Scientific Caribbean Foundation, Inc.
(SCF)

Education and Culture Subaward (ECS)

U.S. Department of State

Virtual 2024
Saturday Research Academy Symposium

Biological Sciences - Neurosciences - Engineering

Computer Science - Artificial Intelligence

Link to join the Symposium: https://meet.google.com/typ-fkkj-unz

Saturday, July 20 - August 10, 2024
11:00 AM EST

Puerto Rico-Haiti-Nicaragua-Colombia-Honduras

SCIENTIFIC CARIBBEAN FOUNDATION (SCF)
EDUCATIONAL AND CULTURAL SUBAWARD

ARE PROUD TO HOST THE

VIRTUAL 2024

SATURDAY RESEARCH ACADEMY SYMPOSIUM

SHOWCASING UNDERGRADUATE AND HIGH SCHOOL STUDENTS' MENTORED RESEARCH

Leadership at

SCIENTIFIC CARIBBEAN FOUNDATION AND MEDETECHNI, INC.

Juan F. Arratia, Ph.D.
President and Founder
Research Professor and Mentor

Kevin Morales Chamorro, MD
Founder and CEO of MedETechni
Researcher at UNICA

PUERTO RICO-NICARAGUA-HONDURAS

JULY 20 - AUGUST 10, 2024

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VIRTUAL 2024 SATURDAY RESEARCH ACADEMY SYMPOSIUM AND THE SCIENTIFIC CARIBBEAN FOUNDATION

MISSION

Scientific Caribbean Foundation (SCF) was founded by Dr. Juan F. Arratia, a 2006 US Presidential Award for Excellence in Science, Mathematics and Engineering Mentoring recipient, with the idea to continue the success of the Model Institutions for Excellence (MIE), a grant awarded by the National Science Foundation (NSF) to transform Universidad Metropolitana (UMET) into a nationally recognized undergraduate research institution, and a model in science, technology, engineering and mathematics (STEM). Mentoring of undergraduates and pre-college students by research mentors was the cornerstone of the MIE Project. Dr. Arratia was the Principal Investigator of the MIE grant at UMET. We believe that creative research is one of the best ways to prepare students to become persistent and successful in college, graduate school and professional careers. Today, the Student Research Development Center (SRDC), which is part of the SCF, is the entity that will continue the MIE strategy by impacting pre-college and university students from institutions in Puerto Rico, across the nation and abroad.

EXECUTIVE SUMMARY

The MIE ended in 2009 at UMET. The outcome of the program was over 280 UMET STEM-C majors completed their BS degrees and 175 were transferred to graduate school, with 65 achieving doctoral status (PhD, MD, VVM, Pharm D). To increase the number of BS degrees transferred to graduate school, we will continue with the strategy of an early research program and partnership with key research institutions in Puerto Rico, the US mainland and abroad. Research mentoring will be the principal component of the knowledge transfer and creative thinking activities at SCF. Project based learning, collaborative learning strategies, presentations at scientific conferences, scientific writing and co-authorship, technology literacy, and preparation for graduate school are activities that are transforming the philosophy of competitive institutions.

GOALS

The main goal of the Virtual 2024 Saturday Research Academy Program is to encourage pre-college and undergraduate researchers to work with research mentors, develop students' written and oral communication skills, provide a forum in the Caribbean for students to foster interest in undergraduate education, particularly in STEM fields, and set national research standards for pre-college research presentations.

EDUCATIONAL AND CULTURAL SUBAWARD

SCIENTIFIC CARIBBEAN FOUNDATION, INC.

VIRTUAL RESEARCH SYMPOSIUM

CONFERENCE AT A GLANCE

SATURDAY, JULY 20 - AUGUST 10, 2024.		VIRTUAL
11:00–11:10 am	**Opening Ceremony**	**Virtual**
	Dr. Juan F. Arratia, Research Professor and Mentor	**Virtual**
	Maia Moore, Senior Program Officer, Partners of the Americas	
11:10–12:30 pm	**Poster Presentations** **Biological Sciences-Engineering-Astronomy** **AI-Computer Science**	**Virtual**
12:30-12:40 pm	**Award Ceremony and Closing Remarks**	**Virtual**
12:40 pm	**Symposium Adjourns**	**Virtual**

MESSAGE FROM THE FOUNDER

Dr. Juan F. Arratia – President of the Scientific Caribbean Foundation, Inc.

July 20, 2024

Dear Students,

The Virtual 2024 Saturday Research Academy Symposium is the culmination of the activities and dissemination process of the Virtual Saturday Research Academy Program. For a period of four months, since March 2024, K-14 students from private and public high schools, and colleges from Puerto Rico-Haiti, Nicaragua-Colombia, and Honduras worked long hours using Internet with the guidance of faculty mentors in research projects in science, technology, engineering and mathematics (STEM) fields.

One of the objectives of the Virtual 2024 Saturday Research Academy Symposium is to offer young, motivated student researchers the opportunity to gain experience and to practice their English communication skills in a formal professional scientific meeting. A second objective is to give students from Puerto Rico-Haiti, Nicaragua-Colombia, and Honduras a forum for the presentation of the outcomes and findings of their research projects to research mentors, family members, and the educational community at large.

The Educational and Cultural Subaward and Scientific Caribbean Foundation is proud of the results obtained by the students and their research mentors in the Virtual 2024 Saturday Research Academy Program. I hope your experience inspires you and your peers to select STEM as your field of study soon.

My sincere appreciation goes to project staff, research mentors, and pre-college and undergraduate research students for their effort and commitment to implementing the Virtual 2024 Saturday Research Academy Symposium.

Sincerely yours,

Juan F. Arratia, PhD
Founder and President
Scientific Caribbean Foundation, Inc.
San Juan, Puerto Rico

Kevin Morales Chamorro – CEO of MedETechni Inc.

July 20, 2024

Dear Students,

The Virtual 2024 Saturday Research Academy Symposium marks the culmination of the efforts and achievements of the Virtual Saturday Research Academy Program. Over the past four months, since March 2024, K-14 students from private and public high schools and colleges in Puerto Rico-Haiti, Nicaragua-Colombia, and Honduras have dedicated their time and energy to develop their research projects online. With the guidance of faculty mentors, they've delved into various STEM fields, leveraging artificial intelligence to drive their discoveries.

Our primary goal for this symposium is to give you, our bright and motivated student researchers, a platform to share your work and practice your English communication skills in a professional scientific environment. Additionally, we aim to provide a forum for presenting your research outcomes to mentors, family, and the educational community, showcasing how AI can solve real-world problems.

I'm incredibly proud of how you've utilized AI in your research and developed innovative tools to benefit society. Your hard work and commitment to using technology to address societal challenges are truly inspiring.

The Educational and Cultural Subaward and the Scientific Caribbean Foundation are thrilled with the progress and results you've achieved. I hope your experience here will inspire you and your peers to pursue STEM fields in the future.

A heartfelt thank you to the project staff, research mentors, and all the participating students for your dedication and perseverance. Your contributions in integrating AI into research and creating solutions for societal issues are commendable.

Sincerely yours,

Kevin Morales Chamorro M.D

Founder and CEO

MedETechni, Inc.

SCHEDULE OF EVENTS

SATURDAY, JULY 20, 2024 VIRTUAL

11:00 AM - 12:30 PM POSTER PRESENTATIONS

Chairperson: Dr. Juan F. Arratia

Puerto Rico-Honduras-Haiti Groups

11:10 – 11:15 a.m. **Mia Sara Ufret Estrada, Academia María Reina**
Artificial Intelligence and its Negative Reality and Effects in High Schools Around the United States of America

11:15 – 11:20 a.m. **Román-Giovannetti-Marina**
The Impact of social media app Tik Tok on Theoretical Astronomy Education

11:20 – 11:25 a.m. **Paula B. Rivera Piñera-Academia María Reina**
Innovative Solutions for Ocean Acidification: Advancing CO2 Capture Techniques

11:25 – 11:30 a.m. **Ana Pizarro González, Academia María Reina**
Effects of COVID-19 on Sleep Disorders within Low-Income Minorities

11:30 – 11:35 a.m. **Casco, José, Partners of the America, Honduras Chapter**
E-learning platform for the Agustin Maradiaga School

11:35 – 11:40 a.m. **Lynn Naïkey Duverneau, Elizabeth Nailha Acacia, Juan F. Arratia**
Practical approach and considerations in the construction of a quiz game for blind people

11:40 – 11:45 a.m. **Victoria Lyceinthe Diann Charles, Elizabeth Nailha Acacia, Juan Arratia**
Possible Causes of gaps in Intracerebral hemorrhage and hypertension monitoring among Haitian citizens

11:45 – 11:50 a.m. **Laeticia Winnie Fayette, Elizabeth Nailha Acacia, Juan F. Arratia**
Advances of Soft-Prosthetic Fingers using reusable materials

11:50 – 11:55 a.m.	**Izadora Lorlay Noël-Jeune, Elizabeth Nailha Acacia, Juan Arratia** Bacterial inhibition using Nepeta cataria strains from Haiti: an homemade experiment
11:55 – 12:00 p.m.	**Ann Corrie René, Elizabeth Nailha Acacia, Juan Arratia** Phylogenetic analysis of Phosphorus Solubilizing Bacteria (PSB)
12:00 – 12:05 p.m.	**Audrey Chloé Verciné, Elizabeth Nailha Acacia , Juan Arratia** Isolation of Tardigrades specimens from bryophytes in Tabarre, Haïti
12:05 – 12:10 p.m.	**Andrée Ann Michel, Elizabeth Nailha Acacia, Juan Arratia** Assessing the Impact of Educational Infrastructure on Dyslexic Students in Haiti: Challenges and Technological Interventions
12:10 – 12:15 p.m.	**Melissa Lorinda Exumé, Elizabeth Nailha Acacia, Juan Arratia** Identification of parasites in Brassica oleracea var. capitata L. strains in the Haitian market
12:15 – 12:20 p.m.	**Shamely S. Gonzalez, Melissa S. Rivera Narvaez** Anesthesia and Athlete Recovery: Exploring the Impact on ACL Reconstruction Surgery

SCHEDULE OF EVENTS

SATURDAY, AUGUST 10, 2024 VIRTUAL

11:00 AM - 12:40 PM POSTER PRESENTATIONS

Chairperson: Dr. Juan F. Arratia

Nicaragua-Colombia-Honduras-Groups

11:10 – 11:15 a.m.	**Nataly Massiel Guevara Flores** Diagnosis Of Diseases Based On The Observation Of Pathological Facies
11:15 – 11:20 a.m.	**Christiana Lyli Lucas Hassan** AlzSync: Virtual Guide for Alzheimer´s Care Management
11:20 – 11:25 a.m.	**Marcela D. Bonilla Jiménez** AI-Based System for Detecting Infections in Open Wounds
11:25 – 11:30 a.m.	**María J. Fargas Sequeira** Skin Cancer Diagnosis Through Image Analysis With AI
11:30 – 11:35 a.m.	**Milan Josué Guzmán Robleto** Intelligent Assistant for Self-care In Chronic Diseases
11:35 – 11:40 a.m.	**Sofía Ivette Palma Sandoval** Facial Vital Signs Recognition Using Artificial Intelligence Algorithms
11:40 – 11:45 a.m.	**Edwin Santiago Rodriguez Lopez** CodeCollab: Promoting efficient collaboration between developers through WhatsApp
11:45 – 11:50 a.m.	**Angie Lorena Leguizamon Rincon** MathSolve: Step-by-Step Solutions with the Singapore Method in WhatsApp
11:50 – 11:55 a.m.	**Diana Marisol Maldonado Miranda** Skincarechat: Intelligent Tool For The Diagnosis And Treatment Of Dermatological Diseases With AI

11:55 – 12:00 p.m.	**Jorelis Taliana Amador Robles** WHATSAPPPETCARE: Pet Care And First Aid
12:00 – 12:05 p.m.	**Nadia Samara Siachoque Ruiz** Innovation in WhatsApp: Reporting Advances in Aerospace Engineering and Renewable Energies
12:05 – 12:10 p.m.	**Sharith Daniela Prada Landinez** SKILLS4YOU : Daily Autonomy
12:10 – 12:15 p.m.	**Paula Isabella Mojica Millan** Mathquest: Interactive Mathematics Learning On Whatsapp
12:15 – 12:20 p.m.	**Ana Sofía Peña Silva** ChatKids:Conflict Solutions - Psychological Help for Children
12:20 – 12:25 p.m.	**Saily O. Rodriguez** Impact of Shopping Bots on E-Commerce Fairness and Retailer Marketing Strategies
12:25 – 12:30 p.m.	**Mia Rachell Padilla Cubas** Planning of Innovative Strategies for the control of the Aedes aegypti mosquito in Honduras
12:30 – 12:35 p.m.	**Jeleni Maydaris Lanza Matos** Integrating Mayan Gastronomy Into the Tourist Experience of Copan
12:35 – 12:40 p.m.	**Elisa María López Soto** Technological Strategies for Transforming the Use of Digital Devices into a Cognitive Development Tool for Children

Research Mentors' Bio Sketches

Research Mentors' Bio Sketches
Juan F. Arratia, PhD
Research Professor and Mentor
Scientific Caribbean Foundation, Inc.

Dr. Juan F. Arratia was born in Pomaire, Chile. He graduated from Universidad Técnica del Estado with a BS in Electrical Engineering in 1973. He was awarded an MSc in Engineering from Louisiana Tech University, Ruston, Louisiana, in 1979 and a Ph.D. in Electrical Engineering from Washington University, St. Louis, Missouri in 1985. He has taught and conducted research at universities in Chile (Universidad Técnica del Estado and Universidad Austral de Chile), Puerto Rico (Universidad Interamericana de Puerto Rico and the University of Puerto Rico-Mayaguez), and in the US mainland at Washington University, St. Louis, and Louisiana Tech University, Ruston, Louisiana. He has lectured and given conferences on advanced automation, robotics, vision systems, artificial intelligence, total quality management and science and engineering education in Chile, Bolivia, Ecuador, Guatemala, Panama, Mexico, Brazil, Nicaragua, Perú, Canada, Spain, the Netherlands, Turkey, Japan, Philippines, Singapore, Australia, China, Puerto Rico and in the US mainland. He was the Advanced Manufacturing Manager for Medtronic, Inc., a leading pacemaker company, and is a consultant in advanced automation for pharmaceutical and medical devices companies in Puerto Rico. From 1998 to 2008, he was the Director and Principal Investigator of the Model Institutions for Excellence (MIE) Project, a National Science Foundation sponsored program based at Universidad Metropolitana in San Juan, Puerto Rico. From 2008 to 2018, he was the Executive Director of the Ana G. Méndez University System (AGMUS) Student Research Development Center, designed to disseminate MIE best practices at Universidad del Turabo and Universidad del Este. For twenty year he was part of AGMUS and during his tenure he wrote proposal to NSF and was awarded more than 85 million USD for MIE, CCCE, AGMUS Institute of Mathematics, MRI-AMISR, MRI-Puerto Rico Laser, Administration of Arecibo Observatory, among others. Since 2018 to present he is the President and Founder of Scientific Caribbean Foundation in San Juan Puerto Rico. In November 2007, he was awarded the US Presidential Award for Excellence in Science, Mathematics and Engineering Mentoring at a ceremony in the White House in Washington DC.

Kevin V. Morales Chamorro
CEO & Founder
MedETechni Inc.

Kevin Virgilio Morales Chamorro was born on August 22, 1996, in Nindirí, Nicaragua. He holds an MD from UNICA (2020), receiving an honorable mention for his outstanding medical research and innovation. Since August 2017, Kevin has managed humanitarian projects based on biomedical engineering technologies, big data, IoT, telemedicine, radiation, and RF at IEEE. In April 2018, he founded MedETechni, a company utilizing UVC radiation linked with AI and IoT to sterilize public hospitals in Nicaragua, reducing hospital costs and nosocomial infections. As founder and CEO, Kevin oversees strategies, clinical trials, business intelligence, product innovation, operations, marketing, and fundraising. Previously, he worked as a regulatory affairs officer at Raven Laboratories (2018-2020), reviewing scientific articles on pharmaceutical products and registering pharmaceuticals in the drug regulatory system. Since December 2020, Kevin has been a research mentor at the Scientific Caribbean Foundation, teaching students about research in health and the STEM sector, and editing research journals and symposia. Since August 2021, he has been an hourly prof. in medical innovation at UNICA, developing innovation methodologies and strategies for creating medical products. Kevin has completed certifications and diplomas in data science, AI, blockchain, cryptocurrencies, business management, web and mobile app development, business intelligence, IoT, and big data. In 2017, he won Best Project with BHOGIP in the Youth Citizen Entrepreneurship Competition by UNESCO, the National Innovation Award in Nicaragua in the ICT sector, and third place in the Global Student Entrepreneur Award with BTRIAGE.In 2020, he received research funds for scientific and technological innovation during the COVID-19 crisis by PARLACEN with the Tesla UV Rays project. He was named Young Scientist of the Year in Nicaragua and won social technology entrepreneurship with the Tesla UV Rays business model. Additionally, he was a finalist at Teknofest in Turkey and won special IEEE funds for UVC lighting prototypes for COVID-19 healthcare providers. In 2021, he was awarded a grant in the La Idea Bootcamp incubation program by InBIA in the US, won the social award in the Central American business competition by the NGO "Yo Emprendedor," and was a global finalist in Accelerate 2030, a UN program. In 2022, he received the Innovator Under 35 Latam award from MIT Technology Review and the National Award in Innovation in Technology from CONICYT Nicaragua. In 2023, Kevin was a winner and finalist in the Entrepreneurship World Cup in Saudi Arabia, received a travel grant with Partners of the Americas in Puerto Rico, participated in Start-Up Chile Ignite, and won the Takeoff Istanbul Early Stage. In 2024, he was selected as a YLAI fellow, Parallel18 program and is a future Fulbright scholar Msc in biomedical innovation.

Yiria E. Muñiz Costas is a dedicated Science Teacher and Technology Integrationist at Academia María Reina in San Juan, Puerto Rico. Her role extends beyond teaching, as she has been actively mentoring high school students in the Pre-College Scientific Research Program since 2010. This mentorship has had a significant impact, as evidenced by her students' success in various competitions and collaborations. These has led students to excel in multiple competitions, such as the Discovering H_2O Science Competition, the US Army, Navy, and Air Force National Junior Science & Humanities Symposiums, the AEOP Alumni Challenge HS Division, the Puerto Rico National Ecological Observatory Network (NEON) Data Jam Program, and the University of Vermont EPSCoR Streams Symposium.Her expertise and recognition in the field are evident in her noteworthy achievements and certifications. These include the Microsoft Office Specialist Certification, ISTE-GM Artificial Intelligence Explorations and Their Practical Use in School Environments Certification, Sustainable Schools Program Awards, the Unsung Hero Teacher's Award (Saint Michael's College, Vermont), and the US Army, Navy, and Air Force Junior Science and Humanities Award. With an unwavering commitment to her professional development. Yiria's current career goal is to become an AI specialist in education. She is working on the first Middle State endorsement in AI Literacy, Safety, and Ethics. Schools that pursue the endorsement will earn a digital credential, signaling their responsiveness to the most significant technology advancement since the public Internet.

Elizabeth Nailha Acacia is a 24 years old final year Microbiology student at Universidad Autonoma de Santo Domingo. Motivated by biological sciences and other STEM related areas, Nailha always tries to go beyond her limits and increase her capacity to do research. Since her participation in 2022 as Britney Hopgood's mentee in the Saturday Research Virtual Program, she could successfully discover a love for bioinformatic and environmental microbiology by studying Azotobacter, a nitrogen-fixing bacteria. In 2023, Nailha won an Honor roll mention from the Dominican Student Congress of Science and Technology (Ceicyt) as her research titled Using MEGA platform in the study genus Serratia's Phylogeny was placed on the top 50 over 500 contestants. Currently, she has mentored 9 students in total for SRA, leading them through topics embracing biological sciences, phylogenetic, engineering and web app development. Her skills include bacterial culture preparation and characterization, biochemical and PCR analysis, phylogeny, microbial ecology and environment, MEGA, ClustalX, Genedoc and other sequence analysis. Her goal is to realize her PhD, apply the earned knowledge in the development of Haiti's agriculture and Educational system while spreading science in her home country by motivating young girls to choose a career in STEM.

Melissa S. Rivera Narvaez is currently a graduate student at the Ana G Mendez University Cupey Campus pursuing a master's in environmental risk management. Her bachelor's degree was done in General Biology with a minor in environmental science. During her early start in STEM related academic events Melissa was a pre-college student in the Saturday Research Academy by Ana G Mendez in the Arecibo Observatory in which she conducted small research about CubeSats. She was sent on an internship to NASA Ames Research Center in San Jose California along with five other students and group research was conducted on the development of designing "Ardulabs" with different sensors and plants to send to the ISS. After the internship she continued being an assistant mentor to various research mentors around different Pre-College Research Sites in the island. She currently is an assistant mentor to the talented Fabiola D. Pagan. Melissa is also a participant on a program funded by Syracuse University along with Puerto Rico Recycling Partnership - PRRP, called GREEN-PR I which has a main objective to allow students to develop leadership skills Working with environmental non profit organizations creating environment friendly solutions for schools, communities and more. Her long-term goals include finishing her master's degree and conducting research specializing in atmospheric topics and continuing pursuing more postgraduate studies in related areas.

Kevin Rodríguez Loáisiga
Director of Research and Innovation
UNICA

Kevin Alexander Rodríguez Loáisiga was born in Managua, Nicaragua, on February 7, 1994. He is an economist, graduated with a Bachelor's Degree in Applied Economics with a major in Business Economics from the Universidad Centroamericana (UCA). In addition, he has postgraduate studies in Innovation and Technology Transfer and a Master's Degree in Education Management from the Universidad Católica Redemptoris Mater (UNICA). In his professional career, Kevin has worked as head of statistics at the Nicaraguan Council for Science and Technology (CONICYT). In this role, he represented Nicaragua before the Ibero-American and Inter-American Network of Science and Technology Indicators (RICYT), contributing to the publications of "The State of Science" in 2017, 2018 and 2019. His experience includes coordinating project improvement processes for multilateral agencies such as the World Bank and the United Nations Office for Project Services (UNOPS). Kevin has extensive experience as a university lecturer in undergraduate and graduate programs. He has been a lecturer in several master's degree programs, teaching modules related to the design of Research and Innovation Projects, as well as in diploma programs focused on innovation and educational technology. His scientific publications include research in the International Journal of Education Economics and Development with the study "Intrapreneurial intentions of undergraduate university students: A comparative study between Spanish and Nicaraguan students", and in the journal Apuntes de Economía y Sociedad with the research "Sustainable development, reduction of inequalities and education from a gender approach". Currently, Kevin is the Director of Research and Innovation at the Universidad Católica Redemptoris Mater (UNICA). In this role, he has proven to be a leader in promoting innovation and digital transformation, with a special focus on emerging technologies such as artificial intelligence. He coordinates the Artificial Intelligence Tools for Productivity diploma course and has been a featured speaker on innovation topics. With a special interest in the development of the knowledge industry through technology transfer, human talent management and innovation, Kevin Rodríguez Loáisiga is dedicated to fostering sustainable growth and reducing inequalities through education and technology. His commitment and experience position him as a reference in his field, working continuously to foster research and innovation in Nicaragua and beyond.

Luis Manuel Matus Ramos
Applications Developer
UNICA

Luis Manuel Matus Ramos was born on July 12, 2000, in León, Nicaragua. He graduated in Systems Engineering from the National University of Engineering (UNI) in 2023. Since 2019, Luis has had diverse experiences in the development world, excelling in various competitions and projects. In 2019, Luis participated in the national science and technology fair of the systems engineering faculty at UNI with a console application and won second place in rapid development data structure competitions. In 2022, he achieved third place in the UNI-IES fair and second place in the faculty of science and technology fair at the National University of Engineering in the web page category with the development of a web page with an intelligent chatbot. In 2023, he won second place in the science and technology fair with a project on formulation and project evaluation (creating a startup). Additionally, he participated and won first place in the social impact category in the Latin American Innovation Rally at the campus level. Luis completed the CS50 course from Harvard, known as Computer Science 50, taught in Nicaragua, and won first place in the CS50 hackathon with a course project based on a web application in 2023. He has also taken various web development courses using technologies such as HTML, CSS, JavaScript, Node.js, Python, Flask, SQL, React, and Next, demonstrating his self taught abilities. In these courses, he has developed projects such as Pokemon web clones, online resumes, e-commerce web systems, information systems for clinics, among others. Additionally, he holds certifications in cybersecurity courses from Cisco Academy, Udemy, and CertiProf. Currently, Luis is working on his graduation project and working at UNICA as an applications developer, contributing to the development of innovative and effective solutions in his field.

Eddy Stevens Martínez Coronado.
Professor of Medical Research
UNICA

Eddy Stevens Martinez Coronado was born on February 4, 1995, in León, Nicaragua. He graduated with honors in Science and Humanities from Colegio la Salle – León. He holds a Doctor of Medicine and Surgery degree from the National Autonomous University of Nicaragua, UNAN - León (2018), where he won First Place in the XXXVI University Scientific Development Conference (JUDC). He is currently a PhD candidate in Public Health. He has specialized in Public Health (Master's in Public Health, Brazil - Nicaragua 2024) and Clinical Nutrition (Master's in Clinical Nutrition, Spain 2024). He has enriched his continuous education through various postgraduate courses and programs from national and international universities and institutions. Notably, he holds a diploma in Scientific Research Methodology (Peru, 2023) and a diploma in Management Skills (Spain, 2022). He has completed specialized programs in Fundamentals of Psychology (Mexico, 2023) and Telehealth and Telemedicine focused on healthcare delivery (Mexico, 2023). In his professional career, he has served as a General Practitioner in Primary Healthcare at a Ministry of Health facility in Nicaragua, where he received recognition for his dedicated and responsible work benefiting the population (2022) and for his active participation in the medical care of suspected Covid-19 patients (2020). Alongside his clinical duties, he performed managerial, teaching, and research functions. Subsequently, he worked with the Pan American Health Organization (PAHO), contributing to consultancies on Continuous Quality Improvement in Health at the First and Second Levels of Care and Digital Transformation. While at PAHO, he was part of the implementation team for the Electronic Health Record in Nicaragua and Telemedicine. On the PAHO Virtual Campus for Public Health, he has worked as a creator of pedagogical content and virtual tutor. He has also been part of a COMISCA team for the implementation of strategies to control, prevent, and mitigate CKDnT in Central America and the Dominican Republic. Currently, he is part of the mentoring team for The Virtual 2024 Saturday Research Academy Program, providing technical and methodological advice to young people from Latin America in research and innovation. Additionally, he is a tenured professor at the Faculty of Medical Sciences at the Catholic University Redemptoris Mater (UNICA) in Nicaragua. His research has focused on Public Health, Telemedicine, and Nutrition.

Astrid Carolina Cotte Rivas
Success Mentoring Promoter
UNICA

Astrid Carolina Cotte Rivas was born in Managua, Nicaragua on January 21st 1997. She is a psychologist with a deep commitment to cultivating creativity, teamwork, and personal growth within individuals. Astrid´s academic journey began at St. Edward's University in Austin, TX, where she earned a Bachelor in Psychology in 2019, complemented by a minor in Spanish. This foundation has equipped her with a solid understanding of psychological principles and effective communication skills. Since 2019, Astrid has served as a psychologist at UNICA in Managua. In this role, she´s provided invaluable support to students navigating academic and personal challenges. Her responsibilities extend to tracking and documenting student progress, designing tailored interventions to enhance academic and psychosocial performance, and conducting workshops on various educational topics to guarantee students overall wellbeing. Astrid is also entrusted with administering psychometric tests and vocational assessments for university applicants and external organizations, ensuring they make well-guided educational decisions. Astrid´s professional growth continued from 2021 to 2022 when she worked alongside with the Office of International Relations at UNICA. Here, she immersed herself in researching and promoting opportunities such as scholarships, international projects, and student exchanges. Astrid actively cultivated and maintained international relationships, managed agreements with prestigious global universities, and coordinated culturally diverse events aimed at fostering global understanding and cooperation. Currently, in this significant investigative project, her role is focused on mentoring participants. Central to her responsibilities is the provision of personalized mentorship, conducting weekly follow-ups to monitor progress, and ensuring timely submission of milestones. As well as making sure they assist and connect into their weekly virtual sessions and meetings, utilizing her expertise to nurture both personal and academic development among participants. Astrid´s professional journey is driven by a passion for empowering individuals through education and psychological support.

Bio-sketches of Research Presenters from Puerto Rico

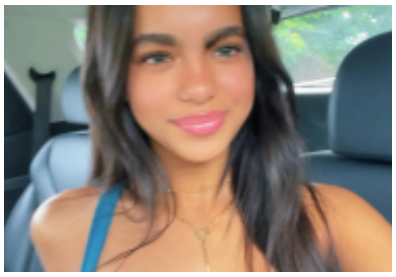
Marina Soleil Román Giovannetti is a sophomore at Academia María Reina High School in San Juan, Puerto Rico. From an early age, Marina showed a keen interest in Theoretical and Observational Astronomy. At sixteen, she excels in various subjects in Science and Math. Marina's passions extend beyond academics, including painting and communication/business studies. She is actively involved in the Virtual Research Academy by the Caribbean Foundation, where she combines her interests in astronomy and social media research. Looking ahead, Marina aspires to pursue a degree in entrepreneurship and is eager to develop a research project focused on innovative learning strategies for modern classrooms.

Ana S. Pizarro González is a rising high school junior at Academia Maria Reina in San Juan, PR. She is sixteen and has a distinct interest in Neurology and Medicine. She is part of the National Honor Society at her high school and is currently founding a STEAM Club along with Mia Ufret. This summer, she shadowed and volunteered at the San Juan VA Medical Hospital to enrich and foster her interest in healthcare. During her spring semester of sophomore year, she joined the Virtual Saturday Research Academy to begin her research on sleep medicine and COVID-19. She enjoys studying Italian and science and participating in Model United Nations, where she has been awarded many distinctions. She hopes to earn a bachelor’s in biology and later study medicine

Mía Sara Ufret Estrada is an aspiring high school senior at Academia Maria Reina in San Juan, Puerto Rico. During her junior year, she discovered her passion for chemical engineering through a summer program that introduced her to various engineering disciplines. Since then, she has actively pursued activities related to science and mathematics.Mía, a member of the National Honor Society, is not just a participant but a leader in the Math Club competitions across the island. Her commitment to STEAM is further demonstrated by her co-founding of a STEAM club at her school with fellow researcher Ana Pizarro. This initiative, aimed at Stimulating, Training, Educating, Attracting, and Motivating peers towards careers in STEAM fields, showcases Mía's leadership and ability to inspire others. This past summer, Mía participated in the MITES Semester program (formerly MOSTEC), a prestigious opportunity that selected 280 participants out of 4,000 applicants. In this program, she tackled rigorous courses such as Computer Science Introduction to AI, Python, and Sustainable Design. Additionally, she joined the Virtual Saturday Research Academy, focusing on the negative effects of Artificial Intelligence in U.S. high schools, with guidance from Yiria Muñiz and Dr. Arratia. As Mía prepares for her senior year, she is not just looking to graduate, but to embark on a journey towards a bachelor's and master's degree in Chemical Engineering. Her determination to leverage her experiences and passion for STEAM to make a significant impact in the field is a testament to her long-term goals and commitment to her chosen career path.

Paula B. Rivera Piñera is a rising junior at Academia Maria Reina in San Juan, Puerto Rico. She has pursued extensive enrichment opportunities across multiple scientific disciplines and is keenly exploring careers in architecture and engineering. Paula has participated in various summer programs that have broadened her horizons and deepened her knowledge in these fields.She exhibits a remarkable aptitude for mathematics. She consistently excels in math-related activities and contributes to her school community as an active math tutor. Her academic prowess is further exemplified by her membership in the National Honor Society and her role as class treasurer during her sophomore year.Beyond academics, she is deeply engaged in extracurricular activities. As a dedicated member of the environmental club, she has set her sights on the presidency to spearhead zero waste initiatives at her school. In the summer preceding her junior year, Paula's exceptional capabilities were recognized when she was selected as one of 40 participants from a pool of 600 applicants for the University of Michigan's SEE summer program, placing her in the top 6% of candidates. Additionally, she joined the Virtual Saturday Research Academy, where she conducted impactful

research on *Innovative Solutions for Ocean Acidification: Advancing CO2 Capture Techniques* under the mentorship of Mrs. Yiria Muniz and Dr. Juan Arratia.

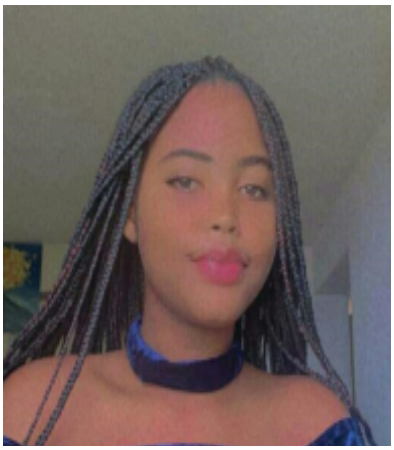


Shamely Smirna Gonzalez Ramkhelawan was born on July 10, 2008, in San Juan, PR. She lives with her family in Humacao and has four siblings. Since she was little, she has always enjoyed spending time with her family. Currently, she studies at Notre Dame Catholic School in Caguas, where she especially enjoys math class. She has participated in community work, collecting donations of personal items to deliver to a girls' home. There, she and her group painted the girls' nails and chatted with them. Additionally, she has attended several camps outside of Puerto Rico, including one on criminal justice at Florida Atlantic University, another on business administration at Yale University, and the most recent one on medicine at Duke University. In her free time, she loves playing volleyball and is a big fan of watching movies, reading books, and listening to music. These activities allow her to exercise and relax, maintaining a healthy balance. In the future, she aspires to be an anesthesiologist or an entrepreneur with her own business. She is working to achieve these goals through her studies and extracurricular experiences. She dreams of being successful in whatever she chooses to study and is committed to reaching her goals.

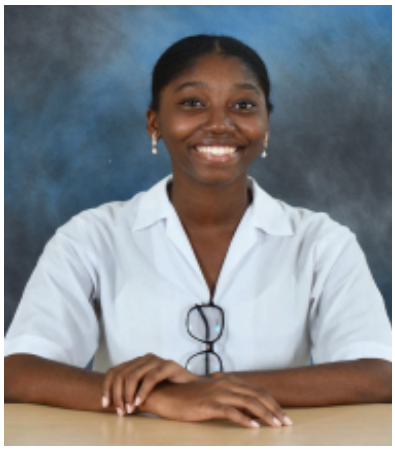
Biosketches of Research Presenters from Haiti

Lynn Naïkey DUVERNEAU, born in Haiti, is a student at Institution du Sacré-Cœur and is now sixteen years old . She is really interested in science specifically in the field of computers, programming, and video games. Her love for science and development led her to participate in the Virtual Research Academy program where she was able, with the help of her mentor Elizabeth Nailha Acacia, to use the acquired knowledge and built her first game app for blind people. Her passions include drawing , crocheting, and learning languages. She aspires to become an architect and a game designer. She also plans to be a polyglot and will use her abilities and her passion for science to optimize her career.

Laeticia Fayette is a rising senior at West Orange High School in New Jersey. She was born in Newark but lived 14 years in Haiti; she is now 16, living in West Orange, New Jersey. She shows interest in the STEM field, precisely engineering. She is extremely creative and her hobbies include: sketching, painting, reading and writing. Laeticia is fluent in more than two languages; she often speaks in French, English and Haitian Creole. She is part of the Saturday Research Program and her project has for objective, the exploration of the advances of sustainability within the soft prosthetic industry with the goal of determining a new alternative material for the creation of prosthetic fingers. Her dream career is to be a mechanical engineer who specializes in the creation of new devices for the medical field. She hopes that one day she will create something memorable that will contribute to the advancement of the prosthetic industry in her home country, Haiti.



Melissa Lorinda Exumé is a student passionate about science, currently in 10th grade at Institution du Sacré cœur (ISC). Her love for science led her to join the « Scientific Caribbean Foundation» program, a prestigious initiative aimed at encouraging and supporting young scientific talents. Within this program, Lorinda had the opportunity to be mentored by Nailha Acacia, a young scientist in the field of biological sciences and phylogeny. Thanks to this mentorship, Lorinda was able to conduct in-depth research in biological sciences, a field that fascinates her. This experience not only allowed her to acquire valuable knowledge but also opened her eyes to the numerous opportunities and challenges that the scientific world offers. Lorinda harbors great ambitions for the future. After completing her studies, she aspires to become a pediatrician or a radiologist, two professions where she can combine her love for science with her desire to help others.



Izadora Fresnelle Lorlay Noel-Jeune, she is a very talented 16 years old student. Born in Port au Prince in Haiti, she is currently at Institution du Sacré-Coeur (ISC). Since she was a child , she had been interested in art. She did classical dance and folklore. She ended up learning to play the violin and recorder. Thanks to her attraction to art , she writes poems, paints , draws and sings. While Art is an important part of her personality, a few months ago she discovered science and got quickly interested in this new domain. Izadora always finds a way to combine art and science as she states: “ Just like painting, science allows us to use our senses through observation and experimentation of specific elements whether of chemical or physical origin”. For this Saturday Research Program, she successfully studied a possibility of bacterial inhibition by using Nepeta Cataria extract from Haiti’s specimen. Izadora believes firmly in Leonardo da Vinci’s saying: "Science without art is only a ruin of the soul" and wants to use her knowledge to benefit her community. Her career goal is to become a doctor specializing in the research of bacterial originated childhood diseases

Ann Corrie René is a high school student at Institution du Sacré-Coeur in Haiti. She was born and raised in the country's capital, Port-au-Prince, and is now fifteen years old. She is a big science enthusiast especially when it comes to biology, mathematics, physics, chemistry and computer science. Some of her other interests include reading, dancing and arts and crafts. She is really determined on pursuing a career in STEM, specifically as a biomedical scientist specializing in genetics. This dream has pushed her to join the Virtual Research Academy, where she worked on a genetics based research regarding a Phylogenetic Analysis of Phosphorus Solubilizing Bacteria (PSB). Later on, she plans on joining more pre-college STEM programs in order to continue enriching her knowledge and experience in the field. Her ultimate goal is to help various fields such as genetics, biology and healthcare with her findings and eventually work towards improving and discovering different treatments and conceptions.

Audrey Chloé VERCINÉ is 16 years old and a student at the Sacré-Cœur institution in Haiti. One of her strong personality traits is curiosity, and for her, every element of the universe is a true source of debate and learning. She is passionate about various scientific fields such as biology and astronomy, as well as literature and visual arts. Her research aims to isolate tardigrades for the first time in Haiti. This organism was ideally embracing her love for astronomy and biology as various theories were debated regarding their origin on this planet. In the future, she plans to pursue a career in research and perhaps try to combine all her passions into one field. Above all, she wishes to contribute to research in her home country. One of her greatest dreams is to help humanity set foot on Mars.

Andrée Ann Michel is a 17 years old student at Institution du Sacre-Coeur. She is currently enrolled in the Virtual Saturday Research Program and her project is focused on the Haitian educational environment and its limitations for students with dyslexia. Andree Ann is really embracing this topic as she has noticed that in Haitian schools, dyslexic students are often ignored, not out of malice but out of ignorance. The real question for her is whether this ignorance is voluntary or involuntary. She is determined to answer this and other questions through her investigation.

Victoria Lyceinthe Diann Charles is a 10th grader student at Institution du Sacré-Coeur. Passionate about research and medical knowledge, she has joined the Scientific Caribbean Foundation's Saturday Research Academy Virtual Program. Her mentor was Elizabeth Naïlha Acacia, whose expertise guided her through the program. Her research aimed to analyze the possible causes of intracerebral hemorrhage among haitians for the past 10 years. Thanks to her determination and her mentor's professionalism and help, she was able to raise awareness about a medical case never emphasized before in Haiti: the hypertension yearly reports. This experience enabled her to acquire so much knowledge on the subject she explored, but also, thanks to this research, she learned the discipline and demands of research and its importance. After high school, Victoria would like to become a cardiac surgeon and perhaps a neurologist, a choice that would enable her to learn a little more every day.

Biosketches of Research Presenters from Nicaragua

Nataly Massiel Guevara Flores was born on April 25, 2004 in Masaya, Nicaragua. She is currently studying the eighth semester of General Medicine at the Catholic University Redemptoris Mater. Since 2021 Nataly has started studying medicine, since the beginning of her career she has always felt attracted to research. It was that same year, in the second semester, when she took the Research and Innovation Workshop with Dr. Kevin Chamorro when she had the opportunity to deepen her knowledge about scientific research and later be part of the Saturday Research Academy Program. One of the advantages of her university is that it encourages its students to carry out studies, thanks to which she has been able to carry out two descriptive studies and a systematic review. As a result, she has gained more research experience. When she finishes her basic years, she would like to pursue a specialty. Beyond having a specialty, she would like to focus on research and go deeper into the fully scientific world. At the moment she is doing a project on the diagnosis of pathological facies by using artificial intelligence, this project has marked a very important step in her life as a researcher, a path that she would like to follow along with many other ideas that throughout her career she would like to develop some of them, if not all of them.

Christiana Lyli Lucas Hassan was born on January 7, 2006. She graduated as the top student of her class from Colegio La Anunciación in Managua in 2022. She began studying medicine at Universidad Católica Redemptoris Mater (UNICA) in 2023 and is currently in her second year. On March 18, 2024, she was awarded a High Academic Distinction for her outstanding GPA in her first year. She also received a certificate of recognition for her exceptional participation in the UNICEF-UNICA volunteer program. Christiana remains an active volunteer with UNICEF and is currently involved in the "Pilas Puestas por el Clima" campaign. Her dedication extends to working with children at Colegio Santo Domingo in Managua, Nicaragua, where she has conducted various interventions and interactions. Christiana's commitment to social projects is further demonstrated through her initiatives such as organizing donations and engaging in recreational activities with the elderly residents of the Asilo Hogar San Antonio in Masaya, Nicaragua. On October 26, 2023, Christiana was acknowledged for her participation in the second scientific research conference of the UNICA Faculty of Medicine with her presentation on "Clinical Manifestations of Systemic Lupus Erythematosus in Adult Patients: A Systematic Review." Additionally, on October 21, 2023, she received a diploma for completing the introductory virtual course on systematic literature reviews by the Pan American Health Organization (PAHO). Her enthusiasm for chemistry was recognized on June 27, 2023, when she was awarded second place at the General Chemistry Fair at UNICA, and again on November 28, 2023, when she received

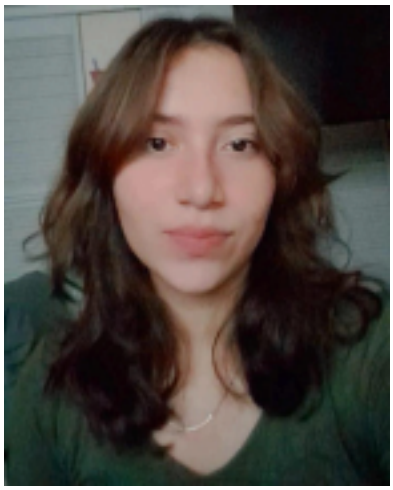
first place at the Organic Chemistry Fair at UNICA. On May 11, 2024, the Vivian Pellas Hospital awarded her a diploma for her participation in the VII Neuroscience Symposium 2024: Updates in Psychiatry and Neurotrauma, accrediting her with 3 hours of continuing medical education. In June 2024, the Vivian Pellas Hospital granted her a diploma for her participation in the Medical and Nursing Congress, recognizing her with 7 credit hours of continuing medical education. Christiana is driven by a passion for improving human health and making a tangible difference in the lives of others, particularly those who cannot advocate for themselves. She aspires to specialize in neurodegenerative diseases to alleviate the burdens they impose on patients and families. Her current projects and volunteer work are essential steps in her journey, providing valuable experience and insights for her future goals of pioneering medical advancements and translating research into effective treatments.

Marcela D. Bonilla Jiménez, born on June 26, 2004, in Managua, Nicaragua, is currently in her third year of General Medicine at the Universidad Católica Redemptoris Mater (UNICA). Throughout her academic life, she has been consistently awarded for her academic performance, always achieving averages above 90 points. She excelled in orthography contests and actively participated in science fairs. In October 2016, she was an exhibitor in the Chemistry category at the First Science Fair for Children and Adolescents promoted by CONYCIT, held at her school, Instituto Pedagógico La Salle. In addition to her academic excellence, she received the "Espíritu Lasallista" recognition at her high school graduation, awarded to students who stand out for their leadership skills, responsibility, fraternity, and service during their time at the school. At university, she has obtained two high academic distinction diplomas for her averages in the first and second years of her medical career. She was also recognized for her service vocation in Health Sciences due to her performance as a student monitor in the Anatomy course. She possesses outstanding skills in leadership, discipline, critical thinking, problem-solving, and quick initiative. These competencies have allowed her to excel in various academic and extracurricular settings. Regarding soft skills, she considers herself a person who generates trust, is empathetic, and enjoys conversing with people, making her very friendly and reliable. She strives to bring out the best skills in her peers and help them recognize their potential. In the future, she envisions herself in the field of surgery or pathology, always alongside research. Her goal is to make a positive impact in her environment as a physician and to foster ideas of change and improvement in the health of her country, with a special focus on Nicaraguan youth.

María J. Fargas Sequeira, born on August 21, 2004, in Managua, Nicaragua, is currently in her third year of studying General Medicine at the Universidad Católica Redemptoris Mater (UNICA). Throughout her school life, she has stood out academically, being awarded for multiple consecutive years by the Fundación Programa Nacional de Cultura "Leer es Vivir," founded in 1994 in San José, Costa Rica. Additionally, she received annual diplomas for academic excellence at Colegio Diocesano "San Vicente de Paúl" in Boaco, Nicaragua. In 2015, she participated in an environmental fair in Managua, winning first place with the project "Eco Bombs" against other departments in the country. She was a member of an environmental movement called "Salvemos al Río Fonseca," whose purpose was to raise awareness about the importance of caring for nature and not polluting our environment. This effort earned her a mention in a local newspaper and coverage by one of Boaco's city channels. At university, she has received two high distinction academic diplomas for the first and second years of the Medicine program. Following her passion for helping and teaching, she served as a teaching assistant for the Biochemistry course. She possesses qualities and interests that allow her to engage in various fields, enriching her experiences and improving her personal traits. Being a multifaceted individual, she has become adept at working in teams and under pressure, understanding that each member has a responsibility to achieve a common goal. In the future, she aspires to specialize in internal medicine and endocrinology, considering the constant advancements in medicine that go hand in hand with research to ensure patient well-being. With great dedication and effort, she has prepared to be a healthcare professional aiming to make a positive impact in the medical community.

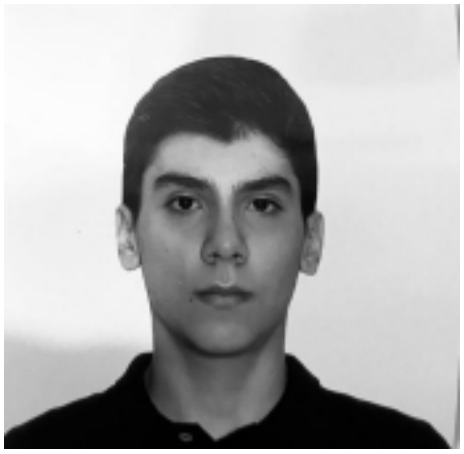
Milan Josué Guzmán Robleto was born on September 17, 2004, in Managua, Nicaragua. He graduated high school from Colegio Pureza de María in 2021. Currently, he is in his third year of medical school, pursuing his dream of becoming a surgical oncologist. Milan has a strong passion for oncology and aims to become a leading researcher in the field of cancer. His dedication to medicine and his aspiration to contribute significantly to cancer research drive him in his academic endeavors. Milan is particularly committed to conducting cancer research that will help advance medical knowledge and treatment options in his home country of Nicaragua. While still early in his medical career, Milan is committed to excellence in his studies and is actively seeking opportunities to engage in research projects related to medicine. He is determined to make a meaningful impact on the fight against cancer through both his clinical practice and research contributions. Milan is inspired by the advancements in medical science and technology, and he is keen on staying at the forefront of these developments to provide the best care for his future patients. His goal is to not only excel as a surgical oncologist but also to be at the cutting edge of cancer research, contributing to breakthroughs that can save lives and

improve patient outcomes. He is particularly motivated to help Nicaragua advance in the field of medicine through his research efforts.



Sofía Ivette Palma Sandoval born on August 17, 2004, in Managua, Nicaragua, is currently in her third year of medical school at a prestigious university. From an early age, she has shown a deep interest in learning and exploring new areas of knowledge. Throughout her academic journey, she has earned diplomas in English at the C1 level and in French at the A1 level. Learning languages allows her to connect more effectively with people from different cultures and backgrounds, and she aims to study Korean and sign language in the future to continue expanding her communicative horizons. In her free time, she dedicates herself to learning new skills and exploring various forms of creative expression. She is self-taught in areas such as knitting, painting, and using a sewing machine. She has developed proficiency in basic programs like Excel and Word, which she considers essential tools for her personal and professional development. Reading is one of her main passions, and to date, she has read 143 books, which has allowed her to gain a wide range of knowledge and perspectives. Her motivation for studying medicine and participating in this project stems from a desire to help people and to find ways to combine her interests into a single pursuit. She is particularly driven by the challenge of integrating various aspects of her passions into a cohesive whole. Looking forward, she aspires to delve deeper into technology and to publish innovative research that can contribute to advancements in the field. This project represents a significant step in her career as a researcher, as it is her first research endeavor. Notably, it has allowed her to address current issues in medicine and develop temporary solutions, with a commitment to further improving these solutions in the future. She has received academic recognition for maintaining high grades in her secondary school and university, with awards in 2018, 2023, and 2024. Her long-term goal is to combine her diverse passions to create innovative solutions that benefit both people and animals. She is particularly interested in how technology can be integrated into the medical and veterinary fields to enhance outcomes and efficiency in care. She has a clear vision for the future and strives to use her knowledge and skills to make a significant difference in the world. Additionally, she deeply values the ability to distinguish between her own life and that of others. She firmly believes that recognizing and working on personal weaknesses is essential for strengthening skills and avoiding comparisons. This perspective allows her to approach challenges with a positive and growth-focused mindset, contributing to her overall development as both a professional and a person.

Biosketches of Research Presenters from Colombia



Edwin Santiago Rodriguez Lopez was born on December 28, 2007, in Villanueva Casanare, Colombia. From a young age, Edwin has demonstrated great interest and dedication to his studies, which led him to join the Fundación M&M Formando Líderes in 2018. During his time at the foundation, he has received several honorable mentions for academic excellence, standing out as an exemplary and committed student. Since 2019, Edwin has been actively involved in various social projects focused on improving his community. These projects include environmental care, promoting sustainable practices, and raising awareness among his peers about the importance of protecting nature. He has also worked to promote quality education by organizing and participating in activities that support the learning of other young people in his municipality. Furthermore, his commitment extends to reducing inequality, especially among young Venezuelan migrants who have arrived in Villanueva, Casanare, helping them integrate and adapt to their new environment. Edwin has shown a passion for language learning. Over the years, he has certified his skills in English and Mandarin Chinese through international exams. In 2018, he passed the Cambridge Movers exam, and in 2019, the HSK1 exam for Mandarin Chinese. His progress continued with the HSK2 exam in 2021, followed by the PET exam from Cambridge in 2022 and again in 2023, solidifying his proficiency in English. In addition to his language achievements, Edwin has sought to expand his knowledge in various academic areas through the Coursera platform. He has completed courses such as Contemporary Biology, Astronomy: Exploring time and space, Introduction to Artificial Intelligence (AI), After the Arab Spring - Democratic Aspirations and State Failure offered by prestigious universities worldwide. This dedication to self-directed learning reflects his insatiable curiosity and desire to understand the world from multiple perspectives. In 2023, Edwin decided to take a significant step in his academic and personal development by applying to the international UWC (United World Colleges) program. After a rigorous and competitive selection process, he was one of 13 young individuals chosen to receive a scholarship to study at an international school. As a result, from 2024 to 2026, Edwin will be pursuing the International Baccalaureate at UWC Costa Rica, an experience that will not only provide him with top-tier education but also allow him to interact with young people from around the world, promoting intercultural understanding and global cooperation.

Angie Lorena Leguizamon Rincon, born on February 10, 2002, in Villanueva, Casanare, Colombia, is a dedicated education coordinator and systems engineer. She completed her degree in Systems Engineering at EAN University, Bogotá, D.C., from January 2019 to December 2023. Since January 2019, Angie has been serving as the Education Coordinator for Fundación M&M Formando Líderes in Villanueva, Casanare. In this role, she designs and implements educational projects, creates strategic alliances with national and international organizations, and trains students for international exams such as SAT, HSK, and IELTS. Additionally, she directs and teaches STEM subjects, nurturing a strong foundation in science, technology, engineering, and mathematics among her students. In March 2022, Angie took on the role of Director for the M&M For Everyone Project. This initiative aims to provide high-quality English education to vulnerable, low-income children in rural areas, helping them gain essential language skills and offering opportunities for a better quality of life. The program also seeks to protect these children from the dangers of the streets, such as drug addiction, prostitution, and violence. Beyond her formal roles, Angie co-created the Robotech M&M project with Fundación M&M in 2021. This initiative provides programming and robotics classes to poor and vulnerable children from Colombia and Venezuela. Through this project, Angie has inspired and educated young minds, equipping them with valuable technical skills and fostering a passion for technology and innovation. In 2024, Angie was selected as a fellow in the Early Career Fellowship from The Internet Society. This prestigious fellowship recognizes emerging leaders in the field of internet technology and policy. Additionally, she was appointed as a Youth Ambassadors Mentor, where she guides and supports young leaders in their personal and professional development. In addition to her professional and volunteer work, Angie has pursued numerous international certifications in diverse fields such as digital marketing, biology, artificial intelligence, and contemporary biology. She is fluent in Spanish and English, with basic proficiency in Chinese.

Diana Marisol Maldonado Miranda born on April 28, 2007, in Villanueva, Casanare, Colombia. She completed her secondary education at School Incetec in 2023 and is currently studying at M&M Foundation Forming Leaders. Since 2019, Diana has been actively involved in several social projects. She is a volunteer of M&M para Todos, a social project dedicated to providing English classes to vulnerable children who do not have the opportunity to receive a high-quality education. This project operates in both rural and urban areas, ensuring that children from various backgrounds can access educational support. Diana dedicates two hours per week to this initiative, making a significant impact on the children's lives by enhancing their language skills and educational opportunities. Diana also participated in Green M&M from 2018 to 2019, an ecological project aimed at improving the environment. The project focused on activities such as collecting rubbish, planting trees, and cleaning rivers. Diana contributed two hours a week to these efforts, demonstrating her commitment to environmental conservation and community service. From 2019 to 2021, Diana worked with Casa Nicolo, a social project providing high-quality education to Venezuelan migrant children. She dedicated two to three hours per week to this cause, helping to create a supportive and educational environment for children who had been displaced from their homes. Her work with Casa Nicolo was instrumental in ensuring that these children received the education and care they needed during a challenging time in their lives. Diana possesses a range of technological skills, including proficiency in Microsoft Word and PowerPoint, intermediate knowledge of Python, basic knowledge of C++, and website design. She has also completed various online courses and certifications, such as human rights and democracy in Latin America, social leadership, coding, happiness at work, artificial intelligence, the Arab Spring, chemical compounds formulation, global entrepreneurship, and digital marketing. Diana's dedication to social work and academic excellence has earned her several awards. She received the Mother Teresa of Calcutta Award from M&M Foundation in 2021, 2022, and 2023 for being the best volunteer in social work. Additionally, she was awarded the Medal of Academic Excellence from M&M Foundation in 2022, and the Web Development Award from M&M Foundation in 2023 for creating the best geopolitical website. Diana is proficient in Spanish, her native language, and has an intermediate proficiency in English and basic knowledge of Chinese. Her passion for education, technology, and social work drives her continuous efforts to make a positive impact in her community.

Jorelis Taliana Amador Robles, born on June 6, 2009, in Villanueva, Colombia, she is a dedicated student and community volunteer deeply committed to social and environmental causes. She is currently in the tenth grade at ICETEC, under the aegis of Fundación M&M Formando Lideres, where she actively participates in initiatives that significantly impact her local community. Jorelis initiated her volunteering journey in 2020 with Green M&M, a project aimed at foresting and preserving local water sources and forests. Her passion for accessible education led to the 2021 launch of M&M para todos, providing tutoring to low-income children from Villanueva and nearby villages. In 2022, Jorelis expanded her volunteer efforts to include Casa Nicolo, a project that offers Venezuelan migrant children safety and educational opportunities. Her dedication has garnered her the Madre Teresa Award in 2021 and the Excellence Award in 2022, both from the Fundación M&M Formando Lideres. Jorelis has also completed several online courses, including studies in Big History, Astronomy, and Artificial Intelligence from reputable institutions. Her education spans diverse topics from human rights and democracy to digital marketing and embedded systems, demonstrating her broad interests and proactive learning attitude. As a volunteer, Jorelis significantly contributes to project strategies, educational activities, and community outreach, embodying the spirit of active citizenship and making a meaningful difference in her community. Furthermore, Jorelis is multilingual, fluent in Spanish as her native language, with a good understanding of English (B1 level) and basic knowledge of Chinese, enhancing her ability to connect with diverse communities and further her educational and personal development.

Nadia Samara Siachoque Ruiz was born on March 15, 2009, in Villanueva, Casanare, Colombia. She is currently studying at Fundación M&M Formando Lideres and is set to graduate from Incetec College in 2024. Since 2019, Nadia has been deeply involved in social and environmental projects: Nadia is a volunteer and leader of Green M&M, an environmental project dedicated to making a positive impact on the environment. The project focuses on educational campaigns about proper waste classification and planting endemic trees in the region. Nadia has dedicated two hours per week to this initiative, demonstrating her commitment to environmental conservation and education. In 2023, Nadia joined M&M para Todos, a social project aimed at providing quality English education to children who lack the economic means to access it. The project also includes initiatives to teach children in rural areas. Nadia commits two hours per week to this cause, significantly impacting the educational opportunities for these children. Nadia possesses a range of technological skills, including proficiency in Microsoft Word, Excel, and PowerPoint, and basic knowledge of Python and Scratch. She has completed various online courses and certifications on topics such as fundamentals of writing, contemporary biology, coding, digital

literacy, digital marketing, happiness at work, artificial intelligence, and the Internet of Things. Nadia's dedication to social and environmental work, coupled with her academic excellence, has earned her several awards and recognitions. She is proficient in Spanish, her native language, and has an intermediate proficiency in English and basic knowledge of Mandarin Chinese. Her passion for education, technology, and social work drives her continuous efforts to make a positive impact in her community and beyond.

Sharith Daniela Prada Landinez was born on June 24, 2006, in Yopal, Colombia. Since she was little, she has always been interested in different professions, especially medicine. Her motivation to continue studying, researching, and improving is based on the idea of helping people. She wanted to be a doctor to help people with their illnesses, relieve their pain, and prolong their lives so they could enjoy more time with their families. When her grandfather got sick, the only thing she wanted was to find a way to relieve his suffering. Not being able to do so, she felt frustrated and began to think about all the families who go through similar moments. It was then that she decided she wanted to be a doctor to save lives. However, after researching more about this career, she realized that the idea of operating on someone or seeing someone in a compromising situation terrified her, and she had to discard that dream. She searched for other careers that interested her and finally found programming. The school where she studies, Fundación M&M in Villanueva, Casanare, Colombia, offered her many opportunities in different programming courses. She discovered that she is passionate about the world of programming, with its vast variety of applications and fields of work. She has taken different programming courses, among others, online with various universities around the world. She is excited to continue expanding her knowledge in this area and thus help other people in a different way. In addition to her interest in programming, she has achieved several academic accomplishments. She has a B1 level in English and has obtained level 1 in Mandarin, certified by the Confucius Institute. These have been recognitions of which she is very proud considering her young age, and she wishes to continue in her process of training and research to achieve her goal of helping people.

Paula Isabella Mojica Millan was born on April 25, 2010, in Yopal, Colombia. She is in secondary school and has always been passionate about learning and helping others. She wants to study international law to help migrant children get better opportunities and high-quality education. Paula's dream is to assist these children in obtaining all their migration papers and enrolling in good schools where they have migrated because she firmly believes that all children of school age deserve, without exception, to be in school with a good education. Growing up, Paula's parents, who raised her in a very academic and competitive environment, taught her the importance of education and achieving success. At the moment, she is about to finish high school and is preparing for the C1 level in English. She already has the HSK 3 level in Mandarin, showcasing her interest in languages, and her mother tongue is Spanish. Paula's plan after graduation is to attend university by distance learning to help her parents' schools with teaching. She believes that combining her studies with practical experience will enhance her understanding and skills. For her postgraduate and master's degrees, Paula plans to go to a major university abroad. Ideally, for her, it would be in the UK with the Chevening scholarship, which is one of the most coveted scholarships. In 2024, Paula won the Youth Ambassador Programme Certificate, Cohort 1, awarded by HundrED and the International Baccalaureate Organization. This prestigious recognition reflects her dedication and potential in making significant contributions to education and international law. Currently, Paula is working on her first research project titled "The Development of a Mathematical Games Platform on WhatsApp with Artificial Intelligence to Promote Interactive Learning of Mathematical Concepts." Dr. Kevin is teaching her how to conduct research and supervises her work. This project involves developing a platform that uses AI to create interactive and engaging mathematical games for students.. This project is a significant step in her journey as a researcher and has provided her with valuable experience in the field of educational technology. In her free time, Paula helps her family with some classes and also assists students who are struggling with their grades. She helps them understand and do their homework, providing them with the support they need to succeed.

Ana Sofía Peña Silva was born in Villanueva, Casanare, Colombia. She obtained her high school diploma from INCETEC in 2023. Currently, she is an active student at Fundación MYM, where she stands out for her dedication and commitment to various educational and volunteer projects. Since 2020, Ana Sofía has been involved in humanitarian and educational projects aimed at providing quality education to refugee children through "The Nicolo Project." This program aims to teach children the importance of education in their lives and promote their overall development. To date, she has dedicated 194 hours to this project, demonstrating her passion for education and the well-being of others. Ana Sofía has completed numerous courses at prestigious institutions. These include "Introduction to Biology: Ecology" at Rice University in 2023, "After the Arab Spring: Democratic Aspirations and State Failure" at the University of Copenhagen in 2022, and "Chinese for Beginners" at Peking University in 2023. She also studied "Human Rights and Democracy: A Vision from Latin America" at the University of the Andes in 2022, "Big History: From the Big Bang to Today" at the University of Amsterdam in 2022, and "Astronomy: Exploring Time and Space" at the University of Arizona in 2021. Her interest in digital marketing led her to complete a course in "Introduction to Digital Marketing" at Poeta in 2022, as well as courses on the "Internet of Things" and several Digital Literacy modules at Poeta between 2021 and 2022. She also participated in "The Hour of Code Minecraft" in 2023 and the "Global Entrepreneurship & Innovation Bootcamp" at Thunderbird and Arizona State University in 2023. In addition to her academic training, Ana Sofía is proficient in several languages. Her native language is Spanish, and she has achieved A2 level in English and HSK 2 in Chinese, demonstrating her ability to communicate in different contexts and her interest in learning new languages.Throughout her career, Ana Sofía has received several awards in recognition of her academic excellence and dedication to social work. She was awarded the "Mother Teresa of Calcutta Award" by the M&M Foundation in 2021, 2022, and 2023 for being the best volunteer in social work. She also received the "Academic Excellence Medal" from the M&M Foundation in 2022 and the "Web Development Award" from the same foundation in 2023 for creating the best geopolitical website.

Biosketches of Research Presenters from Honduras

Saily O. Rodriguez was born on June 2, 2005 in La Paz, Honduras. She grew up in a large family, full of love and affection, consisting of her mother, three brothers and two sisters. His mother, a strong and hardworking woman, has been the central figure in his life, working tirelessly to give them a better life and teaching them the value of effort and dedication. Her education and personal development have been deeply influenced by his family. Her mother's determination and love have inspired her to persevere in achieving her goals. Her brothers and sisters have been a constant source of support and motivation both emotionally and financially, always willing to support her in whatever she needs. In the year 2023 he completed his secondary school studies obtaining his degree in Professional Technical Bachelor in Computer Science, during this period he received the valuable support of the institution APUFRAM. This support was fundamental for his academic and personal formation, providing him with resources and opportunities that he would not have had otherwise. Over the years, she has developed a keen interest in software development, program design, and although she has not yet entered college, she is very excited to continue her education to pursue a career in systems engineering and continue exploring her interests. Her main goal is to enter college next January 2024. Thanks to the support of her family and APUFRAM, she is prepared to face the challenges ahead and continue pursuing her dreams, always carrying with her the values and teachings of her family and APUFRAM. Her goal is to contribute to her department and surrounding communities through volunteer projects and educational support programs, helping other young people to achieve their goals. She also aspires to work on innovative projects in the field of systems engineering, developing ideas and solutions that generate a positive impact on society, as well as learning other languages such as English, French, Mandarin and German.

José R. Casco was born on August 12, 2000 in Comayagua, Honduras. The son of a single mother and an older sister, José has learned early on the value of family and resilience. In December 2023, he graduated as a Telecommunications and Electronics Engineer, marking the beginning of a promising professional career. Days before his internship, he won an employment contract and worked as an Operations Engineer at Tigo Honduras until December 2023, a leading company of the Millicom Corporation. His dedication and passion for telecommunications have led him to dream of one day leading a company in this dynamic sector. In addition to his professional commitment, José is a music enthusiast. One of his personal challenges is to learn about music production and become a DJ, a hobby that has always accompanied him and that he considers a way to explore new skills and express himself creatively. Beyond his personal and professional interests, Jose is a man of deep Christian faith, which guides his life and decisions. Jose also has a big dream to help others in the same way that many people have helped him, simply with the goal of making the world a better place for everyone. He dreams of creating a foundation to support the marginalized sectors of his country, providing educational opportunities for children and youth, and empowering single mothers to get ahead. His greatest motivation is to give back to his mother and sister the unconditional love and support they have always given him, making them feel proud of his achievements. One of the phrases that has impacted him the most is that of the intellectual Albert Camus: “If I had to write a moral book, it would have a hundred pages and 99 would be blank. On the last one, I would write: 'I know only one duty and that is to love'”. This quote reflects his belief in the simplicity and essentiality of love as a moral guide in life.

Mia Rachell Padilla Cubas studies Bilingual Executive Assistant at Lorenzo Cervantes Secondary School. Mia speaks English and Spanish. She was born in La Paz on March 23rd, 2009. Mia started preschool at Las Cumbres Bilingual School when she was three years old and finished in 2013. Then she went to school when she was five years old at Manuel Bonilla School. Later Mia moved to Nuestra Señora de la Merced School in 4th grade. In 5th grade she started to practice ballet for 1 year and she studied there until 2017. In 2018 Mia entered Santa Clara High School and she practiced a little volleyball, basketball, and soccer. Then in secondary school, she moved to Lorenzo Cervantes Secondary School for studying Bilingual Executive Assistant Career. Mia will graduate from secondary in 2025. Then she will start university to study pediatrics or odontology. While studying, she wants to learn a new language. Mia considered working part-time in a call center to cover my expenses. When graduated, she

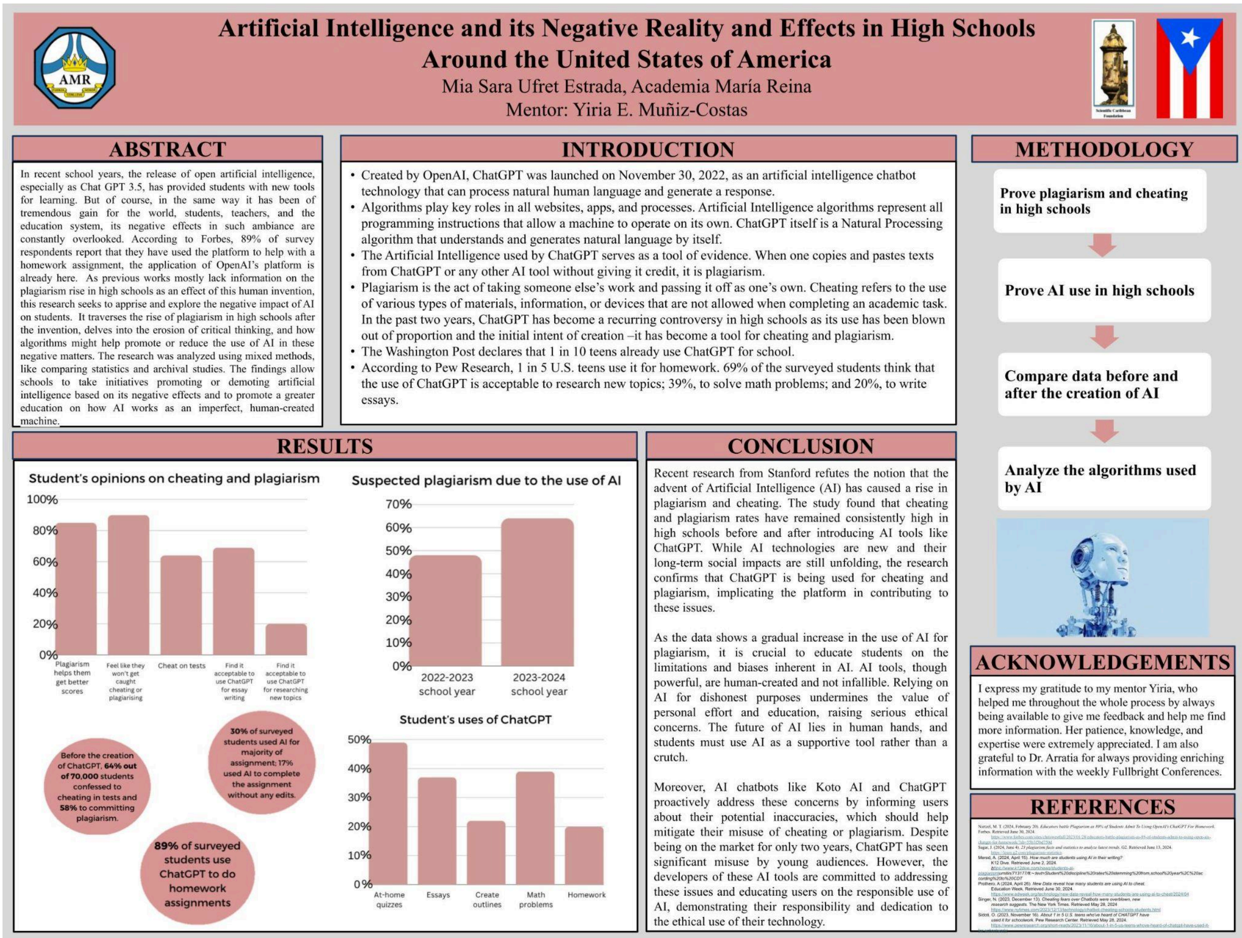
will find a job in a clinic or hospital and get a house. On my holidays, she will travel to other countries for tourism and help foundations in those countries.

Jeleni Maydaris Lanza Matos was born on June 11, 2007, in Tegucigalpa, Honduras, as the eldest daughter of Mario Lanza and Jeleni Matos, who have taught her the value of a close-knit family. In December 2023, she graduated from high school with a degree in Humanities from Instituto Maximiliano Kolbe. During her education, she gained knowledge in various fields, including fieldwork and technology. She is currently pursuing a degree in International Business with a focus on Agroindustry at the National Autonomous University of Honduras. A hobby that has always accompanied her and that she considers a way to explore new skills is cooking, whether it be food or desserts. She is a talented young woman with a passion for gastronomy that she wishes to continue learning about. Through this, Maydaris wants to help others learn more about gastronomy. She would love to have a space where she could cook for children or residents in nursing homes. My greatest motivation is my parents and my siblings.

Elisa María López Soto was born on November 22, 2007, in Comayagua, Honduras. She is currently 16 years old and resides in La Paz, La Paz. She is studying at the Dr. Lorenzo Cervantes Institute, pursuing a career as a Bilingual Executive Assistant. Elisa's educational journey has been diverse and enriching. She began her education at Nuestra Señora de La Merced School in La Paz and attended preparatory school at Rock Valley Bilingual School. She continued her studies at various schools in La Sarrosa, El Progreso, Yoro, and Jocón, Yoro, before returning to La Paz for high school at Dr. Lorenzo Cervantes Institute. Upon completing high school, Elisa intends to continue her university studies, learn new languages, and nurture her passion for reading. Her goals include finding employment, establishing her own business, and eventually purchasing her own home. Additionally, Elisa aims to contribute to the community and help those in need.

Posters of Research Presenters from Puerto Rico

Mia Sara Ufret Estrada, Academia María Reina



Marina Soleil Román Giovannetti

The Impact of social media app Tik Tok on Theoretical Astronomy Education

Román-Giovannetti-Marina
Academia María Reina

Abstract

In the dynamic landscape of modern education, digital platforms like Tik Tok are emerging as influential tools. This study embarks on an intriguing journey into the education of Theoretical Astronomy, meticulously examining the potential merits and pitfalls of employing Tik Tok as an educational medium. While Theoretical Astronomy crafts theories to interpret observational data and forecast cosmic phenomena, the reliability of TikTok as an information source remains contentious, given its open-access nature where misinformation can proliferate.
This study explores the transformative effects of utilizing TikTok to enhance understanding of Theoretical Astronomy highlighting the engagement and cognitive enrichment fostered by short, entertaining videos. By exploring topics such as Dark Matter, the 'Self-interacting Dark Matter Theory,' and future Galaxy Formations, the study strives to reveal the impact of these videos on viewers' attention, productivity, and comprehension in Theoretical Astronomy, advocating for its integration into formal educational frameworks.

Introduction

As society evolves, innovative learning methods are being sought, including the use of non-traditional platforms like social media apps such as TikTok to acquire knowledge. TikTok, often dismissed as a platform for entertainment, holds a unique potential to expand individuals' understanding of Theoretical Astronomy. Misinformation, a common issue on such platforms, can redirect curiosity and encourage further research.
Educators, like Josh Kenney, a high school teacher in Michigan, leverage this aspect of TikTok for educational benefits. Kenney states: "I like TikTok because it has misinformation. That is super-valuable in an educational setting." Another important aspect this research considers is how short attention spans can be attracted to learning specific subjects like Theoretical Astronomy. TikTok's short videos, designed to capture attention quickly, can briefly summarize intriguing topics such as the Big Bang Theory, prompting further investigation. On average, teenagers spend 1 hour and 47 minutes daily on the app, with an attention span for short videos around 8 seconds. If a video doesn't capture their attention quickly, they lose interest. Teenagers' attention spans are even shorter for uninteresting school topics. However, with TikTok's new STEM section, educators can easily use the app to explain different astronomy concepts. This project's primary aim is to demonstrate that incorporating a highly influential app like TikTok into learning habits can effectively utilize time and capture short attention spans, thereby revolutionizing the way we approach education.

Methodology

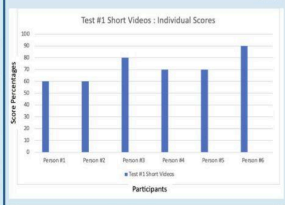
Quantitative:
- Obtaining a series of surveys and calculating the number of questions answered correctly.

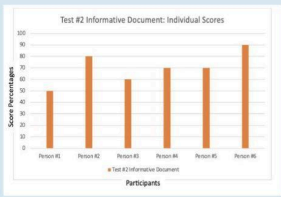
Qualitative:
- Prepare two different methods of testing. One containing an interactive set of videos and the other a writen paper. Both will be used to test the subjects on their abilities and knowledge acquired.

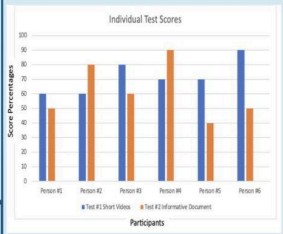
Compare:
- Compare each evaluation form results.

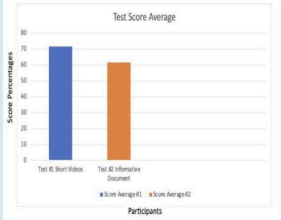
Interpretation:
- Determine wich method works best for obtaining knowledge about Dark Matter: Entertaining Videos or Informative Documents.

Results









Analysis

Person #1: A 16-year-old female whose results indicated a higher success rate with video-based questions.
Person #2: A 16-year-old female who demonstrated a higher success rate with document-based questions.
Person #3: A 15-year-old female with a higher success rate with video-based questions.
Person #4: A 16-year-old female with a much higher success rate on document-based questions.
Person #5: A 15-year-old female whose results demonstrated a higher success rate on video-based questions.
Person #6: A 16-year-old female with a much higher success rate on video-based questions.
Note: All participants were 10th-grade students at an urban all-girl Catholic school.

Discussion

- The data reveals a pattern indicating that video-based questions tend to have higher success rates for most participants. Specifically, four out of six students performed better on video-based questions. This suggests that video content may be a more effective medium for learning and comprehension for these students.
- Conversely, two participants demonstrated a higher success rate with document-based questions. While video-based learning may benefit most, a significant minority finds document-based learning more effective.
- The mixed results highlight the importance of personalized learning approaches. Educators should consider incorporating both video and document-based materials to cater to diverse learning preferences.
- Implementing adaptive teaching methods that dynamically adjust to the student's preferred learning medium may enhance overall educational outcomes.
- This study underscores the necessity of a flexible and inclusive educational approach that recognizes and accommodates different learning styles. Educators can better support all students in achieving their full potential by integrating various instructional media, including innovative platforms like TikTok.

Future Work

Additional research with a larger sample size could provide more insights into the factors influencing the effectiveness of video versus document-based learning. Also, repeat the process with a different topic of Theoretical Astronomy, such as Dark Energy. Understanding why students prefer one medium over another can help design more effective educational strategies.

Acknowledgements

Special thanks to Mrs. Yiria Muñiz for allowing me to participate in and contribute to this investigation. Her mentorship has been extremely valuable in my personal and professional growth as an aspiring scientist. Additionally, I thank the Virtual Research Academy, Scientific Caribbean Foundation, and Dr. Juan Arratia for providing me with this unique and enriching opportunity to participate in such a significant research project.

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Paula B. Rivera Piñera, Academia María Reina

Innovative Solutions for Ocean Acidification: Advancing CO_2 Capture Techniques

Paula B. Rivera Piñera-Academia María Reina
Yiria E. Muñiz Costas - Mentor

Abstract

Rising atmospheric carbon dioxide levels drive ocean acidification, which significantly threatens marine ecosystems. This research project explores the feasibility of employing carbon dioxide capture and utilization methods to address ocean acidification through natural processes and technological interventions.

Natural approaches such as enhanced weathering (EW) and ocean alkalinity enhancement (OAE) hold promise for sequestering carbon dioxide and raising pH levels in marine environments. These methods involve the breakdown and dispersion of minerals to enhance their reactivity, effectively capturing CO_2 from the atmosphere or seawater.

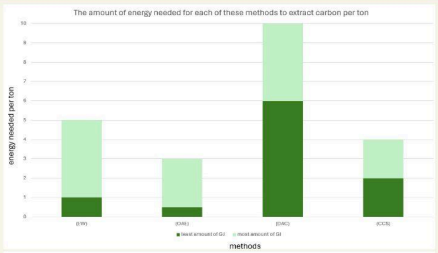
Moreover, the cutting-edge techniques of direct air capture (DAC) and carbon capture storage (CCS) present innovative strategies that not only reduce CO_2 emissions and restore the carbon balance in oceans but also captivate with their potential to generate valuable products such as construction materials, fertilizers, and renewable fuels, providing additional benefits beyond environmental remediation.

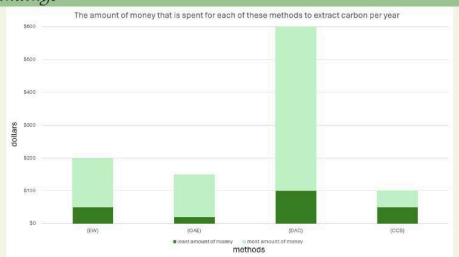
By integrating natural and technological carbon dioxide capture and utilization strategies, we can comprehensively and effectively address ocean acidification while advancing sustainable development goals and enhancing resilience in marine ecosystems. This holistic approach not only shows promise for mitigating the impacts of ocean acidification but also instills confidence in promoting a healthier aquatic environment for future generations.

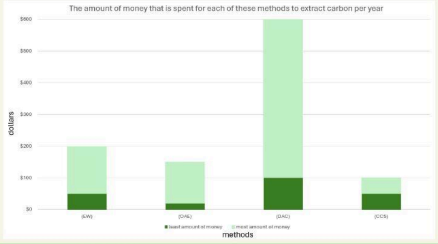
Introduction

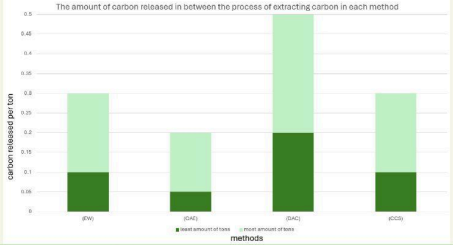
The escalating levels of atmospheric carbon dioxide (CO_2) have catalyzed a concerning phenomenon known as ocean acidification, posing a formidable threat to marine ecosystems worldwide. In response to this pressing environmental challenge, this research project investigates the feasibility and efficacy of employing carbon dioxide capture and utilization methods to combat ocean acidification. As elucidated in the literature, rising CO_2 concentrations in the atmosphere have dire consequences for marine life, leading to disruptions in pH levels and endangering the delicate balance of marine ecosystems. To address this issue, the project will explore natural processes and technological interventions for carbon dioxide capture and utilization. Natural approaches, including enhanced weathering (EW) and ocean alkalinity enhancement (OAE), offer promising avenues for sequestering CO_2 from the atmosphere and seawater. These methods involve the breakdown and dispersion of minerals to enhance their reactivity, effectively capturing CO_2 and raising pH levels in marine environments. In addition to natural techniques, cutting-edge technologies such as direct air capture (DAC) and carbon capture storage (CCS) present innovative strategies for mitigating ocean acidification. Notably, these methods not only reduce CO_2 emissions but also have the potential to generate valuable products such as construction materials, fertilizers, and renewable fuels, thereby providing additional benefits beyond environmental remediation. By integrating natural and technological carbon dioxide capture and utilization strategies, this research project aims to comprehensively address ocean acidification while advancing sustainable development goals and enhancing resilience in marine ecosystems. This holistic approach holds promise for mitigating the impacts of ocean acidification and fostering a healthier marine environment for future generations.

Results/Findings

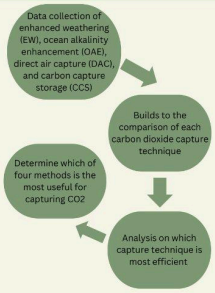








Methodology



Conclusions

- This investigation is aimed to determine the most effective method among Enhanced Weathering (EW), Ocean Alkalinity Enhancement (OAE), Direct Air Capture (DAC), and Carbon Capture and Storage (CCS) by evaluating factors such as cost, carbon capture efficiency, carbon release, and energy requirements.
- CCS emerged as the most effective method due to its relatively balanced performance across all evaluated criteria.
- OAE was the second most effective method, showing promise in cost and carbon capture efficiency, albeit with moderate energy requirements.
- EW was ranked third, demonstrating decent carbon capture capabilities but with higher energy demands and associated costs.
- DAC was found to be the least effective method, primarily due to its high energy consumption and cost, despite its advanced technological approach. T
- The findings highlight the importance of considering multiple factors when assessing the viability of carbon capture methods.
- Future research should optimize these methods to enhance their efficiency and reduce associated costs and emissions. Integrating advancements in renewable energy could further improve the sustainability of these carbon capture technologies.

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Acknowledgments

I would like to express my sincere gratitude to Yiria Muñiz for being an exceptional mentor throughout this process. Your guidance and willingness to clarify my doubts about this research project have been invaluable. I am also deeply thankful to Dr. Juan Arratia and the Fulbright Scholars for providing me with this incredible opportunity and sharing their knowledge on various research topics, greatly enriching my understanding and perspective.

Ana S. Pizarro González, Academia María Reina

Effects of COVID-19 on Sleep Disorders within Low-Income Minorities

Ana Pizarro González, Academia María Reina
Mentor: Yiria E. Muñiz-Costas

ABSTRACT

This research project will focus on the effects of post-acute sequel of COVID-19 (PASC), otherwise known as long covid, on sleep disorders. After the COVID-19 pandemic, many people who contracted the virus are experiencing sleep disorders subsequent to infection. 36% of people had symptoms of insomnia during the first wave of COVID-19, and 31% of people with PASC experience disrupted sleep. Studies continue to document the sleep effects of COVID-19 and which disorders people are experiencing, however, previous work has overlooked the effects on low-income minorities residing in Puerto Rico, in particular. This research will consist in surveying and interviewing neurologists specialized in sleep medicine in low income minorities, as well as enduring long covid. This research seeks to further investigate the exact causes of coronasomia, and the extent of it in low-income minorities. Amongst all the effects COVID-19 had in the world, one especially overlooked is sleep quality, therefore, it deserves to be further investigated.

INTRODUCTION

The COVID-19 pandemic has caused numerous health challenges, with long-term effects continuing to surface. One of the significant yet underexplored issues is the impact of long-term COVID-19 on sleep disorders. Post-acute sequel of COVID-19 (PASC) or "long COVID-19" is a series of health problems persisting or developing after an initial COVID-19 infection, with symptoms lasting for years. The term coronasomia describes the broad scope of sleep problems related to the COVID-19 pandemic, including insomnia, daytime sleepiness, waking up several times a night, or not feeling refreshed in the morning. Recent studies indicate that about 40% of people with PASC report sleep issues among their symptoms, and 31% of individuals with PASC continue to suffer from disrupted sleep.

Despite these findings, there is a lack of focused studies on how these sleep issues manifest in low-income minority populations, who may face unique stressors and barriers to healthcare. Therefore, this study involves researching online, as well as interviewing neurologists specialized in sleep medicine, to provide insights into the clinical aspects and potential underlying causes of these sleep disturbances.

This research project aims to investigate further the specific causes of coronasomia, its extent within this demographic, and the prevalence and nature of sleep disorders caused by long-term COVID-19 in said populations. Sleep quality among low-income minorities with long COVID-19 is significantly compromised, highlighting the urgent need for tailored healthcare responses. Understanding these nuances is crucial for developing targeted interventions and support mechanisms for affected individuals. By shedding light on this overlooked aspect of the pandemic's aftermath, this research aims to significantly contribute to the broader understanding of COVID-19's long-term effects and inform public health strategies to support vulnerable populations, potentially shaping future healthcare policies and interventions.

METHODOLOGY

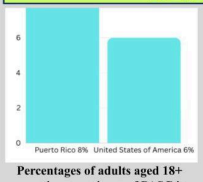
Literature Review

An extensive review of existing research on sleep insomnia related to long COVID was conducted. It included international studies that examine the prevalence, causes (medication, psychological defect, or symptom of COVID-19), and impacts of sleep disturbances among long-term COVID-19 patients.

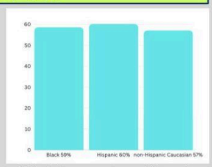
Interview of Neurologists Specialized in Sleep Medicine, Based in Puerto Rico

To comprehensively understand the extent and causes of sleep disorders associated with long COVID in Puerto Rico, I conducted semi-structured interviews with neurologists who specialized in sleep medicine to delve into the specific causes of these sleep disorders.

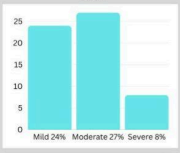
RESULTS



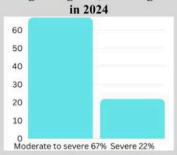
Percentages of adults aged 18+ reporting experience of PASC in 2022



Ethnicity percentages of American patients reporting sleep disturbances mean age being 46.2, suffering PASC in 2024



Percentage extents of reported sleep disturbances in patients mean age being 46.2, suffering PASC in 2024



Percentages of severity of fatigue in American PASC patients, self reported in 2023

CONCLUSION

The research, based on interviews with health professionals and a comprehensive review of the literature, reveals significant findings. On average, patients in Puerto Rico with long-term COVID-19 endure symptoms lasting two months or more. Shockingly, a quarter of these patients continue to suffer from sleep disturbances for up to 350 days after testing positive for COVID-19. Notably, Black and Hispanic individuals show higher rates of COVID-19 infection and development of PASC compared to their white counterparts. However, there is a noticeable gap in research on racial/ethnic differences in post-acute sequelae of SARS-CoV-2 infection, highlighting the need for further investigation. The research also suggests that long covid causes coronasomia due to physiological and psychological factors. The virus's persistent inflammation and immune system dysregulation can disrupt the body's regular sleep-wake cycles, leading to insomnia and fragmented sleep.
Additionally, the psychological stress and anxiety associated with enduring COVID-19 symptoms, along with the social and economic impacts of the pandemic, can exacerbate sleep disturbances. In low-income communities, such as Puerto Rico, these socioeconomic disparities explain even higher levels of stress and anxiety. It's important to acknowledge the challenges faced by these communities and work towards solutions. The virus may also directly affect neurological pathways that regulate sleep, further contributing to coronasomia.

ACKNOWLEDGEMENTS

I especially thank my mentor and teacher, Yiria Muñiz, who gave me this great opportunity to learn more about researching studies and guided along the way. Additionally, I would like to give special thanks to Dr. Juan Arratia for advising me during the entire investigation. Lastly, I thank all the Fullbright Scholars who were open to sharing their research.

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Shamely S. Gonzalez, Melissa S. Rivera Narvaez

Scientific Caribbean Foundation

Anesthesia and Athlete Recovery: Exploring the Impact on ACL Reconstruction Surgery

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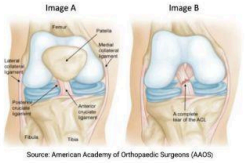
Abstract

This research project investigates the impact of anesthesia types utilized in sports surgeries, particularly focusing on anterior cruciate ligament reconstruction, on athletes' recovery processes and their ability to resume sporting activities, with propofol being the most commonly used. The primary goal is to uncover how different anesthesia methods affect athletes' postoperative healing process and their eventual return to sports participation. Additionally, the study aims to bring light on the psychological aspects of injury and surgery in athletes and their following impact on the recovery journey. Data collection involves a mixed methods approach, including a comprehensive review of medical literature, and analysis of relevant case studies.

Introduction

Anterior cruciate ligament (ACL) reconstruction surgery is a prevalent orthopedic intervention aimed at rectifying injuries to the knee anterior cruciate ligament, which is pivotal for maintaining knee stability, particularly during sports activities characterized by rapid directional shifts.



Source: American Academy of Orthopaedic Surgeons (AAOS)

Image A, shows a healthy and normal Anterior Cruciate Ligament, that has not suffered injury, where as Image B shows a complete tear on the Anterior Cruciate Ligament, the patella is also not present in the image. ACL surgery procedure targets the restoration of knee stability, facilitating patients' resumption of pre-injury sporting endeavors. Anesthesia administration during surgery is integral to ensuring patient comfort and enabling the surgeon to execute the procedure safely and efficiently. General anesthesia is commonly used for anterior cruciate ligament (ACL) reconstruction surgery. The chemical used for general anesthesia in this type of procedure varies but often includes substances such as propofol, fentanyl, and anesthetic gases like nitrous oxide and sevoflurane, with propofol being the most used. The choice of anesthesia technique holds significance, as it may impact the patient's postoperative recovery trajectory and their capacity to return to sporting activities optimally (American Academy of Orthopedic Surgeons.; National Institute of Arthritis and Musculoskeletal and Skin Diseases, 2020).

Methodology

Retrieve information with focus on articles pertinent to surgical procedures on knee and foot.

Screened articles based on predetermined inclusion criteria ensuring relevance to "anterior ligament reconstruction".

Thoroughly reviewed selected articles on data regarding treatment options, surgical techniques and anesthesia methods.

Synthesized findings to identify recurring themes and key insights, contributing to a comprehensive understanding of the subject matter.

Results

The articles collectively emphasize the importance of effective treatment strategies, preoperative assessments, and anesthesia techniques in optimizing outcomes for knee and foot surgeries. Autologous chondrocyte implantation emerges as a promising option for treating knee cartilage defects, demonstrating long-term effectiveness for many patients. High-grade knee laxity preoperatively may signal increased risks and poorer outcomes following ACL reconstruction surgery. However, the execution of ultrasound-guided nerve blocks for foot and ankle procedures proves advantageous, offering effective pain management and high patient satisfaction while reducing reliance on opioid medications. These blocks are also safe and efficient anesthesia methods for arthroscopic knee surgery, contributing to improved pain control and patient preference for future procedures. This type of procedure includes substances such as propofol, fentanyl, and anesthetic gases like nitrous oxide and sevoflurane, with propofol being the most used as anesthesia.

In conclusion, these studies provide a comprehensive insight into various aspects related to the treatment of knee and foot issues. They highlight the effectiveness of methods such as autologous chondrocyte implantation in treating knee cartilage lesions, as well as the importance of assessing preoperative laxity in anterior cruciate ligament reconstruction. Additionally, they underscore the value of anesthesia techniques, especially ultrasound-guided nerve blocks, in pain management during and after surgery. Overall, these findings emphasize the importance of individualized care, thorough preoperative evaluations, and the adoption of advanced anesthesia techniques to enhance surgical outcomes and patient satisfaction.

Acknowledgements

I express my gratitude to Dr. Arratia for allowing me to participate in the research program. Additionally, I want to thank Melissa Rivera, my mentor, for helping me with my research. In addition, I would want to thank my parents for supporting me in this program and for always believing in me and all of my accomplishments.

Future Works

In future studies, it would be beneficial to interview healthcare professionals to gain additional insights into the practical implementation of the treatments and techniques discussed in the articles. Speaking with doctors, nurses, and anesthesiologists could provide valuable perspectives on the real-world effectiveness and challenges associated with these methods. Additionally, conducting patient surveys to gather feedback on their experiences and preferences regarding pain management and surgical outcomes would offer a more comprehensive understanding of the topic.

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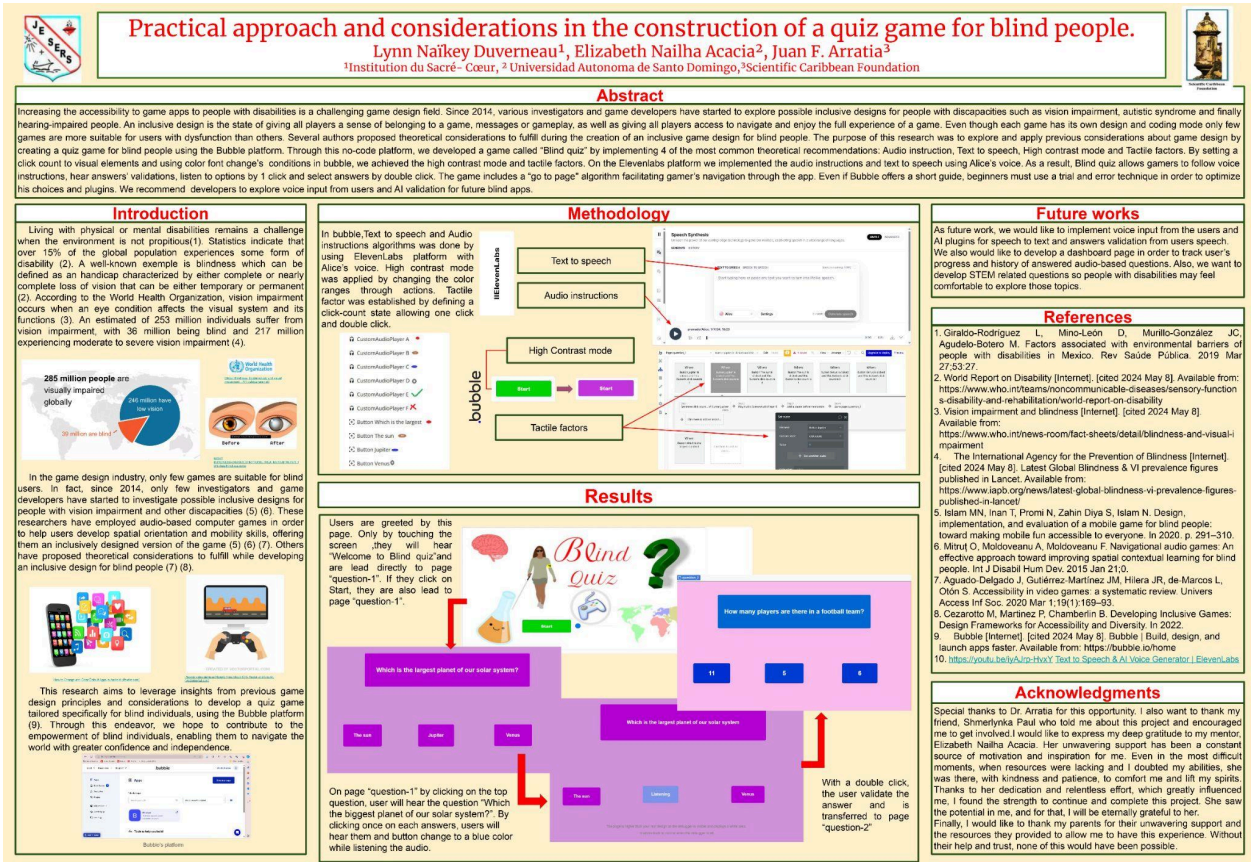
Posters of Research Presenters from Haiti

Lynn Naïkey Duverneau, Elizabeth Nailha Acacia, Juan F. Arratia



Practical approach and considerations in the construction of a quiz game for blind people.

Lynn Naïkey Duverneau[1], Elizabeth Nailha Acacia[2], Juan F. Arratia[3]
[1]Institution du Sacré- Cœur, [2] Universidad Autonoma de Santo Domingo,[3]Scientific Caribbean Foundation

Abstract

Increasing the accessibility to game apps to people with disabilities is a challenging game design field. Since 2014, various investigators and game developers have started to explore possible inclusive designs for people with discapacities such as vision impairment, autistic syndrome and finally hearing-impaired people. An inclusive design is the state of giving all players a sense of belonging to a game, messages or gameplay, as well as giving all players access to navigate and enjoy the full experience of a game. Even though each game has its own design and coding mode only few games are more suitable for users with dysfunction than others. Several authors proposed theoretical considerations to fulfill during the creation of an inclusive game design for blind people. The purpose of this research was to explore and apply previous considerations about game design by creating a quiz game for blind people using the Bubble platform. Through this no-code platform, we developed a game called "Blind quiz" by implementing 4 of the most common theoretical recommendations: Audio instruction, Text to speech, High contrast mode and Tactile factors. By setting a click count to visual elements and using color font change's conditions in bubble, we achieved the high contrast mode and tactile factors. On the Elevenlabs platform we implemented the audio instructions and text to speech using Alice's voice. As a result, Blind quiz allows gamers to follow voice instructions, hear answers' validations, listen to options by 1 click and select answers by double click. The game includes a "go to page" algorithm facilitating gamer's navigation through the app. Even if Bubble offers a short guide, beginners must use a trial and error technique in order to optimize his choices and plugins. We recommend developers to explore voice input from users and AI validation for future blind apps.

Introduction

Living with physical or mental disabilities remains a challenge when the environment is not propitious(1). Statistics indicate that over 15% of the global population experiences some form of disability (2). A well-known exemple is blindness which can be defined as an handicap characterized by either complete or nearly complete loss of vision that can be either temporary or permanent (2). According to the World Health Organization, vision impairment occurs when an eye condition affects the visual system and its functions (3). An estimated of 253 million individuals suffer from vision impairment, with 36 million being blind and 217 million experiencing moderate to severe vision impairment (4).

In the game design industry, only few games are suitable for blind users. In fact, since 2014, only few investigators and game developers have started to investigate possible inclusive designs for people with vision impairment and other discapacities (5) (6). These researchers have employed audio-based computer games in order to help users develop spatial orientation and mobility skills, offering them an inclusively designed version of the game (5) (6) (7). Others have proposed theoretical considerations to fulfill while developing an inclusive design for blind people (7) (8).

This research aims to leverage insights from previous game design principles and considerations to develop a quiz game tailored specifically for blind individuals, using the Bubble platform (9). Through this endeavor, we hope to contribute to the empowerment of blind individuals, enabling them to navigate the world with greater confidence and independence.

Methodology

In bubble,Text to speech and Audio instructions algorithms was done by using ElevenLabs platform with Alice's voice. High contrast mode was applied by changing the color ranges through actions. Tactile factor was established by defining a click-count state allowing one click and double click.

Results

Users are greeted by this page. Only by touching the screen ,they will hear "Welcome to Blind quiz"and are lead directly to page "question-1". If they click on Start, they are also lead to page "question-1".

On page "question-1" by clicking on the top question, user will hear the question "Which the biggest planet of our solar system?". By clicking once on each answers, users will hear them and button change to a blue color while listening the audio.

With a double click, the user validate the answer and is transferred to page "question-2"

Future works

As future work, we would like to implement voice input from the users and AI plugins for speech to text and answers validation from users speech. We also would like to develop a dashboard page in order to track user's progress and history of answered audio-based questions. Also, we want to develop STEM related questions so people with disabilities may feel comfortable to explore those topics.

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Acknowledgments

Special thanks to Dr. Arratia for this opportunity. I also want to thank my friend, Shmerlynka Paul who told me about this project and encouraged me to get involved.I would like to express my deep gratitude to my mentor, Elizabeth Nailha Acacia. Her unwavering support has been a constant source of motivation and inspiration for me. Even in the most difficult moments, when resources were lacking and I doubted my abilities, she was there, with kindness and patience, to comfort me and lift my spirits. Thanks to her dedication and relentless effort, which greatly influenced me, I found the strength to continue and complete this project. She saw the potential in me, and for that, I will be eternally grateful to her.
Finally, I would like to thank my parents for their unwavering support and the resources they provided to allow me to have this experience. Without their help and trust, none of this would have been possible.

Laeticia Winnie Fayette, Elizabeth Nailha Acacia, Juan F. Arratia

Advances of Soft-Prosthetic Fingers using reusable materials

Laeticia Winnie Fayette[1], Elizabeth Nailha Acacia[2], Juan F. Arratia[3]

[1] West Orange High School, [2] Universidad Autonoma de Santo Domingo, [3] Scientific Caribbean Foundation

Abstract

The first prosthetic was discovered on the body of an Egyptian mummy. With time, doubts started to rise in the scientific field once they discovered that prosthetics were both used for cosmetic and medical uses. Ultimately, as the number of people suffering from limb loss is skyrocketing, many researchers attempt to provide prosthetic limbs designed to be both functional and aesthetic. As of now, a large number of prosthetics are made of carbon fiber, an exceptionally lightweight and strong material that provides users with a high flexibility. Unfortunately, due to the discomfort of this material, over 40-60% of patients tend to abandon their prosthetics. Recently, researchers started to explore soft materials in order to generate prosthetics that are more suitable and comfortable. Several options were explored, this includes the use of recycled materials such as plastic in the creation of lower limbs because of its rigid properties. Products like this reduce waste and environmental impact, increase the user comfort and the product accessibility while lowering the cost and need of maintenance. However, despite all their excellent qualities, materials like plastic were not optimal to the need of a flexible yet durable and comfortable material many amputees seeked for their missing upper limbs. The aim of this study was to explore the possibility of creating soft prosthetic fingers using sustainable goods that would result in a lightweight and flexible design, comfortable for the user yet practical. In order to get a successful prototype, we explored different viable materials like hydrogel, alginate, polyvinyl alcohol and cornstarch with corn husk. Results showed that a combination of cornstarch and corn husk can be the best option as it offers the correct solubility and resist biodegradation allowing the obtention of soft prosthetic fingers comfortable to wear, with enhance durability and adaptability while functioning perfectly.

Further information

Please for further information or inquiries contact:
fayettelaeticia@gmail.com or nailhaacacia@gmail.com

Introduction

Many historians claim the first prosthetic was discovered on the body of an Egyptian mummy and as the years passed doubts started to rise in the scientific field, once they discovered that prosthetics were both used for cosmetic and medical causes (1). After much research, most scientists agree on the fact that the earliest prosthetics devices were from the Egyptian civilization and that they were most often created to relieve some kind of handicapes (2).

Over the years, prosthetic designs evolved in design, materials, and functionality (3). As of today, millions of people around the world are living with limb loss, and researchers have found out that about 80% percent of these millions who qualified for a prosthetic there are only a ridiculous amount of them, comfortable enough to use it to conduct their daily tasks (4). Many of these patients seek devices like soft prosthetics to benefit from a better quality of life (5). Because the number of people suffering from limb loss is expected to skyrocket in the near future, due to genetic diseases like diabetes, many researches are being made to provide prosthetics designed to be both functional, aesthetic and convenient for each individual, providing them with both physical and mental comfort (3).

Considering the climate crisis we are currently witnessing, it has become a priority to be as sustainable as we could be, this includes all the advancements being made toward the transformation of recyclable goods like plastic. These new advancements opened new ways for the prosthetic field to explore such as the possibility of creating something new from something old; something that would be comfortable, flexible and yet durable.

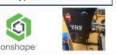
In this poster, the development of soft prosthetic fingers using reusable goods is the prospective goal with the primary objective of having a revolutionary device that would provide amputees with comfort, a natural appearance and valuable and accessible variety of options.

Methodology

1- Materials selection

2- Preliminary sketches

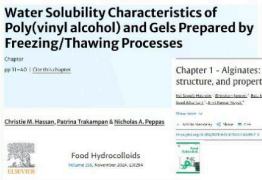
3- Prototype model creation



onshape

Results

Regarding the materials studied for a proper eco-friendly soft-prosthetic fingers, only a mixture of cornstarch mixed and corn husk fibers should be considered for the device creation. This is because studies have shown that alginate, hydrogel and polyvinyl alcohol are either soluble or can easily be degraded by microorganisms. Currently studies are still evaluating the proportion of cornstarch that is required for 3D printing.



Water Solubility Characteristics of Poly(vinyl alcohol) and Gels Prepared by Freezing/Thawing Processes

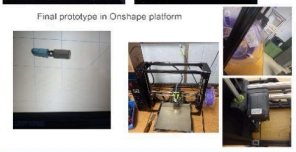
Chapter 1 - Alginates: sources, structure, and properties

Food Hydrocolloids

Augmenting corn starch gel printability for architectural 3D modeling for customized food

We could successfully elaborate in Onshape the prototype model. Based on this model, we will have the molds 3D printed and the best biopolymer will be introduced in until it thickens.

Final prototype in Onshape platform



Luzbot Taz 3D printing machine

Future works

We are looking forward in the near future to 3D print the mold prototype on a Luzibot Taz 3D printing machine and test out our theories about cornstarch mixed with corn husk being THE alternative to carbon fiber when it comes to prosthetics.

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Acknowledgments

Special thanks to Juan Arratia PhD for this research opportunity. Special thanks to my mentor Nailha Acacia for a assistance and help during the whole program. Thank to my engineering teacher Mrs. Catherine Gardener for her devoted help and support in building the prototype. Thank you to Joab Dorsainvil for his insight on soft-prosthetics.

Victoria Lyceinthe Diann Charles, Elizabeth Nailha Acacia, Juan Arratia

Possible Causes of gaps in Intracerebral hemorrhage and hypertension monitoring among Haitian citizens

Victoria Lyceinthe Diann Charles[1], Elizabeth Nailha Acacia[2], Juan Arratia[3]

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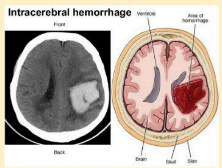
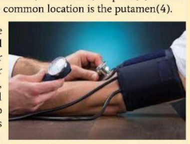
Introduction

Intracerebral hemorrhages (ICH) is a subtype of stroke that occurs when an hematoma is formed within the brain parenchyma. This condition can happen with or without a blood extension into the ventricles (1). It can be characterized by a smooth progressive onset over minutes to hours, but can also be like ischemic stroke, with sudden onset of symptoms(2).



https://healthjade.net/intracerebral-hemorrhage/

ICH risk factors include chronic hypertension, amyloid angiopathy, anticoagulation from medication, and vascular malformations. Additional factors that predispose to ICH include chronic alcohol use and hypocholesterolemia(3). Most intracerebral hemorrhages occur in the basal ganglia, cerebral lobes, cerebellum, or pons(4). When caused by hypertension, the common location is the putamen(4).

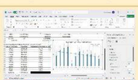


In Haiti, inefficient the management of stroke and the monitoring of similar conditions is a major challenge (5). Therefore, stroke awareness is essential to enable Haitians to recognize the symptoms related to hypertension and its complications such as ICH allowing them to take preventive measures and seek treatment when needed. As it is important to continue educating the population about stroke, this study aims to analyse the reported cases of hypertension in Haiti from 2011 till 2022 highlighting the possible causes of gaps related to theses affectations monitoring in our healthcare system.

Methodology

A- Data collection

We collected the yearly value of HTA reported by the Haitian Public Health and Population Ministry (MSPP, Haiti) for the years 2011 through 2022.

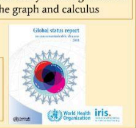


B- Data analysis

Data were analysed using Excel for the graph and calculus

C- Comparison and contextualization

We used other index and global survey for inferential statistics



Abstract

Intracerebral Hemorrhages (ICH) is a devastating condition in which a hematoma is formed within the brain parenchyma with or without blood extension into the ventricles. Although chronic hypertension accounts for the majority of ICH, other common causes include cerebral amyloid, angiopathy, advanced age and underlying cerebral vascular anomalies. While the previous conditions are not related to patients' habits, other conditions result from their daily routine and patient's diet. High blood pressure is also the main cause of cardiovascular diseases (CVD) which is another leading condition of mortality among Haitians. In addition, hypertension is the principal risk factor for vascular complications, accounting for around 50% of the risk of both ischemic and hemorrhagic stroke. Actually, in 2019, stroke was the leading cause of death among women in Haiti but this noncommunicable disease was only reported in 1.03% of the population. As this condition is mostly present in our healthcare system, more investigation about hypertension has become necessary. The aim of this research is to study the possible causes of gaps in hypertension cases' monitoring in Haiti. In order to do so, we analyzed the fluctuations of hypertension reports of Haiti's health ministry database from 2011 to 2022. We then compared the resulting data with global surveys. Results evidentiated criticals gaps in the monitoring of hypertension as values reported for Haiti were extremely low compared to global surveys and regional surveys. Some authors qualified that situation as a lack of data as within the years less cases of hypertension are been reported despite the socio-political crisis due to lack of awareness among the population as 1 out of 5 adults ignore their suffer high blood pressure. But essentially, due to high level of insecurity and the vandalization of hospital since 2019 till today, haitian citizens are not able to get healthcare.

Results

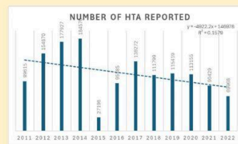
For Haiti, 2014 had the highest value of high blood pressure case reported estimated to 184570 cases. This value was followed by 177927 cases in 2013, and the lowest registered value was 27195 cases in 2015. Generally, the reported cases of high blood pressure for the country had a negative tendence as their frequence diminished through the year with a final value of 69968 in 2022 which is equal to 0.58% of the population.
Several researches and surveys attribute this decline to the lack of data as 1 out of 5 adults affected with high blood pressure is not aware of their condition and are not taking any treatment for that.
In fact, the rate of hypertension in Haiti is generally higher than the United States. Thus, various factors such as limited access to healthcare, the prevalence of infectious diseases, and socio-economic conditions can contribute to higher rates of hypertension. In the United States, although hypertension is also a public health problem, access to healthcare is more widespread, which may help to better manage the disease.
Additionally, since 2019 a lot of hospital were vandalized and the insecurity level obliged citizens to stay at home preventing them from medical care which make it impossible to monitor general diseases and noncommunicable disease as hypertension

Another proof of Haiti's inefficient monitoring system in that according to "La presse" magazine, hypertension was already the world's leading cause of morbidity and the most common chronic disease in France, due to abnormally high blood pressure in the blood vessels. Based on data from 30 regional or national studies, it appears that 26.4% of the adult population in 2000 was hypertensive, for a total estimated number of 972 million people, i.e. 333 million in developed countries and 639 million in developing countries.

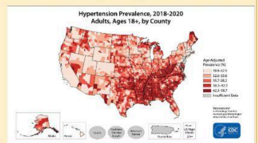
Prevalence of reported cases of hypertension in Haiti for 2011-2022

Year	Number of HTA cases	Population	Population's percentage per year
2011	99615	10258126	0.97%
2012	154870	10413211	1.49%
2013	177927	10579230	1.68%
2014	184570	10745665	1.72%
2015	27196	10911819	0.25%
2016	95585	11078033	0.86%
2017	139272	11244773	1.24%
2018	111799	11411527	0.98%
2019	115419	11160438	1.03%
2020	113155	11743017	0.96%
2021	90429	11887456	0.76%
2022	69968	12033670	0.58%
Average	114983.75	11122247.08	[redacted]

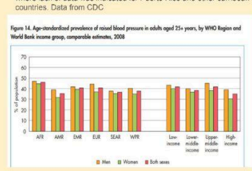
Source : Data were collected from MSPP website and calculations are owned authorship



Number of cases of high blood pressure reported in Haiti by the Ministère de la Santé Publique et de la population (MSPP) for 2010-2022



Relatively high prevalence of hypertension in the US for 2018-2020, where lack of data was indicated for Puerto Rico and other carribean countries. Data from CDC



For the American region (AMR) about 35% of the population had hypertension in 2008. While for 2010 only 0.97% of haitians were reported cases for hypertension

Future Work

Our goal will be to draw the public's attention to the high incidence of hypertension in all the regions of Haiti. In the future, we would also like to deepen this research, in order to help improve the health care system in Haiti and the Caribbeans. And as education is a key in this case, we would like to keep raising awareness about hypertension so, people may recognize the symptoms and go to healthcare while facilitating the monitoring of hypertension and other noncommunicable diseases in our country.

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Acknowledgments

Special thanks go to Dr. Arratia, who set up this program. This opportunity helped me develop my ability to work and do research. Thank you to my mentor Elizabeth Nailha Acacia, who was present throughout this research process. I would also like to thank Shmerlynka Rickerlande Paul for suggesting that I enroll in this program, and I'm grateful to all those who have supported me through thick and thin.

Izadora Lorlay Noël-Jeune, Elizabeth Nailha Acacia, Juan Arratia

Bacterial inhibition using *Nepeta cataria* strains from Haiti: an homemade experiment

Izadora Lorlay Noël-Jeune [1], Elizabeth Nailha Acacia[2], Juan Arratia[3]

[1] Institution du Sacré-Coeur de Turgeau, [2] Universidad Autonoma de Santo Domingo, [3] Scientific Caribbean Foundation

Introduction

Nepeta cataria, commonly known as catnip, is a perennial herbaceous plant belonging to the Lamiaceae family(1) named after the ancient Italian city of Nephi . Widely recognized for its intriguing effects on felines, this plant has garnered increasing attention for its potential medicinal properties in humans(2). Native to Europe and Asia, *Nepeta cataria* is now cultivated worldwide for its ornamental, culinary, medicine,and therapeutic uses(3).

Botanically, *Nepeta cataria* is characterized by its square stems, heart-shaped leaves, and clusters of white or lavender flowers(1). The plant exudes a distinct aroma, attributed to its rich content of essential oils, particularly nepetalactone (1).

Pharmacologically, *Nepeta cataria* exhibits a spectrum of biological activities, ranging from sedative and anxiolytic effects to antimicrobial and antioxidant properties (4).

In this study, we will start by analyzing the morphological aspects of *N. cataria* strains growing in Haiti. Then, we will specifically examine the antimicrobial potential of those strains as bioprospection for possible pharmacology application centered in the treatment of human diseases.

Methodology

1 **Samples collection:** 10 seedlings and 10 adult specimens of *Nepeta cataria* leaves free of holes and yellow spots were collected in Delmas:18°32'12.6"N 72° 17'06.2"W. Specimens were transported in a plastic bag and stored at room temperature.

2 **Extract obtention:** Plant extract was obtained by crushing seedlings and adult leaves separately in two 500ml recipients with 50 ml purified water in each recipient till we get an homogeneous darkest green mixture.

3 **Medium preparation:** 80g of Cornstarch and 500ml of water were boiled with 1 Maggi cube until the mixture thickens. Then 80 ml of the mixture were served in 4 different recipients of 200ml capacity. Recipients were closed directly and stored at room temperature until it cools down entirely.

4 **Bacterial inhibition test:** The 4 recipients were contaminated using a cotton swab which collected microbes from different objects and superficies. 10 ml of the extract were added in only 2 of the previously contaminated recipients.

Abstract

Nepeta cataria also known as Catnip or *Fey Lang chat* in Haitian culture is commonly used for treating cough and other medical conditions. This plant is mostly used during hot seasons due to an increased level of respiratory and throat diseases. Researchers have investigated its chemical composition, including the compounds responsible for its effect on both cats, humans but also as an insect repellent in several countries. Although this leaf is well known in Haiti, no studies have fully been made about the potential or bioprospecting possibilities for the Haitian strains. Here,we studied the potential antimicrobial properties of some Haitian strains of *Nepeta cataria*. For this purpose, seedlings and adult specimens of *Nepeta cataria* , free of holes and yellow spots, were collected in Delmas. Plant extract was obtained by crushing leaves with purified water till the obtention of an homogeneous mixture. The extract was added on previously contaminated starch culture media. This contamination was done using cotton swabs to withdraw microbes from different superficies. Results confirmed the efficiency of *Nepeta cataria*'s Haitian strains as a bacterial inhibitor agent. No visible microbial colonies were observed on starch media in the presence of these plants extract while both bacterial colonies and bubble formation were observed in recipient free of plant's extract. We suggested the further molecular characterization of this extract in laboratory conditions.

Results

After 5 days observation, no colonies were observed on the previously contaminated media posteriorly covered with the *Nepeta Cataria's* extra. Even if no differences were observed between the seedlings and the adult's extract efficiency, the extract from the seedlings was more pigmented than the extract from adult. This is due to the fact that seedlings produce more chlorophyll for their development (5), (6) (7). However, the medium became liquide. And this could be due to the starch instability as superficially no organisms were observed (8) (9).

Bacterial colonies and a very pink light pigment were observed on the starch medium free of plant's extract. We also observed bubbies around the cylindrical surface of the pot and at the bottom. This bubble can either be form moisture releasing process of the starch or from bacterial metabolisms.

Conclusion and Future Works

Studied strains of *Nepeta cataria* in Haiti have demonstrated high efficiency as possible bacterial inhibitor thus no bacterial or fungal colonies were observed in the recipient containing the extract. No differences were observed between seedlings and adults in term of efficiency.

As future work, we want to reproduce the experiment at laboratory level in order to isolate, purify and characterize molecularly the specific compound presenting this properties in these newly described strains of Nepeta Cataria from Haiti.

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Acknowledgements

Special thanks to Juan Arratia PhD for this opportunity in the SRA program. Thank you to my mentor Nailha for her help through this project. Special thanks to my mom and family for their support and finally to Shmerlynka.

Ann Corrie René, Elizabeth Nailha Acacia, Juan Arratia

Phylogenetic analysis of Phosphorus Solubilizing Bacteria (PSB)

Ann Corrie René [1], Elizabeth Nailha Acacia [2], Juan Arratia [3]

[1]Institution du Sacré-Cœur de Turgeau, [2] Universidad Autonoma de Santo Domingo, [3] Scientific Caribbean Foundation

Abstract

Phosphorus Solubilizing Bacterias are microorganisms primarily present in soils with the function of promoting phosphorus availability to plants. The process of P solubilization is performed through the release of acids and enzymes encoded by different genes, and for this particular case: gcd and the phosphate regulon. Despite the numerous studies on the diversity of these bacterias, few researchers explored their phylogeny regarding the previous genes.The aim of this study was to establish possible phylogenetic relations among this group by comparing conserved structural genes and function related genes. Sequences for the genes *phoA, phoD, phoB and ARN16s* were obtained from either NCBI and COG. Different phylogenetic trees were generated using MEGA and Phylogeny.fr as software. Only branches with support above 70 were considered for further phylogenetics analysis. Obtained trees for *phoA* and *phoD* showed similar results for Azotobacter and Xanthomonas. While either in Mega and Phylogeny.fr, for *16S rRNA* and *phoU* we had in all algorithms solid clades for: (*Phyllobacterium, Xanthobacter*), [(*Rhodococcus, Gordonia*) *Arthrobacter*]. Surprisingly, in Mega, the genes for *Haloboforma* and *Halobacterium* which are archaea, were located in bacterial clades supporting previous hypotheses about the acquisition of the phosphorus solubilization capacity through horizontal gene transmission (HGT) in early life episodes. However, results from Phylogeny.fr seemed to be more reliable as they are supported by other papers related to Bacterial and Archaeal relationship.

Introduction

Phosphorus(P) is the second most important nutrient for plants, next to nitrogen (1). It leads vital functions such as root development, seed and flower formation, production quality and strength against diseases. However, only 0.1% of phosphorus present in soil is available in a soluble form ready for plant uptake (2). Furthermore, constant application of chemical P fertilizers—with the aim of making phosphorus more available—only ends up worsening its solubility and availability (2). Thankfully, some microorganisms can metabolize this element while making it available for other organisms.Those are known as the phosphorus solubilizing microorganisms.

Solubilization of an insoluble phosphorus (Tricalcium phosphate) Goswami et al, 2019

Inorganic phosphorus solubilization by phosphate solubilizing rhizobacteria Du et al, 2020

For this research we will only be focusing on Phosphorus Solubilizing Bacteria (PSBs) and their 2 metabolic paths.The first route includes the release of organic acids (1) like gluconic and 2-ketogluconic acid (2). These acids solubilize inorganic phosphorus by acidifying the soil and lowering its pH which then releases P ions available for uptake (3). The second path is about the production of enzymes like phosphodiesterases, phytases and phospholipases which mineralize complex organic phosphorus compounds, thus making them accessible to plants. Many genes are responsible for coding those different acids and enzymes, however in the context of our research only Alkaline phosphatase A (*PhoA)*, Phosphate-specific transport system accessory protein (*PhoU)*, Alkaline Phosphatase D *(PhoD)* and *ARN16s*, a very core conserved gene will be mentioned.

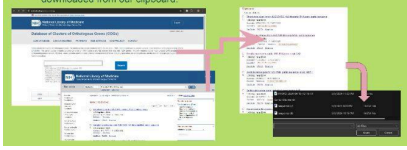
Due to Haiti's poor agriculture (4), a biological fertilization system based on Phosphorus Solubilizing Bacteria should be explored as an alternative while further investigations related to this group may be pursued. Such reflections amplified our interest in the phylogeny of Phosphorus Solubilizing Bacterias, as it was a topic that has not remarkably been reviewed. We believe that if we can put together Phylogenetic Trees and acquire better understanding of the similarities and distinctions between different P-solubilizing bacterias, it could be of help with future procedures aiming to optimize cultivation through PSBs as future transgenesis of structural genes into other host bacteria or even directly into plants.

At the end of this research, we look forward to obtain Phylogenetic Trees that can be of great use and that confirm competing hypotheses like the acquisition of phosphorus solubilizing faculties through horizontal gene transmission.

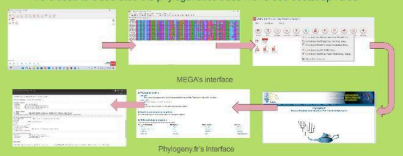
Kenscoff, Haiti

Methodology

A- *PhoA, PhoU,PhoD* and *16S rRNA* sequences were taken from NCBI and COG and downloaded from our clipboard.



B- Sequences were uploaded either in MEGA and Phylogeny.Fr and align using Muscle algorithm. Then Maximum likelihood (ML) and Neighbor Joining (NJ) algotithms were used to elaborated the phylogenetics trees with a 500 bootstrap value



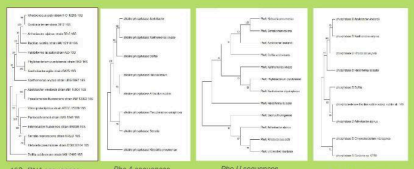
MEGA's interface

Phylogeny.fr's interface

Results

I- MEGA Phylogenetic Trees

1.Maximum Likelihood



16S rRNA sequences *Pho A* sequences *Pho U* sequences *Pho D* sequences

2. Neighbor Joining

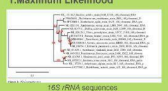
16S rRNA sequences *Pho A* sequences *Pho U* sequences *Pho D* sequences

- Either in Mega and Phylogeny.fr, for *16S rRNA* and *phoU* we had in all algorithms solid clades for: (*Phyllobacterium, Xanthobacter*), [(*Rhodococcus, Gordonia*) *Arthrobacter*].
- In both software we had a solid clade for (*Azotobacter, Pseudomonas*) in all ML and NJ for the *16S rRNA* gene, and another solid clade for (*Klebsiella, Serratia*) in almost all algorithms for *16S rRNA* and *phoU*.
- For Mega and Phylogeny, genes *pho A* and *phoD* result in a solid clade for *Azotobacter* and *Xanthomonas* in all algorithms except for *phoA* tree from NJ of Phylogeny.
- For *phoD*, we had a solid clade for [(*Azotobacter, Xanthomonas*) *Rhodococcus*] in all algorithm for Mega and Phylogeny.fr.
- For *phoA*, only for MEGA we had a solid clade for: [[(*Azotobacter, Xanthomonas*) *Delftia*] *(Halobacterium, Bacillus*)].

Surprisingly, in Mega, the genes for *Halobiforma* and *Halobacterium* which are archaea, were located in bacterial clades indicating a possible mistake regarding the *16S rRNA* but maybe a clue in the horizontal genes transfer for *phoA, phoD* and *phoB* where a bacterium can be a last common ancestor for this gene before HGT.

II- Phylogeny.fr

1.Maximum Likelihood



16S rRNA sequences

Pho A sequences

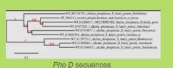
Pho D sequences

Pho U sequences

2. Neighbor Joining

16S rRNA sequences

Pho A sequences



Pho D sequences

Pho U sequences

Among all the differences, results from Phylogeny.fr seemed to be more reliable as they are supported by other papers related to Bacterial and Archaeal relationship (5)

Future Experiments

As future work we would like to investigate the possible reasons behind the low similarities within the trees ML and NJ in both software. And study the phylogenetic relationships among fungi and their metabolic path for phosphorus solubilization.

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Acknowledgements

Thank you to Dr. Arratia for this research experience and his guidance through the process. Special thanks to my mentor, Miss Acacia for helping me considerably throughout this journey. Thank you to my Mom, Dad and friends for their support and encouragement.

Audrey Chloé Verciné, Elizabeth Nailha Acacia , Juan Arratia

Isolation of Tardigrades specimens from bryophytes in Tabarre, Haïti.

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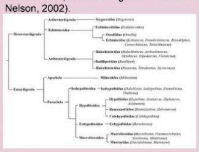
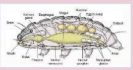
Introduction

Tardigrades, also known as water bears or soft pigs, are microorganisms ranging from 0.05mm to 1.2 mm (Sapkota, 2023). They have a cylindrical body divided into 5 segments with four pairs of short and stocky legs, each ending with claws or adhesive discs and a cuticle that they lose periodically (Sapkota, 2023). Tardigrades are ubiquitous but mostly live in places rich in moss and lichens as marine soils and freshwater sediments. Playing a crucial role in ecosystems by regulating populations of other organisms and serving as bioindicators of environmental change, the phylum Tardigrada comprises two valid classes, *Heterotardigrada* and *Eutardigrada* (Leon, 2018; Nelson, 2002).



Phylogenetic tree of Tardigrade according to recent molecular analysis. (Arjamsam Leon, 2018)

The former have a thickened cuticle, sometimes divided into plates and endowed with numerous waxes or papillae; on the other hand, eutardigrades have a fine cuticle, sometimes carved, and most species are devoid of sensory organs (Ramazzotti & Maucci, 1995).



Identification of tardigrades is made from morphometric characters such as the morphology of nails or claws, the conformation of the oral apparatus, the presence of sensory structures such as waxes, papillae or lamellae, cuticle sculpture, the presence of cuticle plates and, in some genera, egg ornamentation (Nelson & Marley,, 2000; Pilato & Binda, 2010; Ramazzotti & Maucci, 1995).

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Nowadays, tardigrades are known for their ability to withstand the most extreme situations such as lack of oxygen, water and space vacuum (Horikawa, 2012).This is due to cryptobiosis, a state where metabolism is reduced to an almost undetectable level (Neuman, 2006),.

In this state, tardigrades dehydrate their body, reducing it to about 3% of its normal water content, and form a desiccated form called tun.

This aspect of tardigrades is gaining interest in areas such as biochemistry and pharmaceuticals (Reuner et al., 2010) . Studies have been conducted to understand the molecular and cellular mechanisms behind their resistance, which could have applications in medicine, astrobiology and biotechnology. This research is one of the first conducted in Haiti about the tardigrades. It constitutes an advancement regarding the biological sciences as it will be the first describing tardigrade specimen for this country.

Abstract

Discovered in 1773 by the German naturalist Johann August Ephraim Goeze, tardigrades, also known as water cubs, are creatures measuring from 0.1 to 1.2 millimeters. Similar to a small bear with four pairs of legs and a pair of eyes, tardigrades belong to their own family the *Tardigrades* which are microscopic segmented animals. Although these organisms are often found in areas rich in moss and lichens such as tree trunks, roofs and walls, they are known for their abilities to survive in extreme environments. Also, tardigrades can withstand temperatures ranging from -273°C to +340°C, defy pressures up to four times those found deep in the ocean, and are 11,000 times more resistant than humans to X-rays. In addition,they are famous for their capacity to endure space vacuum and lack of oxygen, making them ultimate extremophiles. Their nutrition mainly consists of small plants, mosses, lichens, algae, small invertebrates, bacteria, and some are even cannibals. With nearly 1,340 known species, these animals are widely diversified, and have been studied in a lot of countries. Unfortunately in Haiti, no studies were found describing the genus of tardigrade present in our fauna. This study aims to isolate, characterize and categorize tardigrades present in Tabarre. For this purpose, samples of bryophytes were collected from this area, observed under a microscope and compared with available catalog and atlas of tardigrades' genus in other countries. Obtained images reveal specimens similar to genus *Milnesium* associated with *Fissidens pusillus*. A possible ecological competence was observed between tardigrades and cianobacteria.As this work was the first for Haiti, we suggest further studies in order to identify other possible genus and study their diversity and abundance among bryophyte.species of tardigrades present in the country.

Methods

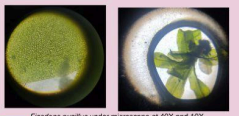
1- Samples collection: 15g of Bryophytes were collected from each region. Water was added to the plant for 24 hours, so the tardigrades can leave the cryptobiosis state (D'Elia et al., 2022).

2- Microscopic observation: Using a dropper, water was located on a microscope slide with some bryophyte and was observed through a microscope National optical/ Swift SS: 110 at 10X

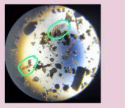
3- Classification: Pictures were taken using a Redmi 9, model: M2003J6A1G and compared to the list described by (Caicedo et al., 2014)

Results

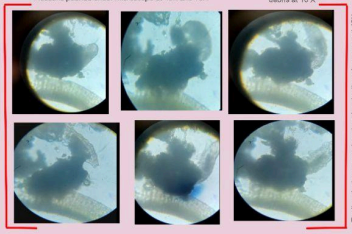
- We could successfully isolate tardigrades from bryophyta and observed them a 10X and 40X. The studied tardigrade specimen here are related to Eutardigrade`s class as no dorsal plates or lateral cirrus were observed.
- Even though at 40X claws and digestive apparatus was difficult to observe, body segments were similar to genus *Milnesium* and no teeth were observed in the oral cavity according to (Morek & Michalczyk, 2020). In addition, videos from the microscopic observation of the isolated tardigrade reveals 4 pair of legs with double claws termination. No eggs were observed in the observed specimen.
- At the ecological level, we noticed that in bryophyte with a high prevalence of cianobacteria, tardigrades could barely be found or were almost inexistent. While, a lot of protist and an average of 4 tardigrade for 1 cm of bryophyte were observed in bryophyte free of cianobacteria.
- Finally we could successfully identify the bryophyte used in this study as *Fissidens pusillus (Wilson) Milde 1869 according to* Inventaire National du Patrimoine Naturel.



Fissdens pusillus under microscope at 40X and 10X



2 tardigrades in bryophyte debris at 10 X



Tardigrades movement captured under the microscope at 40X

Conclusion and Further Works

We would like to study the diversity of tardigrade present in different species of bryophyte. We also would like to study a deeper ecological relation between tardigrades and cianobacterias

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Acknowledgments

I would like to thank Dr. ARRATIA for allowing me to be part of this adventure. I would like to give special thanks to my mentor Nailha ACACIA for her invaluable help, dedication, understanding, and emotional support throughout my journey. I also want to express my gratitude to Shmerlynka PAUL for advising me to participate in VSRA, to Missia Joseph OGE for making the laboratory at the Institution du Sacré-Cœur available to me, and to Thara CABA for her help. Finally, a big thank you to my mother, Gisèle FÉLIX , who has always done her best to provide me with the materials I needed.

Thank you to all these people, because without them this project would not have come to fruition.

Andrée Ann Michel, Elizabeth Nailha Acacia, Juan Arratia

Assessing the Impact of Educational Infrastructure on Dyslexic Students in Haiti: Challenges and Technological Interventions

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Introduction

According to (Doharey et al., 2023) education involves the transmission of knowledge, values, and skills from one generation to another, ensuring the continuity and advancement of civilizations. Also, education encompasses a broad range of activities and processes that facilitate learning while promoting intellectual, social, emotional and physical development (Doharey et al., 2023). While education is often considered the bridge to guarantee learning processes, these 2 topics are actually very independent (Surbhi, 2021). Learning is a continuous process that does not imply a formal conservative approach and can be different for everybody. In fact, dyslexia can be a good example of how learning techniques can vary. Based on the definition of The (British Dyslexia Association. 2024) dyslexia concerns the processing of information, and dyslexics have problems processing and memorizing the information they receive, which slows down the learning process and the acquisition of reading and writing skills.

5 Clues to detect dyslexia What Are the Types of Dyslexia? (Plus How To Identify the Signs) (weareteachers.com)

Differences between a normal brain and a dyslexia brain https://images.app.goo.gl/BSxLCRyur72Vgrz17

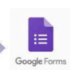
Nowadays, in schools and other education related establishments, authorities seek the possibility to adapt the educational system to more students either by promoting inclusivity or mostly by investigating more about knowledge and information assimilation in kids.

In Haiti, the education system begins with preschool, followed by 9 years of basic studies and ends with four years of secondary studies (Rosenberg, 2017). Schools mostly obey a private administration and only few establishments are public or state-subsidized. Despite the fact that there is a marked disparity between public and private schools, when addressing Haiti's education system, a few points are often raised such as the lack of resources, inadequate facilities, poorly-trained and unpaid teachers and finally outdated teaching methods as they emphasize memorization over critical thinking and practical skills (Unesco,2024). However, no studies have been done on the impact of this unstable learning system on dyslexic students. The aim of this research is to determine the impact and repercussions of Haitian educational infrastructure on students with dyslexia in order to raise awareness and empathy toward mentally or physically disabled people.

Methodology

I- Survey development

- scale-based questions
- yes/no questions
- short answer options
- multiple choice
- check box question



II- Data Analysis

- Keywords technique
- Key Topics
- Critical thinking
- Innovations
- Recomendations

Abstract

Education involves the transmission of knowledge, values, and skills from one generation to another, ensuring the continuity and advancement of civilizations. It's often associated with learning when actually these concepts are very independent. Learning is a continuous process that does not imply a formal conservative approach and can be different for everybody specifically for dyslexic people. Effectively, dyslexia is a disability related to processing and memorizing information but also slows the acquisition of reading and writing skills. While nowadays a lot of education related establishments seek to promote inclusivity and equity, unfortunately in Haiti no research has been done about the impact of this system and its limitation on dyslexic students. The study aimed to assess the impact of Haitian educational infrastructure on dyslexic students. In order to do so, a google form was distributed among students and professionals with different question structure allowing a better understanding of Haiti's situation and evidentiating the gaps related to education and dyslexic students. Results showed that 88,9% of participant would not recommend this educational system due to the lack of preparation and tolerance from teachers, lack of resources and adaptability. Survey answers proposed a student oriented learning system to embrace kids' differences and necessity. As innovations, a sensibility campaign for students, parents and teachers was recommended as harassment comes from every space of Haiti's school environment. IRISPen 8, a device that could help dyslexic kids through reading and writing, thanks to a speech to text algorithm was also suggested in this research. For the future, we recommend applying these devices in the Haitian educational environment .

Results

We had a total of 45 answers : 32 students, 12 professionals and 1 teacher. 27 were female and 18 were male.

31,1% of this sample evaluate Haiti's educational system as a 5 on a scale from 1 to 10. 20% say 6, for 11,1% it's a 4 and for 8,9% it's a 3. Only one answer validate it as a 10.

40% of the sample consider that a physical or mental discapacity can be detected in student at age 5-10. 26,7% say 0-5 years old. According to (Nessy learning, 2024) the best age to detect dyslexia is 5 years old which usually coincide with the first year of school.

88,9% of this sample would not recommend this educational system to disabled people and 91,1% think that the system is not adequate for students with mental or physical discapacities. Also, 62,2% of this sample has experienced a bad situation in schools in Haiti were 35,6% received a bad treatment from teachers.

93,3% agree about disabled student receiving special attention in the school environment.

Out of 45 people, 17 think that the lack of adaptability and tolerance toward dyslexic students is not caused by teacher, 12 people accused the governments and other institutions but for 9 people, teachers are the most guilty as they are the first to be in direct contact with the students beside their parents. So, they are the most capable to make a change.

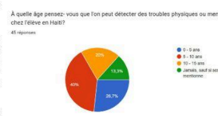
Key word and topics often found were: Lack of resources, lack of tolerance and adaptability, Political crisis, harassment, trauma, heavy academic credits, empathy, assistance, outdated pedagogy, bad treatment, rare schools, inaccessibility of education, lack of structure and violence among students.

About critical thinking, it was suggested a student oriented learning system so it embraces all differences and prioritize student's needs.

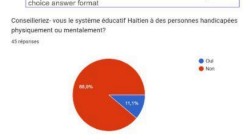
As recommendations answers suggested: training for teachers, increase in school resources and teacher's payment, a more adapted, accessible and inclusive school, less taboo about mental health, a psychological assistance and medical services at school. Also more focus on learning then scoring or less memorization over comprehension. And finally an upgrade of this system methods for learning goals.

As innovations, survey answers suggested: a sensitivity campagne, a more practical and technological approach , a continuous formation system for teachers and the use of IRISPen 8 in the future as a support for reading and writing through different algorithms.

On a scale from 1 to 10, what do you think about haitian education system? Multiple choice answer format.



Question: At what age do you think physical or mental disorders can be detected in the student in Haiti? Multiple choice answer format



Question: Would you recommend the haitian educational system to people physically or mental disabled? Yes/no answer format

IRISPen Reader 8 , a pen that could improve reading for dyslexia people
http://rnt.eklablog.com/irispen-reader-8-nouveau-stylo-numerique-lecteur-de-texte-a216014535

Conclusions and Future works

A lot of factor need to be considered and change in the Haitian educational system in order to ensure a safe environment for dyslexic student. The most important thing is to train teachers so they can deal properly with dyslexic pupils. Also, access to an adequate education is limited by poverty, discrimination and insecurity, particularly in rural areas. Additionally, the chronic political instability negatively affects the education system, leading to frequent school closures and disrupting the learning process.

Responsables call for urgent reform of education in Haiti, with recommendations such as increased investment in education, improved teacher training, and the development of curricula better adapted to students' needs. Considering the inequalities suffered by students without disabilities, we might venture to guess what dyslexic students suffer as they usually needs phonics programs, multisensory input and other activities

As further works, we would like to deepen our research into dyslexia and study the penetrance and variable expression of this discapacity in Haitian kids and teenagers based on their genetic background and environment. Also we would like to implement some of the mentioned technologies in the learning process of the students in Haiti.

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Acknowledgments

Thank you to the Scientific Caribbean Foundation for the opportunity it gave me and my fellow classmates in Haiti, during which we learned a lot. Special Thanks to Dr. Arratia. Foremost, I would like to thank my mentor Elizabeth Nailha Acacia, without whom I would already have given up. She guided me in every step of the way and kept me from giving up even when all seemed lost. She's always full of enthusiasm, doesn't let the obstacles in her path get in the way, and goes for it, taking us along with her. It's hard to give up with Elizabeth Nailha Acacia as your mentor. Finally, I would to like to thank everyone who took the time to fill in the form for this research.

Melissa Lorinda Exumé, Elizabeth Nailha Acacia, Juan Arratia

Identification of parasites in *Brassica oleracea* var. *capitata L.* strains in the Haitian market

Melissa Lorinda Exumé [1] , Elizabeth Nailha Acacia [2], Juan Arratia [3]

[1]Institution du Sacré- Cœur, [2] Universidad Autonoma de santo Domingo, Scientific Caribbean Foundation [3]

Abstract

Cabbage is a highly consumed vegetable in Haitian cuisine through their popular pikliz which is made from shredded cabbage, carrots, onions, and hot peppers. These ingredients are mixed together and left to ferment. This dish is not only a good condiment but also contributes to its nutritional value as it is rich in vitamins: provitamin A, vitamin B, and vitamin C. It also contains valuable minerals and has anti-atherogenic and anticarcinogenic properties. Beside those benefits, cabbages are often infected by parasites such as *Ascaris lumbricoides*, *Giardia intestinalis*, *Enterobius vermicularis* and *Taenia solium*, which are considered health hazards for humans. However, only few studies have investigated the frequency of parasites in cabbages in Haiti meaning that little is known about the diagnosis of worms and how to avoid food poisoning. This project aims to identify the parasites present in cabbages sold in Haiti either from supermarkets or from local street merchants, highlighting their types, and their quantities. Collected cabbages were examined using a microscope with 10X-40X objectives and iodine stain to facilitate parasite's identification. All parasites and egg worm's observations were compared to the CDC online index. Our results, showed the presence of *Enterobius vermicularis, possible Iodamoeba butschlii* cyst in cabbages purchased on the local street market. Regarding the cabbages purchased in supermarkets, only an Acanthamoaba spp. like cyst was observed with other possible debris. In conclusion, for the haitian sales system cabbages must be washed carefully regardless of where they were initially purchased.

Introduction

Brassica oleracea var capitata L., also known as cabbage(1), is an essential ingredient in Haitian cuisine, and Pikliz is a prime example (2). This traditional dish is prepared by mixing finely shredded cabbage with carrots, onions, and hot peppers, then allowing it to ferment (2). In addition to its delicious spicy taste, pikliz is also a significant source of essential nutrients(3). It is particularly rich in vitamins such as provitamin A, vitamin B, and vitamin C, as well as beneficial minerals for health(3). If the final fermented product is good for our metabolism, nevertheless, cabbages should be washed with water and antimicrobial solutions as parasitic contamination of cabbage is common(4)

Brassica oleracea var capitata L. Jardins potagers : partons du chou (kanpe.org)

Pikliz
http://www.chichilicious.com/recipes/haitian-pikliz/

Cabbage sales in popular market
https://x.com/VOACreyolstatus/1100789962955079745

Actually, the presence of parasites like *Ascaris lumbricoides* and *Enterobius vermicularis* in this vegetable, can pose a risk to human health. These parasites are usually present in cabbage due to various factors, such as unsanitary agricultural practices or environmental contamination and their ingestion can lead to health problems especially if the cabbage is consumed raw or undercooked (5).

Thus, proper handling and preparation of cabbage are essential to minimise these risks and fully enjoy its nutritional benefits. In order to raise awareness, this study aims to identify the parasites present in cabbages sold in Haiti either from supermarkets or from local street merchants, highlighting their types, and their quantities.

Methodology

Sample collection: 2 Cabbages were collected from a local street market and 2 cabbages were taken from supermarkets. After recollection, the cabbages were located separately in 2 sterile plastic bags.

Sample preparation: 100 grams of each cabbage taken from the surface leaves were washed with 500ml of distilled water in a 1L capacity sanitised bowl. Cabbages were then removed from the water.

Microscopic analysis: The 4 waters obtained after washing the cabbages were analysed at 40X. In the visualisation process, iodine stain was used for a better observation of parasites and their eggs. Parasite's pictures were taken with an Iphone 9 plus.

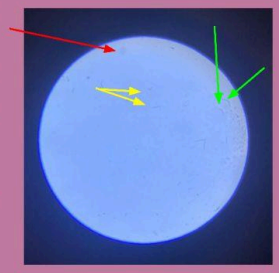
Parasite identification: Pictures were then compared with the CDC's DPDx parasites A-Z index.

Results

1- Cabbage from local street market

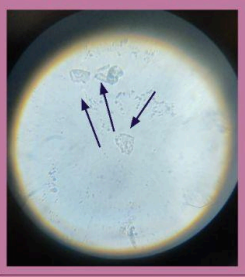
As Results, we could observed worms morphologically similar to *Enterobius vermicularis* (green and yellow arrows).This parasite is usually asymptomatic, but its typical symptoms is perianal pruritus. Other symptoms are abdominal pain, teeth grinding and insomnia.

Also, a possible *Iodamoeba butschlii* cyst was observed (red Arrow) according to the CDC's index. This ameba is non-pathogenic, but indicate fecal exposure.



2- Cabbage from supermarket

We observed a possible cyst for Acanthamoeba spp, it's a free living amoeba known for causing Keratitis among lens wearers (red arrow). The blue arrow shows a possible parasite amoeba but none of the CDC's parasite pictures matches its morphology. Dark purple arrows indicate possible debris from the cabbage water.



Future Works

We would like to explore possible natural pesticide for parasite elimination in vegetables. We also suggest further research to be done in this field in other to raise awareness and prevent contamination through cabbage or cabbage derived food and other vegetables.

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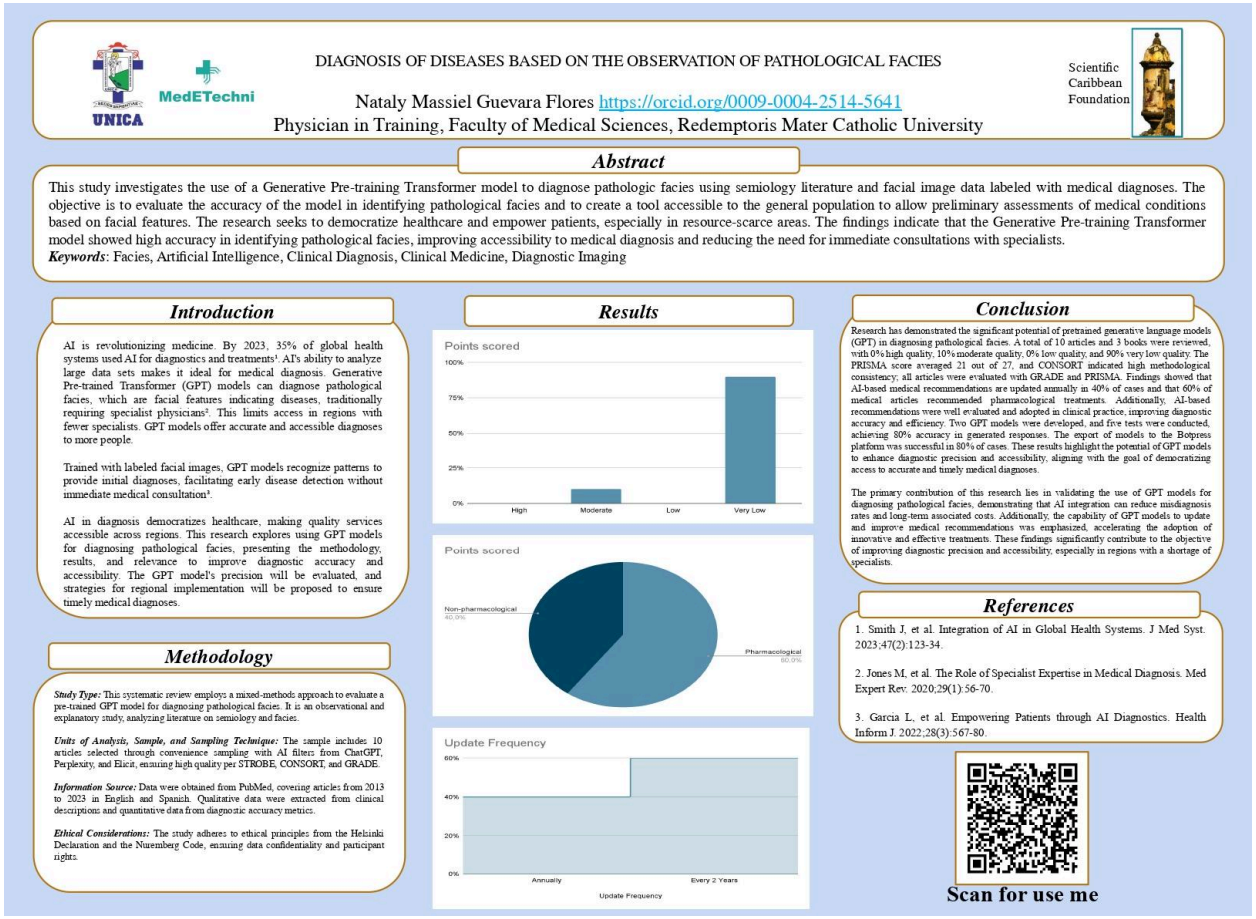
Acknowledgments

I thank Dr. Arratia for this opportunity. This program helps us explore the world of science better, which will assist us in our careers. Through this program, I have learned many interesting things. I especially thank Miss Nailha Acacia for accompanying me throughout the session. She helped me with research, experiments, etc. I also thank those who assisted me during my experiments. I had a great time and I look forward to participating again.

Posters of Research Presenters from Nicaragua

Nataly Massiel Guevara Flores



DIAGNOSIS OF DISEASES BASED ON THE OBSERVATION OF PATHOLOGICAL FACIES

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Abstract

This study investigates the use of a Generative Pre-training Transformer model to diagnose pathologic facies using semiology literature and facial image data labeled with medical diagnoses. The objective is to evaluate the accuracy of the model in identifying pathological facies and to create a tool accessible to the general population to allow preliminary assessments of medical conditions based on facial features. The research seeks to democratize healthcare and empower patients, especially in resource-scarce areas. The findings indicate that the Generative Pre-training Transformer model showed high accuracy in identifying pathological facies, improving accessibility to medical diagnosis and reducing the need for immediate consultations with specialists.

Keywords: Facies, Artificial Intelligence, Clinical Diagnosis, Clinical Medicine, Diagnostic Imaging

Introduction

AI is revolutionizing medicine. By 2023, 35% of global health systems used AI for diagnostics and treatments[1]. AI's ability to analyze large data sets makes it ideal for medical diagnosis. Generative Pre-trained Transformer (GPT) models can diagnose pathological facies, which are facial features indicating diseases, traditionally requiring specialist physicians[2]. This limits access in regions with fewer specialists. GPT models offer accurate and accessible diagnoses to more people.

Trained with labeled facial images, GPT models recognize patterns to provide initial diagnoses, facilitating early disease detection without immediate medical consultation[3].

AI in diagnosis democratizes healthcare, making quality services accessible across regions. This research explores using GPT models for diagnosing pathological facies, presenting the methodology, results, and relevance to improve diagnostic accuracy and accessibility. The GPT model's precision will be evaluated, and strategies for regional implementation will be proposed to ensure timely medical diagnoses.

Methodology

Study Type: This systematic review employs a mixed-methods approach to evaluate a pre-trained GPT model for diagnosing pathological facies. It is an observational and explanatory study, analyzing literature on semiology and facies.

Units of Analysis, Sample, and Sampling Technique: The sample includes 10 articles selected through convenience sampling with AI filters from ChatGPT, Perplexity, and Elicit, ensuring high quality per STROBE, CONSORT, and GRADE.

Information Source: Data were obtained from PubMed, covering articles from 2013 to 2023 in English and Spanish. Qualitative data were extracted from clinical descriptions and quantitative data from diagnostic accuracy metrics.

Ethical Considerations: The study adheres to ethical principles from the Helsinki Declaration and the Nuremberg Code, ensuring data confidentiality and participant rights.

Results

Conclusion

Research has demonstrated the significant potential of pretrained generative language models (GPT) in diagnosing pathological facies. A total of 10 articles and 3 books were reviewed, with 0% high quality, 10% moderate quality, 0% low quality, and 90% very low quality. The PRISMA score averaged 21 out of 27, and CONSORT indicated high methodological consistency; all articles were evaluated with GRADE and PRISMA. Findings showed that AI-based medical recommendations are updated annually in 40% of cases and that 60% of medical articles recommended pharmacological treatments. Additionally, AI-based recommendations were well evaluated and adopted in clinical practice, improving diagnostic accuracy and efficiency. Two GPT models were developed, and five tests were conducted, achieving 80% accuracy in generated responses. The export of models to the Botpress platform was successful in 80% of cases. These results highlight the potential of GPT models to enhance diagnostic precision and accessibility, aligning with the goal of democratizing access to accurate and timely medical diagnoses.

The primary contribution of this research lies in validating the use of GPT models for diagnosing pathological facies, demonstrating that AI integration can reduce misdiagnosis rates and long-term associated costs. Additionally, the capability of GPT models to update and improve medical recommendations was emphasized, accelerating the adoption of innovative and effective treatments. These findings significantly contribute to the objective of improving diagnostic precision and accessibility, especially in regions with a shortage of specialists.

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Christiana Lyli Lucas Hassan

AlzSync: Virtual Guide for Alzheimer´s Care Management

Lucas-Hassan, Christiana [a] https://orcid.org/0009-0005-9138-8104

[a] *Medical Student, Faculty of Medical Science, Universidad Católica Redemptoris Mater*

Abstract

Alzheimer's caregiving presents significant challenges, including medication management, effective care strategies, and staying informed on therapeutic advancements. This study aims to develop "AlzSync," a virtual assistant designed to provide Alzheimer's caregivers with essential information and support. Utilizing GPT from ChatGPT and Botpress, AlzSync will offer detailed drug guidance, medication management, and therapeutic updates in an accessible format.

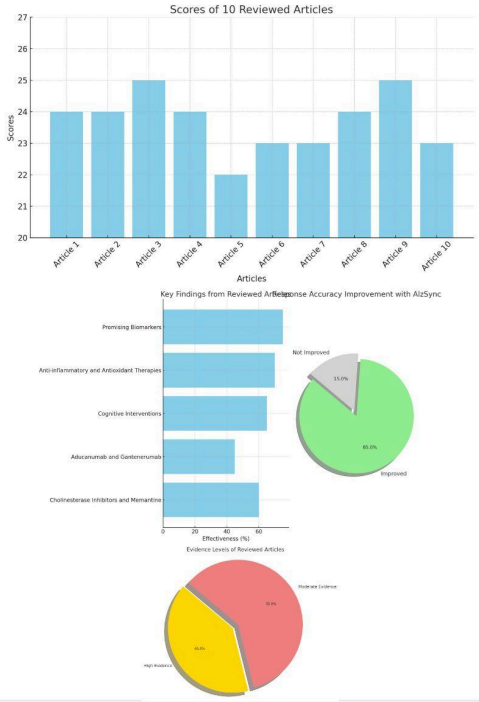
Introduction

Alzheimer's degrades memory and learning, severely impacting caregivers. Integrating AI offers invaluable support: tools for health monitoring, medication management, and staying updated with new therapies, thereby alleviating stress and improving the quality of life for caregivers and patients.

Methodology

This systematic review on Alzheimer's care integrates qualitative and quantitative data from articles published between 2013 and 2023. It aims to develop a GPT model for a virtual assistant on Botpress. Ten high-quality articles from SpringerLink, PubMed, and Frontiers were selected using ChatGPT. Data extraction follows PRISMA and GRADE standards, analyzed qualitatively with NVivo®. Ethical considerations follow the Declaration of Helsinki and Nuremberg Code, ensuring proper citation. No human or animal subjects are involved.

Results



Conclusion

This research highlights key Alzheimer's treatments, demonstrating moderate efficacy of cholinesterase inhibitors and memantine for cognitive symptoms without slowing disease progression. Aducanumab and Gantenerumab show promise in reducing amyloid plaques but face challenges with patient response and biomarker reliability. Cognitive and anti-inflammatory therapies provide significant benefits, while advanced neuroimaging and biomarker identification improve early detection. The GPT model, AlzSync, offers innovative support, enhancing care strategies and easing the burden on caregivers.

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Use AlzSync now!

Marcela D. Bonilla Jiménez

AI-Based system for detecting infections in Open Wounds

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[1]*Medical Student, Faculty of medical science, Universidad Católica Redemptoris Mater, Nicaragua*

Abstract

This study investigates infections in open wounds and the microorganisms involved. Using artificial intelligence, a tool was developed to identify infection patterns and microbial characteristics. Our results suggest improvements in diagnosis and treatment. This work contributes to medicine by providing new insights into infections and optimizing therapeutic strategies with AI.

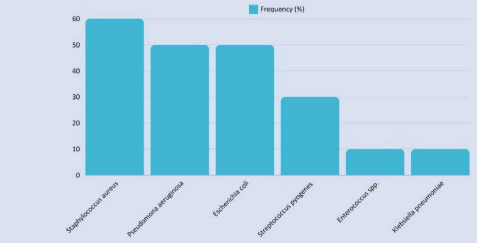
Introduction

Infections in open wounds delay healing and can cause severe complications such as sepsis. This study develops an artificial intelligence tool to identify infection patterns, improving diagnosis and treatment. This research is crucial for optimizing medical care and reducing morbidity associated with open wound infections.

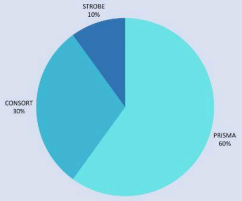
Methodology

This observational and explanatory study was conducted prospectively and longitudinally with a mixed approach. High-quality articles were selected using systematic sampling techniques and evaluated with GRADE, obtaining the following scores: 7 articles (++++) and 3 articles (+++); 60% with PRISMA (average 18/27), 30% with CONSORT (average 15/25), and 10% with STROBE (average 14/22). Information was obtained from scientific literature using AI tools like ChatGPT and Elicit. Descriptive and thematic analyses were applied to evaluate associations between variables.

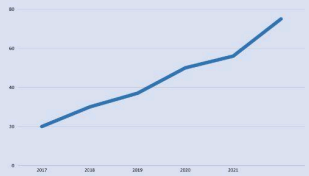
Results



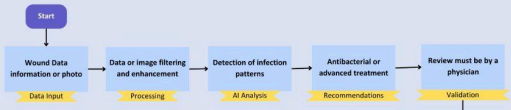
Graphic 1. Frequency of Microorganisms in Open Wounds According to Analyzed Literature



Graphic 2. Distribution of Study Types According to Evaluation Methodologies



Graphic 3. Increase in the adoption of predictive models in AI studies over several years



Graphic 4. Workflow of AI-Based system for detecting infection in open wounds: *"¿Qué herida es ésta GPT?"*

Conclusion

This project identified the main microorganisms in open wounds. Of the 10 articles reviewed, Staphylococcus aureus appeared in 6 articles (60%), Pseudomonas aeruginosa in 5 articles (50%), and Escherichia coli in 5 articles (50%). Streptococcus pyogenes was found in 3 articles (30%), while Enterococcus spp. and Klebsiella pneumoniae appeared in 1 article each (10%). Additionally, an AI tool was successfully developed to improve infection diagnosis and treatment, overcoming numerous technical difficulties and restrictions. This research advances knowledge and optimizes therapeutic strategies in managing open wounds.

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Acknowledgements

I wish to express my gratitude to the Scientific Caribbean Foundation, Dr. Kevin Morales, MedETechNI, Eng. Luis Matus, and Universidad Católica Redemptoris Mater (UNICA) for their invaluable support in the completion of this article.

Want to identify your wound and learn how to care for it?
Scan here to find out!

María J. Fargas Sequeira

SKIN CANCER DIAGNOSIS THROUGH IMAGE ANALYSIS WITH AI

Fargas- Sequeira, María José
Physician-in-training, Faculty of Medicine, Catholic University Redemptoris Mater

Abstract

This study explores the identification of skin cancer lesions through advanced image analysis using AI. By examining the unique characteristics of each skin lesion, our AI system leverages the capabilities of ChatGPT-4 to provide accurate dermatologic assessments. The goal is to develop a AI-driven tool that aids healthcare professionals in diagnosing skin cancer, offering a reliable means of support in dermatology and oncology.

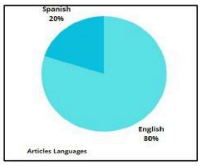
Introduction

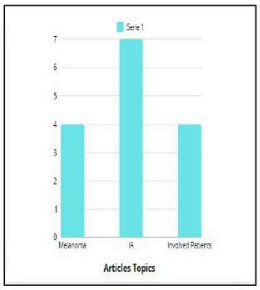
The research aims to develop an AI system to analyze dermatologic images for the identification of skin cancer lesions. By integrating findings from dermatologic literature and leveraging advanced machine learning techniques, the study highlights the feasibility of using AI for accurate skin cancer diagnosis. The goals are to, improve diagnostic accuracy through continual training, and offer a reliable and accessible diagnostic support system for both healthcare professionals and patients.

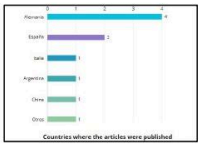
Metodology

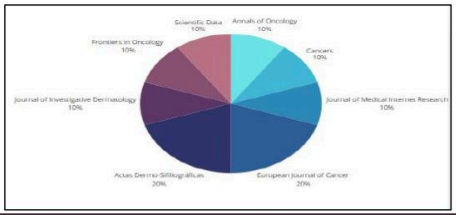
This study involves active researcher intervention, prospective data collection, and an analytical approach. We reviewed 10 articles from Perplexity, assessed using STROBE, PRISMA, CONSORT, and GRADE tools. Data analysis included thematic analysis and AI-generated summaries. Ethical guidelines from the Declaration of Helsinki and Nuremberg Code were followed.

Results









Conclusion

The development of an AI system based on ChatGPT-4 for dermatologic assessments represents a significant advancement in the early detection of skin cancer. The integration of AI into dermatology not only promises to improve patient outcomes but also democratizes access to expert-level diagnostic tools. As the system continues to evolve with additional training and validation, it could become an indispensable asset in both clinical settings and remote healthcare, offering a scalable solution for early skin cancer detection.

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Acknowledgements

I sincerely thank Dr. Kevin Morales for his support throughout the research. I also thank my friends who made this process something I value and cherish so much.

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Milan Josué Guzmán Robleto

Intelligent Assistant for Self-care In Chronic Diseases

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Medical Student, Facultad de Ciencias Médicas, Universidad Católica Redemptoris Mater, Nicaragua

Abstract

To address the growing burden of chronic diseases and improve health management at home, Intelligent Assistants are being developed. These systems, based on artificial intelligence and natural language processing, provide personalized support to patients. By offering medication reminders and suggestions for symptom management, Intelligent Assistants help patients maintain their health and well-being. Additionally, they facilitate better treatment management for family members caring for their loved ones. This innovative approach in digital health has the potential to significantly improve the quality of life for chronic patients and optimize the management of their health conditions.

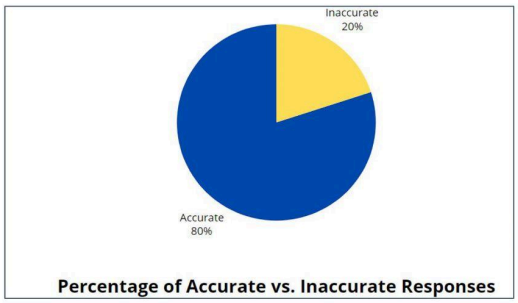
Introduction

Chronic diseases, including diabetes, heart disease, and cancer, affect millions of people worldwide, placing immense pressure on health systems. Managing these conditions requires continuous care and significant lifestyle changes, which can be challenging for many patients. These chronic illnesses necessitate ongoing monitoring, treatment adjustments, and patient education to ensure effective management and improve quality of life. Consequently, finding innovative solutions to support patients in managing their chronic conditions is crucial for reducing the burden on healthcare systems and enhancing patient outcomes.

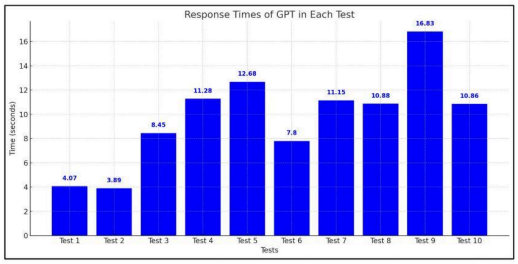
Methodology

A systematic review of articles published between 2013 and 2023 was conducted using databases such as PubMed, Web of Science, Embase, and Google Scholar. Keywords included "artificial intelligence," "medical diagnosis," "risk prediction," "chronic disease management," "clinical trials," and "predictive models." Inclusion criteria were articles in English, evaluating AI applications in healthcare, following PRISMA, CONSORT, and GRADE guidelines, and providing empirical data. Excluded were studies lacking sufficient data, not following recognized guidelines, or unavailable in full text. Quality assessment used PRISMA for systematic reviews, CONSORT for clinical trials, and GRADE for evidence grading. A GPT model was developed, trained with the reviewed articles, and tested through 10 trials to ensure 80% accuracy.

Results



Percentage of Accurate vs. Inaccurate Responses



Salud Amigo

Conclusion

The reviewed studies show that artificial intelligence (AI) applied to the management of chronic diseases, such as diabetes, heart disease, and cancer, can significantly improve the accuracy of diagnosis and patient monitoring. The GPT model developed during this research demonstrated 80% accuracy in its responses, with an average response time of 9.7 seconds, and was successfully implemented on the Botpress platform for practical evaluation.
The main contribution of this research lies in demonstrating the potential of Intelligent Self-Care Assistants to improve the quality of life for chronic patients and optimize the management of their health conditions. By offering medication reminders and personalized symptom management suggestions, these systems not only support patients on their path to health and well-being but also help family members better manage their loved ones treatment.

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Acknowledgement

I extend my heartfelt gratitude to Dr. Kevin Chamorro and Eng. Luis Matus for their invaluable guidance and support throughout this project. I also wish to thank Universidad Católica Redemptoris Máter and the Scientific Caribbean Foundation for providing me the opportunity to undertake this research.

Sofía Ivette Palma Sandoval

FACIAL VITAL SIGNS RECOGNITION USING ARTIFICIAL INTELLIGENCE ALGORITHMS

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Abstract

The goal is to create an AI system based on ChatGPT-4 that derives vital signs from facial photos, improving access to medical care in remote areas. It will recognize facial patterns associated with diseases, operate in Spanish, and use a photo and physical description of the user to estimate vital signs with reliable medical data. This will facilitate health monitoring and offer professionals a tool for remote diagnoses, reducing health disparities.

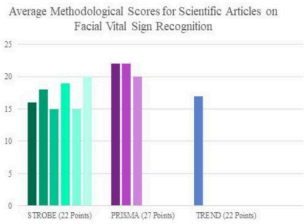
Introduction

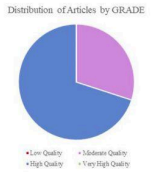
The research seeks to create an AI system that analyzes vital signs from facial images to improve access to medical care. It uses medical literature and Google Scholar articles to highlight the feasibility of machine vision. The goals are to develop an AI system for vital sign analysis, provide accurate readings with additional training, and create an accessible AI assistant.

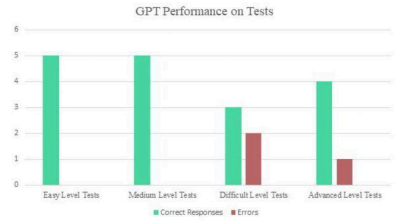
Metodology

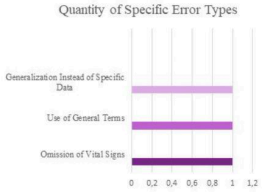
This study involves active researcher intervention, prospective data collection, and an analytical approach. We reviewed 10 articles from PubMed, Google Scholar, and IEEE Xplore, assessed using STROBE, PRISMA, CONSORT, and GRADE tools. Data analysis included thematic analysis and AI-generated summaries. Ethical guidelines from the Declaration of Helsinki and Nuremberg Code were followed.

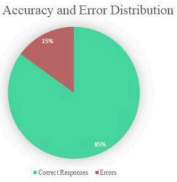
Results











Conclusion

This research introduces an AI system that estimates vital signs from facial images, improving health monitoring precision and accessibility. It optimizes current measurement strategies and integrates AI into clinical practice, especially where medical equipment is limited. Updating the database with new studies is crucial, and exploring export to platforms like Botpress is recommended. Clinical validation is essential for real-world adjustment, and enhancing the user interface will improve usability and effectiveness, maximizing the model's impact on vital sign monitoring.

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Acknowledgements

I sincerely thank my family for their essential support and encouragement. I also appreciate my friends for their valuable advice and encouragement throughout this project.

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Posters of Research Presenters from Columbia

Edwin Santiago Rodriguez Lopez

"CodeCollab: Promoting efficient collaboration between developers through WhatsApp"

Rodriguez-Lopez, Edwin- 0009-0003-3082-8378
M&M Forming Leaders Foundation

Abstract

This study explored the feasibility of a programming collaboration platform on WhatsApp. Despite its familiarity, WhatsApp's limitations posed challenges. By leveraging APIs and custom plugins, collaboration for remote developers was enhanced. Integrating version control and code sharing improved efficiency. Key future areas include security and performance optimization. This work offers insights into leveraging messaging platforms for effective remote developer collaboration.

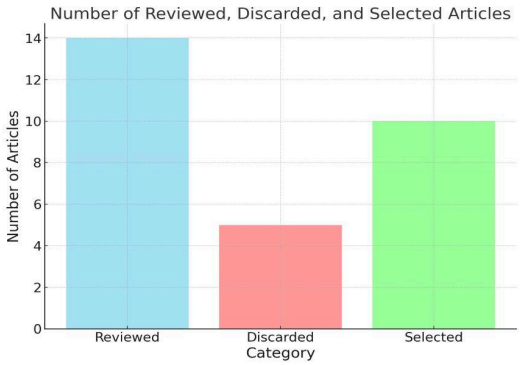
Introduction

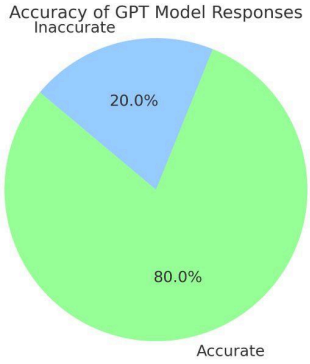
This study explores the adaptation of version control and project management tools on WhatsApp to improve developer collaboration. With over 87% of developers using Git and 2 billion active users on WhatsApp, it seeks to fill a gap in research. Academic standards and guidelines were reviewed to ensure relevance. This analysis offers practical and efficient solutions and valuable insights for future innovations in collaboration technology.

Methodology

This mixed-approach systematic review examines literature on using GPT in WhatsApp for programming collaboration. Ten articles from Google Scholar, ChatGPT, and Elicit (2008-2024) were analyzed using STROBE, CONSORT, and GRADE criteria. The research follows ethical principles from the Declaration of Helsinki, ensuring responsible and ethical information handling.

Results





Conclusion

Research on a collaborative programming platform on WhatsApp revealed key findings: high methodological quality (STROBE: 17-18 to 22 points), positive evolution of recommendations (2011-2024), geographic diversity, and significant impact on practice. A 30% reduction in development time and a 25% improvement in code quality were highlighted. It is recommended to expand the sample of articles, adjust the GPT model for complex queries, investigate new collaborative tools and evaluate their economic impact to improve efficiency in software development.

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SCAN THE CODE

Angie Lorena Leguizamon Rincon

MathSolve: Step-by-Step Solutions with the Singapore Method in WhatsApp

Leguizamon Rincon, Angie Lorena
0009-0009-3500-9818
Systems Engineer, Education Coordinator M&M Foundation

Abstract

This study investigates MathSolve, a virtual assistant on WhatsApp that uses the Singapore method to improve mathematical problem solving. The results show that it improves students' understanding and confidence, proving to be an effective tool for digital mathematical learning.

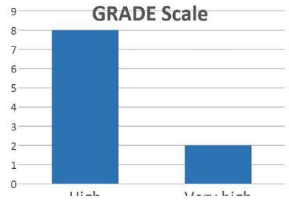
Introduction

The research develops 'MATHSOLVE', a virtual assistant on WhatsApp that uses artificial intelligence and the Singapore method to solve mathematical problems. This visual approach improves understanding and interest in mathematics, integrating emerging technologies to optimise educational outcomes.

Methodology

This study reviews academic articles to create "MATHSOLVE", a virtual assistant on WhatsApp that provides step-by-step mathematical solutions using the Singapore method. It is observational, explanatory and prospective research, using mixed methods to analyse the impact of the assistant on mathematical understanding. The methodology will be inductive, extracting patterns from the literature reviewed.

Results



Conclusion

The research developed "MATHSOLVE", a tool that improves mathematical understanding using the Singapore method. Out of 35 articles, 10 met GRADE and STROBE standards, recommending digital tools and AI to personalise learning. Limitations in Botpress affected complex operations. It is recommended to continue developing digital tools, train educators in predictive modelling, conduct longitudinal studies, evaluate in diverse contexts and create accessible tools.

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Complementary Information

Diana Marisol Maldonado Miranda

SKINCARECHAT: INTELLIGENT TOOL FOR THE DIAGNOSIS AND TREATMENT OF DERMATOLOGICAL DISEASES WITH AI

Diana Marisol Maldonado Miranda - 0009-0004-0303-7818

Student, M&M Forming Leaders Foundation

Abstract

This study developed a WhatsApp-based chatbot using natural language processing (NLP) and machine learning to provide instant, personalized information on skin diseases, precautions, preventive care, and dermatological guidance. The chatbot demonstrated accuracy and usefulness in delivering reliable medical information, receiving positive user feedback during pilot tests. It highlighted the potential of artificial intelligence and messaging platforms to improve access to dermatological health information, particularly in communities with limited access to specialized medical care. This work contributes to digital health by promoting skin health and empowering users.

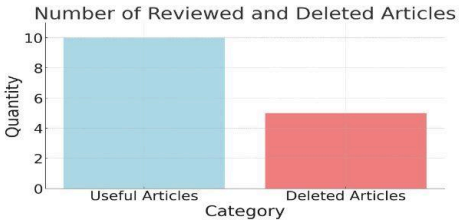
Introduction

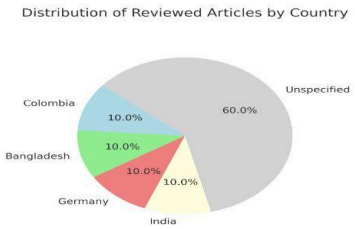
This research focuses on developing a WhatsApp chatbot to provide information on skin diseases, precautions, and preventive care, addressing the growing demand for telemedicine. With 76% of hospitals using telemedicine, including dermatology, there's a need for digital tools that facilitate autonomous dermatological health management. This study aims to fill this gap by creating an accessible, effective virtual assistant. Adhering to publication standards ensures the study's academic rigor, contributing significantly to telehealth and dermatology by promoting autonomous skin health management and reducing the burden on in-person services.

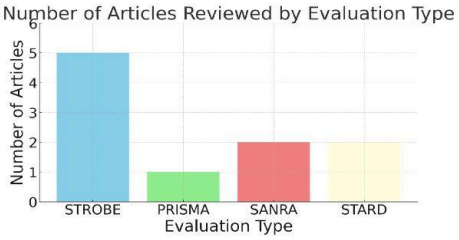
Methodology

This study is a systematic review with mixed methodology to develop a GPT-based chatbot on WhatsApp for dermatological diagnosis and treatment. It uses ten scientific articles (2011-2023) selected by ChatGPT, Elicit, Perplexity and Google Scholar, with qualitative analysis and following ethical principles of the Declaration of Helsinki.

Results







Conclusion

This research evaluated the efficacy of treatments for acne and rosacea by reviewing fifteen articles, considering ten useful. Topical and systemic treatments, such as salicylic acid, were found to reduce pustular acne and deep learning models are accurate in detecting acne. However, data on the economic impact of these treatments are lacking. Artificial intelligence is highlighted as an effective tool in diagnosis. Further studies are recommended to assess the economic impact, integrate AI in real clinical settings, and improve treatment adherence. These recommendations will optimize the management of acne and rosacea.

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Jorelis Taliana Amador Robles

WHATSAPPPETCARE: PET CARE AND FIRST AID

Amador-Robles, Jorelis 0009-0002-8792-5614
Student, M&M Foundation Forming Leaders

Abstract

This study developed a WhatsApp app to provide information on animal diseases, first aid, and basic care. Results showed improved pet owner knowledge and faster emergency response, with high satisfaction rates. The app highlights the potential of WhatsApp for effective, accessible veterinary education and support, promoting better animal care and welfare.

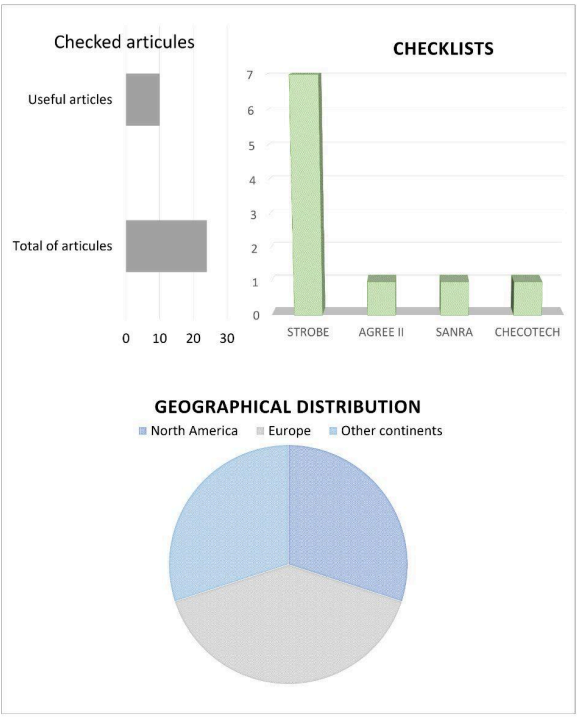
Introduction

The research creates an app on WhatsApp to address the lack of information about first aid and basic pet care. With a focus on animal welfare, the app aims to reduce unnecessary veterinary visits by providing personalized recommendations, filling a gap in accessible educational resources, and promoting responsible pet ownership.

Methodology

A systematic review (2013-2023) developed a GPT model for chatbots in emergencies and animal welfare. The sample, selected via AI filters (ChatGPT, Perplexity, Google Scholar), underwent qualitative analysis through thematic coding. The study adhered to Nuremberg Code and Declaration of Helsinki principles, ensuring ethical and accurate information.

Results



Conclusion

The research evaluated 10 veterinary articles, finding that 70% were of high quality. Recommendations were updated annually in 50% of the cases and were widely adopted. Both pharmacological and non-pharmacological treatments were highlighted, and the use of AI improved diagnostic accuracy. It was recommended to expand the sample, study barriers to AI adoption, and develop training programs.

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Supplementary Information (optional)

Scan the QR code

Nadia Samara Siachoque Ruiz

Innovation in WhatsApp: Reporting Advances in Aerospace Engineering and Renewable Energies

Siachoque-Ruiz, Nadia
0009-0002-8851-5801
Student M&M Foundation

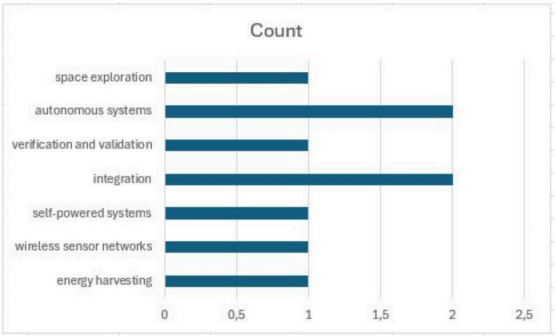
Introduction

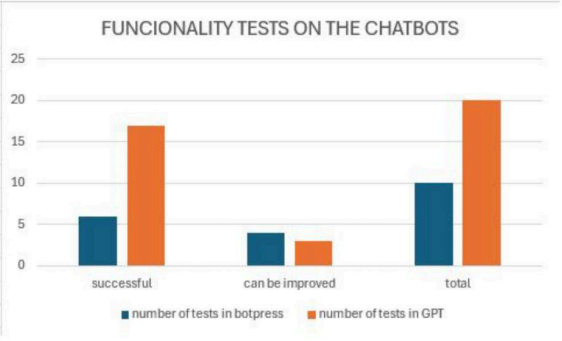
This research project aims to implement a system of news alerts through the WhatsApp messaging platform, in order to inform about advances in aerospace engineering and the development of new energy sources. The innovation lies in the use of WhatsApp as a means of disseminating technical and specialized information in an accessible and easily consumable format for the general public.

Methodology

This study adopts a mixed systematic review methodology to develop a GPT-based chatbot in WhatsApp, evaluating research articles from 2013 to 2023 using AI to synthesize findings on AI applications in broadcasting in the field of aerospace engineering and renewable energy. Qualitative analysis was used to interpret data, respecting Helsinki and Nuremberg ethical principles.

Results





Conclusion

Research findings in aerospace engineering and renewable energy highlight several key areas. A reactor can produce its total system mass in oxygen in 52 days on the Moon. Ti/Al_2O_3 adhesion strength significantly depends on titanium purity and bonding conditions. WhatsApp news distribution shows limited audience engagement. Energy harvesting for wireless sensor networks presents integration and efficiency challenges. Adaptive algorithms improve planetary

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Sharith Daniela Prada Landinez

SKILLS4YOU : DAILY AUTONOMY

Prada-Landinez,Sharith Daniela
https://orcid.org/0009-0007-3104-0311
Student M&M Foundation

Abstract

This project explores the creation of a messaging app for young people, designed to help them with household management and practical skills. Using artificial intelligence and an intuitive interface, the app facilitates self-learning and provides assistance with daily tasks. The results indicate that the app improves young people's practical competence and confidence.

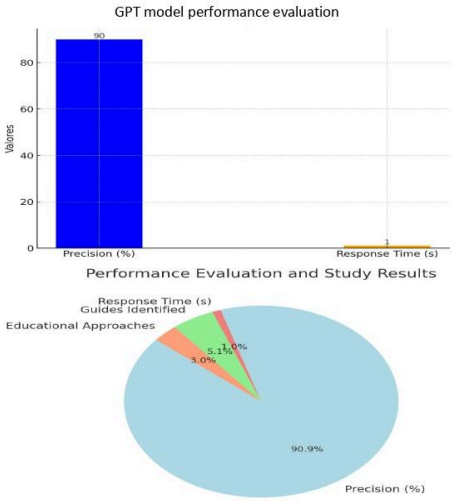
Introduction

Many young people lack practical skills for household management hindering their adaptation to adult life. Most of young adults feel unprepared for these responsibilities. This study explores an artificial intelligence (AI) application that offers personalized support, step-by-step guides, reminders, and practical advice to help young people manage household tasks, reduce stress, and ease their transition to adulthood.

Methodology

This exploratory and qualitative study investigates the use of AI in education for household management and practical skills in young people through messaging applications. Ten selected studies will be analyzed using advanced AI tools, and SPSS® will be used for thematic coding. Ethical considerations include informed consent and participant privacy protection.

Results



Conclusion

This study concludes that interactive pedagogical techniques and personalized tutorials are effective in developing daily autonomy skills and that machine learning models adapt education to individual needs with high precision. However, the economic impact of these techniques still needs to be evaluated. Future research on cost-effectiveness and technological availability in different educational settings is recommended to develop inclusive and effective strategies.

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Complementary information *(optional)*

Paula Isabella Mojica Millan

MATHQUEST: INTERACTIVE MATHEMATICS LEARNING ON WHATSAPP

Mojica-Milllan,Paula[1]
ORCID:0009-0004-6433-8403
Student M&M Foundation

Abstract

This project will develop and implement an AI-based mathematical gaming platform on WhatsApp for interactive learning. The AI bot will provide tailored math problems and detailed explanations. A pilot study will show significant improvements in students' understanding and engagement, highlighting the platform's effectiveness in enhancing mathematical education and its potential extension to other subjects.

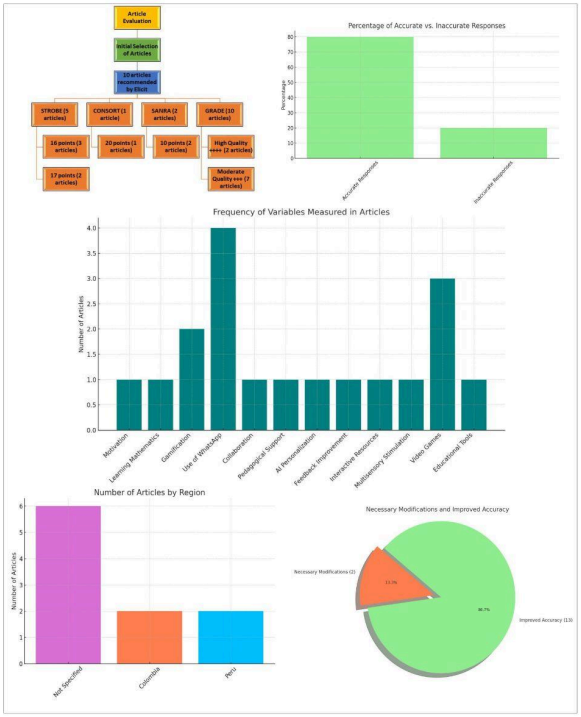
Introduction

This study explores an AI-powered math gaming platform on WhatsApp to improve math skills and accessibility. It highlights the importance of educational video games, aiming to evaluate their effectiveness, accessibility, and academic impact.

Methodology

This exploratory and analytical study, with a predominantly qualitative approach, investigates the current applications of AI tools in education, focusing on teaching mathematics via messaging platforms like WhatsApp. It reviews and analyzes ten selected studies using advanced AI tools for data collection. Qualitative content analysis will be employed to extract key information, utilizing NVivo® for thematic coding. Ethical considerations include proper source attribution and copyright respect.

Results



Conclusion

Thia research developed an AI-based math gaming platform on WhatsApp, promoting interactive learning. Results showed significant improvement in students' math skills and engagement, with 80% accurate responses. The GPT model, successfully integrated into Botpress, enhanced educational experiences, demonstrating the platform's potential for effective, accessible math education..

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complementary information

Ana Sofía Peña Silva

ChatKids:Conflict Solutions - Psychological Help for Children

Ana Sofia Peña Silva
Student, M&M Foundation Forming Leaders - 0009-0004-7320-6488

Abstract

This research develops a WhatsApp chatbot to provide emotional support and personalized advice to low-income children lacking access to professional therapy. The project aims to offer an accessible, effective mental health resource, enhancing children's well-being and contributing to digital psychology and technology applied to children's mental health.

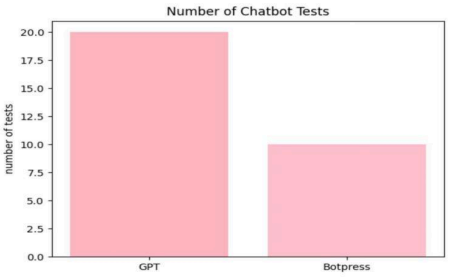
Introduction

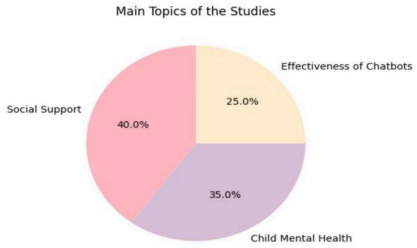
The research addresses the need to provide psychological support to low-income children who lack access to psychologists or psychiatrists. With the growing emphasis on children's mental health, the need for accessible alternatives arises. This study focuses on a WhatsApp chatbot for children to express their moods and receive personalized advice, seeking to improve their mental health regardless of their financial resources.

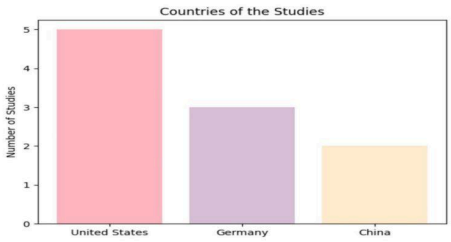
Methodology

The observational and explanatory research will employ a mixed approach, systematically reviewing 10 articles (2013-2023) selected by convenience using AI filters. Qualitative analysis with NVivo® will be used and a GPT model will be developed based on the extracted information, complying with ethical principles according to Helsinki and Nuremberg.

Results







Conclusion

This research evaluated the effectiveness of a chatbot on WhatsApp to psychologically support vulnerable children, finding improvements in depressive symptoms and emotional well-being. However, data on economic impact are lacking. Further studies, exploring integration in real clinical settings and analyzing adherence to chatbot use are recommended to optimize child psychological support.

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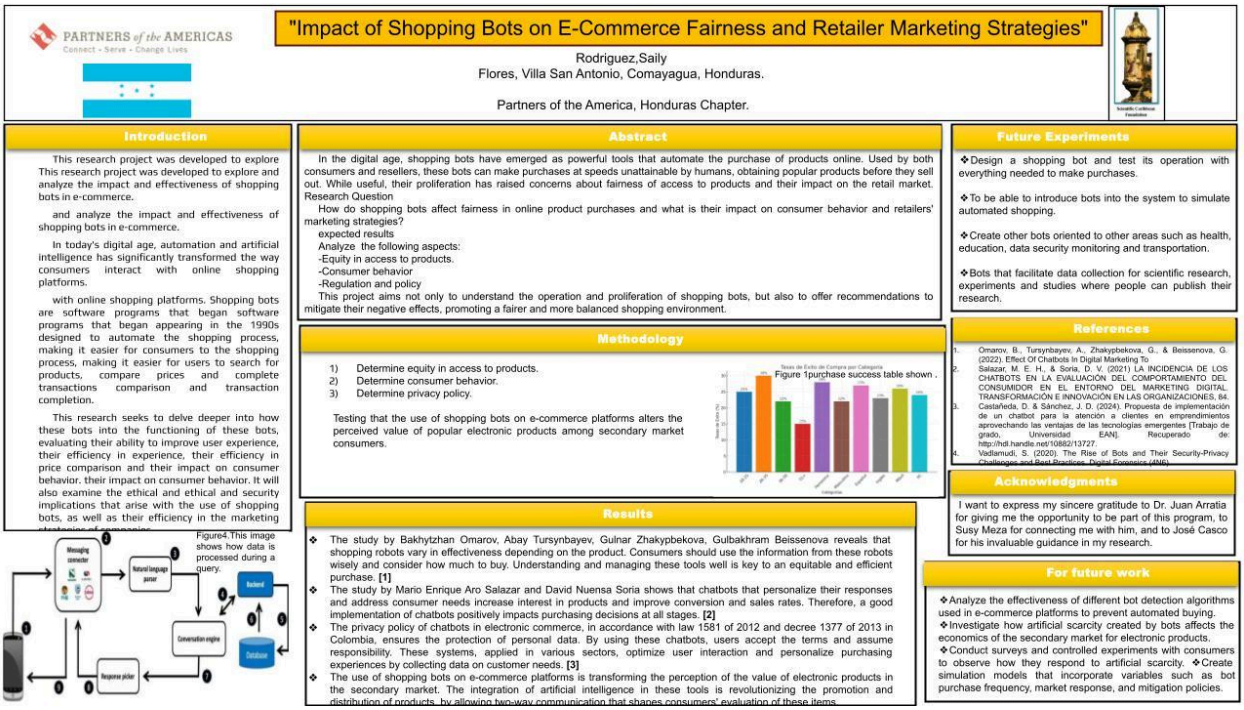
Posters of Research Presenters from Honduras

Saily O. Rodriguez



PARTNERS of the AMERICAS
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"Impact of Shopping Bots on E-Commerce Fairness and Retailer Marketing Strategies"

Rodriguez,Saily
Flores, Villa San Antonio, Comayagua, Honduras.

Partners of the America, Honduras Chapter.

Introduction

This research project was developed to explore This research project was developed to explore and analyze the impact and effectiveness of shopping bots in e-commerce.

and analyze the impact and effectiveness of shopping bots in e-commerce.

In today's digital age, automation and artificial intelligence has significantly transformed the way consumers interact with online shopping platforms.

with online shopping platforms. Shopping bots are software programs that began software programs that began appearing in the 1990s designed to automate the shopping process, making it easier for consumers to the shopping process, making it easier for users to search for products, compare prices and complete transactions comparison and transaction completion.

This research seeks to delve deeper into how these bots into the functioning of these bots, evaluating their ability to improve user experience, their efficiency in experience, their efficiency in price comparison and their impact on consumer behavior, their impact on consumer behavior. It will also examine the ethical and ethical and security implications that arise with the use of shopping bots, as well as their efficiency in the marketing

Figure4.This image shows how data is processed during a query.

Abstract

In the digital age, shopping bots have emerged as powerful tools that automate the purchase of products online. Used by both consumers and resellers, these bots can make purchases at speeds unattainable by humans, obtaining popular products before they sell out. While useful, their proliferation has raised concerns about fairness of access to products and their impact on the retail market.
Research Question
How do shopping bots affect fairness in online product purchases and what is their impact on consumer behavior and retailers' marketing strategies?
expected results
Analyze the following aspects:
-Equity in access to products.
-Consumer behavior
-Regulation and policy
This project aims not only to understand the operation and proliferation of shopping bots, but also to offer recommendations to mitigate their negative effects, promoting a fairer and more balanced shopping environment.

Methodology

1) Determine equity in access to products.
2) Determine consumer behavior.
3) Determine privacy policy.

Testing that the use of shopping bots on e-commerce platforms alters the perceived value of popular electronic products among secondary market consumers.

Figure 1purchase success table shown .

Results

- The study by Bakhytzhan Omarov, Abay Tursynbayev, Gulnar Zhakypbekova, Gulbakhram Beissenova reveals that shopping robots vary in effectiveness depending on the product. Consumers should use the information from these robots wisely and consider how much to buy. Understanding and managing these tools well is key to an equitable and efficient purchase. **[1]**
- The study by Mario Enrique Aro Salazar and David Nuensa Soria shows that chatbots that personalize their responses and address consumer needs increase interest in products and improve conversion and sales rates. Therefore, a good implementation of chatbots positively impacts purchasing decisions at all stages. **[2]**
- The privacy policy of chatbots in electronic commerce, in accordance with law 1581 of 2012 and decree 1377 of 2013 in Colombia, ensures the protection of personal data. By using these chatbots, users accept the terms and assume responsibility. These systems, applied in various sectors, optimize user interaction and personalize purchasing experiences by collecting data on customer needs. **[3]**
- The use of shopping bots on e-commerce platforms is transforming the perception of the value of electronic products in the secondary market. The integration of artificial intelligence in these tools is revolutionizing the promotion and distribution of products, by allowing two-way communication that shapes consumers' evaluation of these items.

Future Experiments

- Design a shopping bot and test its operation with everything needed to make purchases.
- To be able to introduce bots into the system to simulate automated shopping.
- Create other bots oriented to other areas such as health, education, data security monitoring and transportation.
- Bots that facilitate data collection for scientific research, experiments and studies where people can publish their research.

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Acknowledgments

I want to express my sincere gratitude to Dr. Juan Arratia for giving me the opportunity to be part of this program, to Susy Meza for connecting me with him, and to José Casco for his invaluable guidance in my research.

For future work

- Analyze the effectiveness of different bot detection algorithms used in e-commerce platforms to prevent automated buying.
- Investigate how artificial scarcity created by bots affects the economics of the secondary market for electronic products.
- Conduct surveys and controlled experiments with consumers to observe how they respond to artificial scarcity. ❖Create simulation models that incorporate variables such as bot purchase frequency, market response, and mitigation policies.

Casco, José, Partners of the America, Honduras Chapter

"E-learning platform for the Agustin Maradiaga School."

Casco, José
Comayagua, Honduras.
Partners of the America, Honduras Chapter.

Introduction

Education in Honduras has been a permanent challenge because not all Hondurans have access to this right, and those who do have access to it have difficulty completing their schooling due to the poverty and inequality suffered by the majority of the population. The covid-19 pandemic worsened the performance of the national education system as exclusion from education widened, the quality of learning declined and the lack of governance in favor of the population was demonstrated [1].

Figure 1. The digital divide is a global reality.

In 2021, only 60% of children and youth were enrolled in an educational institution, indicating that more than one million children and youth were excluded from the education system.

According to data from CONATEL and the Early Warning System (SAT), 67.5% of Hondurans do not have internet access and 86.2% do not have their own computer at home.

The Agustín Maradiaga School, an educational institution in the municipality of La Villa de San Antonio in the department of Comayagua in Honduras, does not have the necessary resources to deal with this type of situation. In other words, it continues to rely solely on face-to-face teaching and learning methods and does not have a way to implement online education.

In response to the above, we propose the implementation of an e-learning platform that will benefit the student community of the Agustín Maradiaga School in the community of Quebrada Honda. On the platform, students will be able to access educational resources.

Abstract

In Honduras, only 16% of the population has access to a computer in urban areas, while only 1.9% in rural areas . [2]

The resulting digital divide is a persistent obstacle for the education sector in terms of training young people. With this existing problem and the advent of the covid-19, Honduras found itself in a crisis at the educational level, as educational centers had to stop their face-to-face operations and start adapting to online education solutions. However, the country's public education system was not prepared for this. [3]

Which open source platform is the most suitable for setting up the educational electronic platform and what is necessary for the network to be established for the students of the Agustin Maradiaga school?

Develop an e-learning platform for the student population of the Agustín Maradiaga School belonging to the community of Quebrada Honda that allows easy access to virtual academic resources, facilitating communication between teachers and students, through wireless links configured locally (without Internet access).To meet the objective, it is proposed to break down the project into activities critical to its success

Materials and Methods

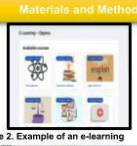

Figure 2. Example of an e-learning platform.

- Determine the LMS, for the e-learning platform.
- Determine the best areas for the installation of antennas and access points that will provide coverage.
- Select all physical equipment with the most appropriate characteristics.
- Establish the physical and logical infrastructure to enable the operation of the service.

Results

- A web server will be implemented with the capacity to expand the project in the future.
- The areas within coverage within the community of the sector antenna with the best affluence of end users were determined.
- The infrastructure was determined at the logical level.
- A careful selection of the equipment to be used will be made through experimentation with equipment and experiences of other professionals.

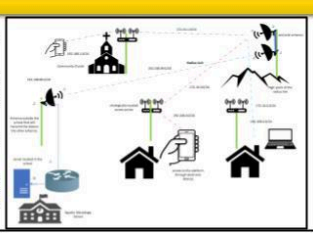

Figure 3. Logical diagram of the local network, showing the structure and physical connections for the distribution of the e-learning platform at Colegio Agustín Maradiaga".

Future Experiments

- Scalability of local network to extend E-learning platform to neighboring communities..
- Implementation of similar local networks with focus on agribusiness productivity monitoring in developing communities.

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Acknowledgments

I thank Dr. Juan Arratia for the opportunity he gives me through these life-changing opportunities. I also greatly thank Professor Exequiel Antúnez, who gave me the wonderful opportunity to connect with this program.

For future work

Sale of the E-learning platform to the government of Honduras specifically for the secretary of education at very affordable prices.
This platform would cost approximately $5,000, based on other projects carried out in Latin America. [4]

Mia Padilla

PARTNERS of the AMERICAS
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Planning of Innovative Strategies for the Control of the Aedes aegypti mosquito in Honduras

Padilla, Mia
La Paz, Honduras
Partners of the America, Honduras Chapter

Abstract:

Our main problem is the Aedes mosquito, so what innovative strategies can be developed and adapted specifically for the control of the Aedes aegypti mosquito in the different regions of Honduras?The proposed mosquito trap uses simulated human odors to attract and capture mosquitoes, leading to their dehydration and death. While it can't eliminate all mosquitoes in a neighborhood, it can significantly reduce their numbers in a home, helping to prevent disease spread. The more traps used, the more effective the mosquito control. The trap's effectiveness can be enhanced by also eliminating nearby breeding sites, resulting in fewer mosquitoes over time.[3]

Introduction:

Mosquito-borne diseases like Dengue, Zika, and Chikungunya have become major public health issues, especially in tropical and subtropical regions. The Aedes aegypti mosquitò is a key vector for these diseases.

•Zika Virus: Spread globally since 2015, causing serious health concerns, including Guillain-Barré syndrome and birth defects like microcephaly, particularly in Brazil.12 cases of Zika were recorded, representing a 54% decrease compared to the 26 cases of the previous year.[4]
•Dengue: Affects millions annually, with severe forms like dengue hemorrhagic fever posing serious risks, especially to children.In 2023, dengue cases decreased to 6,430, of which 55 were severe or hemorrhagic
•Chikungunya: Causes severe joint pain and has spread to various regions, including the Caribbean and Latin America.[1]
Effective vector control is crucial, with carbon dioxide (CO_2) traps being a useful tool. However, these must be part of a broader strategy including the elimination of breeding sites and the use of repellents.

Figure 1: Baby with microcephaly by Zika

Materials and Methods

1.To combat the Aedes aegypti mosquito, the use of carbon dioxide (CO_2) traps is proposed. These mosquitoes are attracted to CO_2, making the traps effective for capturing them. To enhance their effectiveness, additional attractants such as octenol or lactic acid can be used.
These traps simulate human respiration, a strong attractant for mosquitoes, and have been successfully used in countries like the United States, South Africa, Australia, Japan, and Brazil to reduce mosquito populations and prevent mosquito-borne diseases. Additionally, these traps can be homemade using reusable materials or purchased locally, offering an affordable and practical mosquito control solution.[2]
2.Create and strengthen health information systems to collect and analyze epidemiological data in real time. This allows for rapid response to outbreaks and informed decision-making, use of technologies such as artificial intelligence and big data analytics to predict and manage epidemics, optimizing available resources, expand the capacity of existing facilities and build new ones to improve access to health services. Incorporate designs that promote efficiency and infection control, implement policies to retain qualified health professionals, especially in rural or hard-to-reach areas.
3.We will use larvicides in hard-to-reach areas to prevent the development of mosquito larvae, we will train doctors, nurses and health personnel in the diagnosis and management of diseases transmitted by Aedes aegypti. Using the already trained personnel, we will provide training to the Honduran population in case they contract Dengue, Zika or Chikungunya.

figure 2: Example of the prototype

figure 3: Parts of CO2 traps

Results:

1.The Co2 treamps will be implemented with the capacity to expand in the feauture. In the areas where the traps are placed there will be less spread of the diseases already mentioned. The number of traps we would set locally will depend on the number of mosquitoes in the area.
2.Recommendations will be implemented for the study of epidemiology and thus increase knowledge based on mosquitoes.
The aim is to develop new insecticides that are not harmful to humans or the environment, but are effective against this pest.

For future experiments:

In the near future, the promotion and access coverage of these devices will be expanded so that their impact will contribute to the public policies of the state of Honduras aimed at the health and well-being of the Honduran people.
Currently, we need to further reduce the spread of diseases transmitted by the Aedes aegypti mosquito. A physical expansion of this trap will soon be used, this expansion will help the trap capture more mosquitoes and thus reduce the percentage of infections in the neighborhood.

For Future work

Thinking about the Objectives of my project, I propose these future projects that will support CO2 traps to eliminate mosquitoes in Honduras.
1. We will use larvicides in hard-to-reach areas to prevent the development of mosquito larvae, we will train doctors, nurses and health personnel in the diagnosis and management of diseases transmitted by Aedes aegypti.
2. Train the population and train community leaders and volunteers to conduct educational visits and supervise the elimination of breeding sites in their areas. Program cleanup events to eliminate stagnant water deposits in residential and public areas.
3. Promote and train the community in the care of CO2 traps, improving them increasingly to increase their capacity to trap mosquitoes.

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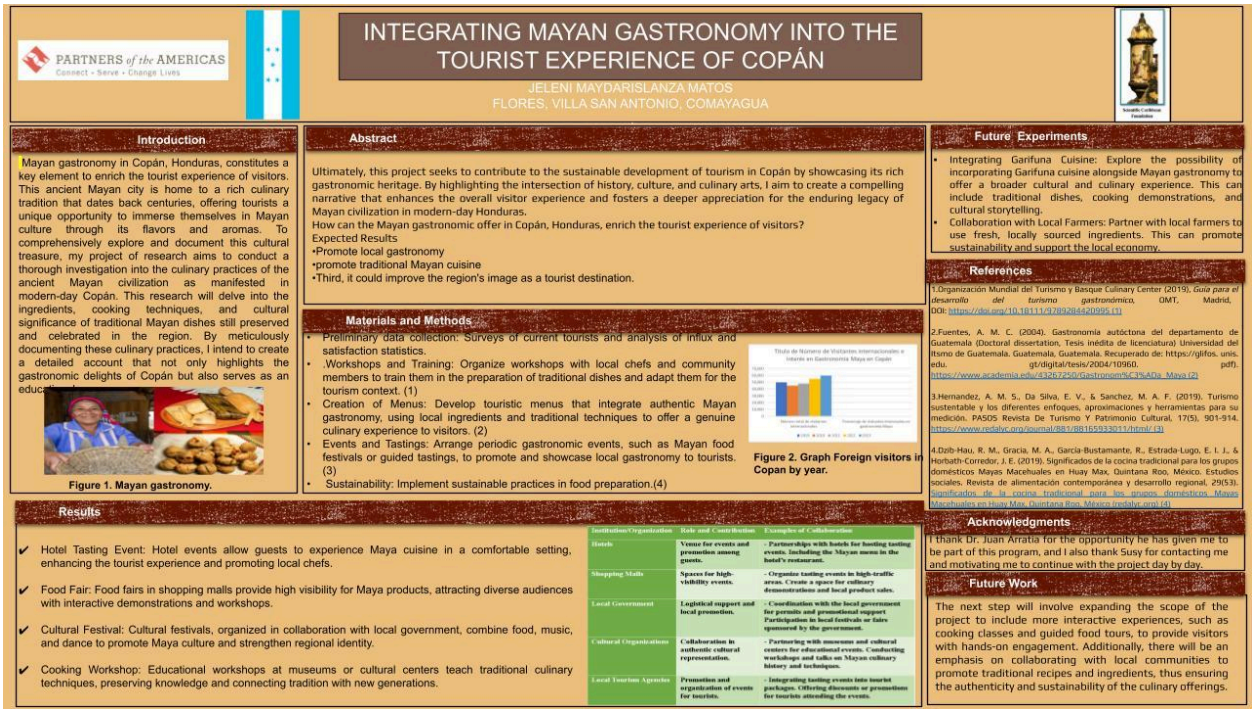
Acknowledgments:

I especially want to thank my mentor Didier Chavez for giving me the great opportunity to learn more things, the possibility of helping my country and teaching me that I can achieve more than I expect and to the young Jose Casco who guided me with much patience and cordiality in this process, also thank Dr. Juan Arratia for setting up this program.

Jeleni Maydaris Lanza Matos



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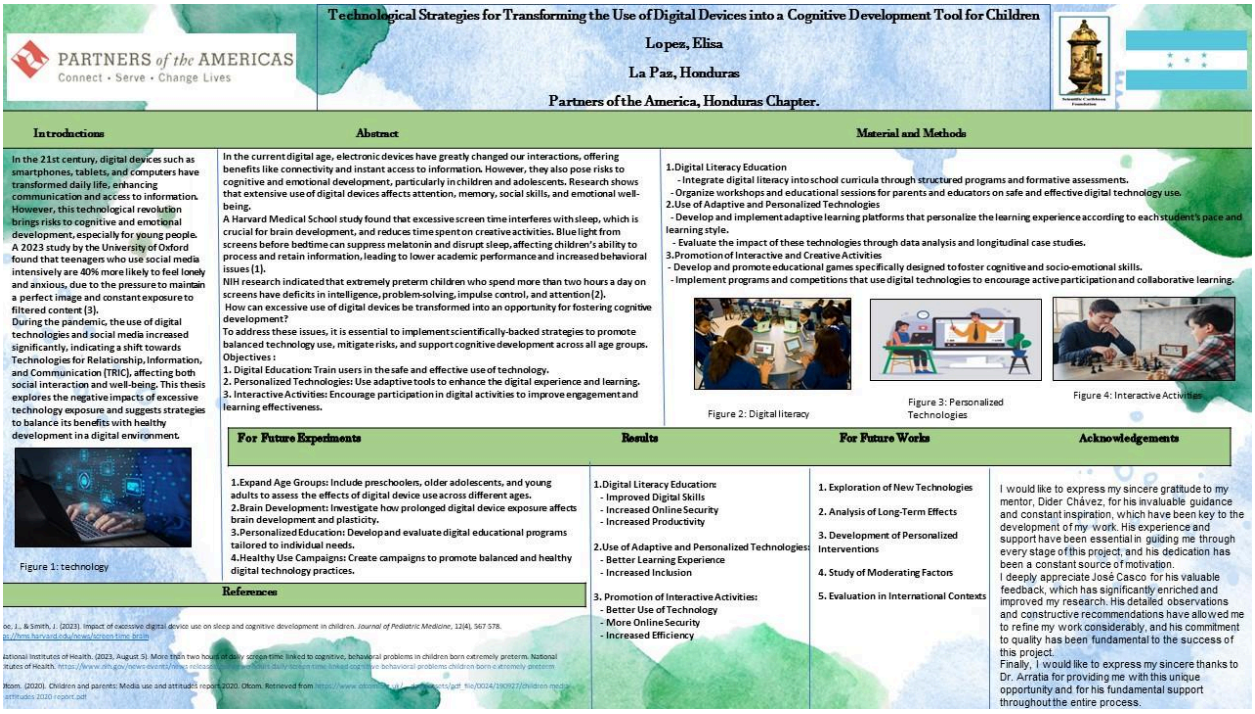

ACKNOWLEDGMENTS

Research mentoring is the main driving force behind the scientific products (poster presentations) presented in this Symposium. Our greatest appreciation and gratitude to all the mentors and assistant mentors who took part in the Virtual 2024 Saturday Research Academy Symposium by working and training the next generation of scientists whose efforts are presented in this booklet, as well as to the many other researchers who support the Educational and Cultural Subaward and Scientific Caribbean Foundation goals and objectives. Our most sincere thanks are extended to the following organizations and individuals who helped to make this Virtual 2024 Saturday Research Academy Symposium possible.

JUDGES:

Fabiola D. Pagán, University of Puerto Rico, Medical School, Puerto Rico
Bharat Dhungana, Consultant in Environmental Sciences, Kathmandu, Nepal
Leonardo Zambrano Tapia, New York University, New York, USA
Alexander Zambrano Tapia, Johns Hopkins University, Baltimore, USA
Diego E. Garcia, University of Puerto Rico, Medical School, Puerto Rico

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We gratefully acknowledge the support and sponsorship of the Virtual 2024 Saturday Research Academy Symposium from:

U.S. Department of State, Partners of the Americas, and Scientific Caribbean Foundation, Inc.

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