired research is essential for the territory to keep pace in the global economy. Education is pivotal in ensuring the workforce has the skills and knowledge to excel in new economic sectors or industries. The territory must improve its education system and



The Virgin Islands Institute for STEM Education Research and Practice (VI-ISERP) is a research and learning center focused on building capacity, teacher professional development, and preparing USVI K-12 and undergraduate students with the skills and expertise to be effective members of the Territory's workforce. As seen here, professional development opportunities are held every summer for in-service teachers of grades 6-12. *File photo.*

develop a local workforce to thrive in a new economy, especially for STEM fields. Developing skilled and knowledgeable STEM teachers is a fundamental start to this endeavor, as they can inspire and educate students more effectively. So is promoting and funding STEM education programs in K-12 schools. A solid K-12 education foundation may help future students become more competitive in a rapidly changing global economy. Science and technology-based industries typically offer high-paying jobs, which can contribute significantly to the economy. Collaborations and

6 According to U.S. Census, 2020, over a quarter of the territory's population lives below the poverty line. see <https://www.census.gov/newsroom/press-releases/2023/2020-dhc-summary-file-usvi.html>

7 Rudge, K. (2021), Changing climate, changing discourse: Analyzing reporting of climate change and economic development in the U.S. Virgin Islands, *Climate Risk Management*, Volume 33, 2021, 100350, <https://www.sciencedirect.com/science/article/pii/S2212096321000796?via%3Dihub>

8 Founded in 1962, UVI has a combined enrollment of approximately 1500 undergraduate and graduate students on its two campuses. It continues to offer a high-quality, affordable liberal arts education and professional programs in a culturally diverse environment. The University's objective is to be recognized as the leading American institution of higher learning in the Caribbean.

partnerships between UVI and VIDE are imperative to improve the territory's education system and create pathways for future students to thrive in the new economy.

## University of the Virgin Islands and Virgin Islands Established Program to Stimulate Competitive Research

UVI is an important post-secondary education institution in the territory, playing a crucial role in the region's educational and economic transformation, with a particular focus on science and technology education. It is a public, co-ed, land-grant, HBCU in the USVI that brings to bear numerous subject matter experts who excel in business management, science, mathematics, marine and environmental sciences, education, computer science, and research. UVI is a forward-thinking, innovative, entrepreneurial minded university committed to providing excellent, quality service to the government and its students and partners.



Outplanting mangrove saplings at Range Cay near the University of the Virgin Islands was a fun and educational opportunity at this family outreach event.

*Photo: Jarvon Stout.*

According to the College Factual Demographics and Diversity report, UVI is home to approximately 1,838 students. UVI offers an exceptional center for excellence in leadership and learning, a marine and environ-

mental sciences program, a research and technology park, cyber security pipeline programs, and many outstanding academic and professional programs and degrees. UVI has fostered innovation and knowledge creation through initiatives like VI-EPSCoR. This program, funded by the NSF, underscores the university's pivotal role in advancing science and technology



*St. Croix teachers at the VI-ISERP summer workshop, 2023. File photo.*

education within the USVI. Through VI-EPSCoR and similar efforts, UVI has established a robust foundation for nurturing the region's scientific and technological talent, making it an essential driver of the workforce for the new economy.

VI-EPSCoR has been funded by the NSF since 2004. The four Research Infrastructure Improvement (RII) awards to the territory have primarily focused on building research and education capacity in the marine and environmental sciences. Of note was the funding support that created the Masters in Marine and Environmental Sciences degree program that gave our research faculty the student resources to greatly expand the STEM research portfolio over the past 15 years. In the last two RII awards, STEM workforce development has emerged as a new area of research and investment with a strong professional development program for K-12 teachers across the territory.

The territory's current award, "RII Track-1: Ridge to Reef Processes and Interdependent Drivers of Small Island Resilience" (OIA-1946412), addresses the impacts of changing environmental conditions on small island social-ecological systems. Healthy coastal and coral reef ecosystems are essential components of the tourism-driven economy in the Caribbean. However, our coral reefs and associated habitats are becoming increasingly more vulnerable to environmental stressors such as the impacts of climate change, land and water use practices, as well as episodic events such as hurricanes. The ability of these natural systems to resist and recover from these stressors is key to their resilience. Understanding and quantifying these drivers is the focus of the Ridge to Reef project. The education and workforce development component of Ridge to Reef, through the professional development of local teachers, is focused on developing the next generation of Virgin Islanders to ensure a resilient future for their natural resources - a foundational element of the dominant tourism-based economy of the U.S. Virgin Islands.



Teachers at the VI-ISERP summer workshop, 2023. *File photo.*

To prepare for the future, VI-EPSCoR will continue supporting core research opportunities for marine and environmental science students and explore devel-

oping new interdisciplinary courses that integrate marine science, environmental science, policy studies, and stress math and science in education. While these courses may lead to curriculum changes in some schools or departments, they will help students eventually communicate scientific concepts effectively to the public and apply scientific research to inform policy decisions.

As part of enhancing and consolidating the territory's K-12 educational programs, it will be particularly important to strengthen UVI's teacher training offerings, especially those with a STEM focus. This can be done by providing more specialized courses, workshops, and flexible offerings for teacher certification programs. These efforts must be coupled with incentives at VIDE and are essential to improve competency in teaching these subjects in the territory.

Collaboration and partnerships are important for preparing the territory for the future. Collaboration with the VI Government is critical, especially with VIDE and the Virgin Islands Department of Planning and Natural Resources (DPNR). Working with VIDE will allow for better alignment between the university's course offerings and improve STEM in the territory's K-12 curricula. Working with DPNR via internships and fellowships will allow students and graduates to apply their skills and work on real-world natural resource management projects. Partnerships with industry and even other EPSCoR jurisdictions will help develop programs that teach technical and soft skills, which are increasingly essential for the workplace.

### Vision and Purpose of this Plan

The S&T Plan is a strategic road map that outlines a way forward for advancing STEM education and research in the Virgin Islands. It was developed through a comprehensive and inclusive process that involved outreach to a diverse range of stakehold-

ers between February and October 2023. The plan represents the insights, experiences, and aspirations of the entire community.

UVI leadership and researchers played a central role in its development, aligning the plan with UVI's commitment to excellence in science and technology education. Local educators also contributed valuable perspectives, highlighting the critical role of STEM in the local educational landscape. Government and industry leaders provided strategic insights to align the plan with broader territorial goals and economic needs. The plan captures a holistic understanding of the challenges by incorporating input from diverse stakeholders. It sets forth actions for fostering STEM education, research, and innovation as integral to the territory's growth and development.

One of the fundamental drivers behind the creation of this plan is the requirement set by the NSF's Established Program to Stimulate Competitive Research (EPSCoR) program. The program mandates formulating an S&T Plan for jurisdictions with active EPSCoR funding, including the U.S. Virgin Islands. While adhering to the EPSCoR mandate, this plan goes beyond compliance, aiming to identify opportunities for investments in capacity building, education, workforce development, and resource allocation specific to the Virgin Islands. The plan recognizes the multifaceted role of STEM in shaping the territory's future, given the unique social, political, and cultural profile of the Virgin Islands, which is distinct from other EPSCoR jurisdictions. That said, the plan is a living document that the Jurisdictional Steering Committee will revisit regularly as part of their adaptive oversight of the plan and evolving needs of the territory.

## *Working Together to Empower Our Territory's Future Through STEM*

The overarching vision, "Working Together to Empower Our Territory's Future Through STEM," articulates what the territory can accomplish by working together and developing partnerships to strengthen STEM-based education and research. The challenges outlined in the plan are countered by actions that are put forth to guide decision-makers in academia, the private sector, non-governmental organizations, and government to integrate science and technology into the Virgin Islands' economy, its essential services, and critical infrastructure and to develop the next generation of workers and citizens – our students and youth. The plan aims to enhance STEM education and research by strengthening scientific research at UVI, fostering collaboration between key educational institutions, and building career and technical opportunities to fortify the territory's workforce. The plan envisions breaking down silos and bridging gaps among disciplines, resources, and institutions to create a cohesive and supportive STEM ecosystem.

The outlined actions represent an investment in the present to ensure a brighter, more prosperous, and empowered future for the Virgin Islands.



The red mangrove is native to the USVI. Their tangled roots trap sediments and create a natural, vital nursery for juvenile fishes. *File photo.*

## 2.0 Science and Technology Challenges In The U.S. Virgin Islands

Science and technology research and education are essential for any society's economic and social development. However, in the U.S. Virgin Islands, several challenges and gaps hinder the advancement and integration of science and technology in education, research, and workforce development. As summarized in Figure 1 below, territorial stakeholders identified six emergent themes that reflect these challenges and gaps. They are as follows: the need to reinforce science and technology research being conducted at UVI; limited awareness of science and technology research, education, and its application to and linkage to our tourism-driven economy; weak linkage between UVI's education program and VIDE to support the territory's general education and STEM needs; lack of a cohesive and standardized framework to support STEM education at the district levels; high remedial education needs among incoming students, which lowers retention and limits engagement/interest in pursuing STEM degrees; and limited career and technical education opportunities in the territory to support and develop the workforce.



Awed, these local youth watch intently at one of the turtle tagging events hosted by UVI. The endangered hawksbill and green sea turtles are tagged and tracked at Brewers Bay so researchers can collect data on their feeding and lifestyle habits. All sea turtle work is conducted with permission and permits from the USVI Department of Planning and Natural Resources. *Photo: Dan Mele*

Figure 1: Stakeholder Views And Goals

| EMERGENT THEMES                                                            | VISION                                                                                                                                                                                            | GOALS                                                                                                                                   |
|----------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|
| Reinforce Core Research Areas                                              | More awareness and recognition of UVI core research areas.<br><br>Increase in research programs, number of graduates, and support of environmental protection and economic growth.                | Goal 1: Strengthen and expand science, technology research, and education at UVI.                                                       |
| Build Awareness And Engagement Of Stem                                     | Raise awareness and engagement in scientific and technological research and education.<br><br>Make research more accessible and engaging for broader audiences.                                   | Goal 2: Build awareness of the science, technology research, education, and innovation at UVI.                                          |
| Strengthen Science, Technology, And Math Education In K-12 Schools.        | Collaboration between the University of the Virgin Islands and the Department of Education builds trust.<br><br>USVI students meet national standards in science and math and pursue STEM degrees | Goal 3: Provide urgent and sustained investments to better structure K-12 STEM education in the territory.                              |
| Improve Teacher Preparedness And Certification Levels                      | UVI School of Education enhances STEM education for teachers.<br><br>Enhancing UVI teacher certification programs.                                                                                | Goal 4: Strengthen UVI's education programs to cultivate skilled teachers and support the territory's general education and STEM needs. |
| Quality Education And Supports Inclusive And Equitable Academic Excellence | UVI creates a nurturing and inclusive environment for academic excellence.                                                                                                                        | Goal 5: Improve Student Support Programs at UVI to Enhance Retention and Prepare for STEM Education.                                    |
| Responsive Community Center Education Program At UVI                       | A cutting-edge CTE center that bridges the gap between education and workforce needs in the Virgin Islands.                                                                                       | Goal 6: Develop a community-centered education program at UVI aligned with the territory's human capital and workforce needs.           |

UVI should continue to bolster its science research capabilities by securing more federal grants for its Biology, Chemistry, Computer Science, Marine Biology, Environmental Science, Mathematics, Physics, and Computer and Data Science programs. These programs help to foster science education, environmental stewardship, and economic development. The College of Science and Mathematics at UVI has made notable progress. Still, there is a need for additional resources to expand research activities and align academic offerings with the environmental and economic development needs of the territory. Several of the university's programs align well with promising industries identified by the territorial government. For example, UVI's coastal and marine science program is particularly important to our tourism industry or for spurring growth in a new blue economy sector. Therefore, investing in better research facilities and equipment and supporting researchers is essential. Investing in research fosters better collaboration with external institutions. It helps grow critical programs and is important for the institution's growth.

As research programs at UVI grow in stature, this plan will actively increase awareness and understanding among the wider community regarding its science, technology education, and research. The limited awareness among the general population regarding academic research conducted at higher education institutions is a barrier to the territory achieving its vision



Local children outplant mangrove saplings at Hull Bay, St. Thomas with Dr. Kristin Wilson Grimes. Photo: Dan Mele.

for economic development and better environmental stewardship. A targeted public relations campaign, which includes public events, science communication workshops, and government and business partnerships, will help alleviate this and will help bridge the gap between UVI's scientific expertise and the community's needs and interests.

Collaboration between the VIDE and UVI is critical for bolstering territorial-level STEM education in K-12 schools. Territorial stakeholders highlighted deficiencies in science and technology education in the USVI.

Among stakeholder concerns were the misalignment of education programs with national standards and the lack of comprehensive student support services within schools. Regarding STEM, the territorial STEM policy office requires funding and resources to promote initiatives across the territory, especially at the district level. Equipping teachers with high-quality instructional materials and providing ample professional development opportunities will also go a long way in helping to boost K-12 student outcomes.

The linkage between the UVI and VIDE is important to build a cadre of qualified teachers in the territory. Stakeholders have emphasized the need for qualified teachers within the Virgin Islands, spanning elementary and secondary education levels. The challenge is twofold: a limited supply of teachers supporting STEM



Students in the UVI Masters of Marine and Environmental Science program learn a variety of hands-on skills and participate in extensive field work. Photo: Dan Mele.

education at the elementary level and a shortage of certified teachers at the secondary level, particularly in science and math. These findings emphasize the need to strengthen the curriculum and course offerings of UVI's School of Education. Incentives can be offered to both students and teachers. Incentives offered to students can be intrinsic and extrinsic to motivate them

to become teachers, while financial incentives may be offered to teachers to pursue certification through VIDE.

In parallel, UVI faces the ongoing challenge of low graduation rates, which fall significantly below the national average, especially compared to other HBCUs in the United States. The literature suggests this is largely attributed to socioeconomic factors and inadequate pre-college preparation.<sup>9</sup> Low persistence rates may also be related to students' remedial education needs. Addressing these challenges at UVI will require careful consideration to understand student needs adequately and identify what investments can be made to improve student results, help obtain higher retention rates, and increase engagement in STEM disciplines.

In addition to this challenge, limited career and technical education opportunities in the territory constrain the range of choices available to students. This may limit or hinder the pursuit of vocational or technical pathways following secondary school, especially those related to science and technology. The aftermath of the devastating 2017 hurricanes laid bare the territory's heavy dependence on external resources and underscored the urgent need for workforce improvement programs. Thus, there is a strong necessity to fully assess the viability and potential impact of a community-centered education program at UVI. Such a program need not be contradictory to UVI's traditional 4-year degree programs but play a pivotal role in increasing the number of students in associate to bachelor programs and helping to prepare students for skilled technical careers.

Addressing these themes will be crucial and lay the foundation for the territory. The section below defines pathways for developing a brighter future by prioritizing science and technology research and education.



Jendahye Antoine, 2023 MMES graduate, with a long-spined sea urchin (*Diadema antillarum*) Photo: Dan Mele.

<sup>9</sup> [New tactics needed to fix low HBCU graduation rates](#) | Thurgood Marshall College Fund ([tmc.org](https://tmc.org))

## 3.0 Pathways For Strengthening Science And Technology, Education, And Research In The Territory

Collaborating closely with the VI-EPSCoR working group, stakeholders have diligently crafted a comprehensive set of recommended actions to realize the plan's goals over the upcoming five years (2025-2030). These recommendations draw upon the university's efforts to bolster its research capacity and the existing findings, which point to a need for structured and long-term investment to bolster the territory's education system. A robust business case underpins each of these goals. The essential opportunities and the rationale for the imperative changes underscore this plan's objectives.

**Figure 2: Goals And Actions For Science And Technology, Education, And Research**

| GOALS                                                                                          | ACTIONS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Goal 1: Strengthen and Expand Science, Technology Research, and Education at UVI.              | <p>Increase research expenditures in targeted areas and include undergraduate degrees in applied sciences.</p> <p>Allocate funding to improve research capabilities, increase grant funding, and support faculty and student research initiatives.</p> <p>Strengthen grant management infrastructure to provide support for research areas.</p> <p>Invest in state-of-the-art equipment and facilities to support current scientific research at UVI.</p>                                                                                                                                                              |
| Goal 2: Build Awareness of the Science, Technology Research, Education, and Innovation at UVI. | <p>Develop a strategic communication and marketing strategy to build awareness and effectively convey scientific advancements at UVI to the wider community.</p> <p>Hire and support a professional science communicator who can translate academic and scientific research into understandable language for wider publication.</p> <p>Organize and conduct workshops, seminars, webinars, and public lectures within and outside the territory to promote the university's outreach programs.</p> <p>Establish a science and technology education outreach and demonstration program with VIDE for K-12 students.</p> |

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|------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Goal 3: Provide Urgent and Sustained Investments to Better Structure K-12 STEM Education in the Territory.</p>                              | <p>Work with VIDE to establish a K-16 collaborative and develop an action plan to reinforce and restructure STEM education in the territory.</p> <p>Strengthen the territory's VIDE STEM office by allocating resources for direct grant writing and management to obtain funding to support STEM education.</p> <p>Initiate a dialogue with the teachers' union to integrate a strategic pay system for STEM teachers.</p> <p>Promote formalizing the existing K-12 math and science curricula to conform with up-to-date national standards (i.e., Common Core Standards, Next Generation Science Standards, and the National Educational Technology Standards).</p> <p>Invest in culturally appropriate support services, including counseling &amp; tutoring programs that address students' social, emotional, and academic needs.</p> <p>Provide teachers with high-quality instructional resources and tools to support an updated science and technology curriculum.</p> |
| <p>Goal 4: Strengthen UVI's Education Programs to Cultivate Skilled Teachers and Support the Territory's General Education and STEM Needs.</p> | <p>Strengthen UVI's School of Education's curriculum and course offerings, particularly its teacher certification programs, for better STEM education.</p> <p>Develop and implement a program integrating education coursework and teaching experiences within STEM degree programs to incentivize STEM students to pursue teaching careers.</p> <p>Conduct a thorough exploration and advocate for VIDE to adopt financial incentivization strategies to attract teachers to the UVI teacher certification program.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <p>Goal 5: Improve Student Support Programs at UVI to Enhance Retention and Prepare for STEM Education.</p>                                    | <p>Conduct a comprehensive assessment to identify the level of funding needed to expand and sustain an efficient administrative student support structure at UVI.</p> <p>Develop and implement a funding strategy to invest in support infrastructure and support services at UVI.</p> <p>Continue to support and advocate for increased territorial funding for college preparation programs.</p> <p>Research and identify requirements for implementing a mentoring program that can be piloted for STEM degrees at UVI.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <p>Goal 6: Develop a Community-Centered Education Program at UVI Aligned with the Territory's Human Capital and Workforce Needs.</p>           | <p>Assess the viability and potential impact of the proposed community-centered education program at UVI.</p> <p>Develop a comprehensive funding strategy to support the implementation and sustainability of a CTE at UVI.</p> <p>Develop a CTE curriculum through close collaboration with private and public sector stakeholders.</p> <p>Initiate a dialogue with the private sector investors to organize and participate in workshops or lecture series for workforce development.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |

## Goal 1: Strengthen and Expand Science, Technology Research, and Education at UVI.

UVI is actively working to improve its research capabilities and attract federal research grants. UVI's College of Science and Mathematics offers Biology, Chemistry, Computer Science, Marine Biology, Mathematics, Physics, and Process Technology degrees. The College has successfully secured grant funding in the past few years, bringing in 11.6 million dollars in federal grants in 2020-2021 and 7.2 million dollars in 2021-2022.<sup>10</sup> While this funding is significant, more is needed to enhance research activities and expand course offerings to help the university fully realize its potential. Investments will support researchers, improve facilities, labs, and research infrastructure, and ensure academic offerings align with the territory's economic development needs. To promote economic development and better environmental stewardship in the territory, UVI needs to expand core research areas and develop new courses to make scientific research more actionable. The development of new courses that support degrees in emerging technologies, environmental policy, environmental conservation, and sustainable natural resource management should be explored. Additionally, attention is required to expand the School of Education's offerings, such as professional development courses for teachers, and to expand innovative research for STEM. For more information on education research, see Goal 4: Strengthen UVI's School of Education for STEM.

The Virgin Islands Economic Development Authority (VIDEA) has developed an aspirational plan called Vision 2040, which identifies the Blue Economy, Agri-

cultural Sciences, and Renewable Energy as potential industries of opportunity. These sectors hold abundant, largely untapped potential, which could drive a vigorous economy in the years ahead.<sup>11</sup> Coastal and marine ecosystems contribute up to 11.5 billion USD to global tourism while protecting our coasts from storms and floods, providing habitat for biodiversity, carbon storage, and detoxification.<sup>12</sup> These priority areas for economic development align well with the core research and STEM disciplines of UVI, with its new School of Agriculture and especially its Center for Marine and Environmental Studies (CMES), which offers substantial research opportunities, including graduate and undergraduate programs in marine and environmental science.

Expanding and improving research and education programs is crucial to equip students with scientific knowledge and management skills to promote the sustainable use and management of land and ocean resources in the territory. The health of our natural resources, including its many sensitive ecosystems and their services, is critical to the territory's economy. Hence, it is important to have academic programs that balance scientific research with practical applications, particularly when supported by internships that foster collaborations with industry and government. Internships and assistantships allow students to apply their knowledge, gain experience, and acquire the skills needed to compete in today's workforce. If such programs are implemented, UVI researchers can utilize data from these programs to understand their impact and contribution to sustainable practices in the territory and track student career paths, which would be crucial for informing and expanding STEM education research at the university.

<sup>10</sup> UVI Office of Sponsored Programs, Mindy Solivan, 2023

<sup>11</sup> Fostering a blue economy: Offshore renewable energy ([irena.org](https://irena.org))

<sup>12</sup> [Making waves for a blue economy](https://www.un.org/en/development/desa/policy/2019/policybriefs/pb1901-making-waves-for-a-blue-economy.pdf) | United Nations

Expanding UVI's STEM research enterprise will also allow it to address future environmental challenges, such as rising sea levels, increasing temperatures, and other climate-related threats. These changes pose a significant risk to marine and coastal environments and the territory's economy, which relies heavily on tourism. Expanding core marine and environmental research activities at UVI is essential to protect the environment and promote sustainable use of land and ocean resources. To do so requires additional funding. While research funding to the College of Science and Mathematics faculty contributes significantly to the University's grant funding, more will be required to enhance its research capabilities further and help the University compete for additional federal grants. UVI should consider increasing its research pre- and post-grant management staffing. A dedicated cadre of grant administrators can provide essential support for managing grants and collaborations. Such support can help scientists comply with institutional and federal regulations, help identify additional grant opportunities, and facilitate better institutional collaboration. Also, additional funding could be provided to help faculty members take time off from teaching to pursue or support research. Investing in faculty is a costly endeavor. Nevertheless, academic literature indicates that faculty involved in research can assist in creating new knowledge, incorporate evidence from research into the classroom, and help enhance the university's reputation. UVI can help researchers focus on their work and achieve goals by investing in researchers and developing a supportive administrative research infrastructure. Such investments can help the institution assume a pivotal role in the territory and promote scientific research that helps safeguard the environment, promote sustainable practices, and build resilience.

Investing in and maintaining cutting-edge equipment and upgrading research facilities is imperative. Stakeholders have suggested that allocating resources for facility improvements through internal channels, such as targeted capital expenditures and external funding mechanisms, is essential. Before facilities are upgraded and equipment is purchased, however, the university must ensure that there are appropriate supply chains and available maintenance support for these investments. By upgrading research facilities and investing in technology and data management systems, the university can stimulate student interest in pursuing STEM degrees while fostering a dynamic learning environment that offers hands-on and practical experiences with new state-of-the-art equipment. The Medical Simulation Center on St. Croix and the Research & Strategy Innovation Center on St. Thomas are great examples of such investments. Well-equipped labs and facilities can serve as catalysts for nurturing partnerships with external institutions interested in conducting research in the territory. By actively cultivating collaborations with other research institutions, UVI can enhance its research enterprise by gaining visibility, credibility, and diverse expertise. Collaborative research projects, joint funding proposals, faculty exchanges, and shared resources are all avenues that can contribute to expanding UVI's research capabilities and generating increased interest in STEM disciplines such as data science.



Students in the Upward Bound program at UVI participate in a variety of learning opportunities. *Photo: Jarvon Stout.*

## Goal 2: Build Awareness of the Science, Technology Research, Education, and Innovation at UVI.

Many residents of the U.S. Virgin Islands are unaware of the science, technology, education, and research conducted at the UVI. While it is common for the larger society to be unaware of the scientific research conducted by higher education institutions, it poses significant challenges to the territory, especially given the current structure and future vision for its economy.<sup>13</sup>

The university is often overlooked as a community resource. As a result, researcher expertise and knowledge at UVI are not adequately leveraged for economic development or to promote growth in targeted sectors. Therefore, a targeted awareness campaign is required to bridge this gap and promote a better understanding of scientific and technological research and advancements at UVI. Building awareness of these activities at the UVI will require sustained efforts to translate and simplify scientific content and, most importantly, identify practical pathways that link the university's research to the territory's needs. (e.g., environmental stewardship, tourism, economic diversification).

Critical to these efforts will be the integration of UVI's science and technology advancements into an overarching communication and marketing strategy. Communication specialists and planners should work with the university's leadership to develop a vision reinforcing its brand or culture. A structured public awareness campaign should leverage diverse communication channels like social media, television, and radio to increase the public's understanding and enthusiasm for the university and its scientific research. Public

meetings and events can be executed to disseminate information about the university and ongoing research, highlighting their significance and potential benefits to the local community. For instance, public events, like UVI's Energy Fair, Reef Fest, The Great Mangrove Cleanup, and Afternoon on the Green, contribute positively to the community and showcase the work of UVI researchers.<sup>14</sup> Additionally, such events provide greater visibility for researchers, demonstrate the institution's ability to provide quality education, and highlight the institution's awareness of community concerns. Another avenue may be coordinating an annual public science communication workshop, where university professors, researchers, or guests provide lectures on scientific and development issues of cultural or community importance. Such events can help showcase the university's scientific depth. They can spark support from stakeholders like alums, donors, and the government and interest from prospective students.

One of the key aspects of UVI's public engagement should be enhancing and sustaining productive relationships with government leaders. The university should seek targeted opportunities to meet with the executive and legislative branches of government and present its scientific research in a compelling and accessible way. The university should tailor its presentations to ensure they address the specific needs and interests of the territory, such as its development goals, or explain how education and research can better help the territory address its environmental challenges. It will be paramount to show government leaders how scientific research and findings can inform and support policy decisions. Such engagements should be well-organized and presented in user-friendly, easy-to-understand, and relatable formats. The main objective

<sup>13</sup> Note that the VIEDA's VISION 2040 identifies the Blue Economy, Agricultural Sciences, and Renewable Energy as potential industries of opportunity.

<sup>14</sup> <https://www.uvi.edu/community/virgin-islands-marine-advisory-service/st-thomas/reef-fest.html>

of engaging the government is to increase awareness, stimulate appreciation, and build trust and credibility that the university is a valuable resource in the territory. At the same time, the government is responsible for coordinating and supporting the well-being of its higher education system. Therefore, such engagement reinforces the university's mission of ensuring access, diversity, and the quality of research and education.

ing energy efficiency, protecting coastal and marine resources, and even addressing the emerging threat of *Sargassum* accumulation on our local beaches. In addition to the private sector, cultivating relationships with the non-profit sectors can be valuable for identifying areas where scientific research can address community challenges and make meaningful contributions to their community actively.



In response to the many factors affecting coral reefs in the Territory (coral disease, warming ocean temperatures, sediment run off, boat anchors and more) Dr. Marilyn Brandt and her lab at UVI are growing and outplanting corals at multiple locations around the USVI. Here, a student in the Brandt Lab is outplanting a staghorn coral branch.

Photo: Dan Mele.

In addition to outreach to government leaders, it will be important for UVI to develop additional partnerships with local businesses. By building awareness of the science and technology research and education opportunities at UVI, researchers and public relations specialists can create opportunities for UVI and simultaneously enhance professional prospects for its students. Showcasing UVI's scientific research, particularly marine and environmental sciences, with hotels, resorts, and tour operators can help build awareness of the environmental challenges and promote better stewardship of our resources by visitors. These partnerships can also help UVI identify ways that scientific research or technologies can be applied to help the tourism industry overcome challenges, such as increas-

Finally, another important area to address is to rekindle and strengthen communication and collaboration between UVI and VIDE. According to Judkins et al., university partnerships with schools can help supplement and enhance educators' evidence-related skills and capacities via teacher education opportunities, professional development, 'critical friend' advice, information sharing, and internships.<sup>15</sup> In this regard, a partnership between UVI and VIDE is essential for improving the educational landscape of the Virgin Islands (See Goals 3 and 4). To leverage its expertise in science and technology and help introduce young Virgin Islanders to practical science applications, UVI can formally develop a STEM outreach and demonstration program. This program can provide lectures and

15 Judkins, M., Oliver, S., McCrone, T., & Inniss, M. (2014). Teachers' use of research evidence: a case study of United Learning schools. Slough: National Foundation for Educational Research. Retrieved from <https://www.nfer.ac.uk/publications/IMUL01/IMUL01.pdf>.

demonstrations at public and private schools, where professors and researchers engage students with exciting presentations and hands-on experiments. Through such outreach, UVI can immediately bolster existing STEM programming at VIDE and, most importantly, ignite interest and curiosity among students. Doing so will require UVI professors and researchers to develop a comprehensive program and specific education materials that target different age groups (i.e., PreK-6, 6-8, 9-12 grades). UVI researchers must ensure that materials are simple, user-friendly, and formatted to engage and educate students about science, especially concerning the immediate world around them.

UVI can address the community's limited awareness of science and technology research and education through a targeted and robust communication and marketing campaign. Increased awareness and understanding of the university's scientific and technological advancements will enhance public and private trust. This can also work to generate interest in UVI to recruit and retain students in targeted STEM fields, which will help increase the university's enrollment numbers.

### **Goal 3: Provide Urgent and Sustained Investments to Better Structure K-12 STEM Education in the Territory.**

STEM education integrates multiple disciplines, specifically science, technology, engineering, and mathematics. The centrality of the STEM approach lies in promoting critical thinking, problem-solving insight, and analytical proficiency. These attributes are deemed to be important for individual and professional development. Like other small island economies, the territory faces challenges in building a base capacity among its

students and improving academic performance.<sup>16</sup> According to data collected by VIDE, most public school students perform below standard in English language arts, literacy, and mathematics.<sup>17</sup> In mathematics, over 65 percent of public school students test below standard for their grade level. Student outcomes are tied to many factors outside the classroom, including socioeconomic status, access to computers, exposure to violence, parental support, and lack of basic needs. Therefore, the importance of STEM and these findings make it imperative that there are focused and sustained efforts to enhance and consolidate it in the territory's K-12 educational programs.

Cultivating dialogue between UVI and VIDE is crucial for aligning resources and creating a meaningful STEM program in the territory. Stakeholders from both UVI and VIDE have identified a deficiency in this regard. A K-16 collaborative with administrative infrastructure and appropriate representation is needed to improve communication and collaboration between these entities. To establish a formal collaborative, formal and structured communication should be initiated by UVI: first with the Office of the Governor and then with VIDE at the highest level. Immediate follow-up can involve meetings and consultations involving key faculty with officials, administrators, and educators from VIDE. A sustained dialogue between UVI and VIDE will constitute a fundamental step for improving STEM education in the territory. The primary objective of these deliberations is to engender an environment of openness and constructive discourse, which, in turn, can identify ways K-12 STEM programs can be developed, implemented, and strengthened in the USVI. Such efforts follow best practices cited in EdTech

<sup>16</sup> Shah, Kalim. Science, Technology & Innovation for Sustainability in Small Island States: Key Implications for Policy and Practice, (2021) SSRN Electronic Journal. DOI: 10.2139/ssrn.3798220

<sup>17</sup> The 2015-2016, 2016-2017, and 2018-2019 academic years are considered transition years for data collection, as the Virgin Islands Department of Education prepares for full implementation of the accountability plan under ESSA. Data was not collected for the 2017-2018 academic year.

Magazine in May 2018 that stressed the importance of partnerships between colleges and K-12 schools. This article highlighted how a collaborative atmosphere allowed researchers, instructors, and teachers to share expertise and perspectives to boost student achievement.<sup>18</sup> Such a partnership needs to be structured and not done ad hoc.

Such collaboration is essential for establishing a robust framework for STEM education in the territory. UVI offers extensive experience and research expertise in science and technology, which VIDE can leverage to develop interesting and engaging STEM programs for the territory. An immediate opportunity for collaboration would be to conduct a comprehensive assessment and develop an action plan focused on improving the territory's K-12 curricula. This work could help discern where initial targeted support can be provided to advance science and technology education in schools. This evaluative process may also help illuminate the potential organizational changes in VIDE that can facilitate more effective STEM education program implementation at the district levels. Historical evidence underscores that organizational changes are pivotal in implementing educational programs effectively. For instance, an international study by the Canadian Council on Learning entitled *Changing our Schools: Implementing Successful Educational Reform* found that systemic approaches focusing on reorganizing entire school systems rather than implementing individual school improvement initiatives helped meet students' learning needs more effectively.<sup>19</sup>

Building on the findings of an assessment, UVI and VIDE can also collaborate in grant writing and research. An important initial step would be for UVI researchers to collaborate with VIDE's STEM office

and assist in the writing and submission of grant proposals to secure funding. Realistic progress for STEM education hinges on a concerted and sustained investment by VIDE to endow its STEM office with adequate financial and human resources. Collaboration can also provide valuable opportunities for UVI to advance



MMES students have been conducting a variety of experiments focused on the invasive seagrass *Haolphia stipulacea*. Photo: Dan Mele.

STEM education research in the territory. As highlighted in Goal 4 below, focused efforts to advance the accreditation of teachers and harmonize educational offerings with national standards are of significant importance. The data from such programs can contribute to understanding the efficacy of programmatic enhancements and facilitate more targeted investments in the future.

18 Higher Education and K-12 Form Partnerships to Help Educators and Learners | EdTech Magazine

19 Canadian Council on Learning (2009), *Changing our schools: Implementing successful educational reform*.

Recognizing that such investments and improvements may not yield the desired outcomes without attracting and retaining a professional cadre of teachers is important. Like other resource-poor areas, the territory suffers from a lack of qualified teachers. As a result, the territory has begun to rely on foreign teachers to fill the gaps. According to a 2019 CNN article, the territory is not alone. CNN reported that some schools in the US are hiring teachers from overseas, including the Philippines, to fill teacher shortages. Many teachers are being hired on J-1 visas, which allows them to stay in the US for up to five years.<sup>20</sup> While hiring foreign teachers may present a short-term solution, it may not be a long-term one. The Learning Policy Institute estimates that the US will need to hire nearly 316,000 teachers by 2025 to replace those who will retire or leave the profession.<sup>21</sup> A systematic review of international research revealed that financial incentives were the most promising approach to attracting teachers in hard-to-staff areas.<sup>22</sup>

Governor Bryan's recent decision to increase the starting pay for teachers to \$50,000 is a positive step towards improving the education system in the territory. During his fifth State of the Territory Address, he highlighted the crucial role of education and acknowledged the challenges teachers face in supporting themselves.<sup>23</sup> In a post for the National Council on Teacher Quality, however, Patricia Saenz-Armstrong discussed research findings that indicated salary increases for all teachers will not necessarily solve teacher shortages. She highlights that strategic pay incentivizes

teachers in hard-to-staff schools by providing more pay for the level of education received or for teaching hard-to-staff subjects.<sup>24</sup> A strategic pay system may be useful for the territory, especially regarding STEM. This system could provide extra pay for teachers with bachelor's or master's degrees who pursue certifications and/or have specialty certifications in science and math education. Implementing a merits-based reward system at VIDE will require a constructive dialogue between education authorities, union officials, and teachers. Such a system should also be explored at UVI, where faculty salaries are low compared to US institutions.

VIDE will also need to invest in its infrastructure to maximize the potential for its investments in teachers. Education infrastructure includes schools and supportive buildings, many of which were severely damaged during the 2017 hurricanes. VIDE must prioritize the implementation of its reconstruction program outlined in its *Educational Facility Master Plan*.<sup>25</sup> Research has shown that the condition of school buildings is linked to academic performance and improves teacher retention, even when additional predictive factors are controlled. Inadequate facilities interfere with both the teaching and learning experience.<sup>26</sup> Upgrading and modernizing educational facilities will provide students with the infrastructure necessary to thrive in STEM subjects.

Reconstruction of facilities may present opportunities for VIDE to invest in ICT. ICT encompasses various technologies that transmit, store, create, share, or

20 [Desperate to fill teacher shortages, US schools are hiring teachers from overseas | CNN](#)

21 Research Report: A Coming Crisis in Teaching? Teacher Supply, Demand, and Shortages in the U.S. [learningpolicyinstitute.org](https://learningpolicyinstitute.org)

22 Beng Huat See, Rebecca Morris, Stephen Gorard & Nada El Soufi (2020) What works in attracting and retaining teachers in challenging schools and areas?, Oxford Review of Education, 46:6, 678-697, DOI: 10.1080/03054985.2020.1775566

23 <https://viconsortium.com/caribbean-education/virgin-islands-starting-salary-for-usvi-teachers-climbs-to-50000-beginning-in-september-governor-bryan-has-announced>

24 <https://www.nctq.org/blog/How-are-school-districts-using-strategic-pay-to-attract-and-retain-teachers-where-th>

25 <https://www.newschoovide.com/>

26 Durán-Narucki, "Public School Condition."

exchange information. VIDE schools could be rebuilt to include dedicated ICT labs or technical centers with digital tools, laptops, WiFi hotspots, and educational software. However, a multi-faceted and structured approach is necessary to integrate ICT into the territory's education system. Clear and well-defined guidelines and standards for using ICT must be established by VIDE to harness the potential of technology fully, as should mechanisms that ensure oversight and



As part of the Mangroves in the Classroom program Charlotte Amalie High School students participate in in-class experiments such as this one. Here they are testing different sediments to see which ones are more beneficial to mangrove growth.

Photo: Kristin Wilson Grimes

maintenance. In a recent article, Timotheou and Miliou pointed out that integrating digital technologies is a complex and continuous process that affects different stakeholders in the school ecosystem.<sup>27</sup> To encourage effective and efficient change in the school environment, it is essential to demonstrate the impact of ICT and to have a structured framework for implementation.

Investment in ICT is crucial for the advancement of STEM education. According to Napal, in a special issue of Sustainability, ICT has a potentially transformative effect on education. Firstly, it enhances science education by fostering an understanding of complex or remote concepts, easing inquiry and modeling processes, and facilitating the creative processes paramount in STEM.<sup>28</sup> Integrating ICT, however, will require more than establishing a technical computer center at each territory school (as mentioned above) or ensuring adequate internet connectivity. VIDE will need to develop learning curriculums for ICT and evaluate what resources are necessary to staff such labs or centers. Investment in ICT will require the training of teachers and administrators so that technologies can be appropriately leveraged and integrated into learning environments. Professors, researchers, and even graduate students can initially help build capacity in VIDE. In the future, such training can be supported by academic and technical courses offered by UVI or by one of its many MSI and HBCU partners (See Goal 6: Career and Technical Education Center).

Up-to-date ICT infrastructure must be coupled with investments in new instructional materials and teacher professional development. Such investments can empower teachers and facilitate more nuanced, contemporary, and engaging lessons. Again, UVI can assist by developing new education courses and providing flexibility to its course offerings (see Goal 4: Strengthen UVI's School of Education for STEM below). Professional development courses, such as workshops, training sessions, and conferences, can effectively allow teachers to share information and enhance their skills and knowledge in various aspects of education. Teachers' professional development is especially im-

<sup>27</sup> Timotheou, S., Miliou, O., Dimitriadis, Y. et al. Impacts of digital technologies on education and factors influencing schools' digital capacity and transformation: A literature review. *Educ Inf Technol* 28, 6695–6726 (2023). <https://doi.org/10.1007/s10639-022-11431-8>

<sup>28</sup> Napal, Maria (2020): Sustainability: Sustainability Teaching Tools in the Digital Age, ISSN 2071-1050, [Sustainability | Special](#)

portant for STEM, given the territory's insularity. In a 2014 blog post in Scientific American, Kenneth Gibbs argues that exposure to diverse STEM topics is critical for underprivileged black students for several reasons. Firstly, it helps to break down stereotypes and challenge biases that may exist in society regarding who can succeed in STEM fields. By providing teachers access to a wide range of resources, educators can help students explore different facets of STEM, discover passions, and pursue further education and careers.<sup>29</sup> When students have limited exposure to STEM, it can be challenging to fully understand the breadth and depth of opportunities available in these fields.

Investment is also critical in student support services. Bolstering student support services can address students' social, emotional, and academic needs. Student counseling and tutoring are important to a school system's success. According to the American Counseling Association and the Center for School Counseling Outcome Research and Evaluation - the University of Massachusetts, Amherst, comprehensive school counseling programs are directly linked to student academic achievement. K-12 students enrolled in schools with comprehensive counseling programs for at least three years produce higher academic achievement than those not enrolled in schools with such programs. These findings highlight the importance of exposure and investing in educational infrastructure and student support programs,<sup>30</sup> which may help the territory overcome its challenges related to academic performance.

## Goal 4: Strengthen UVI's Education Programs to Cultivate Skilled Teachers and Support the Territory's General Education and STEM Needs.

Like many school districts, the territory struggles to find qualified math and science teachers. In an investigative report, National Public Radio (NPR) found a chronic and perpetual misalignment of teacher supply with demand nationwide. Investigators reported that qualified special education, science, and math teachers are among the hardest to find, according to federal data.<sup>31</sup> This is particularly noticeable in the territory's elementary education, where only 31% of teachers are certified in the St. Thomas and St. John district and 65% in St. Croix. At the secondary level, percentages are much lower. Only 19% of secondary education teachers in St. Thomas and St. John and 35% of teachers in St. Croix are certified.<sup>32</sup> Most education graduates from UVI also teach at the elementary level, inadvertently neglecting the critical areas of science and math education.

This presents two challenges for the territory: a limited supply of teachers at the elementary level who do not exhibit confidence in teaching science and math, and an increasing number of secondary teachers, who possess degrees in specialized subject areas, but have limited pedagogical knowledge. UVI can support the territory's broader educational goals and address these challenges, but this will require strengthening UVI's School of Education's course offerings and curriculum. At UVI, a comprehensive assessment is required to target improvements to the School of Education's curriculum and course offerings. Such an assessment could

<sup>29</sup> Diversity in STEM: What It Is and Why It Matters - Scientific American Blog Network

<sup>30</sup> [https://www.counseling.org/PublicPolicy/PDF/Research\\_Support\\_School\\_Counseling-ACA-CSCORE\\_02-11.pdf](https://www.counseling.org/PublicPolicy/PDF/Research_Support_School_Counseling-ACA-CSCORE_02-11.pdf)

<sup>31</sup> What to know about teacher shortages and what schools can do about them : NPR

<sup>32</sup> Virgin Islands Department of Education, 2023

also identify where better pedagogical collaboration may be required between the School of Education and other departments (e.g., the College of Science and Mathematics and the School of Business) or how education majors may develop a deeper understanding of STEM.<sup>33</sup> Another recommendation may be to devise ways to expose math and science majors to education. For example, the University of California, Berkeley, offers a Science and Math Education minor through the CalTeach program. The program is designed for undergraduate STEM majors interested in exploring a career in education. The courses emphasize inquiry-based learning, creating and assessing student learning outcomes, equity in urban education, project-based instruction, research methods, and positive teacher-student interactions.<sup>34</sup> This exposure can be vital for teachers, helping them engage students to develop a scientific mindset and approach problem-solving in a structured manner.<sup>35</sup>

In a 2021 article in *Science and Education*, Ortiz-Revilla et al. highlight the importance of scientific literacy and the need for educational approaches that integrate the teaching of diverse scientific disciplines.<sup>36</sup> Developing a STEM concentration in education may contribute positively to the territory's education standards. Educators with a STEM concentration can play a vital role in shaping education standards by advocating for the inclusion of STEM-related content and practices. The National Science Foundation's *Science and Engineering Indicators 2014* report finds that teacher quality is among the most important factors

influencing student learning. Students' achievement in mathematics and science depends partly on their access to high-quality instruction in those subjects.<sup>37</sup> In this regard, a change in UVI curricula could play a vital role in shaping the next generation of Territorial teachers who promote better practices and higher standards.<sup>38</sup> However, a recent *International Journal of STEM Education* study warns that this is not a panacea. Researchers indicate many challenges are faced when trying to integrate STEM into school programs and curriculums. These include pedagogical challenges, curriculum challenges, structural challenges, concerns about students, concerns about assessments, and a lack of [institutional] support.<sup>39</sup>

Finally, more flexible course offerings at UVI and better financial compensation and incentives at VIDE may be required to stimulate teacher demand for certifications. In this regard, UVI could develop specialized STEM-focused courses for teacher certifications by working closely with VIDE educators. Such courses can be provided in the evenings, online, or through hybrid formats to accommodate teachers with various commitments. Courses can also be designed to address specific STEM needs, which could help to add value to UVI's continuing education program. Policy changes could be an effective tool to increase demand among teachers. A carefully administered requirement for teacher certification could be coupled with better compensation and incentives. The higher the quality of a teacher's education, the better education they can provide to their students. Researchers at the University

33 [Increasing access and opportunity in STEM crucial, say experts – Harvard Gazette](#)

34 [Science and Math Education < University of California, Berkeley](#)

35 [Elementary and Secondary Mathematics and Science Education | NSF - National Science Foundation](#)

36 Ortiz-Revilla, J., Greca, I.M. & Arriasecq, I. A Theoretical Framework for Integrated STEM Education. *Sci & Educ* 31, 383–404 (2022). <https://doi.org/10.1007/s11191-021-00242-x>

37 [nsf.gov](https://www.nsf.gov) - S&E Indicators 2014 - US National Science Foundation

38 There is a need to formalize K-12 education with up-to-date national standards (i.e., Common Core standards, Next Generation Science Standards, and the National Educational Technology Standards.

39 Teachers' perception of STEM integration and education: a systematic literature review | *International Journal of STEM Education* | Full Text ([springeropen.com](https://www.springeropen.com))

of Texas found that teachers in the Houston Independent School District who graduated from an approved teacher education program were more effective at stimulating student achievement gains in reading and mathematics in fourth and fifth grades.<sup>40</sup> Teacher certification does not happen organically; incentives such as scholarships, grants, and stipends must be explored. This can also include competitive salaries, benefits packages, or opportunities for greater professional development. (See Goal 3: Sustain Investments in K-12 STEM education above, which discusses the importance of incorporating strategic pay as an incentive for teachers). Financing such incentives may be tricky, but external grants from federal agencies or monies from philanthropic sources could be tapped for this purpose.

Innovative approaches are needed to address key issues related to building a cadre of qualified math and science teachers in the territory. UVI can address these by proposing a comprehensive analysis and reform to UVI School of Education's curriculum and providing more flexibility in its course offerings. Careful collaboration with VIDE and the VI Board of Education is required to incentivize teachers to pursue certification. The results will improve teacher education and positively impact our students.

## Goal 5: Improve Student Support Programs at UVI to Enhance Retention and Prepare for STEM Education.

Graduation and retention rates have become important outcome metrics for postsecondary institutions.<sup>41</sup> A significant difference is observed when examining graduation rates at UVI compared to similarly sized HBCUs in the United States. Over a decade, from 2012 to 2021, UVI's average graduation rate for all students stood at 26%, significantly trailing behind the national average.<sup>42</sup> According to the Thurgood Marshall College Fund, which represents 47 public HBCUs, the graduation rate for HBCUs is 35%.<sup>43</sup> According to the United Negro College Fund, the literature suggests that graduation rates are tied to pre-college preparation and socioeconomics.<sup>44</sup> These findings present a challenging future for USVI students, most of whom begin their postsecondary educational pursuits with less-than-ideal beginnings.

Using guidelines established by the Every Student Succeeds Act (ESSA), data collected by the VIDE indicates that most USVI public-school students perform below standard in English language arts and literacy.<sup>45</sup> Student performance in mathematics is weaker still, with more than 65 percent of public school students testing below standard for their grade level. Researchers have indicated that socioeconomics plays a role, whereas factors such as access to resources, cultural expectations, and parental education significantly

40 Darling-Hammond, L., Holtzman, D. J., Gatlin, S. J., & Heilig, J. V. (2005). Does teacher preparation matter? Evidence about teacher certification, Teach for America, and teacher effectiveness. Education Policy Analysis Archives, 13(42). Retrieved [date] from <http://epaa.asu.edu/epaa/v13n42/>.

41 Cook, B., & Pullaro, N. (2010). College graduation rates: Behind the numbers. Washington, DC: American Council on Education.

42 U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System (IPEDS), 2012-2021.

43 [The flaw at historically black colleges and universities: dreadful graduation rates | ThinkingOregon](#)

44 Ibid

45 The 2015-2016, 2016-2017, and 2018-2019 academic years are considered transition years for data collection as the VIDE prepares for full implementation of the accountability plan under ESSA. Data were not collected for the 2017-2018 academic year.

influence students' persistence to graduate or attend graduate school.<sup>46</sup> Researchers have noted that low-income students face considerable barriers to pursuing university degrees. The 2020 Census findings reveal socioeconomic status is a factor in the territory, whereas approximately 22.8% of the population in the USVI reside below the poverty line.<sup>47</sup> This figure is likely to be underestimated, primarily due to the USVI's heavy reliance on the tourism industry, which has been experiencing declining revenues, along with the persistent challenges of expensive imported goods and housing. These economic hardships create an unfavorable environment for individuals aspiring to higher education.

These socioeconomic factors and a local education system that struggles to maintain a rigorous and standard curriculum affect students' preparation. As a result, many incoming freshmen (58%) at UVI require foundational skill development and must take remedial math, English, or both to catch up.<sup>48</sup> This requires students to invest more time to obtain a college degree. An examination of retention rates highlights the importance of academic preparation and performance. UVI reported that between 2016 and 2020, students with a GPA greater than 2.3 were likely to continue their studies, while students with a GPA lower than 2.3 were less likely. For well-performing students' retention rates exceeded 77%, which exceeds the national average for HBCUs.<sup>49</sup> For the same cohort with a lower GPA, the retention rate dropped considerably and averaged 39.8% for the same period.<sup>50</sup>

The data emphasizes the importance of academic preparedness and performance, especially since UVI offers free tuition to local high school graduates with a cumulative GPA of 2.5.<sup>51</sup> This underscores the need to expand and improve programs at UVI that aid students



Participants in the VI-ISERP summer workshop conduct a variety of experiments.  
Photo: Elisa Bryan.

in achieving their educational objectives. Dedicated administrative student support structures can assist incoming students in navigating the complexities of a new academic environment and unfamiliar administrative processes. Such structures can also play a pivotal role in boosting university persistence rates, offering valuable resources and guidance that can contribute to a student's success. By scaling up and investing in student support programs, UVI can create an environment that empowers all students, regardless of their personal and social circumstances and preparedness level. Research-based approaches that have succeeded, such as the VI Growth Model for STEM Retention, should be further evaluated and scaled in this regard.<sup>52</sup>

46 (PDF) Socioeconomic Status and College: How SES Affects College Experiences and Outcomes (researchgate.net)

47 <https://www.census.gov/newsroom/press-releases/2023/2020-dhc-summary-file-usvi.html>

48 UVI Instructional Advancement Department, 2023.

49 What HBCUs Have the Best Retention Rates? - The Edvocate (theedadvocate.org). The national average retention rate of incoming freshmen at HBCUs is 64% of full-time, first-time undergraduate students, but the data revealed that the average retention rate lowers for part-time students to 43.3%.

50 UVI Instructional Advancement Department, 2023.

51 <https://www.uvi.edu/enrollment/uvi-free-tuition.html#>

52 NSF HBCU-UP ACE Implementation Project: The UVI Growth Model, NSF Project Grant Number 1623126. UVI Growth Model for STEM Retention. With support from VI-EPSCoR and other NSF and NIH grant projects, the UVI Growth Model for STEM Retention has resulted in a 48% increase in STEM majors. Since its implementation in

By utilizing a data-driven approach to understand student challenges better, UVI will be able to identify specific challenges, such as financial barriers and limitations of existing student support programs (e.g., advising, tutoring, academic mentoring), to support its students better.

to support structures will help UVI maximize student success. It will also help the university meet its larger societal mandate of providing a quality and equitable university education to Virgin Islanders.<sup>54</sup>



MMES student Race Stryker (2024) is part of the team on St. Croix gathering data on sediment in the streams and guts as part of VI-EPSCoR's Watershed and Terrestrial Monitoring and Land Use research area.

*Photo: David Hensley*

Data-driven approaches align with best practices championed by the Hope Center for College, Community, and Justice at Temple University. Through its #RealCollegeHBCU initiative and partnership with the Center for the Study of HBCUs at Virginia Union University, it offers training sessions to help student affairs professionals at HBCUs strategize on how best to increase institution capacity to support students facing food, housing, and other basic needs insecurities. Through this program, participating institutions learn and share best practices for seeking additional state and federal funding. They also work on optimizing their system of student support services.<sup>53</sup> Conducting an assessment of its student body, linking with such programs, and providing sustained funding

To build student support structures, investments are required in institutional infrastructure and personnel. Resources such as libraries, laboratories, computer centers, and research facilities are critical. Equally important is investment in academic coaching, tutoring programs, study skills workshops, and mentoring initiatives. A recent report by McKinsey & Company highlights the importance of investing in student support services at HBCUs. The report found that HBCUs are responsible for the graduation of 10% of all Black students nationwide. HBCUs award 17% of all Black bachelor's degrees and 24% of all Black science, technology, engineering, and math degrees.<sup>55</sup> Funding will be required, but programs like the U.S. Department of Education's Additional Higher Education Emergen-

2019, there has been a 9.2% increase in the percentage of STEM graduates between 2018 and 2019 and a notable 11.3% increase between 2019 and 2020

53 [HBCU initiative aims to address widespread basic needs insecurity - THE FEED \(georgetown.edu\)](#)

54 Equity in education means that personal or social circumstances, such as gender, ethnic origin, or family background, are not obstacles to achieving educational potential (fairness) and that all individuals reach at least a basic minimum level of skills (inclusion) (see OCED (2012). Equity and Quality in Education: Supporting Disadvantaged Students and Schools).

55 [Investing in HBCUs Helps Students and Communities | Diverse: Issues In Higher Education \(diverseeducation.com\)](#)

cy Relief Fund may provide opportunities for UVI to kick-start investments.<sup>56</sup> Investing in a comprehensive range of support services would allow UVI to demonstrate its commitment to diversity and equity and build a culture of academic support on its campuses.

Institutional culture plays a significant role in student success. For instance, Xavier University, a historically Black and Catholic university, is renowned for its exceptional mentoring program and for producing STEM and health science graduates. According to Coston and Payton-Stewart, Xavier's success can be attributed to a strong institutional culture and unwavering commitment to the program.<sup>57</sup> Xavier's program focuses on academic and personal growth. Xavier's Center for the Advancement of Teaching and Faculty Development links students with mentors who offer guidance on academics, careers, and personal development. The mentees learn teamwork, creative thinking, and other essential interpersonal and leadership skills, which employers highly value.<sup>58</sup> To replicate this program, UVI must develop a stronger institutional culture for student support and more pragmatically better links with the private sector, which can support students academically and simultaneously help students build critical skills.

UVI must also continue to increase funding for college preparation programs like the University Bound program, geared towards students entering UVI and other universities. Title III funds support such programs, but territorial support is required to expand them and help prepare more students for the challenges of higher education. Such programs have proven an excellent way to introduce children to various disciplines and skills

and help students transition smoothly into the university environment.

There are various programs that work towards building foundational skills and interest in STEM among children. For example, the Virgin Islands Marine Advisory Service (VIMAS) and VI-EPSCoR's Ocean Explorers' program exposes children to fun and exciting topics that utilize mathematics and science. By participating in such programs, children are exposed to new concepts and ideas, which can help them develop their interest and skills in STEM. Providing incoming students with the necessary academic support, summer camps, and bridge programs can help strengthen skills and preparation, leading to higher retention and graduation rates.

### **Goal 6: Develop a Community-Centered Education Program at UVI Aligned with the Territory's Human Capital and Workforce Needs.**

Starting with UVI's Center for Excellence in Leadership and Learning, UVI should explore ways to enhance, expand, and diversify its course offerings to establish a CTE center. Establishing a center that caters to the territory's workforce needs was laid bare after the devastating storms of 2017. The catastrophic hurricanes of 2017 revealed that the territory was heavily reliant on external expertise and labor, which limited opportunities for Virgin Islanders to participate in the territory's reconstruction meaningfully. It underscored the need to address workforce needs by bolstering education programs that build foundational and technical skills.

<sup>56</sup> U.S. Department of Education Announces \$3.2 Billion in Additional Higher Education Emergency Relief Funds to Support Students at Historic and Under-Resourced Institutions | U.S. Department of Education

<sup>57</sup> Tiera S. Coston and Florastina Payton-Stewart (2019): 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, ACS Symp Ser Am Chem Soc. 2019; 1328: 215–227. doi: [10.1021/bk-2019-1328.ch014](https://doi.org/10.1021/bk-2019-1328.ch014)

<sup>58</sup> What are Soft Skills and Why are They Important for Students? | SIM

A comprehensive feasibility study is necessary to evaluate the viability and potential impact of a proposed CTE program at UVI. The study will take into consideration existing career and technical education programs available at the secondary level as well as new efforts being considered by VIDE. As such, the study will help determine how a program can be structured to meet the needs of the community. The study will help determine how a program can be structured to meet the needs of the community. A well-structured framework is crucial for a CTE program, including clear objectives, entry requirements, and student progression pathways to gain stakeholder credibility. Clear program objectives will guide curriculum development to ensure students receive a comprehensive education that equips them with practical skills and knowledge in cutting-edge fields like STEM. Integrating such a program seamlessly with existing UVI programs is also important to create pathways for non-traditional students who want to access technical courses and transition into traditional four-year degree programs.<sup>59</sup>

Collaboration with the government and the private sector will be important. Government stakeholders include local and federal government agencies like the VIDE, particularly its Career and Technical Education Board. Other important government stakeholders include the Virgin Islands Department of Labor, the VIEDA, and the U.S. Economic Development Administration. In addition to government agencies, linkage with industry is equally important to ensure that a CTE program is well integrated into the territory's economic needs. Working with the private sector can help ensure that the program's curriculum aligns with the current and future workforce demands. Establishing links with industry can also provide progression pathways to career placement, increase visibility, and spur interest in the university among potential students.

A CTE program at UVI can be designed to provide training in STEM and other technical fields, which can help address the immediate skills shortage in the local workforce.<sup>60</sup> These programs can focus on preparing students for the evolving demands of the digital landscape, including hands-on training and mentoring programs in coding, cybersecurity, data analytics, and network administration. By tailoring the curriculum to address specific ICT needs, UVI can build a local workforce to support educational tech centers (See Goal 3: Strengthen K-12 STEM education) or demands put forth by financial service businesses that have invested in the territory. A CTE program can open up new opportunities for students by equipping them with the



Student engagement is an important part of the Grimes Lab's program. USVI students participate in field trips to clean up marine debris, ouplpant mangroves, and learn about the tropical ecology. Photo: Kristin Wilson Grimes.

knowledge and skills needed to succeed. Therefore, UVI can become a crucial catalyst for professional advancement and economic growth by aligning education with private sector needs.

Partnering with the private sector can also offer UVI students and faculty valuable insights into the skills in demand for employment. Students and faculty can better understand market demands and employment needs by engaging with investors from the Economic

<sup>59</sup> According to Best Colleges, there's no easy way to define a nontraditional student. While some colleges consider all students above a certain age nontraditional, others look at factors such as income level, marital status, and/or whether a student earned a high school diploma.

<sup>60</sup> [Area CTE Centers: Conquering the Skills Gap through Business and Industry Collaboration - Advance CTE \(careertech.org\)](#)

Development Commission (EDC) and UVI Research and Technology Park (RT Park). One way to achieve this is by developing customized workshops or a lecture series where private sector leaders can provide an overview of their businesses and discuss important technical and soft-skill attributes required for employment (e.g., effective communication, teamwork, problem-solving, adaptability, and leadership).<sup>61</sup> By better understanding these skills, UVI students and faculty can better position themselves for success in the job market. Moreover, this collaborative approach can also be beneficial for program funding. A comprehensive funding strategy that involves the private sector will be

necessary for future program operation and sustainability. Private sector investors may be more likely to invest in programs they have a direct stake in, and by engaging with them, UVI can demonstrate the value of its programs and the impact they can have on the local economy.

As highlighted above, goals and actions were developed based on findings garnered from stakeholder interviews. Interviews allowed planners to comprehensively understand the territory's strengths and weaknesses associated with science and technology education and research and to pinpoint areas requiring attention and intervention.

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61 8 Essential Leadership Communication Skills | HBS Online

From swimming to SCUBA diving. These Youth Ocean Explorers students have earned their Open Water SCUBA certification with Coki Beach Dive Club. *File photo.*



## 4.0 IMPLEMENTATION AND REVIEW ARRANGEMENTS

### Implementation

The VI-EPSCoR Governing Committee and the VI-EPSCoR program leadership shall work with the relevant VI Government decision-makers in Education and other relevant agencies to oversee the overall implementation of the territory's S&T Plan (2025-2030). This will involve developing an action committee comprising members of UVI, VI-EPSCoR researchers, VIDE, and other territorial partners. This action committee for Science and Technology will operationalize and translate the plan's goals and actions into specific activities. This will involve developing a more detailed implementation plan outlining responsible bodies, milestones, and timeframes for implementing specific activities.

### Review and Monitoring

The VI-EPSCoR Jurisdictional Steering Committee will routinely evaluate the execution of the territory's S&T Plan (2025-2030) based on established criteria. As outlined below, an action matrix offers suggested outcomes or metrics for each action corresponding to the plan's goals. Annually, the Jurisdictional Steering Committee will evaluate the implementation plan and assess the efficiency and effectiveness of actions assigned to different entities. Formal reviews of the plan are scheduled annually.

### Goal 1: Strengthen and Expand Science, Technology Research, and Education at UVI.

| ACTION ID  | ACTION                                                                                                                           | POTENTIAL OUTCOMES                                                                                                                                                     |
|------------|----------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Action 1.1 | Increase research expenditures in targeted areas and include undergraduate degrees in applied sciences.                          | Increased funding for UVI's undergraduate science programs and expanded offerings in applied sciences.                                                                 |
| Action 1.2 | Allocate funding to improve research capabilities, increase grant funding, and support faculty and student research initiatives. | The number of successful publications in academic journals.<br>The number of presentations at local, regional, and national conferences.                               |
| Action 1.3 | Strengthen grant management infrastructure to provide support for research areas.                                                | The number of successful STEM-related grants awarded to UVI.                                                                                                           |
| Action 1.4 | Invest in state-of-the-art equipment and facilities to support current scientific research at UVI.                               | Assessment of facility needs and budgets that keep pace with the growth of the research enterprise.<br>Identification and securing of funding for facility investment. |

**Goal 2: Build Awareness of the Science, Technology Research, Education, and Innovation at UVI.**

| ACTION ID  | ACTION                                                                                                                                                        | POTENTIAL OUTCOMES                                                                                                                                                                                 |
|------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Action 2.1 | Develop a strategic communication and marketing strategy to build awareness and effectively convey scientific advancements at UVI to the wider community.     | Communication and marketing strategy developed with input from relevant stakeholders.<br><br>Execution of activities defined in strategy.                                                          |
| Action 2.2 | Hire and support a professional science communicator who can translate academic and scientific research into understandable language for wider dissemination. | The number of publications in local, regional, and national media outlets promoting UVI scientific research.<br><br>The number of proposals that build UVI's communication and marketing capacity. |
| Action 2.3 | Organize and conduct workshops, seminars, webinars, and public lectures within and outside the territory to promote the university's research programs        | Increase the participation of scientists and researchers in public events.<br><br>Number of outreach programs, events, workshops, and public lectures executed by UVI scientists and researchers.  |
| Action 2.4 | Establish a science and technology education outreach and demonstration program with VIDE for K-12 students.                                                  | Co-develop content for a STEM demonstration program.<br><br>Executed STEM demonstration program in local schools.                                                                                  |

**Goal 3: Provide urgent and sustained investments to structure K-12 STEM education in the Territory.**

| ACTION ID  | ACTION                                                                                                                                                   | POTENTIAL OUTCOMES                                                                                                                                   |
|------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| Action 3.1 | Work with VIDE to establish K-16 collaborative and develop an action plan to reinforce and restructure STEM education in the territory.                  | Establish formal K-16 collaborative with appropriate decision-makers from UVI and VIDE.<br><br>Co-develop and complete a STEM action plan with VIDE. |
| Action 3.2 | Strengthen the territory's VIDE STEM office by allocating resources for direct grant writing and management to obtain funding to support STEM education. | Number of grants submitted and awarded.<br><br>Identification and allocation of financial resources for the VIDE STEM office.                        |
| Action 3.3 | Initiate a dialogue with the teachers' union to integrate a strategic pay system for STEM teachers.                                                      | Explore the potential for implementing a strategic pay system for STEM teachers.                                                                     |
| Action 3.4 | Continue formalizing the process updating K-12 math and science curricula to national standards.                                                         | Updated and formalized K-12 math and science curricula aligned with national standards.                                                              |

|            |                                                                                                                                                           |                                                                                                                                                   |
|------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|
| Action 3.5 | Invest in culturally appropriate support services, including counseling & tutoring programs that address students' social, emotional, and academic needs. | Increased percentage of counseling or tutoring programs implemented in schools.                                                                   |
| Action 3.6 | Provide teachers with high-quality instructional resources and tools to support an updated science and technology curriculum.                             | Number and type of high-quality instructional resources (e.g., textbooks, laboratory materials, digital tools) acquired and provided to teachers. |

**Goal 4: Strengthen UVI's Education Programs to Cultivate Skilled Teachers and Support the Territory's General Education and STEM Needs.**

| ACTION ID  | ACTION                                                                                                                                                                         | POTENTIAL OUTCOMES                                                                                                                           |
|------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| Action 4.1 | Strengthen UVI's School of Education's curriculum and course offerings, particularly its teacher certification programs, for better STEM education.                            | New courses that emphasize math and science are available to students.                                                                       |
| Action 4.2 | Develop and implement a program integrating education coursework and teaching experiences within STEM degree programs to incentivize STEM students to pursue teaching careers. | New education courses offered as integrated STEM programs.<br><br>Increased number of students that enroll in UVI's STEM education programs. |
| Action 4.3 | Conduct a thorough exploration and advocate for VIDE to adopt financial incentivization strategies to attract teachers to the UVI teacher certification program.               | Increase the number of teachers enrolled in education certification programs at UVI due to receipt of financial incentives.                  |

**Goal 5: Improve Student Support Programs at UVI to Enhance Retention and Prepare for STEM Education.**

| ACTION ID  | ACTION                                                                                                                                                         | POTENTIAL OUTCOMES                                                                                                                                                   |
|------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Action 5.1 | Conduct a comprehensive assessment to identify the level of funding needed to expand and sustain an efficient administrative student support structure at UVI. | Comprehensive assessment of support service infrastructure conducted with input from UVI students and stakeholders.                                                  |
| Action 5.2 | Develop and implement a funding strategy to invest in support service infrastructure at UVI.                                                                   | Identification and securing of funding for strengthened university support services.<br>Increased student persistence and retention rates.                           |
| Action 5.3 | Continue to support and advocate for increased territorial funding for college preparation programs.                                                           | Increased territorial funding for college preparatory programs.                                                                                                      |
| Action 5.4 | Research and identify requirements for implementing a mentoring program that can be piloted for STEM degrees at UVI.                                           | Collaborate with the private sector, especially EDC and RT Park investors, to determine the feasibility of funding and piloting a mentoring program for STEM at UVI. |

**Goal 6: Develop a Community-Centered Education Program at UVI Aligned with the Territory's Human Capital and Workforce Needs.**

| ACTION ID  | ACTION                                                                                                                                      | POTENTIAL OUTCOMES                                                           |
|------------|---------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------|
| Action 6.1 | Assess the viability and potential impact of the proposed community-centered education program at UVI.                                      | A completed feasibility study that incorporates input from key stakeholders. |
| Action 6.2 | Develop a comprehensive funding strategy to support the implementation and sustainability of a CTE at UVI.                                  | Identification and securing of funding for a CTE at UVI.                     |
| Action 6.3 | Develop a CTE curriculum through close collaboration with private and public sector stakeholders.                                           | Develop a curriculum for a CTE at UVI that is aligned with workforce needs   |
| Action 6.4 | Initiate a dialogue with the private sector investors to organize and participate in workshops or lecture series for workforce development. | Investor participation in private sector workforce lecture series.           |

## 5.0 Conclusion

The Science and Technology Plan for the U.S. Virgin Islands outlines a pivotal strategy for addressing the economic complexities of the territory. At its core, the plan recognizes the unique position of the University of the Virgin Islands (UVI) as a Historically Black College/University and the critical role played by the Virgin Islands Established Program to Stimulate Competitive Research (VI-EPSCoR), funded by the National Science Foundation, in bolstering research and education capacity, particularly in environmental sciences.

The plan is based on the idea that STEM (Science, Technology, Engineering, and Mathematics) education, research, and workforce development can bring about positive change in the territory. The plan outlines six goals that provide a roadmap for achieving this vision. These goals include expanding STEM research capabilities at UVI, promoting the university's scientific contributions, improving K-12 STEM education, enhancing teacher preparedness, and strengthening UVI's School of Education. Each goal addresses specific challenges and proposes targeted solutions. The plan also recognizes the importance of improving student support mechanisms at the university to improve retention and

graduation rates. To address the workforce skills gap, the plan also proposes the establishment of a Career and Technical Education center at UVI.

Critical to the plan's success are its implementation and review arrangements. These arrangements serve as a linchpin for success by providing a structured framework for the execution and assessment of the implementation of defined actions. The responsibility for implementation lies with the Jurisdictional Steering Committee and the VI-EPSCoR research leadership in collaboration with relevant government decision-makers. The VI-EPSCoR team proposes establishing action committees comprising UVI members, VI-EPSCoR researchers, the Virgin Islands Department of Education, and other partners to ensure a collaborative and comprehensive approach to translating the plan's goals into specific activities.

This plan encapsulates a forward-looking vision recognizing the transformative power of STEM education, research, and workforce development can have on the territory's future.



St. Thomas, USVI. *File photo*