S&T EDUCATION AND SCHOLARSHIPS

WINNING AT THE FRONTLINE

2021 SEI ANNUAL REPORT

TABLE OF CONTENTS

INTRODUCTION

Much of 2021 was about navigating the "New Normal." As the dust began to settle from the worst global health crisis in over a century, the undeniable importance of science and technology (S&T) shone through. From the ground-breaking speed at which COVID-19 vaccines were developed, to the myriad technological solutions that emerged as pivotal holdovers in our daily lives, the critical value of S&T—and, to a great extent, S&T education—became clear.

As proponents of the sector, we at the Science Education Institute (SEI) fortified our commitment to cultivate the country's emerging talent pool of S&T human resources in the face of great, pandemic-induced challenges. This is reflected on the theme of the 2021 SEI Annual Report, "S&T Education and Scholarships: Winning at the Frontline."

While education systems have been upended by the pandemic, DOST-SEI stood firm on the belief that the learning must and always push through. It was only imperative to continue to provide quality education to the next generation of innovators to ensure a more robust S&T field for the Philippines in the following years and decades—not only in preparation for the next global pandemic, but to keep up with an evolving world.

Thus, in 2021, we improved and streamlined our adaptative responses developed out of urgency from the past year.

For instance, the efforts led to the remarkable growth in the number of DOST-SEI scholars, on the strength as well of curated programs. This includes the full implementation of online undergraduate S&T scholarship application and development of other information systems, along with the expansion of the DOST Scholarship program to priority municipalities, among others.

Aside from improving processes, we also kept our foot on the pedal in terms of driving innovations in education. We introduced several breakthroughs in the learning environment to foster interest in and ease of delivery of STEM education and scholarship opportunities. We likewise sustained our gains by enhancing teaching proficiencies, conveying new knowledge, and enhancing internal process initiatives.

There is so much to discover and learn about our new environment that could be unlocked by the continued and unwavering investment in the development of S&T-proficient citizens. All told, the goal for DOST-SEI in 2021 transcended easing our transition into the New Normal. By remaining steadfast in our mission to promulgate the type of science that serves the people, DOST-SEI took on a higher purpose: to help establish a Better Normal for generations to come.

MESSAGE FROM THE SECRETARY

Digital transformation was well underway for the better part of the past decade. The big talk on the fourth industrial revolution, or "Industry 4.0," in particular, had science and technology (S&T) stakeholders gushing over manifold innovations expected to introduce fundamental changes to our lives. But such an overhaul in systems and lifestyles were predicted to take years before reaching mass adaptation. When the COVID-19 pandemic broke out, timelines were scrapped and digital acceleration was expedited to warp speed.

While 2020 for most of us was about getting acclimated to the digital shift, 2021 was a time for settling in and moving forward. The significant contributions of S&T enabled us to continue to live our lives, instilling some much-needed sense of normalcy, including students being able to receive learning opportunities amid challenging times.

Embracing the bright light education shines amid the darkness of fear and confusion, we at the Science Education Institute (SEI) stayed the course in carrying our mandate. In 2021, as the world turned to S&T for more answers, we improved our plans, programs, and projects for the promotion and enhancement of science and technology education. We kept true to our commitment to strengthen the Filipinos' intellectual capital through dynamic and enhanced adaptations.

All this while the S&T and education sectors were among those greatly challenged by the pandemic. Through our determination and that of our partners', along with the full support of the government, we faced obstacles with heads held high. It is with great confidence to report that we have achieved more than encouraging results, which inspired the theme for the 2021 SEI Annual Report: "S&T Education and Scholarships: Winning at the Frontline."

In spite of the claim of victory, however, we remain clear in our understanding of the situation. It is important to note the verb tense of the operative word. "Winning" does not mean we have won.

The pandemic rages on and challenges still abound. More to the point, the sector is being tested by those who aim to discredit what the science says in favor, perhaps, of convenient ignorance. Rest assured that the DOST-SEI will continue to uphold today the great value to society of S&T, as well as S&T education, to lay the groundwork for a stronger, even more impactful, S&T sector tomorrow.

PROF. FORTUNATO T. DELA PEÑA
DOST Secretary

MESSAGE FROM THE DIRECTOR

Times may change, systems may evolve, but the Science Education Institute (SEI) will always remain rooted in its mission to accelerate the development of science and technology (S&T) human resources of the country.

This mantra served as the impetus that drove the Institute to new heights in 2021. Despite the vast and difficult challenges brought forth by the raging global health crisis, we trudged on and reached our goal to convert the heightened interest on S&T into developing the next generation of Filipino S&T professionals.

In 2021, DOST-SEI supported a record number of S&T scholars. The year saw a 24.65% increase from 2020 in undergraduate scholars at 37,445 under the three scholarship programs: RA 7687, RA 2067 or Merit, and RA 10612. Moreover, the remarkable figure totals to a 230% rise over the last ten years.

To contextualize the magnitude of the record, Section 10 of RA 7687 provides for the enlistment of two scholars by municipality and ten per congressional district without municipality. In 2021, a whopping turnout of 98% of the total municipalities have had S&T scholars.

We at the Institute are overwhelmed by how deeply ingrained the value of S&T education is on the youth. To nurture their interest on S&T education and simplify processes, one of the Institute's focal points coming into 2021 was to develop the digital approaches and to streamline procedures born out of necessity from the past year. Perfecting the created online systems based on client feedback and adoption of readily available online services enabled the continued and better delivery of the various services to the stakeholders of the S&T Scholarships Division.

For instance, scholars no longer had to physically report to the office for monitoring purposes. They could upload the scanned copies of the required documents in the dedicated Google Forms, then mail the hard copies to DOST-SEI for validation. Subsequently, their financial assistance would be released. It's a practical move that also abided with health and safety protocols of limiting physical interactions.

The Institute also introduced the Scholar's Portal, an online platform that serves as a tool for uploading the required documents and downloading the contract, making it an effective way to confirm acceptance of scholarship and the review of policies. Also launched in 2021 was the S&T E-Scholarship Application System, which garnered a total of 14,169 applicants. Of this number, 9,688 applications were accepted.

More information about DOST-SEI's 2021 accomplishments are discussed in detail in our 2021 annual report. We are proud to present to you the product of the Institute's enduring dedication in the face of great challenges, chronicled within the next pages. But more than a showcase of our accomplishments, may this annual report reflect the indomitable spirit of the Filipino people that shines ever brighter during the darkest times.

As we move forward and emerge into a new day, we hope S&T be held in high regard in society. The Institute promises to play its part in turning this into reality in the name of progressive development.

Josette T. Biyo

DR. JOSETTE T. BIYO
DOST-SEI Director

PERFORMANCE HIGHLIGHTS

Undergraduate and Graduate Scholarship Programs

25%
INCREASE

37,445
undergraduate scholars
registered under RA 7687, RA 2067, and RA 10612, a 24.65% increase from the 30,039 scholars in 2020.

8,067
qualifiers
for the 2021 DOST-SEI Undergraduate S&T Scholarship Program.

9,688
successfully applied for the 2021 JLSS, and 106,272 for the 2022 DOST-SEI S&T Undergraduate Scholarship Program using the new S&T E-Scholarship Application System.

206%
INCREASE FROM 2020 TO 2021

799
graduating S&T scholars
participated in the first online DOST-SEI Nationwide Exit Conference.

13,507
scholars
took part in webinars and other activities under the Filipino Patriot Scholars Project, a 206.14% increase from 2020 to 2021.

897
Master's

577
Doctoral scholars
were supported by the CBPSME.

1,233
MS and PhD scholars
were supported under the ERDT.

146
MS

19
PhD scholars
were supported under Project STRAND.

45
applicants
were awarded scholarships under the DOST-SEI Foreign Graduate Scholarships in Priority S&T Fields program.

Educational Conferences

202
research outputs
of the CBPSME scholars were featured in the 7th National Research Conference in Science and Mathematics Education.

1,421
participants
attended the series of virtual plenary lectures under the annual ERDT Congress

Over 3,000
educators and non-teaching personnel
from the Department of Education (DepEd) and educational institutions attended the Project STAR's second international conference

Innovative Learning Solutions

2
new schools
adopted the 21st Century Model Classroom- Kidapawan City National High School and Bayambang National High School, bringing the total adopters to 25.

106
proposal
were submitted to the InnoBox competition, with 11 making it to the final stage for development.

42
more modules in science and mathematics
for Grades 9-10 were digitized and added to the hundreds of free DOST Courseware available online.

61
participants
from 30 schools in Caraga region attended the training webinas on the use of AR in teaching.

43
participants
attended the virtual Climate Science Youth Camp

9
RadyoEskwela episodes

10
TuklaSiyensya episodes
were aired on different radio networks

Human Resource Development Initiatives

1,475
teachers
attended the regional training sessions on the topic "Design Thinking for K-3 Science and Mathematics Teaching" in a virtual platform

1,834
teachers
participated in various webinars on relevant science and mathematics topics held via Zoom and Facebook

191
science and mathematics teachers
participated in training session for Non-Major Science Teachers on Content and Pedagogy

139
JLSS Scholar-Graduates
attended virtual sessions on Capacitating Scholar-Graduates with Pedagogical Skills

232
DOST-SEI employees
participated in several ICT Workshops and Orientations organized by the MIS unit

— SECTION I —

CONTINUITY THROUGH ADAPTATION

Having overcome the brunt of the pandemic in 2020 only strengthened the commitment of the Institute to keep true to its oath to the Philippine S&T and education sectors. Empowered to take on new heights in 2021, we at the Institute shifted our focus from finding new ways to support education systems to strengthening these channels, while maintaining a mindset of "continuity through adaptation."

The goal was to build on our success and remain responsive to the times. This chapter showcases our adaptive measures and their fruitful results that resulted in the continued growth in the number of scholars, as well as streamlined scholarship provisions and processes, among other milestones.

UNDERGRADUATE SCHOLARSHIP PROVISIONS

Highest number of S&T scholars in a decade

Improvements on the innovative digital approaches and streamlined procedures born out of necessity due to the Covid-19 pandemic were among the priorities for 2021. In this regard, the S&T Scholarships Division stood at the fore by continuing and even enhancing the delivery of its various services to its stakeholders by adopting readily available online services and perfecting created online systems based on client feedback.

Notwithstanding the ongoing restrictions of the pandemic, the three scholarship programs RA 7687, RA 2067 or Merit, and RA 10612 under the Undergraduate Scholarships and the Junior Level Science Scholarships (JLSS) registered a total of 37,445 undergraduate scholars in 2021. This represents a 24.65% increase from the 30,039 scholars in 2020 and 230% over the last ten years. Among the total number of scholars supported, 49.69% are male and 50.31% are female.

Section 10 of RA 7687 provides for the enlistment of two scholars by municipality and ten per congressional district without municipality. In 2021, 98% of the total municipalities have had S&T scholars.

Further facilitating the scholarship monitoring process, DOST-SEI no longer required scholars to physically report to the office. They simply uploaded the scanned copies of the required documents in the dedicated Google Forms, and then mailed the hard copies to DOST-SEI for validation. Subsequently, their financial assistance was released.

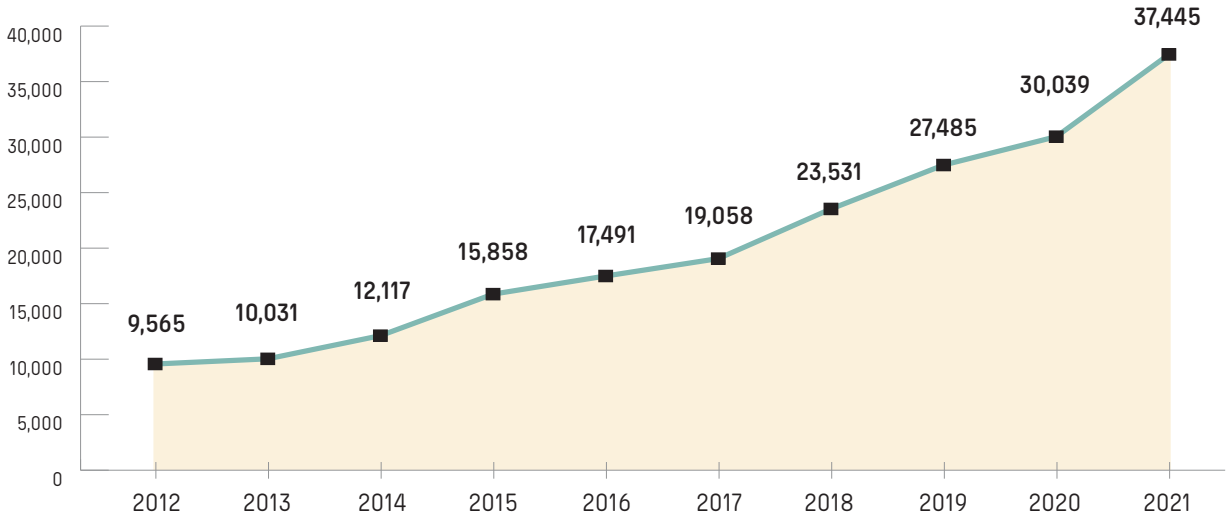


FIGURE 1: The steady increase in the number of scholars supported through the years shows the strong support of the government towards the development of S&T experts.

Announcement and orientation of the 2020 Junior Level Science Scholarship (JLSS) Qualifiers

On August 1, 2021, 785 qualifiers to the 2020 JLSS, a program for incoming regular third year college students who are enrolled in priority science and technology courses, were announced in leading newspapers and posted on DOST-SEI's official website.

The national qualifying examination did not push through due to the COVID-19 pandemic. Instead, a scheme was developed using data analytics to determine the qualifiers.

"For several years, the result of the scholarship examination has been one of the most important criteria in the selection of new scholarship qualifiers. Suspending the conduct of the face-to-face examination was not an easy decision for DOST-SEI. However, with the use of data analytics, I believe that we are able to identify qualifiers and award this scholarship to deserving third year college students," said DOST-SEI Director, Dr. Josette T. Biyo.

The JLSS has three component programs: a) RA 7687 program, which provides for socioeconomically challenged students; b) Merit program, which gives chance to students with high aptitude in STEM; and c) RA 10612, which aims to accelerate the production of science and mathematics teachers in secondary schools.

On August 18, 2021, the NCR-based scholarship qualifiers and their parents attended the Virtual Orientation on Scholarship Policies and Procedures via Zoom platform.

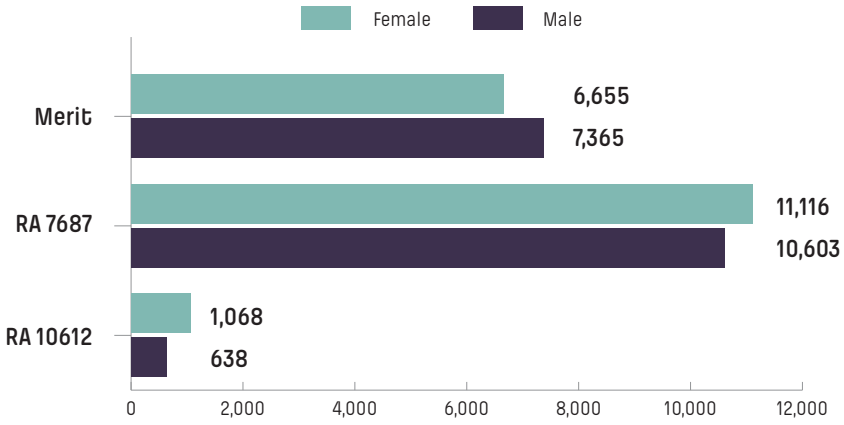


FIGURE 2: Distribution of DOST-SEI undergraduate scholars by program and sex.

The banner announcing the 2021 Junior Level Science Scholarship qualifiers in the DOST-SEI website and official social media accounts.

Announcement and Orientation of the 2021 Undergraduate S&T Scholarship Qualifiers

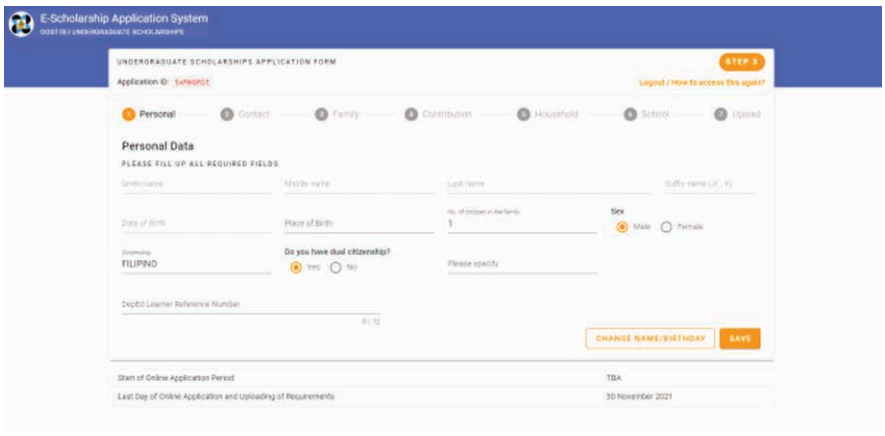
DOST-SEI identified 8,067 qualifiers for the 2021 DOST-SEI Undergraduate S&T Scholarship Program. The list of qualifiers was announced in leading newspapers and posted on DOST-SEI's official website and Facebook page on August 29, 2021.

Of the figure, 3,815 qualified under the RA 7687 Scholarship Program while 4,252 qualified under the Merit Scholarship Program. There were 2,933 more that were considered potential qualifiers pending completion of requirements and subject to further evaluation of DOST-SEI.

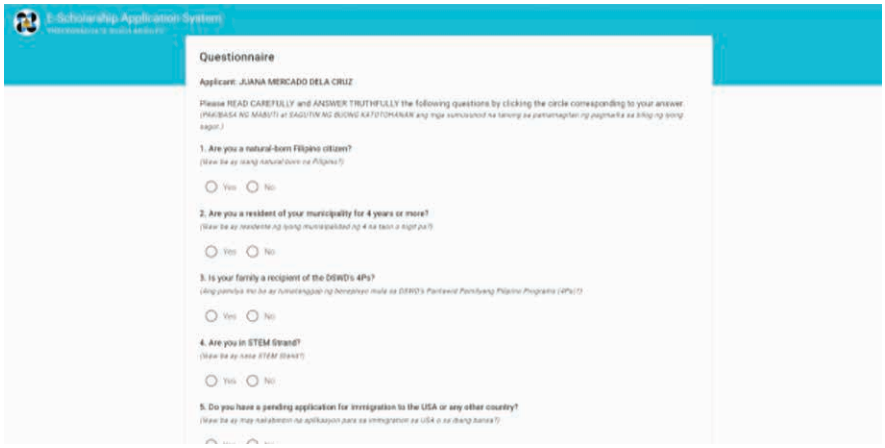
The national scholarship qualifying examination was not administered due to the COVID-19 pandemic. Data analytics of certain proxy indicators were employed in place of the exam to identify the scholarship qualifiers. Documentary requirements were collected through the E-Scholarship Application System beginning June 2020.

On September 20-21, the NCR-based scholarship qualifiers and their parents attended the Virtual Orientation on Scholarship Policies and Procedures via Zoom platform. During the orientation, the terms and conditions of the S&T scholarships were discussed, while issues and concerns were clarified.

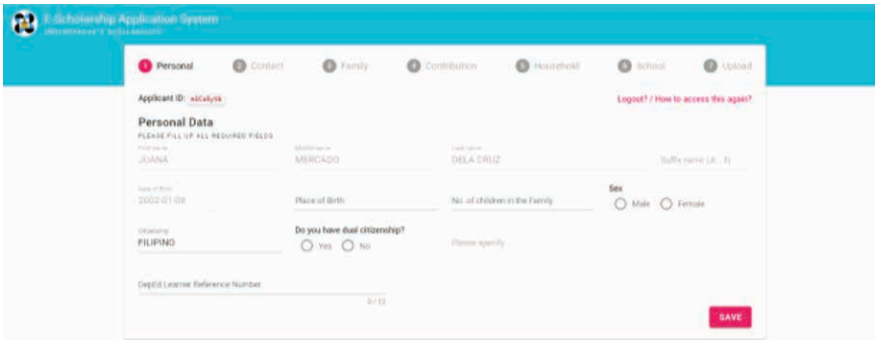
DOST-SEI posted a compilation of frequently asked questions with answers on its website and on the Scholar's Portal, an online platform designed to enable the scholarship qualifiers to download their personalized copy of the Scholarship Agreement, Letter for Enrollment or Endorsement Letter and LBP Letter of Introduction. A recorded video of the orientation was also uploaded on the portal, allowing all qualifiers and their parents to view or revisit parts of the orientation that they might have missed.



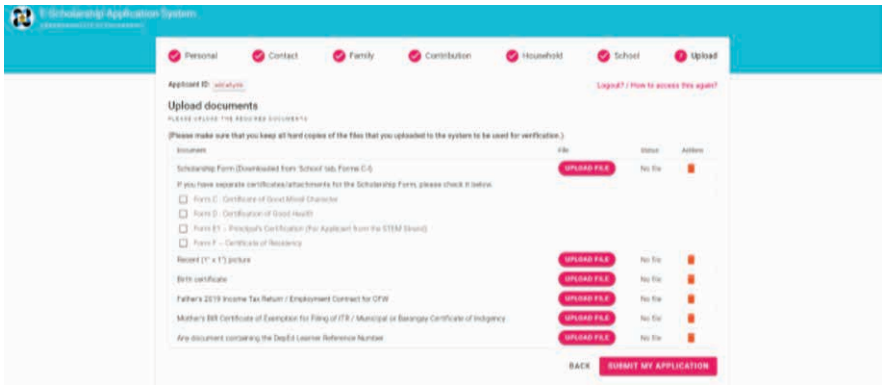
The E-Scholarship Application System.



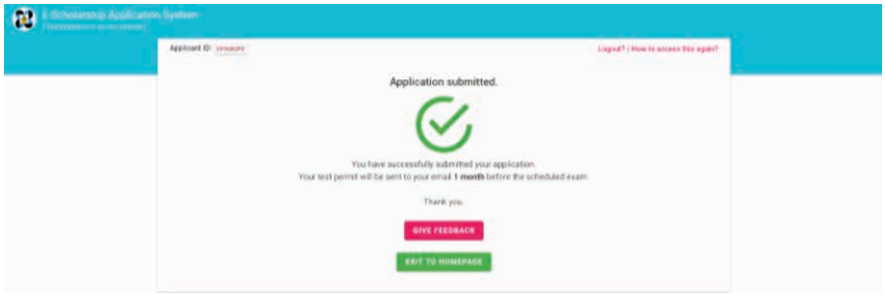
This questionnaire allows the system to automatically determine an applicant's eligibility to the DOST-SEI Scholarship Program. If eligible, the application proceeds to the next module, otherwise, a notice of disqualification is generated.



The module of the e-Scholarship Application System where applicant encodes personal information.



This module enables the applicant to upload and submit the requirements depending on the information entered in the application. It also serves as a checklist to ensure that all documentary requirements have been submitted before the application is finally submitted.



The system informing applicants on the status of their application.

S&T E-Scholarship Application System

Adapting to developments in the field of Information and Communications Technology (ICT) is imperative for organizations to improve and sustain productivity and efficiency, especially in the new normal. The DOST-SEI's Management Information System Unit (MISU) moved into high gear in 2021 to accommodate the sudden demand for the alternative working arrangement during the pandemic, and to enhance the Institute's capabilities to connect with the public.

Through the full implementation of the E-Scholarship Application System, applicants can now submit and upload documentary requirements for both the JLSS and the Undergraduate Scholarship Program via https://www.science-scholarships.ph/.

The system consists of three modules – Eligibility Check, Encoding of Personal Information, and Uploading of Documentary Requirements. The system also evaluates the applicable scholarship program and advises on the correct documents that must be submitted.

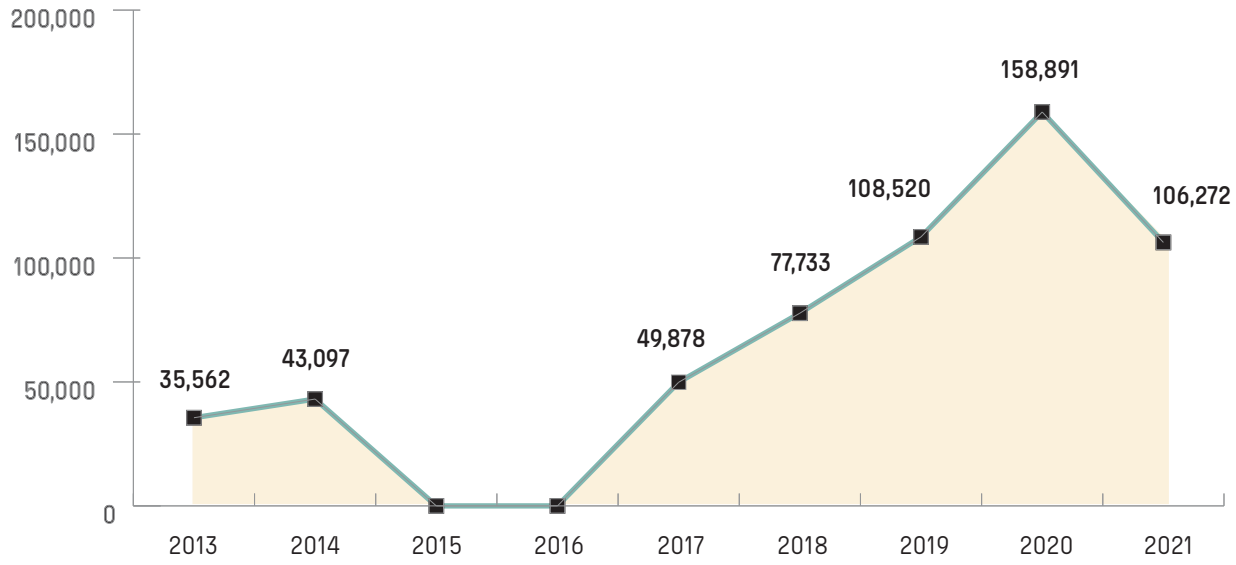


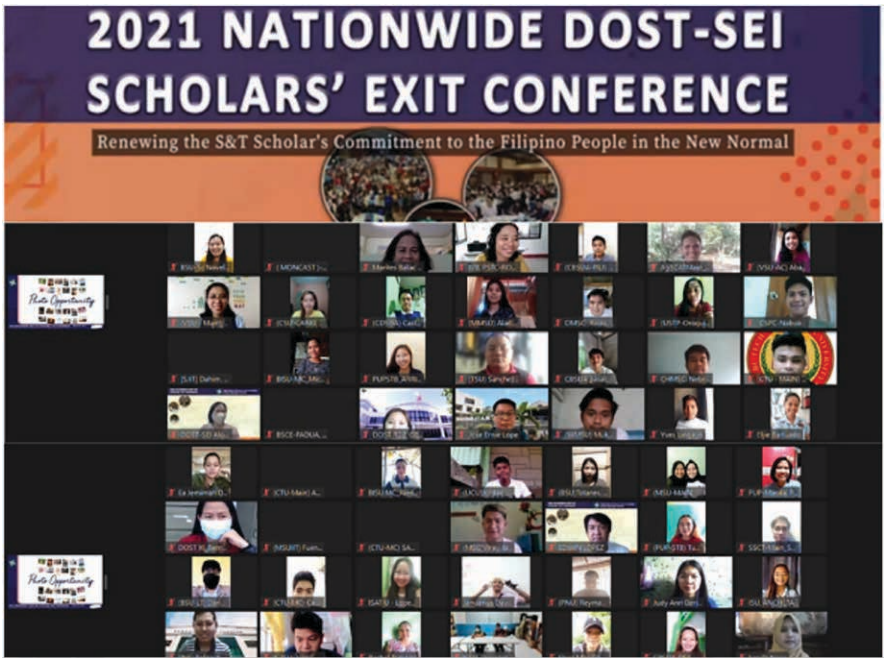
FIGURE 3: Number of applicants for the S&T Undergraduate Scholarship per year. The data shows an annual rise in the number of applicants indicating that more students are interested in taking up careers in science and technology. In 2015 and 2016, no scholarship examination was conducted due to the DepEd transition to the K-12 Program.

The S&T E-Scholarship Application System for the 2021 JLSS debuted on September 20, 2021, and garnered 14,169 applicants. Of this number, 9,688 applications were considered successful applicants after submitting complete documentary requirements. Meanwhile, the S&T E-Scholarship Application System for the 2022 DOST-SEI S&T Undergraduate Scholarship Program was launched on October 22, 2021, and garnered 106,272 applicants.

Launching of E-Application System Dashboard for the Management of Database of Schools

Due to the absence of the scholarship qualifying examination and employment of data analytics in the determination of new scholarship qualifiers, the Institute turned to the academic institutions themselves to obtain comparable information about the applicants.

The School Management Module was added to the E-Application System Dashboard on November 11, 2021. This allowed for the efficient management of the school options for both the Undergraduate and JLSS E-Application Systems as the scholarship staff nationwide can view and update existing school options, add new schools among the options and on rare occasion, report possible duplicate records of schools in the system.



Since the module was launched, 73 requests for the JLSS and 3,486 requests for the Undergraduate E-Application Systems were investigated and acted on accordingly.

Exit Conference: Reconnecting with Graduating S&T Scholars

The first online DOST-SEI Nationwide Exit Conference was participated in by 799 graduating S&T scholars and was held on March 26, 2021 via Zoom meeting.

DOST-SEI annually conducts the Exit Conference to re-orient scholars who are expected to graduate on the terms and conditions of the Scholarship Agreement specifically on service obligation and provide them information about S&T career opportunities and the DOST-SEI graduate scholarship programs.

Filipino Patriot Scholars: Contributing to Community Resilience and Development

DOST-SEI initiated the Filipino Patriot Scholars Project to create a roadmap for developing scholars' mindset and character of being patriots, volunteers, and civic leaders. The Institute believes it should go beyond providing STEM scholarships to create citizens who are both high performing and committed to contributing towards national security, resiliency and development. Thus, DOST-SEI implements the Patriot Project to maximize the scholars' capabilities for nation-building and inspire them to sustain and broaden their engagement in national service.

In its fifth year of implementation, the Patriot Project expanded the reach of its various activities despite the extended COVID-19 restrictions. The Patriot Team hosted and conducted webinars and other activities to continue inculcating patriotism, volunteerism, humanitarianism, and leadership among science scholars. From 2020 to 2021, the project significantly increased its number of beneficiaries who participated

in all activities by 206.14%, covering a total of 13,507 scholars. For 2021, the project has accomplished three major activities, as follows:

- **Webinar on Scholars Values Formation Program**
  From February to July 2021, DOST-SEI hosted 13 webinars on Scholars' Values Formation Program. A total of 3,696 undergraduate scholars (1,771 male; 1,925 female) participated nationwide including MS and Ph.D. scholars under the Capacity Building Program in Science and Mathematics Education (CBPSME). The activity is specifically aimed at mobilizing the S&T scholars placing them at the forefront of patriotism, volunteerism, and social change.

  The program was composed of various activities including talks on DOST-SEI Scholarship Program as a Package of Opportunities for DOST-SEI Scholars, the Making of a Filipino Patriot Scholar, and the Core Values of Professional Excellence, Servant Leadership, and Social Responsibilities.

- **Webinar on Understanding Community Resiliency**
  Another webinar dubbed, "*Understanding Community Resiliency*" was conducted from August to November 2021. A total of 9,388 scholars attended (3,896 male; 5,492 female), including both at the undergraduate and graduate levels and scholar-graduates. The activity is intended to advocate appreciation and integration of scientific knowledge in building community resilience. It also aims to make science scholars understand the concept of resiliency in the context of being a patriot and a Filipino citizen and to operationalize the values of resilience in securing and developing the country.

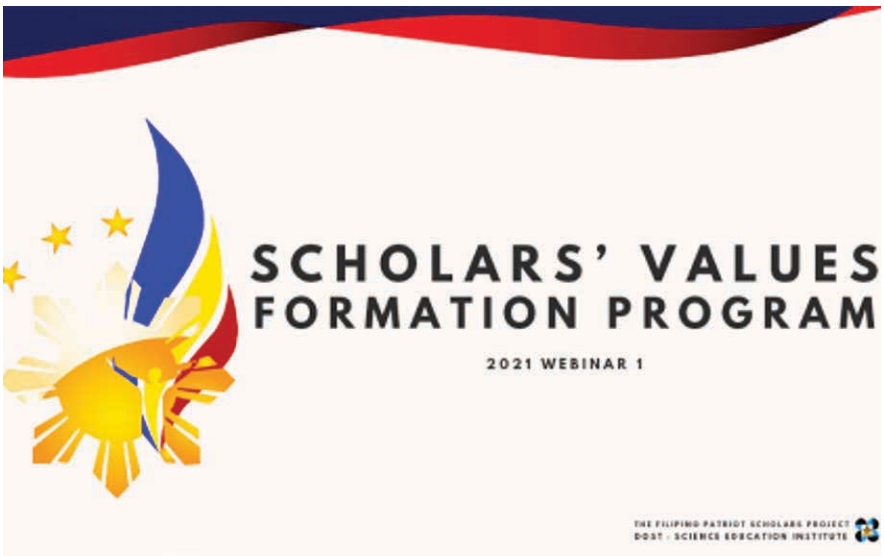
  This webinar was a six-part virtual gathering which tackled different sub-topics on understanding community resilience at the individual, family, and community levels. Topics included:

  - Strengthening Individual and Family Resiliency
  - Understanding Natural Hazards in the Philippines Towards Achieving Resiliency
  - Addressing Health and Food Security in the Philippines
  - The Filipino Behavior and Economic Development During the Pandemic: How Resilient Is It?
  - Understanding Human Development and Community Resilience; and
  - Election as a Social Contract and Citizenry Agenda for National Resilience

  Speakers in these series were from the government, academe, medical field, and local and international organizations.
  Both webinars garnered excellent rating from the participants who regarded the activities as both relevant and transformative, as these made them realize their larger responsibilities of contributing to national development.

- **Publication of The Patriot Magazine**
  Another notable accomplishment was the publication of four issues of the Patriot Magazine with 16,000 copies disseminated to its stakeholders. Featured articles focused on different innovations and volunteering activities in line with education, livelihood, agriculture, public service, health, and environment sectors. The publications were well appreciated by its beneficiaries, especially by the universities as these will serve as reference materials to their library users.

  The Institute funded and supported some of the featured projects of the scholars. The three projects implemented by the scholars from Region I are worth noting. These are the 1) *YouthCheck: Kamustahan at Palitan ng Karunungan* aimed at encouraging the Filipino youth to register for voting and promote active participation in Election 2022; 2) *Youth Advocacy in Caring for the Aged and PWDs (YACAP)* which provided support for the elder persons in six barangays in Ilocos Sur; and 3) the *PailaJuan Project* which provided electricity to four barangays in Ilocos Sur and Ilocos Norte.
  Another remarkable volunteering initiative supported by the Institute



were the collaborative efforts by the Philippine Normal University (PNU) scholars called the *Gabay Iskolar: Aksyon Para Sa Education and EduShare: Turo-Iskolar – a mentoring Initiative for Students in DepEd ALS' Convergence Learning Program*.
The Institute through the Patriot Project is committed to continuously providing science scholars with learning opportunities in the field of science and technology and to make them part of the scientific community contributing towards inclusive national development.

GRADUATE SCHOLARSHIP PROVISIONS

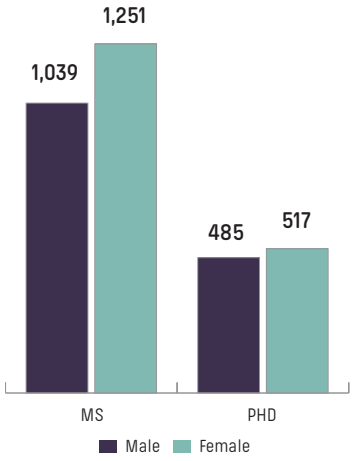


FIGURE 4: Distribution of Scholars Supported by Degree Level and Sex

Accelerated Science and Technology Human Resource Development Program (ASTHRDP) Taking on Challenges of the New Normal

ASTHRDP Scholars Supported in 2021

In 2021, DOST-SEI supported 3,292 graduate scholars through the Accelerated Science and Technology Human Resource Development Program (ASTHRDP). Of the number, 46% are male while 54% are female.

DOST-SEI announced the availability of ASTHRDP graduate scholarships on its website in April 2021. Due to the pandemic, applicants submitted their scanned applications and other requirements via e-mail.

For the First Semester of AY 2021-2022, DOST-SEI awarded 465 new scholars.

After the DOST Secretary approved the list of qualifiers, electronic copies of the notice of award were sent to them.

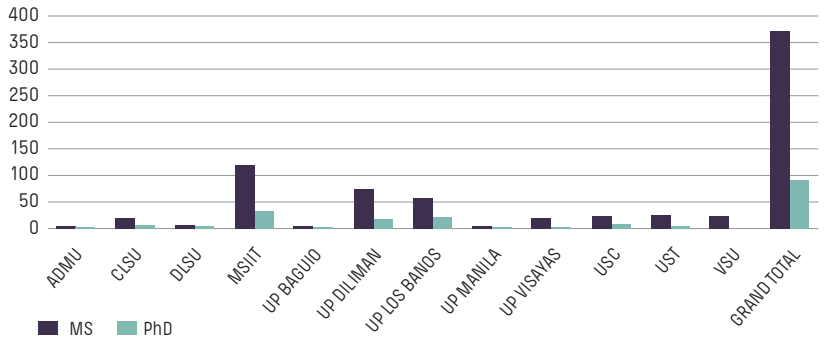


FIGURE 5: Distribution of ASTHRDP Qualifiers in the First Semester of AY 2021-2022 by Degree Level and University

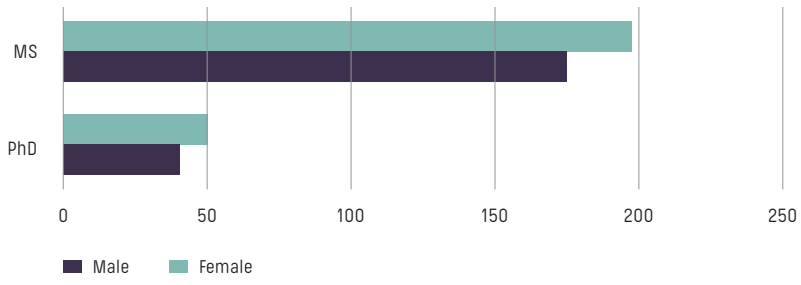


FIGURE 6: Distribution of ASTHRDP Qualifiers in the First Semester of AY 2021-2022 by Degree Level and Sex

Orientation of ASTHRDP-NSC Batch 2021 in a Virtual Setting

Considering the health and safety of the staff and the awardees, DOST-SEI, in collaboration with the ASTHRDP-NSC Project Leaders and university-based Project Staff, held a series of virtual orientations for the 2021 batch of ASTHRDP scholars by university using the Zoom platform for the first time.

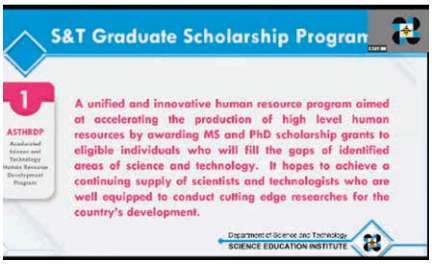
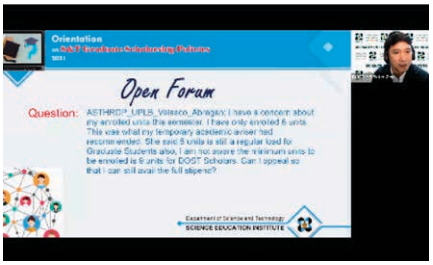
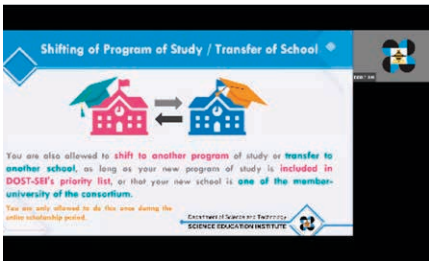


TABLE 1: ASTHRDP Schedule of Scholars' Orientation.

DATE OF ORIENTATION	TOTAL NO. OF SCHOLARS WHO ATTENDED THE ORIENTATION
9 March 2021	113
21 June 2021	65
04 October 2021	206
26 November 2021	237





Research grants and related activities

- **Student Research Support Fund (SRSF)**
  In 2021, DOST-SEI approved 24 requests for grant of scholars for three components: Dissemination Component, Research Grant and Mentor's Fee under the SRSF.

  Graduate scholars are provided financial support when they get opportunities to present or publish their research output in local/ international conferences or refereed journals under the Dissemination Component. The Research Grant, on the other hand, is an additional funding to supplement the outright thesis/dissertation's research allowance. The Mentor's Fee is given as an incentive to the thesis/ dissertation advisers of scholars who are able complete their research and their degrees on time.

- **Research Enrichment (Sandwich) Program**
  Under the Research Enrichment Program, seven ASTHRDP scholars were provided grants in 2021. This enabled the scholars to do part of their

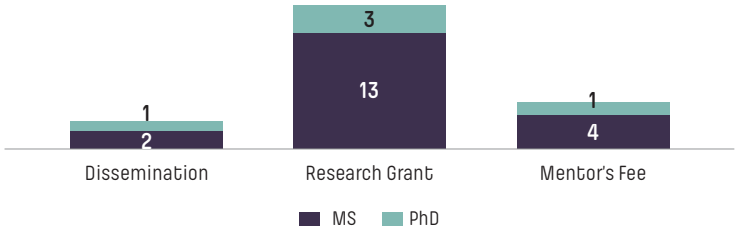


FIGURE 7: Number of Approved Request for SRSF by Degree Level and Component

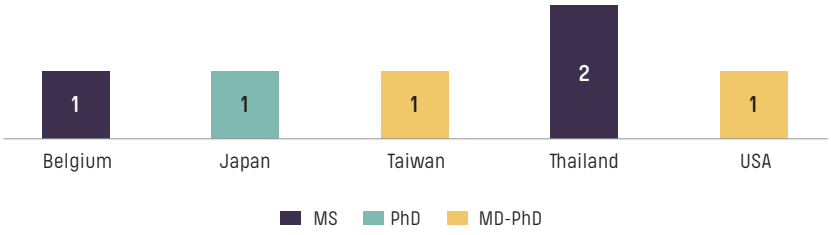
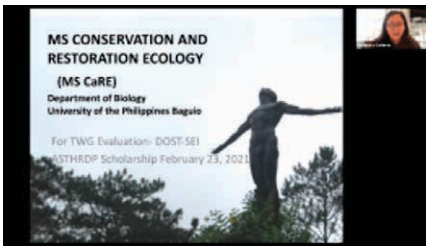


FIGURE 8: Distribution of Sandwich Program Grantees by Degree Level and Country

research in R&D institutions abroad that required facilities, resources or expertise that are not available locally. However, due to travel restrictions, some scholars were advised by their host universities to move the schedule of their sandwich program to 2022.

- **Manila Economic and Cultural Office (MECO) – Taipei Economic and Cultural Office (TECO) Sandwich Scholarship Program (SSP)**
  Six out the 11 MECO-TECO SSP qualifiers in 2020 proceeded with the conduct of their SSPs in Taiwan in 2021.



The TWG for the evaluation of the UP Baguio MS Conservation and Restoration Ecology program meet online via Zoom, with the UP Baguio officials, faculty members and students to discuss the details of the said program.

Graduate Programs Evaluated for Possible ASTHRDP Expansion via Zoom

To expand the courses covered under the ASTHRDP, DOST-SEI conducted virtual evaluation of four graduate programs in priority S&T areas in various universities.

The evaluation was conducted by DOST-SEI through the Technical Working Groups (TWG) composed of experts in the identified programs. The programs were assessed based on their admission process, enrolment and graduation rates, research facilities, library holdings, and the availability and capabilities of faculty members who can mentor scholars in their theses/dissertation.

The MS CaRE program of UP Baguio was approved for inclusion effective AY 2021-2022 while the other programs shall be effective AY 2022-2023.

Scholars doing their laboratory work under the Research Enrichment Program: (L-R) Ms. Jess Grumo conducting a Scanning Electron Microscopy (SEM) Characterization and Ms. Rea Sebumpan conducting a laboratory assay of EPFs against different developmental stages of S. Litura and semi-field assay of Entomopathogenic Fungi against 4th instar Larvae of Spodoptera litura at the National Biological Control Research Center, Khon Kaen University, in country.

TABLE 2: Graduate Programs Evaluated in 2021.

GRADUATE PROGRAM	UNIVERSITY	DATE
MS Conservation and Restoration Ecology (CaRE)	UP Baguio	February 23, 2021
MS Food Science	UP Visayas	June 25, 2021
PhD Applied Mathematics	UP Los Baños	October 1, 2021
MS Physics	UP Los Baños	October 8, 2021

(L-R) Dr. Rosemarie Gutierrez and Dr. Zenaida M. Baoanan, current and former MS CaRE Graduate Program Coordinator at UP Baguio, respectively, Prof. Rolando M. Hipol, Department Chair at UP Baguio, Engr. Albert O. Mariño, Deputy Director of DOST-SEI, Dr. Renezita S. Come, Professor at VSU, Dr. Anthony S. Ilano, Quality Insurance Director of CTU during the online evaluation of the MS CaRE of UP Baguio held on February 23, 2021 via Zoom.

Continuing Support for Regional Universities through Project STRAND

Inclusive development across the regions in the Philippines has always been one of the priorities of the DOST. To ensure that this goal is met, the Department through the Science Education Institute (SEI) remains steadfast in its effort to continue capacitating the higher education institution (HEIs) in the regions through its Project Science and Technology Regional Alliance of Universities for National Development or Project STRAND.

As of December 2021, DOST-SEI supported a total of 146 MS and 19 PhD scholars under Project STRAND. (see Table 3)

TABLE 3: Distribution of On-going STRAND Scholars per University.

UNIVERSITY	ON-GOING SCHOLARS	
	MS	PHD
Batangas State University	5	
Central Mindanao University	63	2
Mariano Marcos State University	6	
Mindanao State University – Marawi	38	
Nueva Vizcaya State University	7	5
Saint Louis University	18	
University of Southeastern Philippines	6	
University of Science and Technology of Southern Philippines – Cagayan de Oro	3	12
Total	**146**	**19**

Conceived to address the need to expand the delivering HEIs for the DOST-SEI graduate scholarships in STEM courses including science and mathematics education, the Project STRAND aims to provide the S&T professionals in the regions opportunities and access to advanced degree studies in universities with approximately high quality of education.

Prior to the implementation of the project, there were three (3) consortia running the graduate scholarship programs namely: National Science Consortium (NSC) for the Accelerated Science and Technology Human Resource Development Program (ASTHRDP); Engineering Research and Development for Technology (ERDT) Consortium; and the National Consortium in Graduate Science and Mathematics Education (NCGSME) for the Capacity Building Program in Science and Mathematics Education (CBPSME). Altogether there were 18 member universities comprising these consortia: 3 schools in Mindanao, 4 schools in the Visayas, and 11 in Luzon, 7 of which are in Metro Manila.

The project is also one strategy in addressing the call of the administration to reach out and support the HEIs in the provinces that need to be strengthened in terms of developing human resource capabilities in order to offer quality STEM courses.

Capacity Building Program in Science and Mathematics Education (CBPSME)

Number of Scholars supported

In 2021, the CBPSME supported a total of 897 Master's and 577 Doctoral scholars enrolled in the member-universities of the National Consortium on Graduate Science and Mathematics Education (NCGSME). Of the 897 Master's scholars, DOST-SEI supported 53 scholars under the Part-time Scholarship for Science and Mathematics Teachers – a component of the CBPSME.

7th National Research Conference in Science and Mathematics Education

The annual conference of the scholars under the Capacity Building Program in Science and Mathematics Education, with a theme, "*SME Innovations: Teaching for Diversity and Equity in the New Normal*" was held on November 10-12, 2021 via Zoom.

TABLE 4: List of Winners for Oral Presentations.

PARALLEL SESSION ROOM (PSR)	CATEGORY	NAME OF SCHOLAR	UNIVERSITY
PSR 1	First	Corina N. Samin	ADMU
	Second	Norzeda B. Angagao	MSU-IIT
	Third	Michelle P. Bales	WVSU
PSR 2	First	Arman DC. Santos	UPOU
	Second	Reymar L. Madeja	BU
	Third	Edsel O. Coronado	WVSU
	Third	Becky May I. Sajo	WVSU
PSR 3	First	Julius Ceasar C. Hortelano	DLSU
	Second	Angelie Mae B. Bonaobra	BU
	Third	Shaira S. Sorongon	WVSU
PSR 4	First	Daylen M. Enriquez	WVSU
	Second	Jose Carel A. Jondonero	WVSU
	Third	Joseph Simon V. Madriñan	ADMU
PSR 5	First	Liza Jean M. Molas	WVSU
	Second	Frosyl F. Miguel	DLSU
	Third	Judy V. Bongala	PNU
	Third	Alicia Jane F. Peras	DLSU
PSR 6	First	Dave Arthur R. Robledo	DLSU
	Second	Gelyn R. Acar	DLSU
	Third	Jenny Lou Bermejo	ADMU
PSR 7	First	Jonathan M. Barcelo	UPOU
	Second	Jhoanne Catindig	DLSU
	Third	Gilbert G. Baybayon	DLSU
PSR 8	First	Nikko Lorenz P. Lawsin	DLSU
	Second	Rholeo O. Virata	DLSU
	Third	Dennis Lee Jarvis B. Ybañez	ADMU
PSR 9	First	Sylvester T. Cortes	USC
	Second	Mark Donnel D. Viernes	CLSU
	Third	Hazel P. Germinal-Diaz	SMU
	Third	Lester Hao	ADMU
PSR 10	First	Judy Mae L. Castillo	USC
	Second	Apler J. Bansiong	UPOU
	Third	Lovelyn B. Balbedina	ADMU
PSR11	First	Allan M. Canonigo	UPCEd
	Second	Aaron A. Funa	DLSU
	Third	Shila Rose D. Sia	DLSU
PSR12	First	Jonathan O. Borbon	WVSU
	Second	Harold P. Lumayod	ADMU
	Third	Mikka Angela A. Elviña	DLSU

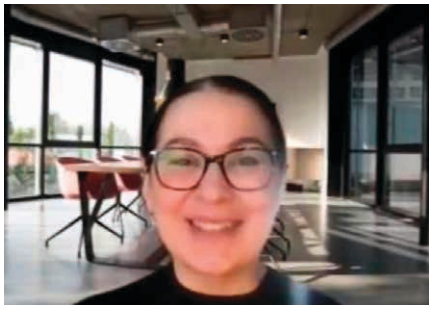
A total of 202 research outputs of the master's and doctorate scholars were featured: 160 in oral technical presentations and 42 in poster presentations. The research outputs presented in this year's Conference addressed the following areas of teaching:

- Instructional Materials and Development
- Learning Experiences and Assessments
- Teaching Modes and Strategies and
- Conceptual Studies and Teaching Capacity Development

The top two universities with the highest research outputs were the West Visayas State University (WVSU) with 35 and the Ateneo de Manila University (ADMU) with 32. In this year's Conference, the CBSPME Organizing Committee recognized the best 3 posters and best 3 oral presenters per category/areas of teaching and parallel session room (PSR), respectively. A total of 39 winners for the oral presentations and 12 winners for the poster presentations were awarded.

Prof. Fortunato T. De la Peña giving his inspirational message during the Scholars' Conference.

DOST Secretary Prof. Fortunato T. De la Peña underscored the importance of Science and Mathematics Education and scientific communication, especially during the pandemic when a strong culture anchored on STEM can go a long way in saving lives and saving economies. He also emphasized that more innovations are needed that will make SME more inclusive to all and this conference hopes to bring to light the innovations and best practices that can be extended to schools all over the country.



Dr. Silvija Markic explains the innovative methods used to meet the challenges of diversity and inclusion in Science education.

Dr. Silvija Markic, a full professor for (primary) Science and Chemistry education at the Ludwigsburg University of Education, Germany, in her Plenary Talk reported about her institution's practices of continuing studies on innovative methods of teaching and learning to cater to diversity in learning. As learners bring in their differences in culture, race, cognitive skills, migration background, personal or special needs and language – these pose challenges to science teaching.

In her talk "Diversity in Science towards Social Inclusion" she explained the development and implementation of innovative methods, tools, and activities to foster inclusive science education. This can be achieved through the development of good practice material and further innovation in concrete learning settings and through the support of pre-and in-service science teachers in addressing dimensions of diversity in science class and reflecting with them on the impact of diversity in science learning.

The virtual participation and attendance of 683 participants that include CBPSME and Project STRAND scholars; project directors/staff, faculty-research advisers from the NCGSME universities in Luzon, Visayas and Mindanao and the NCR and STRAND suggests that access to connectivity that may cause challenges can always be managed when teachers are empowered through education in science and mathematics.

TABLE 5: List of Winners for Poster Presenters.

CATEGORY	AWARD/ PLACE	NAME OF SCHOLAR	UNIVERSITY
Category 1	First	Eufemio D. Adarayan jr.	ADMU
	Second	Kristelle M. Ileto	CLSU
	Third	Fidel P. Manaol jr.	CLSU
Category 2	First	Daisy B. Revilla	ADMU
	Second	Zaldy D. Alima	ADMU
	Third	Joselito Q. Bolivar	WVSU
Category 3	First	Ray Matthew A. Cortez	ADMU
	Second	Josiemah L. Castañeda	CLSU
	Third	Daryl N. Baltazar	CLSU
Category 4	First	Leonardo M. Francisco	DLSU
	Second	Bench G. Fabros	CLSU
	Third	Jonnah Christine S. Guerrero	ADMU

TABLE 6: Breakdown of Conference Participants by Academic Institutions

CONSORTIUM UNIVERSITY	NO OF PARTICIPANTS
Ateneo de Manila University	39
Bicol University	50
Central Luzon State University	50
Cebu Normal University	37
De La Salle University	76
Leyte Normal University	13
Mindanao State University (MSU)-Iligan Institute of Technology	56
MSU-Marawi	33
Mariano Marcos State University	46
Philippine Normal University	26
Saint Mary's University	35
University of San Carlos	42
University of the Philippines (UP)-Open University	31
UP College of Education	21
Western Mindanao State University	24
West Visayas State University	44
DOST-SEI	24
STRAND Participants	
Central Mindanao University	23
University of Science and Technology of Southern Philippines – Cagayan de Oro	3
Nueva Vizcaya State University	10
Total	**683**

Engineering Research for Development and Technology (ERDT) Consortium

Similarly, the DOST-SEI and the Engineering Research for Development and Technology (ERDT) Consortium maximized the use of digital and online tools and applications to push through with its activities, functions, and processes in the new normal.

Local Graduate Scholarship 2021 Intake and Number of Scholars Supported

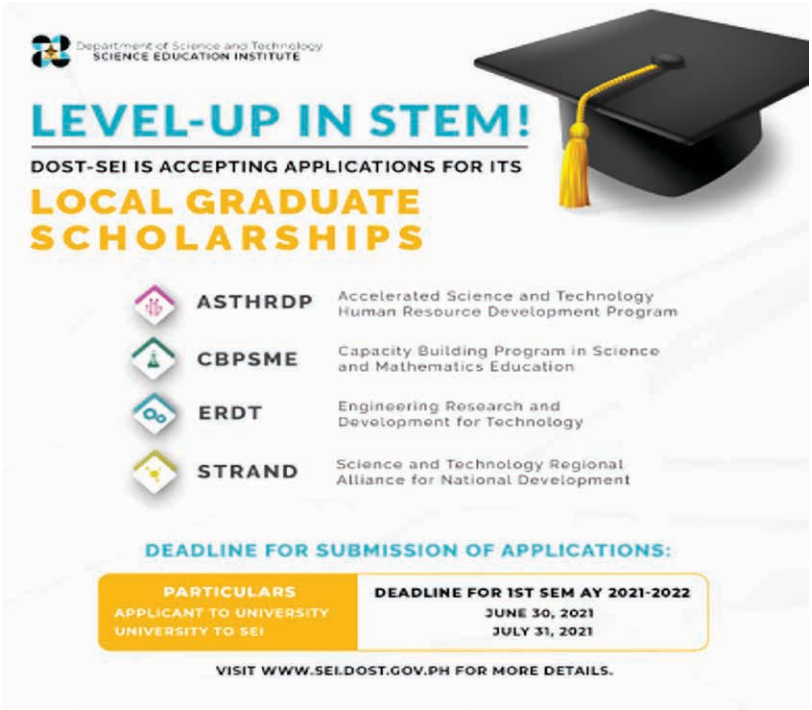
To fulfill its mandate and to enable the ERDT applicants to meet the requirements, DOST-SEI relaxed the timeline and extended the deadlines of the application. Interested applicants emailed their applications to the specific consortium member-university they wished to enter, and the latter endorsed the list of potential qualifiers to the Institute for final evaluation and approval.

In 2021, a total of 1,233 MS and PhD scholars in various engineering fields were monitored and supported under the ERDT in collaboration with 8 universities constituting the ERDT Consortium.

TABLE 7: Number of ERDT Scholars Supported in 2021.

STATUS	MS	PHD	TOTAL
New	305	46	351
Continuing	260	149	409
Graduating	361	112	473
TOTAL	926	307	1,233

Some 327 MS and 48 PhD qualifiers were approved by the DOST Secretary. Before the semesters started, these new qualifiers attended the first Virtual Orientation on Scholarship Policies and Procedures via Zoom held by their respective university ERDT Project Leader and Project Staff.



Announcement of the submission of applications for all the Local Graduate Scholarship Programs, including the ERDT, as posted in the DOST-SEI website and official Facebook Page.

Expansion of Priority S&T Graduate Degree Programs/ Graduate Scholarship Consortium under the ERDT Program

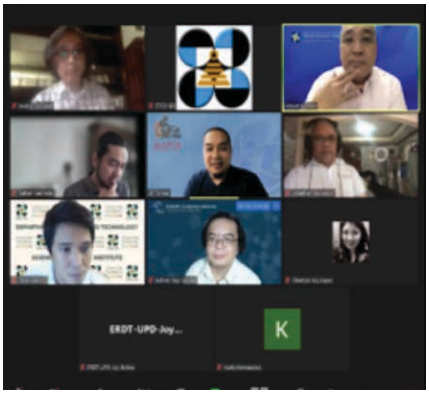
To widen the scope of specializations and enable more students to avail themselves of the ERDT scholarship, requests for inclusion of new graduate programs from universities were evaluated.

A Technical Working Group of experts evaluated the Master of Science in Computer Science (MSCS) and Doctor of Philosophy in Computer Science (PhD CS) programs of the Technological Institute of the Philippines-Manila (TIP-Manila) and Master of Science in Computer Science (MSCS) program of the Technological Institute of the Philippines-Quezon City (TIP-QC).

The evaluation process included the document review; and on September 9, 2021, a virtual visit to the requesting university where details of the program were presented, ocular tour of its facilities, and virtual interview of the programs' faculty members and students were conducted.

On the recommendation of the TWG, the DOST Secretary approved the allocation of graduate scholarship slots to TIP Manila and Quezon City as delivering institutions for the MS Computer Science and PhD Computer Science programs covered under the ERDT effective the Second Semester of AY 2021-2022. DOST-SEI initially provided TIP five (5) scholarship slots per degree program in each campus.

The TWG conducting the virtual evaluation and ocular visit of the TIP programs/facilities via Zoom Meeting App.



The TWG conducting the pre and post evaluation lead by Engr. Mariño.

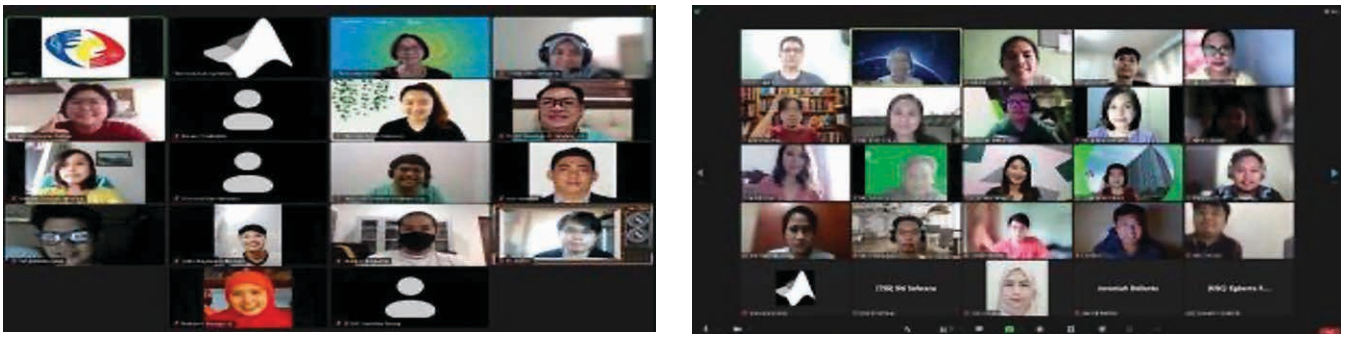
Training on Advanced Computer Software (MATLAB)

After an assessment survey conducted among the scholars and faculty members of the Engineering Department, the ERDT conducted a series of training on MATLAB computational software focusing on specific MATLAB applications that were deemed useful to the scholars for their programs and research.

Conducted from July 22 to September 24, 2021, the series of training was designed to empower scholars and faculty advisers to start or continue their researches remotely with the use of advanced computer software.

TABLE 8: Number of Participants per Training Course.

COURSE TITLE	COVERED DATE/S	PARTICIPANTS			
		MALE	FEMALE	UNDISCLOSED	TOTAL
Machine Learning G1	22-23 Jul 2021	14	10	1	25
Machine Learning G2	29-30 Jul 2021	20	4		24
Statistical Methods G1	2-3 Aug 2021	13	10		23
Machine Learning G3	5-6 August 2021	21	3		24
Big Data G1	11-Aug-21	18	3		21
Machine Learning G4	12-13 August 2021	12	9		21
Statistical Methods G2	16-17 August 2021	12	12		24
Machine Learning G5	19-20 August 2021	12	9		21
Deep Learning G1	19-20 August 2021	14	8		22
Statistical Methods G3	23-24 August 2021	8	13		21
Image Processing G1	25-27 August 2021	15	7		22
Big Data G2	01-Sep-21	12	6		18
Statistical Methods G4	6-7 September 2021	9	9		18
Statistical Methods G5	20-21 September 2021	9	7		16
Image Processing G2	22-24 September 2021	11	8		19
	TOTAL	**200**	**118**	**1**	**319**



Group photos of some of the MATLAB Training participants.

9th ERDT Congress: Engineering the Future through Digital Transformation

The ERDT Congress, an annual event where ERDT scholars, faculty members, researchers, visiting professors, and industry delegates come together, learn, and get inspired by plenary lectures of distinguished local and foreign professors, researchers, and government and industry leaders, was conducted on September 8, 10, 15 and 17, 2021 . Due to restrictions on gatherings and mobility, the ERDT Consortium held its yearly congress virtually for the second time via Zoom Meeting App. The same was live streamed on YouTube to open the viewership to the public.

With the theme, "*Engineering the Future through Digital Transformation*", the 9th ERDT Congress drew hundreds of participants in the virtual sessions.

Announcement of the Call for Papers as posted in the ERDT website and official Facebook Page.

Notable individuals from the different sectors and industries talked about the domains of digital transformation and discussed key points iof digital literacy, digital inclusivity, and data privacy. They shared how they digitized processes in their organizations and talked about the latest technologies in the Production and Manufacturing Sectors.

TABLE 9: Number of Participants per Session During the 9th ERDT Congress.

SESSION	NO. OF PARTICIPANTS
Plenary Session 08 September 2021	454
e-Poster Competition 10 September 2021	241
Parallel Session A: Digital Infrastructure 15 September 2021	156
Parallel Session B: Digital Literacy and Inclusivity, and Data Privacy 16 September 2021	124
Parallel Session C: Sectoral Transformation in Government, Business, and Academe 17 September 2021	306
Parallel Session D: Sectoral Transformation in the Production and Manufacturing Sector 18 September 2021	140

The Speakers and Moderators of the plenary and parallel Sessions.

17th ERDT Conference: Engineering Innovation and Technology for Recovery and Resilience

The 17th ERDT Conference was conducted virtually on December 21-22, 2021. With the theme *"Engineering Innovation and Technology for Recovery and Resilience,"* the conference sessions were attended by students and academicians from different colleges and universities all over the country.

The 2-day online conference served as a platform where ERDT scholars presented their researches, exchanged information, and collaborated in the areas of engineering, science and technology with their co- scholars and research advisers.

Announcement of the Call for Papers as posted in the ERDT website and official Facebook Page.

For the second day of the Conference, five oral presentation sessions took place simultaneously. ERDT scholars and faculty advisers presented 32 papers under the five R&D tracks of ERDT, namely: Energy, Environment and Infrastructure, Information and Communication Technology, Manufacturing and Machinery, and Semiconductor Materials and Electronics. The following researches received the Best Paper Award:

TABLE 10: List of Papers Presented During the 17th ERDT Conference.

TITLE OF PAPER	AUTHORS	UNIVERSITY
Regional Cyclonic Wind Field Modeling of the Philippines	Joshua C. Agar*, Timothy John S. Acosta, Jaime Y. Hernandez Jr.	UPD
Investigating the Interaction Between Crowd Dynamics and Train Operations Through Agent-Based Modeling	Alexczar Dela Torre*, Unisse Chua, Briane Paul Samson	DLSU
Development of Dryer-Cleaner Machine for Rice Hull as Litter Material for Broiler Breeder Production	Rolando Almerol*, Marvin Cinense, Ruel Peneyra, Carolyn Grace Somera	CLSU
Hydrothermal Synthesis of Non-fired Ceramic Material for Coral Reef Rehabilitation	Rodmar Love Morales*, Ephraim Ibarra, Lori-Ann Cabalo	MSU-IIT

*presenting author

The different sessions enjoyed the following viewership:

TABLE 11: Number of Participants per Session.

SESSIONS	PARTICIPANTS
Morning Plenary Session 21 December 2021	171
Afternoon Plenary Session 21 December 2021	165
Oral Presentation Session 22 December 2021	309

Speakers and Moderators during the Plenary Session

Strengthening the ERDT Consortium Faculty Members

To capacitate and level up the skills of the faculty members of the ERDT Consortium, DOST-SEI awarded foreign PhD scholarships to 15 qualified faculty members under the Faculty Development Program in 2021.

DOST-SEI, in collaboration with the ERDT Consortium, monitored and supported a total of 39 on-going faculty development scholars including the new intake in the year 2020. Table 4 shows the countries where these scholars are studying and their fields of study.

TABLE 12: The New Scholars Under the Faculty Development Program (Foreign Ph.D. Scholarship) for the Year 2021.

NAME OF FACULTY SCHOLAR	HOME UNIVERSITY	HOST UNIVERSITY	COUNTRY	AREA OF SPECIALIZATION
Balicanta, Louie P.	UPD	Universiti Teknologi Malaysia	Malaysia	Geoinformatics
Carreon, Mario T.	UPD	Nara Institute of Science and Technology	Japan	Computer Science
Chua, Adelson N.	UPD	University of California, Berkeley	USA	Electrical Engineering and Computer Sciences
Dizon, Arniel Ching O.	MSU-IIT	McMaster University	Canada	Chemical Engineering
Fernandez, Ken Bryan A.	UPD	Kyushu University	Japan	Energy and Environmental Engineering
Galad, Marlon N.	CLSU	North Dakota State University	USA	Agricultural and Biosystems Engineering
Gonzales, Jeffrey A.	UPLB	Colorado State University	USA	Civil Engineering
Ibañez, Roderaid T.	UPD	University of Nottingham	United Kingdom	Mechanical Engineering
Lowaton, Allenn C.	MSU-IIT	National Taipei University	Taiwan	Electrical Engineering
Macasieb, Reygie Q.	UPD	Hokkaido University	Japan	Geoenvironmental Engineering
Santos, Christopher G.	UPD	Korea Advanced Institute of Science and Technology	South Korea	Electrical Engineering
Ventura, Giancarlo P.	UPD	Stanford University	USA	Structural Engineering & Geomechanics
Vidal, Adrian R.	UPD	Monash University	Australia	Electrical and Computer Systems Engineering
Zoleta, Joshua B.	MSU-IIT	Hokkaido University	Japan	Minerals Processing and Resources Recycling Engineering

TABLE 13: Distribution of On-going Faculty Scholars per Country and Field of Study.

COUNTRY	FIELD OF STUDY	NO. OF SCHOLARS
Australia	Electrical and Computer Systems Engineering	1
	Electrical Engineering	1
	Materials Science and Engineering	1
Austria	Surveying and Geoinformation	1
Canada	Chemical Engineering	1
France	Materials Science and Engineering	1
Japan	Computer Science	2
	Energy and Environmental Engineering	1
	Geoenvironmental Engineering	1
	Mechanical Engineering	1
	Minerals Processing and Resources Recycling Engineering	1
Malaysia	Geoinformatics	1
Netherlands	Aerospace Engineering	1
New Zealand	Mechanical Engineering	1
Singapore	Architectural Engineering	1
South Korea	Architectural Engineering	1
	Electrical Engineering	1
	Mechanical Convergence Engineering	1
Taiwan	Electrical Engineering	3
Thailand; Japan	Engineering Technology and Civil Engineering	1
United Kingdom	Biomedical Imaging	1
	Computer Science and Informatics	1
	Electronics and Communications Engineering	1
	Mechanical and Aerospace Engineering	1
	Mechanical Engineering	1
	Sustainable Energy Technology	1
USA	Biological and Agricultural Engineering	4
	Chemical Engineering	1
	Civil and Environmental Engineering	1
	Civil Engineering	1
	Electrical Engineering and Computer Sciences	1
	Engineering (concentration in Mechanical Engineering)	1
	Structural Engineering & Geomechanics	1
	Total	**39**

TABLE 14: Faculty Scholars Under the FDP-Foreign Ph.D. Scholarship Who Graduated in 2021.

NAME	DEGREE PROGRAM	HOST UNIVERSITY	TITLE OF DISSERTATION	GRADUATION/ COMPLETION
Central Luzon State University				
MATEO, Wendy C.	PhD in Biological and Agricultural Engineering	Washington State University, U.S.A.	Synthesis of Biomass-based Solid Acid Catalyst by Direct Carbonization-Sulfonation	May 2021
FABULA, Jonathan V.	PhD in Biological and Agricultural Engineering	Kansas State University, U.S.A.	Quantifying Nozzle Pressure Flow Rate and Response Time of Pulse Width Modulation Control Modules in Agricultural Sprayer	May 2021
Mindanao State University-Iligan Institute of Technology				
JABIAN, Marven E.	PhD in Electrical and Electronic Engineering	Kyushu University, Japan	Electrical Power Supply Management in Normal and Supply Deficit Situation for Residential Consumers Based on Appliances Priority Consideration, Fairness Evaluation, and Activity Identification	March 2021
University of the Philippines Diliman				
DALISAY, Jon Dewitt E.	PhD in Theoretical and Applied Mechanics	University of Illinois at Urbana-Champaign	Nonlinear System Identification, Reduced Order Modelling, and Uncertainty Quantification	December 2021
DE GUZMAN, Jaybie	PhD Electrical Engineering	University of New South Wales	Decentralizing Storage and Processing of Wearable Data for Improved User Privacy and data Protection	January 2021
MONTEALEGRE, Charlimagne M.	PhD Chemical and Biomolecular Engineering	Hong Kong University of Science and Technology, Hong Kong SAR	Development of a Bacteriophage-based Platform Technology: Application in the Treatment of Hydrogen Sulfide Generation	September 2021
University of the Philippines Los Baños				
LAURIO, Michael Vincent O.	PhD in Engineering (Chemical Engineering)	Rowan University, U.S.A.	Utilization of Lignocellulosic Biomass Ash for the Production of Geopolymer	July 2021

Research Enrichment Program (Sandwich Program)

Nine ERDT scholars were awarded grants under the Research Enrichment (Sandwich) Program in 2021 to do part of their research abroad. However, one of them was placed on-hold waiting for change of schedule while three withdrew due to pandemic-related travel restrictions.

TABLE 15: ERDT Scholars Who Are Awarded under the Sandwich Program in the Year 2021.

NAME OF SCHOLAR	HOME UNIVERSITY	DEGREE PROGRAM	HOST UNIVERSITY	COUNTRY	TITLE OF RESEARCH/TOPIC/ DISCIPLINE OF STUDY	STATUS
Doña, Florie Joy C.	MSU-IIT	MS in Material Science and Engineering	National Institute for Materials Science (NIMS)	Japan	Thermoelectric Properties of Beneficiated Copper-bearing Minerals Mechanically Modified by Micro/ Nanostructuring Method	withdrew
Lopez, Edgar Clyde R.	UPD	Ph.D. in Chemical Engineering	National Cheng Kung University	Taiwan	Synthesis of Transition Metal-based Cyclodextrin Metal-Organic Frameworks for Carbon Dioxide Capture	withdrew
Nate, John Vincent A.	CLSU	MS in Agricultural Engineering	Washington State University	USA	Profiling and Characterization of Liquid and Gas Products from Fast Pyrolysis of Cacao (Theobroma Cacao L.) POD Husk	returned - on-going local scholarship

continued on next page

continued from previous page

NAME OF SCHOLAR	HOME UNIVERSITY	DEGREE PROGRAM	HOST UNIVERSITY	COUNTRY	TITLE OF RESEARCH/TOPIC/ DISCIPLINE OF STUDY	STATUS
Papa, Ervin F.	MU	Ph.D. Environmental Engineering	National Tsing Hua University	Taiwan	Rational Utilization of Coffee By-products as a Modified Biochar for the Removal of Organic and Inorganic Pollutants from Wastewater	hold - for change of schedule
Picones, Marjorie Ann S.	UPD	MS in Environmental Engineering	University of Salerno	Italy	Self-forming Dynamic Membrane Bioreactor-Nanofiltration (SFD-MBR-NF) Hybrid System for Wastewater Treatment: Removal of Pollutants, Nutrient Recovery, and Water Reuse	returned - on-going local scholarship
Romero, Junnile L.	MSU-IIT	MS in Material Science and Engineering	Hokkaido University	Japan	Extraction of Rare Earth Elements from Coal Fly Ash Leachate through Extraction Chromatography	on-going SP
Vistan, Rhovee P.	UPD	MS in Chemical Engineering	National Chung Hsing University	Taiwan	Degradation of Metronidazole in Aqueous Solution using Peroxymonosulfate-UV-AC (PMS-UV-AC) System	withdrew

Research Dissemination Grant

Seventy-eight ERDT scholars had their research works published in refereed journals or presented their research outputs in local and international conferences, or scientific meetings with financial grant under the ERDT Research Dissemination Grant (RDG) in 2021.

TABLE 16: RDG-Supported Paper Publication/Presentation in 2021

22	56
Number of Published Papers	Number of Presented Papers

Faculty Research Dissemination Grant

The faculty members of the ERDT Consortium member-universities enjoyed financial support under the Faculty Research Dissemination Grant (FRDG) for the publication of their research works in refereed technical journals or presentation of the same in local and international conferences, forums, and scientific meetings.w

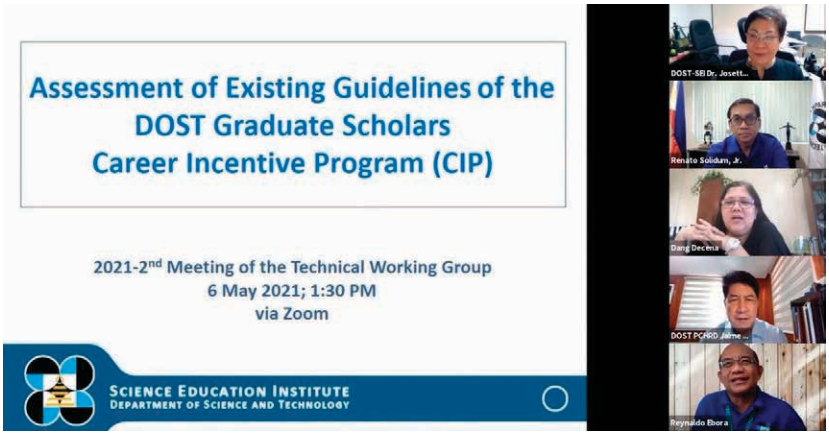
TABLE 17: FRDG-Supported Paper Publication/Presentation in 2021.

20	36
Number of Published Papers	Number of Presented Papers

Resumption of Deployment of CIP Graduate Fellows

Recognizing the possible risks facing humanity in the coming years, the Department of Science and Technology – Science Education Institute (SEI) deemed it necessary to put in place some strategic mechanisms that would ensure stable and sustainable supply of local researchers, scientists, and engineers in the country.

After being put on hiatus for more than a year and upon direction to double the human resources amidst the country's fight against the pandemic, the DOST-SEI resumes hiring and deployment of



DOST-SEI Director, Dr. Josette T. Biyo, discusses the agenda of the TWG meeting.

researchers, scientists, and engineers to help government and industry craft, create and implement more science-based decisions and policies through its DOST Graduate Scholars Career Incentive Program (CIP).

On May 6, 2021 the Technical Working Group (TWG), headed by the Undersecretary for Scientific and Technical Services, Dr. Renato U. Solidum, Jr., held its second meeting to assess and reformulate the guidelines for the CIP. The TWG is composed of the DOST-SEI Director, Dr. Josette T. Biyo, and heads of the different DOST Advisory Bodies and Councils such as the National Research Council of the Philippines (NRCP), Philippine Council for Agriculture, Aquatic, and Natural Resources Research and Development (PCAARRD), Philippine Council for Health and Research and Development (PCHRD), and Philippine Council for Industry, Engineering, and Emerging Technology Research and Development (PCIEERD).

The Career Incentive Program provides training opportunities through actual involvement in research and development and other technological services and thus, creates a pool of trained S&T personnel.

Since its implementation in 2015, the Career Incentive Program (CIP) for S&T Graduate-Scholars has employed hundreds of highly skilled and competent S&T professionals who are products of the various DOST-SEI Graduate Scholarship Programs. Following the approval of the revised CIP guidelines, the DOST-SEI has resumed the deployment of the CIP Graduate Fellows in September 2021. As of December 2021, DOST-SEI deployed a total of 80 CIP Graduate Fellows to different DOST research institutions, other government research institutions, university research facilities where they contributed their knowledge and expertise.

The CIP is just one of the schemes addressing the administration's call to strengthen the country's S&T capability and to a certain extent, avert unemployment of DOST-SEI scholar-graduate.`

TABLE 18: Distribution of CIP Graduate Fellows in 2021.

HOST INSTITUTION	MS GRADUATE FELLOW	PHD GRADUATE FELLOW	TOTAL
CARAGA Food Innovation Center	1		1
Central Luzon State University	3		3
De La Salle University	1		1
DOST – Food Nutrition Research Institute	1		1
DOST – Industrial Technology Development Institute	1		1
DOST – Philippine Council for Agriculture, Aquatic, and Natural Resources Research and Development	1		1
DOST – Philippine Nuclear Research Institute	6		6
DOST – Philippine Textile Research Institute	1	1	2
DOST Regional Office 1	1		1
DOST Regional Office 11	3		3
DOST Regional Office 12	1		1
DOST Regional Office 6	1		1
DOST Regional Office 8	1		1
Mindanao State University-Iligan Institute of Technology	2		2
Philippine Carabao Center	1		1
Research Institute for Tropical Medicine	3		3
University of San Agustin	2	2	4
University of the Philippines-Diliman	16	1	17
University of the Philippines-Los Baños	25		25
University of the Philippines -Manila		2	2
University of the Philippines -Visayas	1		1
Visayas State University	2		2
Total	**74**	**6**	**80**

Continuing Support for the DOST-Human Resource Development Program (DOST-HRDP)

In 2021, the DOST-SEI, in collaboration with the DOST-HRDP Committee, implemented the DOST Human Resource Development Program (HRDP) – Degree Component. It included Local Scholarships, Foreign Scholarships, Incentives for Self-Financed Graduates, Bar Review Grant, Sandwich Program, and Student Research Support Fund.

Local Scholarships

This component of the HRDP provides scholarships in local universities to regular DOST employees for the pursuance of graduate studies in areas relevant to their job functions.

The Committee reviewed the profile of applicants, conducted the interview and subsequently deliberated for the selection of qualifiers for the scholarship program. For AY 2021-2022 the HRDP Committee awarded 27 MS and 8 Ph.D. degree scholarships.

The HRDP also approved the program entitled "Capacity Building of DOST Food Safety Team through the Master in Food Safety Management (MFSM) Program of the Philippine Women's University" proposed by the Office of the Undersecretary for Regional Operations through the DOST Region III. Twenty applicants were awarded the scholarship, i.e. 17 from the different regional offices and 3 from Industrial Technology Development Institute, Food Nutrition Research Institute and the Office of the Undersecretary for Regional Operations.

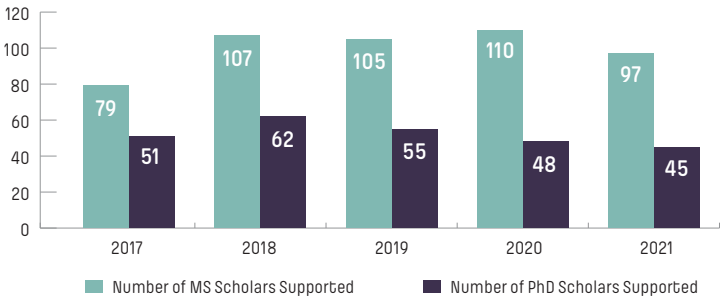


FIGURE 9: Number of DOST-HRDP Scholars Supported: 2017-2021

TABLE 19: Distribution of New DOST-HRDP Scholars by Agency

AGENCY	NO. OF SCHOLARS		TOTAL
	MASTER'S	DOCTORAL	
ITDI	5		5
FNRI	1		1
PCAARRD	4		4
MIRDC	2		2
FPRDI	1		1
TAPI	2		2
PAGASA	1		1
ASTI		1	1
PNRI	3		3
PSHS-MAIN		2	2
PSHS-WVC		1	1
PSHS-CALABARZON	1		1
PSHS-BICOL	1		1
PSHS-CVC		1	1
PSHS-CARAGA	1	1	2
OUSERO	1		1
DOST-NCR	3		3
DOST-CAR	1	1	2
DOST I	1		1
DOST II	1		1
DOST III	4		4
DOST IV-A	3		3
DOST IV-B	3		3
DOST V	1		1
DOST VI	2		2
DOST X	1		1
DOST XII	2		2
DOST XII	1	1	2
DOST XIII	1		1
TOTAL	**47**	**8**	**55**

Foreign Scholarship Program

Foreign scholarships may be granted to selected DOST employees subject to availability of counterpart funding support from external sources and subject to the requirements of DOST, the sending agency and the sponsoring agency.

In 2021, the DOST-HRDP supported a total of three scholars under its Foreign Graduate Scholarship component. The MS and two PhD scholars were enrolled in notable universities in Japan and Thailand. The Foreign Graduate Scholarship is granted to selected DOST employees subject to the availability of counterpart-funding from external sources and to the requirements of the DOST and the sponsoring agency.

TABLE 20: Distribution of DOST-HRDP Foreign Scholars by Agency

AGENCY	NO. OF SCHOLARS		TOTAL
	MASTER'S	DOCTORAL	
DOST REGION IV-B	1	-	1
ITDI	-	1	1
FPRDI	-	1	1
Total	1	2	3

Incentives for Self-financed DOST Employees

Incentive program for self-financed graduates of Master's and Doctorate degree.

Seven DOST employees were given Certificate of Merit and cash incentives for obtaining advanced degrees in 2021 as self-financed students. The cash incentives ranged from P60,000 to P120,000 for Doctorate graduates and P40,000 to P80,000.00 for Master's degrees.

TABLE 21: List of Self-financed DOST Employees.

NAME	AGENCY	DEGREE PROGRAM	UNIVERSITY
VIANZON, JERWIN R.	DOST Region III	Master of Technology Management	University of the Philippines - Diliman
LOPEZ, GIRLIE EUNICE P.	PNRI	Master of Science in Chemistry	De La Salle University
PERALTA, PAOLO GABRIEL L.	PCAARRD	Master of Development Management and Governance	University of the Philippines-Los Baños
ENCARNACION, ELYSON KEITH P.	ITDI	Master of Science in Environmental Science	University of the Philippines-Diliman
BUENO, FREDERICK C.	ITDI	Master of Engineering in Industrial Engineering	Mapua University
GUZMAN, JOHN PAUL MATTHEW D.	ITDI	Master of Science major in Microbiology	University of Santo Tomas

Thesis/Dissertation Grant

Thesis/dissertation grant may be obtained by a DOST employee studying in his personal capacity and who already completed his coursework and is already conducting his/her research.

The DOST-HRDP approved the application for Thesis Grant of Mr. Nichole M. Bristol, a Science Research Specialist I of the Food and Nutrition Research Institute pursuing Master of Development Communication at the University of the Philippines – Open University for the conduct of his thesis entitled, "Nutrition Information Exposure, Seeking and Utilization Behavior During a Pandemic".

Bar Review Grant

Bar Review Grant may be obtained by a qualified DOST employee who completed his/her Bachelor of Laws/Juris Degree and intends to take the Bar Examination.

In 2021, the DOST-HRDP approved the application of Ms. Hazel M. Barbarona, Science Research Specialist I of the Department of Science and Technology Region X, for Bar Review Grant.

Student Research Support Fund

SRSF shall be provided to assist the scholars in the conduct of thesis/dissertation research, dissemination of research outputs, and covers payment for adviser's/mentor's fee to ensure timely completion of the degree.

Research Grant

This is an additional funding support that may be given to a scholar whose budget requirement to complete his thesis/dissertation research exceeds the thesis/dissertation allowance.

TABLE 22: Scholars Granted Additional Funding Support

NO.	NAME	AGENCY	DEGREE	UNIVERSITY	THESIS/DISSERTATION TOPIC
1.	Pelegrina, Leilani D.	PCAARRD	PhD in Horticulture	UP Los Baños	"Biochemical and Molecular Characterization of Browning Reactions in Eggplant (Solanum melongena L.) and Related Species"
2.	Guirindola, Mildred O.	FNRI	PhD in Environmental Science	UP Los Baños	"Food environment and socio-ecological attributes as drivers of food security before and during COVID 19 quarantine in Cavite, Philippines"

Dissemination Grant

This is a funding support to a scholar whose thesis/dissertation has been accepted for oral/poster presentation in a local or international conference or for publication in a refereed technical journal.

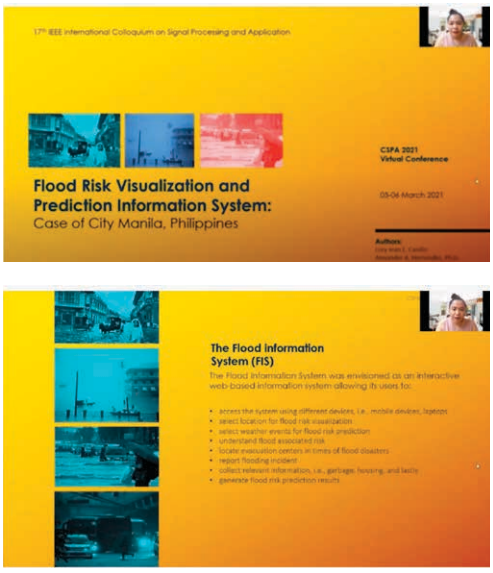
Seven scholars were awarded the Dissemination Grant, a component of the Student Research Support provided to DOST-HRDP scholars whose thesis or dissertation has been accepted for oral or poster presentation in a local or international conference or for publication in a referred technical journal.

TABLE 23: Scholars Accepted for Paper Presentation:

NO.	NAME OF SCHOLAR	AGENCY	CONFERENCE TITLE	VENUE OF CONFERENCE	DATE OF CONFERENCE	RESEARCH TITLE
1.	Canillo, Lory Jean L.	PAGASA	17th IEEE International Colloqium on Signal Processing and Applications (CSPA2021)	Malaysia via Virtual Conference	March 5-6, 2021	"Flood Risk Visualization and Prediction Information System: Case of City Manila, Philippines"
2.	Maglalang, Paul Eric M.	ITDI	4th International Conference on Material Engineering Research 2021	Incheon, South Korea via Virtual Conference	May 14-16, 2021	"Investigating the Mechanical Behavior of 3D Printed PLA-Coco Coir Composites"
3.	Hadji Yassin, Nabil A.	DOST XII	6th North American International Conference on Industrial Engineering and Operations Management (IEOM)	Monterrey, Mexico via Virtual Conference	November 3-5, 2021	"Analyzing Different Factors Affecting Users' Adoption of DOST STARBOOKS in Region 12 Using Technology Acceptance Model"

TABLE 24: Scholars accepted for publication:

NO.	NAME OF SCHOLAR	AGENCY	RESEARCH TITLE	PUBLICATION
1.	Parreño, Ronaldo, Jr. P.	ITDI	"Effect on thermal stability of microstructure and morphology of thermally-modified electrospun fibers of polybenzoxazines (PBz) blended with sulfur copolymers (SDIB)"	Royal Society of Chemical (RSC) Advance Journal
2.	Rogelio, Jayson P.	MIRDC	"Alignment Control using Visual Servoing and MobileNet Single-Shot Multi-box Detection (SSD): A Review"	International Journal of Advances in Intelligent Informatics or JOIV: International Journal on Informatics Visualization
3.	Margarito, Marianito T.	ITDI	"Characteristics and Performance of PTU-Cu Composite Membrane fabricated through Simultaneous Complexation and Non-Solvent Induced Phase Separation"	MDPI – Polymers
4.	Boado, Trinmar A.	MIRDC	"Classifying the Steel Microstructure from Metallographic Images Using Convolutional Neural Network"	International Journal of Advances in Intelligent Informatics or JOIV: International Journal on Informatics Visualization



17th IEEE International Colloqium on Signal Processing and Applications (CSPA2021)

4th International Conference on Material Engineering Research 2021 (ICMER 2021), Incheon, South Korea

TESTIMONIAL

REGINA G. RODRIGUEZ
MS in Food Science, 2021
University of Santo Tomas

"Being both a DOST employee and a student through the DOST-HRDP scholarship is one of a kind. Not only do you get to be supported financially, but you are also given sufficient time to work towards your academic endeavors. Having remaining classes during the pandemic, I never felt that I needed to worry as I was guided and given incomparable assistance – the only thing left for me to do was focus. Luckily, I graduated M.S. Food Science in June 2021, and my sending agency, DOST-FNRI, was pleased to have another employee whose enriched knowledge and expertise can be of great help in achieving the goals of the Institute.

Thank you

Continuous Intervention for the ASEAN Region

The Scholarship Offerings for ASEAN Researchers in Cambodia, Lao PDR and Myanmar (CLM) is a graduate scholarship program in engineering and sciences being implemented by the Department of Science and Technology (DOST) through the Science Education Institute (SEI) for qualified young researchers from these three countries. The objective of the program is to promote human resource development for sustainable socio-economic development of the ASEAN region, particularly in CLM. The implementation of the program started in the Second Semester of AY 2017-2018.

To further strengthen its support to the ASEAN STI Partnership Contributions and capacitate the human resources of CLM, DOST Secretary Fortunato de la Peña pledged additional twenty-four (24) scholarship slots to CLM, i.e. eight annually from 2019 to 2021, during the IAMMST-10 on October 19, 2018 in Cebu City. Hence, there are now four (4) batches of scholars (26 MS and 14 Ph.D) pursuing, while some already finished, their graduate degrees from the country's premier universities such as De La Salle University-Manila and University of the Philippines - Diliman, Manila and Los Baños Campuses.

TABLE 25: Number of CLM Scholars Supported.

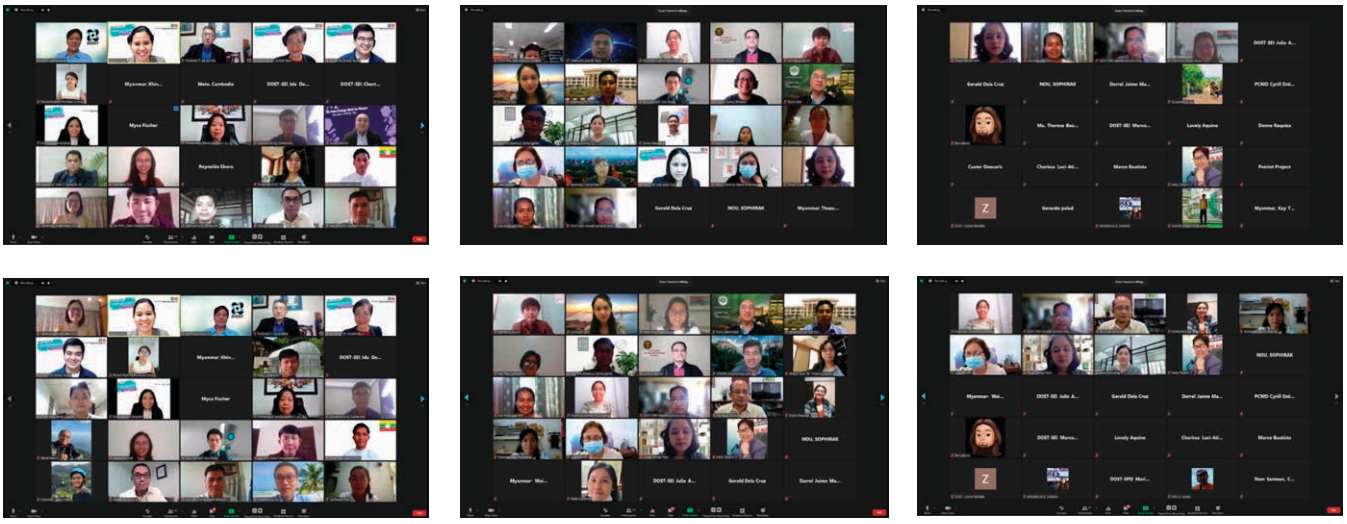
COUNTRY	NUMBER OF SCHOLARS		GRADUATED	
	MS	PH.D	MS	PH.D
Cambodia	12	-	5	-
Lao PDR	3	3	1	-
Myanmar	11	11	7	1
TOTAL	**26**	**14**	**13**	**1**

Out of the 40 scholars from CLM, 13 MS and 1 Ph.D scholars or 35% already graduated as of end of First Semester AY 2021-2022 as shown in the summary below:

The remaining 13 MS and 13 Ph.D scholars are still completing either their coursework or thesis/dissertation. The program will continue until 2024 with the hope that the scholars will all graduate from Philippine universities.

A meet-and-greet event dubbed, Kamustahan: Scholars' Gathering with DOST and Partner Institutions, was held on March 24, 2021 via Zoom. Some of the highlights of the activity include messages from the DOST officials and individual messages and academic reports of scholars. Secretary de la Peña emphasized in his speech that R&D remains critical to national growth for it allows us to truly innovate. He believes that by finishing the graduate degrees of CLM scholars, they can influence how the process of innovation takes place in their respective communities and countries.

On the other hand, the scholars expressed their gratitude to DOST for the scholarship opportunity extended to them by the Philippine government. They said that they did not only learn but have loved the Filipino culture and scenic views of the country as well. The employment of scholar-graduates and the performance of the ongoing scholars are closely tracked and monitored by the Institute.



Kamustahan: Scholars' Gathering with DOST and Partner Institutions March 24, 2021 via Zoom

Foreign Graduate Scholarships in the New Normal

The S&T foreign graduate scholarship programs, some of which are in collaboration with foreign universities and other governments, aim to build the capacities of Filipino students and enhance the use of enabling technologies in priority research and development (R&D) areas identified in the DOST R&D Trusts.

For 2021, the DOST-SEI announced the availability of scholarship slots for graduate studies abroad under the following programs:

- DOST-SEI Foreign Graduate Scholarships in Priority S&T Fields;
- DOST-SEI-UAlberta S&T Graduate Scholarship Program; and
- PhilFrance DOST Fellowship Program.

Adapting to the challenges of the recent health crisis, application to various scholarship programs and submission of documentary requirements were done online, as well as the orientation of qualified applicants for Academic Year 2021-2022.

With the declining cases of COVID-19 in most parts of the world, countries slowly opened their borders to accommodate foreigners and travelers, including the DOST-SEI foreign graduate scholars. Scholars who have previously attended online classes under the supervision of their respective universities were able to depart and attend their face-to-face classes at their study placement. Their stipend rate was adjusted to the foreign rate and their entitlements were released upon arrival at the universities abroad.

Moreover, scholars who are attended online continued to receive their monthly living allowance based on the rate given to local S&T graduate scholars; this will eventually be adjusted to the foreign rate once they report to their schools abroad. .

DOST-SEI Foreign Graduate Scholarships in Priority S&T Fields

The scholarship program is open to Filipino citizens who wish to pursue MS or Ph.D. degrees in reputable universities abroad, provided these degrees are not being offered yet in any higher education institution in the country.

For the year in review, DOST-SEI awarded scholarships to 45 successful applicants to the program: 29 MS and 16 Ph.D. Among these, 39 accepted the scholarship and signed the Scholarship Agreement.

DOST-SEI-UAlberta S&T Graduate Scholarship Program

In collaboration with the University of Alberta, the DOST-SEI implements the DOST-SEI-UAlberta S&T Graduate Scholarship Program. The program aims to create mechanisms for master's and doctoral students from the Philippines to pursue graduate studies in priority fields and conduct research at the University of Alberta with support provided jointly through DOST-SEI scholarships and UAlberta.

In 2021, the DOST-SEI awarded 2 scholarship to MS and Ph.D. applicants to pursue their respective degrees at UAlberta.

TABLE 26: Shows the Distribution of Scholars per Study Placement and Degree Program as of December 2021.

COUNTRY	MS	PH.D.	MS/PH.D.	TOTAL
Australia	3	5	-	8
Belgium	-	2	-	2
Czech Republic	-	1	-	1
Finland	-	1	-	1
France	6	1	-	7
Italy	2	1	-	3
Germany	1	-	-	1
Hong Kong	-	1	-	1
Japan	2	6	-	8
Malaysia	1	1	-	2
Netherlands	8	-	-	8
New Zealand	1	1	-	2
Singapore	-	2	-	2
Spain	1	2	-	3
South Korea	-	1	-	1
Switzerland	-	1	-	1
Taiwan	4	3	-	7
Thailand	1	2	-	3
United Kingdom	4	14	-	18
United States of America	4	2	2	8
Total	**38**	**47**	**2**	**87**

PhilFrance DOST Fellowship Program

The PhilFrance DOST Fellowship Program aims to foster the mobility to the French Republic of Filipino professionals working in academic, research or government institutions to pursue master's or doctorate degrees in the following priority S&T fields in public higher education institutions under the Ministry of National Education, Higher Education and Research of the French Republic:

Agriculture
Bioengineering
Bioinformatics (Medical)
Biological Science
Climate Change
Forestry
Health and Medical Research
Material Science
Natural Resources and Environment
Nuclear Application on Health
Nuclear Medicine
Veterinary Science
Virology

The DOST-SEI awarded scholarships under this program to 14 qualified applicants aiming to pursue their degrees in various public universities in France in 2021. Out of the number, 13 scholars were able to depart to attend their face-to-face classes while one scholar deferred the acceptance of the scholarship pending admission to the university in France.

Scholar-graduates fulfilling their service obligation

The DOST-SEI Foreign Graduate Scholarship Programs produced 14 graduates in 2021.

As part of the required service obligation, the scholars returned to the Philippines after completion of their MS/Ph.D. programs to render service along their fields of specialization for a period twice the length of time that they enjoyed the scholarship.

The new graduates who joined the country's pool of experts were:

ERNEST JOIE T. GUZMAN, MSc

MS in Forensic Dentistry with specialization in Disaster (Health) Risk Management

University of Dundee in Scotland, United Kingdom

RESEARCH TITLE: *"Understanding the role of Prosthodontics in Forensic Odontology: Assessment of the effects of high temperature in different material"*

Mock court trial as forensic odontology experts for dental malpractice case together with presiding judge Dr. Scheila Manica (third from L-R) and court advocate for cross-examination Dr. Ademir Franco

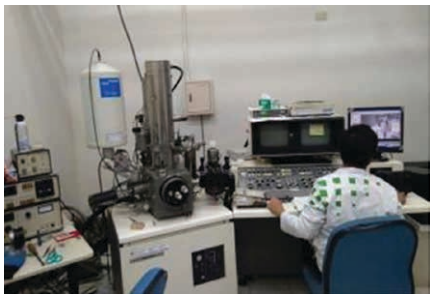
First invite as a guest lecturer for forensic odontology at the University of the Philippines-College of Dentistry Prosthodontic Department.

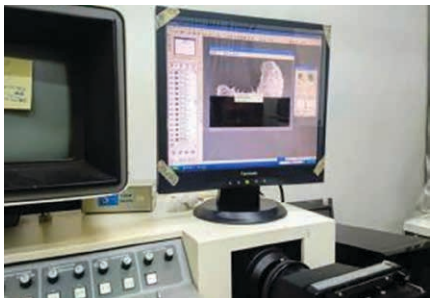
RUCHI BRIAM JAMES S. LAGITNAY, MSc

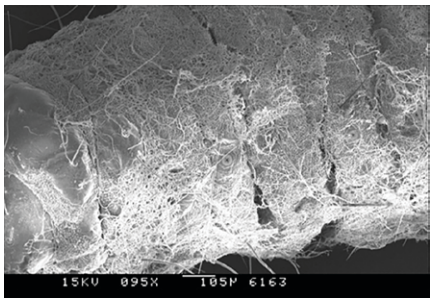
MS in Biochemistry with specialization in Agriculture (Soil Science)

National Chung Hsing University in Taichung, Taiwan

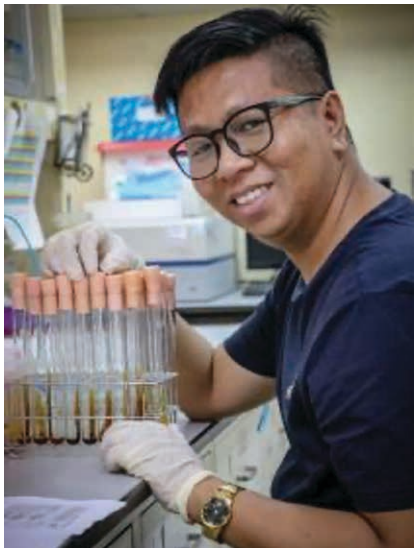
RESEARCH TITLE: *"Peptide Mapping, Micro Sequencing and Structure Elucidation of Fungicidal Proteins from Two Philippine Entomopathogenic Fungal Isolates"*







A glimpse at some molecular techniques done by the researcher to come up with his Master's thesis and three publications in a scopus journal.



Under the supervision of Dr. Wen-Hsin, observing the pathogenicity of several fungi isolates on Citrus Rind Borer using a scanning electron microscope at the Plant Parasites & Pesticide Resistance Molecular Diagnosis Laboratory, Department of Pathology, National Chung Hsing University.

Winter Break Hands-on training on Gram-negative Bacterial DNA isolation and Primer Design for RT-PCR with the Filipino Post-Doctorate Dr. Ronnie Gicana

Constant monitoring and consultation with adviser, Dr. Duen-Yau Chuang, is done to verify that all laboratory operations are appropriately conducted. The results of the experiments were presented at weekly laboratory meetings.

During the Radiation Safety for Operators Workshop, a photo with a professor from the National Synchrotron Radiation Research Center and other Filipino scholars.

With other participants during the extensive hazardous material training conducted by the Taiwan government for all international students studying chemistry and material science as part of the 2020 Taiwan-Southeast Asia Regional Cooperation Study and Training program.

LEO JESS G. BAYA, MSc

MS Quantum Photonics and Nanomaterials (Nanotechnology)

University of Sheffield,
United Kingdom

RESEARCH TITLE: *"Strong light-matter interactions in semiconductor photonic structures"*

"Being a scholar of the DOST-SEI under the Foreign Graduate Scholarship Program for Priority S&T Fields has been the most privileged experience I ever had. I am very thankful for the DOST-SEI for the trust and for the support in helping me grab the rare opportunity of completing my Master's degree in Research in Quantum Photonics and Nanomaterials at the University of Sheffield.

To study in a foreign country was a humbling experience. Meeting people from different cultures around the world is another experience on its own as well. For all this, I give credit to DOST-SEI for helping me move, dream, and achieve higher in my career."

FELIX ALEJANDRO D. CAMAGAY, MSc

MS in Biomedical Engineering

Université Paris Descartes, Arts et Metiers Paristech, Université Paris Sciences et Lettres in Paris, France

RESEARCH TITLE: *"Comparison of Walking Speed, Metabolic Cost and Ground Reaction Force (GRF) between ESAR (Energy Storing and Return) and Hydraulically-Controlled Prosthetic Feet for K2 Ambulators"*

I'd like to very much thank DOST-SEI for the opportunity they gave me - not only during the span of the scholarship, but even after I graduated and have returned to the Philippines.

During the start, I had a lot of doubts whether I'd be able to finish the program since I was never a stellar student to begin with. But with the help of my friends, teachers and DOST-SEI team, I was able to overcome my imposter syndrome and was able to perform well above my peers. I was also able to learn new languages while being immersed in new cultures because of the scholarship. DOST's support was more than enough for me study, travel and live comfortably.

Normally, the saddest part would be leaving my friends and my lifestyle abroad. But slowly, more opportunities continue to open their doors concluding that there might be, and must be, a higher reason for all this. So, I fervently urge all scholars to return and complete their return service to give way to more opportunities for themselves and for others.

Again, thanks DOST! Mabuhay! Santé! Prost!

GRECO MARK B. MALIJAN, M.D., MSc

MS in International Health and Tropical Medicine

University of Oxford, United Kingdom

RESEARCH TITLE: *"Validation of Hospital Score in Predicting 30-Day Readmission in the Philippine Setting"*

Thanks in large part to the team behind the DOST-SEI Foreign Graduate Scholarship, I had a life changing year in Oxford. The need for training in global health through the MSc International Health and Tropical Medicine has been more acutely felt in the past few years than before. As a physician, I held individual patient gains as the highest priority, but global health problems require a different set of skills and a more population-based perspective. Through the program I was able to meet foremost scientists in COVID-19 and beyond. It was surreal being able to directly converse with principal investigators of some of the largest COVID-19 studies and to gain insight into their perspectives in research and scientific gains.

Although my course was a taught degree, research was central to our teaching. I chose a placement project that would challenge me as a physician and that could potentially be useful for the Philippines, and the support I received in conquering the steep learning curves was phenomenal. I now use many of the skills I learned from the course in my work as a researcher here in Manila. I am grateful to the DOST-SEI team for helping us arrange our documentary requirements seamlessly, in the middle of multiple lockdowns and varying policies. They have also been helpful even and especially when I was already in the UK.

I take pride in being the first Filipino graduate of the MSc program, and I am thankful to DOST-SEI for helping plant the Philippine flag in that corner of Oxford and the world. May the scholarship program continue to prosper and support many Filipinos in achieving their dreams while at the same time advancing science and research in the country."

IZRAEL ZENAR C. BAUTISTA, Ph.D.

Ph.D. in Space Engineering (Applied Science for Integrated System Engineering)

Kyushu Institute of Technology, Japan

RESEARCH TITLE: *"Development of Solar PV Model of Emerging Solar Technologies Under Space Environment"*

I have been a recipient of the Foreign Graduate scholarship program of DOST-SEI from 2018-2021. They supported my study in Kyushu Institute of Technology, in Japan where I studied Doctor of Philosophy in Engineering (Space systems) as part of the STAMINA4Space program, Project STEP-UP of DOST where we became part of the team who built the Maya-2 CubeSat. As a scholar, I'm very thankful for the support provided by DOST-SEI. They always try to provide us the stipends we need and I commend the staff specially during the pandemic where they continued to process our papers just to enable us to receive our stipend in a timely manner. I understand that they have several scholars whose questions and queries they need to attend to and I see that they try their best to respond to us as soon as they can.

Thank you for all the hard work and I hope your institution could continue supporting scholars here and abroad as we promise to give back to our country as thanks to the help you provided us in our academic careers.

DOST-SEI Foreign Graduate Scholarships in Priority S&T Fields

ELIJAH ERIC P. UGADDAN

ERASMUS MUNDUS Masters of Materials Science Using Large Scale Facilities

University of Montpellier, France and University of Turino, Italy

Microcutting of Alloys for Characterization

Selection of Materials (Intermetallic Compounds) for Hydrogen Storage while studying its Crystallographic Point of View

PAULENE S. PINEDA

Master of Philosophy in Reproduction and Genetics with specialization in Bioinformatics

University of Adelaide, Australia

Preliminary seminar at the Stefanson Lecture Theatre, Roseworthy Campus, The University of Adelaide, Australia as a prerequisite to the CaRST activities

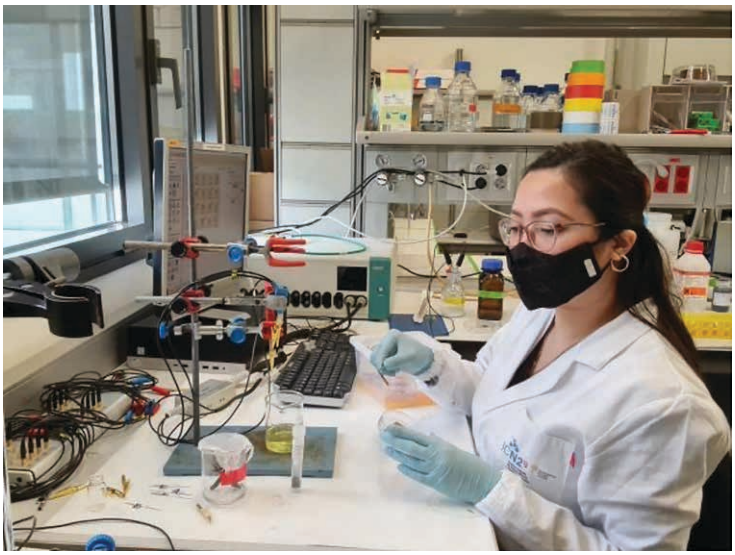
VERNALYN R. ABARINTOS

Ph.D. in Biotechnology

Universitat Autonoma de Barcelona, Spain

.

Ms. Abarintos and Ms. Yang pictured with the wearable microfluidic nanosensor. They are the first and second authors of the published journal article titled ¨Wearable and fully printed microfluidic nanosensor for sweat rate, conductivity, and copper detection with healthcare applications¨, which can be read at Biosensors and Bioelectronics



Testing the newly fabricated nanoelectrodes by electrochemical characterization.

CHRISTER LAURENZ G. FETALVERO

MS in Renewable Energy

University of Oldenburg, Germany

Solar radiation measurements in analyzing the characteristic performance of a solar collector with varying irradiance levels.

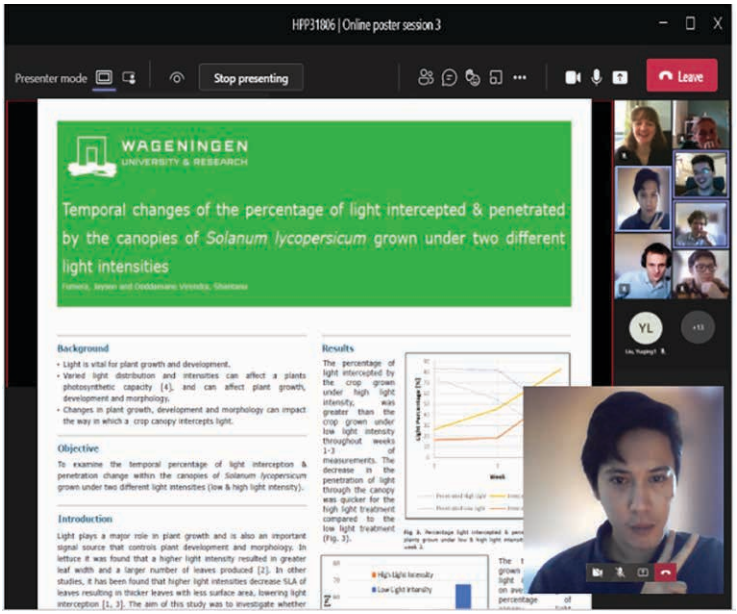
JAYSON O. FUMERA

MS in Biosystems Engineering

Wageningen University and Research,
The Netherlands

Photo was taken at Ter Laak Orchids at Middenzwet, Wateringen. Ter Laak Orchids has been operational since 1954. They produce 6 million orhids annually all throughout Europe and in some parts outside but are now aiming for 8 million plants to produce annually on a total area of 17.5 hectares. They use highly specialized greenhouses that save important resources such as energy and water, while minimizing C02 emissions. They were given the MPS Florimark Production Label that certifies their strict compliance concerning environment, human and quality.

Online poster presentation via MS Teams. The topic was about the temporal changes of percentage of light intercepted & penetrated by the canopies of Solanum lycopersicum grown under two different light intensities when taking the course Advanced Methods for Plant Climate Research in Controlled Environments.



JERICO M. CONSOLACION

Ph.D. in Tropical Agrobiology and Bioresource Management

Czech University of Life Sciences,
Prague, Czech Republic

Pictures with animals. The Common Elands (Taurotragus oryx) are raised in the Experimental Lany Farm of the Czech University of Life Sciences.

JOHN PAUL O. BUSTILLO

Ph.D. in Physics (Medical Radiation Physics)

University of Wollongong,
NSW, Australia

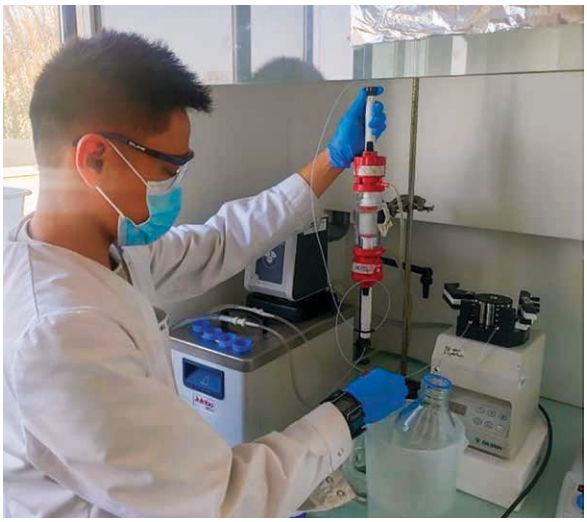
Setting up a radiotherapy water phantom used for quality assurance of a medical linear accelerator

Picture after receiving my 3D printed test objects fabricated at the DOST-AMCen

NOEL ANGELO P. KALACAS

Ph.D. in Chemical Engineering (Molecular Biology and Biotechnology; Nanotechnology)

University of Technology
Compiegne, France



Solid-phase synthesis of molecularly imprinted polymers (MIPs) for a protein target

DOST-SEI-UALBERTA S&T Graduate Scholarship Program

University of Alberta, Edmonton, Canada

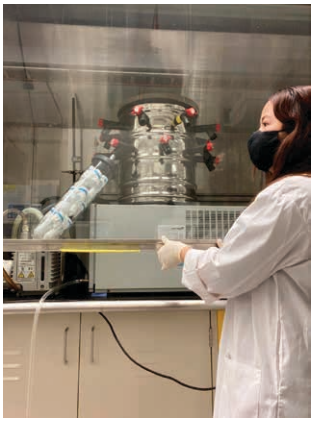
DANIELITO L. DOLLETE

MS in Agricultural, Nutrition, and Food Sciences

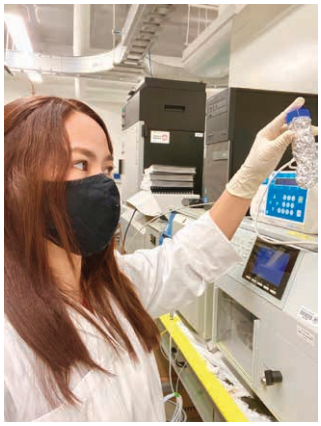
Photosynthesis and SPAD Reading

SHIENNA MARIE A. PONTILLAS

Ph.D. in Chemical Engineering



Freeze-drying of synthesized polymers.



Measuring Molecular weight of polymers using Gel Permeation Chromatography (GPC)

Observing and capturing images of cells using microscope.

Performing particle size and surface charge analysis of transfection complexes for drug delivery to cancer cells.

KARLA CRISTINA P. CRUZ

MS in Biochemistry

Centrifugation of yeast culture to pellet the cells.

Performing lysis of cells by adding lysis buffer and glass beads into the solution and placing it in a homogenizer which will break open the cells to release the DNA.

Precipitating the chromosomal DNA of the yeast in preparation for PCR reactions.

Inoculating yeast culture into a YEPD media in preparation for a Yeast genomic DNA extraction. Inoculating yeast culture into a YEPD media in preparation for a Yeast genomic DNA extraction

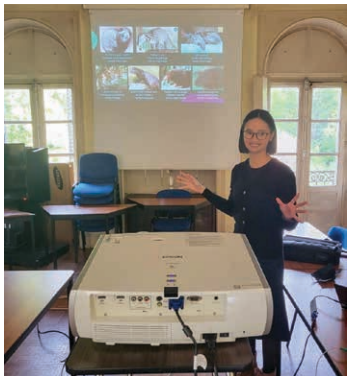
PhilFrance DOST Fellowship Program

DESAMARIE ANTONETTE P. FERNANDEZ

Ph.D. in Natural Sciences

Muséum National d' Histoire Naturelle and Sorbonne Universités, Paris, France

.



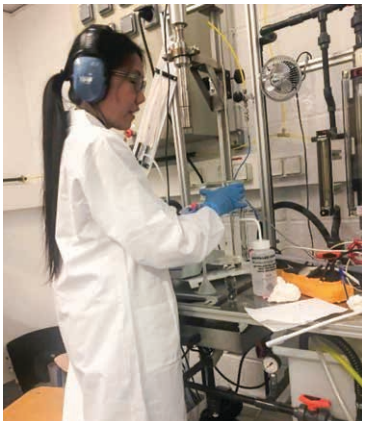
Thesis proposal presentation of Prof. Desamarie Fernandez at the Tropical Ecology Laboratory of Museum National d'Histoire Naturelle.

Setting up camera traps to study Philippines carnivores in Puerto-Princesa Subterranean River National Park

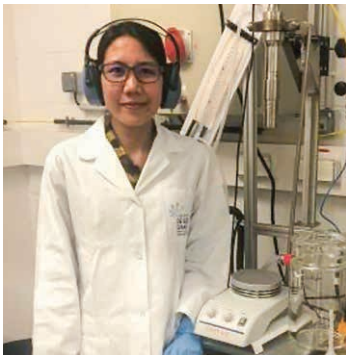
FEBY E. CARMEN

Ph.D. in Chemical and Environmental Engineering

Université Fédérale Toulouse Midi-Pyrénées, Toulouse, France



Preparing the 2L glass reactor where the sample is placed for the sonication.



Hands-on training and experimentation with Ultrasound homogenizer Sinaptec

BENJO S. SALVATIERRA

MS in Chemistry of Complex Systems

Université Côte d'Azur, Nice, France

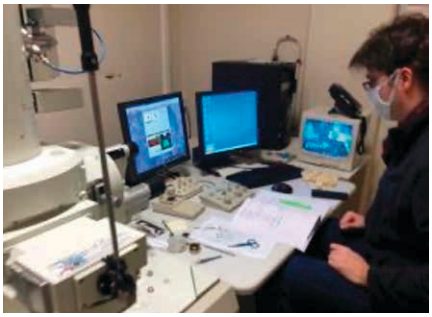
Preparing 3D files using the Simplify 3D software at NICE Learning Laboratory

Handling and maintenance of 3D printers at the NICE Learning Laboratory

CHRIS ALLEN EARL T. FRANCIA

Ph.D. in Chemistry

Université Côte d'Azur, Nice, France



Laboratory Immersion on SEM and NMR

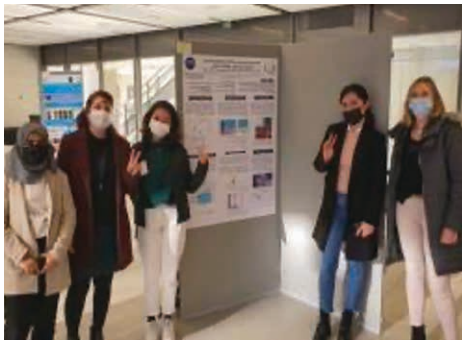
Supporting fellow PhD students by helping the in preparing samples

GIRLIE EUNICE P. LOPEZ

Ph.D. in Chemistry

Université Paris-Saclay, Paris, France

Working on H_2O_2 production under visible light irradiation ($\lambda \geq 420$ nm)

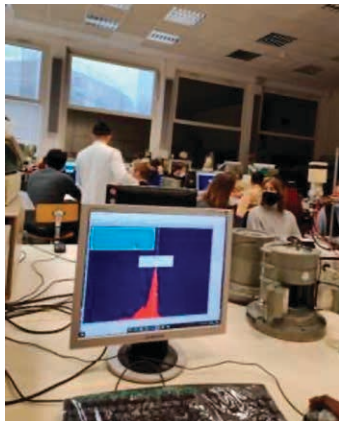


Launch of the Institut de l'Energie Soutenable (Institute of Sustainable Energy) of Paris-Saclay

JERALD M. APAC

Master's in Nuclear Engineering: M1 Nuclear Energy, Physics Track

Université Paris-Saclay, Paris, France



Class and laboratory works

JOHNRELL S. ZUNIEGA

Ph.D. in Agroresources, Processes, Food and Bioproducts

Montpellier SupAgro,
Montpellier, France

Setting up the system to be used in the preliminary in vitro assay

Measuring a known quantity of essential oil to be used in the preliminary in vitro assay

MELCHOR J. POTESTAS

Ph.D. in Physics with specialization in Materials Science

Université de Limoges,
Limoges, France

Set-up preparation for the synthesis of titanium carbohydrides (TiCH) powders under this multifunctional furnace system.

Thermogravimetric Analysis – Differential Thermal Analysis (TGA-DTA) with Mass Spectrometry characterization of the produced TiCH powders.

PCARI Scholarships Project Soldiering on Towards Completion

Also in the face of the pandemic restrictions, the SEI-PCARI Project Implementation Unit was still able to fully implement its scholarship program. The project, which is about to culminate in 2023, focused on monitoring all continuing scholars in the country and at the University of California, USA.

The program supported 33 continuing local MS scholars enrolled in UP Diliman, UP Los Banos, De La Salle University and Mapua University. There were setbacks with regards to their enrollment process as various universities revised their academic calendars. PCARI scholars, however, still continuously reported to their respective project laboratories and work on their respective assignments.

TABLE 27: Number of Continuing Local MS Scholars by University

UNIVERSITY	NUMBER OF SCHOLARS
UP Diliman	29
UP Los Banos	2
De La Salle University	1
Mapua University	1
Total	**33**

Four local MS scholarsgraduated accordingly despite the challenges in reporting to laboratories to finish their experiments,defending their thesis online, and finalizing their manuscript.

There are four continuing PhD enrolled in the University of California Berkeley, Merced and Davis.

TABLE 28: List of PCARI Local MS Scholar-Graduates by Degree Program and University in 2021

NAME OF SCHOLARS	DEGREE PROGRAM	UNIVERSITY
Rogie M. Madula	MS in Materials Science and Engineering	UP Diliman
Santiago Emil A. Joson	MS in Microbiology	UP Diliman
Raymond G. Debuque	MS in Environmental Engineering	UP Diliman
Joyce Emlyn B. Guiao	MS in Statistics	De La Salle University

TABLE 29: List of Continuing Foreign PhD Scholars

NAME	DEGREE PROGRAM	UNIVERSITY
Marc Francis M. Labata	PhD in Environmental Systems	University of California Merced
DJ Darwin R. Bandoy	PhD in Integrative Pathobiology	University of California Davis
Alben Rome B. Bagabaldo	PhD in Civil and Environmental Engineering	University of California Berkeley
Joy N. Carpio	PhD in Civil and Environmental Engineering	University of California Berkeley

PCARI PhD Scholar Ms. Joy Carpio conducting lessons on Electrostatic to undergraduate students as part of the PhD program teaching requirements

PCARI PhD scholar Joy Carpio (lower far right) is a recipient of the UC Berkeley Schlumberger Foundation Faculty for the Future 2020-21 fellowship. The program recognizes women from developing countries who are pursuing post-graduate studies in various STEM disciplines, with the goal of accelerating gender equality in STEM.

PCARI PhD scholars Ms. Joy Carpio (4th from left) and Mr. Alben Rome Bagabaldo (first from right) pose with other students of the University of California Berkeley Mobile Sensing Laboratory and their adviser Dr. Alexandre M. Bayen (first from left), Associate Professor for Moffett Field Program Development

DOST-SEI's Continuous Intervention for Marawi

The DOST-SEI Bangon Marawi Program in Science and Technology Human Resource Development (STHRD) aims to help the Philippine government in rebuilding and rehabilitating Marawi's human and social infrastructures. The scholarship grants include baccalaureate and graduate degrees in engineering and sciences. The first batch of scholars was awarded scholarships in the Second Semester of AY 2017-2018, while the second batch received theirs in the First Semester of AY 2019-2020.

The primary goal of the program is to provide scholarship grants for students who are immediate members of the families affected by the armed conflict or were displaced from their communities due to the Marawi siege in 2017. The program intends to inculcate in the beneficiaries the love of the country, strengthen their Filipino identity and citizenry, and deepen their trust and confidence in the Philippine government.

Through The Filipino Patriot Scholars Project, the scholars were involved in activities that aim to inculcate nationalism and patriotism among them. They attended webinars in 2021 titled, *Values Formation Program, and Understanding Community Resiliency* (from individual to family and community resiliency).

After five years of implementation, the program has already produced 49% graduates, where 20 scholars were able to finish their BS courses with flying colors as of the end of the First Semester of AY 2021-2022, shown in the data below:

TABLE 30: Number of Scholars Supported under Bangon-Marawi Program.

LEVEL	NUMBER OF SCHOLARS	GRADUATED
BS	436	229*
MS	47	10
Ph.D	13	3
TOTAL	**496**	**242**

* 4 Magna cum laude and 16 Cum laude

The DOST-SEI has designated Project Director at MSU-Main Campus, Marawi City and Project Coordinator at MSU-IIT, Iligan City with two Project Staff assisting them. Moreover, Working Committees were also created to oversee the implementation, formulation of policies and conduct of intervention programs for the scholars.

The Learning Resource Center (LRC) was put up on September 27, 2019 at the MSU-Main Campus to assist the scholars in research and other academic activities. During the COVID-19 pandemic, the LRC is used by the scholars, faculty and staff for completion of their course requirements, webinars and conferences.

With this intervention, the scholars are always grateful for the scholarship opportunities provided by DOST-SEI to Marawi City. Once the program is completed, an evaluation study will be conducted to determine the impacts of the program to the beneficiaries, their families and communities.

Learning Resource Center (LRC) at MSU-Main Campus, Marawi City

Scholars' Orientation on Scholarship Policies and Contract Signing with their parents or guardians April 26, 2018 at the MSU-Main Campus, Marawi City

October 16, 2019 at the MSU-Main Campus, Marawi City

DOST-SEI's Steady Contribution Towards STHRD

Policy studies that monitor the availability of S&T human resources are essential as they provide outlook and guidance to national economic planners in ensuring adequate supply of workforce to meet economic and development targets. The third series of S&T Human Resource Development (HRD) Stat Updates delivered an update on the stock and supply of the S&T workforce in the country using the 2014-2018 datasets obtained from the Commission on Higher Education (CHED), DOST-SEI, and Professional Regulatory Commission (PRC).

Primary findings showed that the general bulk of enrollees and graduates with S&T courses in the country for the undergraduate level were males, while females dominate the master's and doctorate levels (see Table 31).

Based on the academic years 2014 to 2018 of the data from CHED, a predominant share in the total number of enrollees

TABLE 31: Percentage Distribution of Enrollees and Graduates According to their Degree Levels and Sex

DEGREE LEVEL	S&T BROAD FIELDS	ENROLMENT (AYS 2014-15 TO 2017-18	GRADUATE (AYS 2014-15 TO 2016-17)
Undergraduate level	**Total**	**5,309,303**	**630,840**
	Male	57.6%	54.2%
	Female	42.4%	45.8%
Master's Degree	**Total**	**146,606**	**16,167**
	Male	43.2%	39.2%
	Female	56.8%	60.8%
PhD Degree	**Total**	**18,910**	**1,471**
	Male	43.2%	40.7%
	Female	56.8%	59.3%

and graduates with S&T courses in the undergraduate level were admitted in engineering and technology, whereas medical and health science courses were widely pursued by those in the master's level. While the doctorate level students were frequently enrolled in social sciences, particularly in science and mathematics teaching, nearly equal proportion of them have also completed natural sciences, social sciences, and medical and health science (please refer to Table 32).

From the academic year 2014-2017, the DOST-SEI scholarship programs' contribution to the total number of S&T graduates in the country was only 1.1% (6,831) out of approximately 631 thousand bachelor's degree graduates nationwide, whereas about 11.5% (1,866) come from 16,167 master's graduates, and 21.3% (313) come from 1,471 doctorate graduates. Generally, there are almost equal proportion of male and female DOST-SEI beneficiaries in RA 7687 and RA 10612 for the bachelor's degree level. While higher percentage share of female scholar-graduates in the ASTHRDP and CBPSME was noted, more males have completed their master's and PhD degrees under the ERDT program.

With regards to the S&T Broad Fields of the scholar-graduates, many of the bachelor's graduates for the RA 7687 and Merit scholarship programs took engineering and technological courses, while RA 10612 scholar-graduates pursued social sciences (i.e., science and mathematics education). In addition, most of the scholar-graduates in the master's level for ASTHRDP have graduated with natural sciences courses, engineering and technology courses for ERDT, and physics and mathematics education for CBPSME. As to the largest share of doctorate scholar-graduates, agricultural and veterinary sciences were noted for ASTHRDP, engineering and technology for ERDT, and mathematics education for CBPSME.

TABLE 32: Percentage Distribution of Enrollees and Graduates According to Program Levels and S&T Broad Fields

PROGRAM LEVEL	S&T BROAD FIELDS*	ENROLMENT (AYS 2014-15 TO 2017–18	GRADUATE (AYS 2014-15 TO 2016–17
Undergraduate level	**Total**	**5,309,303**	**630,840**
	Engineering and Technology	41.3%	36.3%
	Natural Sciences	27.8%	29.8%
	Medical and Health Sciences	14.1%	17.5%
	Agricultural and Veterinary Sciences	9.9%	8.5%
	Social Sciences	6.8%	7.9%
Master's Degree	**Total**	**146,606**	**16,167**
	Engineering and Technology	15.4%	12.8%
	Natural Sciences	20.6%	18.5%
	Medical and Health Sciences	31.5%	44.0%
	Agricultural and Veterinary Sciences	10.0%	8.4%
	Social Sciences	22.4%	16.3%
PhD Degree	**Total**	**18,910**	**1,471**
	Engineering and Technology	10.5%	7.0%
	Natural Sciences	24.2%	26.9%
	Medical and Health Sciences	21.3%	24.7%
	Agricultural and Veterinary Sciences	11.7%	14.7%
	Social Sciences	32.4%	26.6%

Data Source: CHED
*International Standard Classification of Education
**Total of percentages may not exact 100.0% due to rounding off

TABLE 33: Percentage Distribution of DOST-SEI Scholar-graduates by Scholarship Program and Sex, CYs 2014 to 2018

DEGREE LEVEL	S&T BROAD FIELDS	MALE	FEMALE
Undergraduate level	**Total**	**5,285**	**5,201**
	RA 7687	64.5%	66.7%
	RA 10612	21.6%	24.6%
	Merit	13.9%	8.7%
Master's Degree	**Total**	**1,159**	**1,230**
	ATHRDP	53.7%	70.9%
	ERDT	41.8%	23.4%
	CBPSME	4.6%	5.7%
PhD Degree	**Total**	**209**	**211**
	ATHRDP	52.2%	60.7%
	ERDT	33.5%	18.5%
	CBPSME	14.4%	20.9%

Data Source: DOST-SEI

In terms of S&T registered professionals in the country, a stable increase from 2014 to 2018 was noted, with more females than the males (Figure 10).

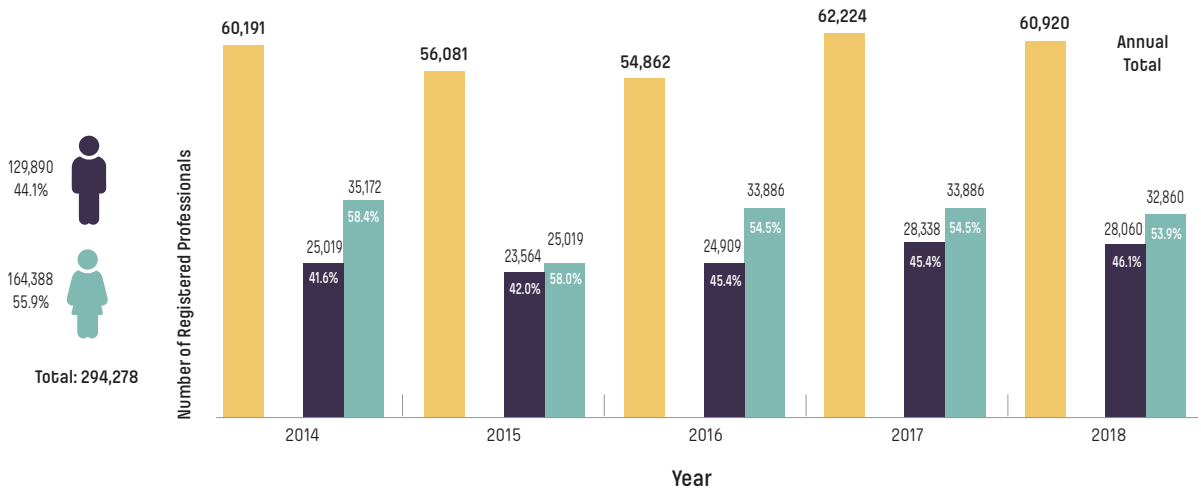


FIGURE 10: Percentage Distribution of DOST-SEI by Scholarship Program and Sex, AYs 2015-2015 to 2017-2018.

Furthermore, the biggest distribution of registered S&T professionals (Figure 11) in the country for 2014 to 2018 were noted in medical and health sciences, as well as engineering professions. Medical and health professionals include nurses, medical technologists, physicians, radiologic technologists, dentists, nutritionists-dieticians, while engineers include civil, mechanical, electrical, and electronics engineers. Alternately, agricultural and veterinary professionals (e.g., agriculturists, foresters, and agricultural and biosystem engineers), and natural sciences professionals (e.g., chemists and geologists) have the least number of S&T registered professionals.

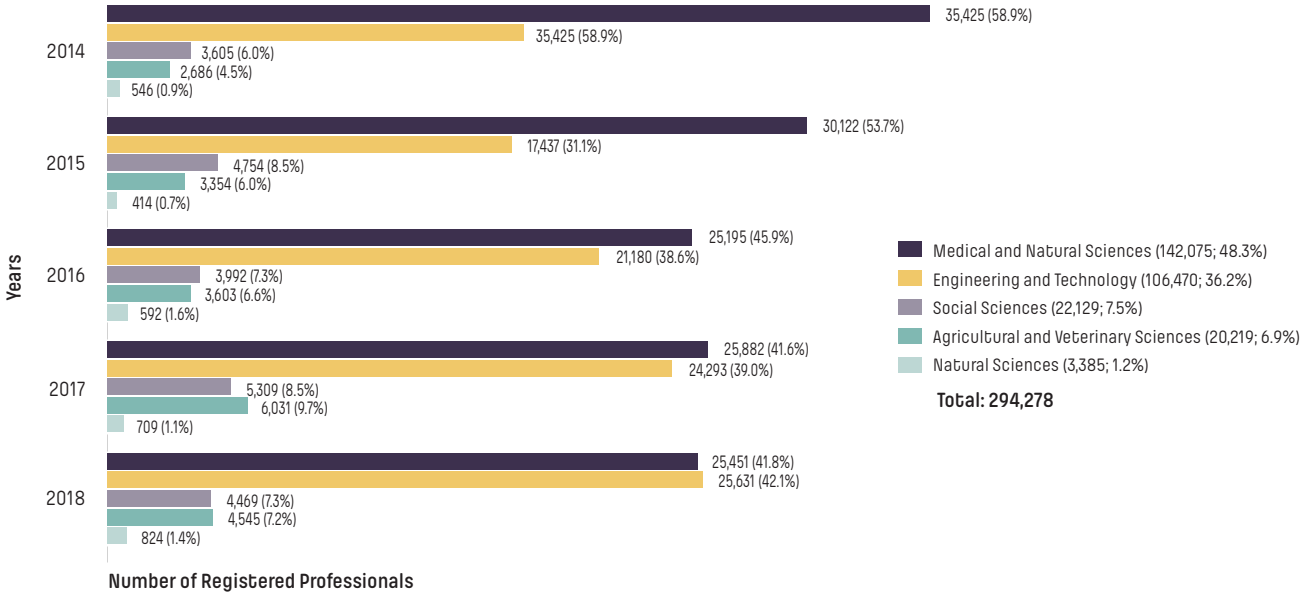


FIGURE 11: Percent distribution of registered S&T professionals by broad S&T classifications, CYs 2014 to 2018

Although the percentage share of S&T and non-S&T teaching professionals was not specified in the report due to the merged data obtained from PRC, it is still notable how teaching professionals are female-dominated and saw yearly increase, particularly among secondary teachers (see Figure 12).

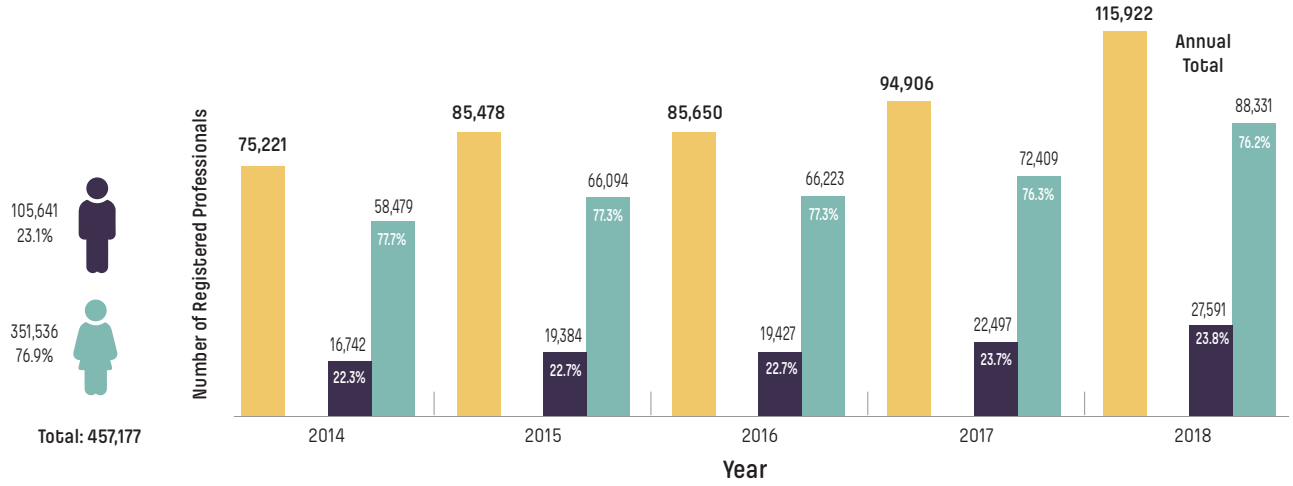


FIGURE 12: Percent distribution of registered professionals in Education, CYs 2014 to 2018

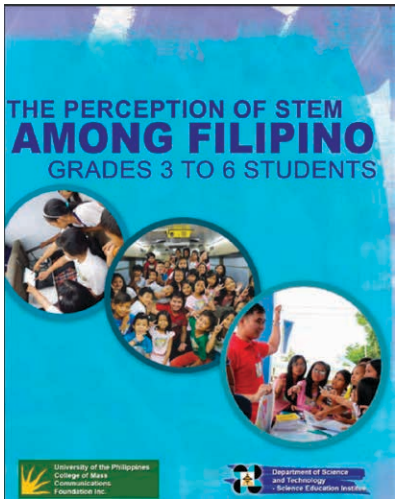
Considering that highly skilled and globally competitive S&T workforce can be drawn from the pool of students presently enrolled in different academic institutions as potential sources and feeders to various available S&T scholarship programs, it is important to understand the various factors influencing their career choice.

Furthermore, those who are already employed in the S&T fields should be given opportunities to upgrade and enhance their knowledge, technical skills, and expertise through advanced trainings and post graduate studies to encourage innovation and productivity. The SEI, as the S&T human resource development arm of the Department of Science and Technology, plays a critical role in this aspect, particularly in crafting relevant policies to improve the implementation of the scholarship programs to entice more applicants and produce more successful scholar-graduates now and in the future.

Appreciating Science: A Project on Perception of Science Among Filipino K3 to K6 Students in the Philippines (Year 1)

In partnership with the University of the Philippines College of Mass Communication Foundation, Inc (UPCMCFI), the Department of Science and Technology–Science Education Institute (DOST – SEI) concluded the first year of its three-year comprehensive study that explores the attitudes of K-12 students towards science, technology, engineering, and mathematics (STEM).

Key findings of the survey conducted to almost 1,100 K3 to K6 students, followed by several FGDs, were further investigated in a round table discussion with experts from relevant fields. The discussion highlighted neutral to positive awareness and knowledge of STEM subjects even if students perceive it to be difficult. In addition, both survey and FGD revealed that intentions to pursue STEM originate in internal support and field exposure. Learning through reality integration also manifests its role in cultivating interest in the field. This can be an opportunity to give the spotlight to our Filipino scientists and their significant works to invigorate



students' curiosity towards STEM fields. This study also reveals that connecting to the world is an integral part of K3 to K6 students' perception, learning, and appreciation of STEM.

Together with the DOST – SEI officials, UPCMCFI researchers, and various experts from the field of education, the round table discussion was conducted online on August 26, 2022, titled "Kuwela pa ba and Siyensya?"

Study on Progressive Participation of Women in S&T Fields

In support of the advancement of gender equality in the country, the Research Unit of the Institute published Women in Science Factsheet No. 4. This is in response to the urgent call towards sustainable development while highlighting the important contributions of Filipinas in the science and technology landscape. It also emphasized the importance of gender statistics and sex-disaggregated data in all its programs and projects to promote gender concerns, and analysis of statistics for planning and policy decision-making purposes.

Women in Science publication used the census data collected by the Philippine Statistics Authority (PSA) from 1990 to 2015 to provide relevant information on gender parity among science and technology (S&T) professionals in the country. Specifically, this study focused on the current gender distribution, occupational groupings, demographics, and other relevant groupings that will help describe women empowerment in science and technology in the country.

Important findings of the report revealed that from 1990 – 2015, a progressive participation of women in S&T fields (Figure 13), particularly dominating the medical and healthcare sectors are in Nursing, Midwifery, and Health. In addition, fields of Engineering,

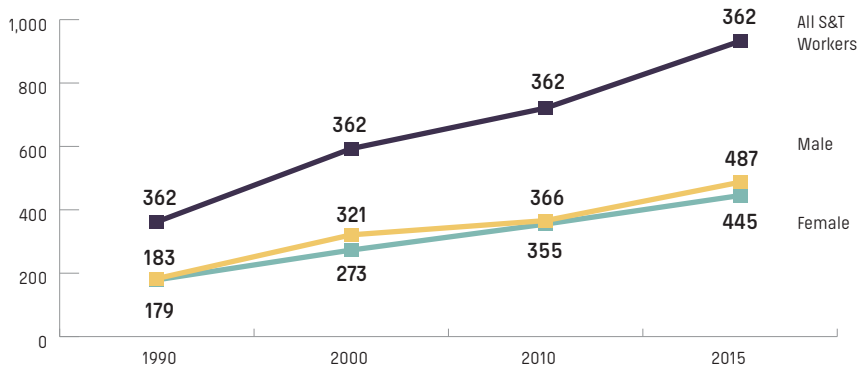


FIGURE 13: Number of S&T Workforce in Thousands, 1990 to 2015.

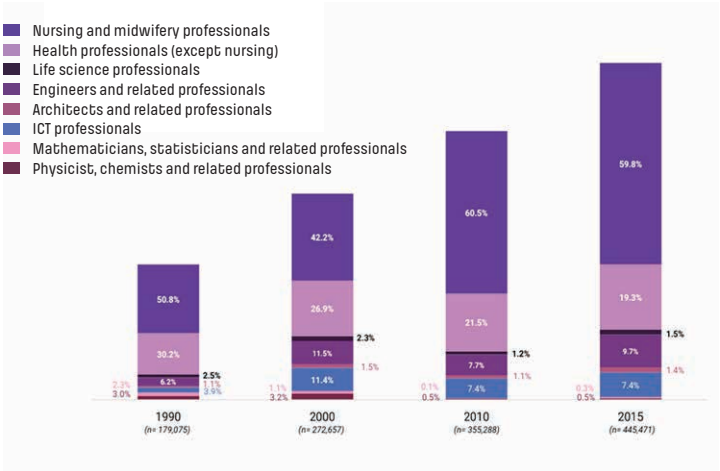


FIGURE 14: Number of Female Workforce with S&T Occupations, 1990 to 2015.

Architecture, and ICT are regarded as emerging disciplines due to its growing number of female S&T personnel (Figure 14).

Geographical spread of female S&T workers showed clustering in National Capital Region (NCR), Central Luzon, and CALABARZON attributable to high volumes of nurses, midwives, health practitioners, and engineers in these regions (Table 1).

TABLE 34: Number of Female Workforce by S&T Occupation, 1990 to 2015.

	1990		2000		2010		2015	
National Capital Region	60,088	(33.6)	79,519	(29.2)	97,852	(27.9)	111,725	(25.1)
Cordilliera Administrative Region	4,346	(2.4)	5,631	(2.1)	7,973	(2.3)	11,613	(2.6)
Caraga	2,982	(1.7)	4,151	(1.5)	4,422	(1.3)	6,309	(1.4)
Region I - Ilocos	9,153	(5.1)	13,392	(4.9)	18,770	(5.3)	25,228	(5.7)
Region II - Cagayan Valley	4,589	(2.6)	6,785	(2.5)	9,177	(2.6)	12,843	(2.9)
Region III - Central Luzon	16,816	(9.4)	28,920	(10.6)	41,303	(11.8)	52,257	(11.7)
Region IV - Southern Tagalog	24,940	(13.9)	46,427	(17.0)	57,234	(16.3)	82,952	(17.5)
Region V - Bicol	6,988	(3.9)	9,271	(3.4)	10,719	(3.1)	13,374	(3.0)
Region VI - Western Visayas	12,853	(7.2)	19,637	(7.2)	26,039	(7.4)	31,931	(7.2)
Region VII - Central Visayas	10,457	(5.8)	18,575	(6.8)	22,930	(6.5)	27,519	(6.2)
Region VIII - Eastern Visayas	4,513	(2.5)	7,440	(2.7)	7,669	(2.2)	11,091	(2.5)
Region IX - Zamboanga Peninsula	4,048	(2.3)	6,115	(2.2)	10,346	(2.9)	12,268	(2.8)
Region X - Northern Mindanao	4,649	(2.6)	6,856	(2.5)	13,078	(3.7)	15,313	(3.4)
Region XI - Davao	7,424	(4.1)	11,905	(4.4)	12,662	(3.6)	15,984	(3.6)
Region XII - SOCCSKSARGEN	3,296	(1.8)	6,107	(2.2)	7,937	(2.3)	10,788	(2.4)
Region XV - Autonomous Region of Muslim Mindanao	1,933	(1.1)	1,926	(0.7)	3,057	(0.9)	4,276	(1.0)
Total	**179,075**		**272,657**		**355,288**		**445,471**	

Data on specific educational information, which was only present in the 2015 census, showed that out of 10 million Bachelor's degree holders, only 3.7 million were S&T degree graduates wherein 44.6% were female. (Figure 15).

Approximately, there are 434 thousand (48.1%) female S&T bachelor's degree holders with S&T occupations (Figure 16).

Furthermore, it showed that there are more women (54.3%) with Postbaccalaureate degrees working in the S&T fields (Figure 17).

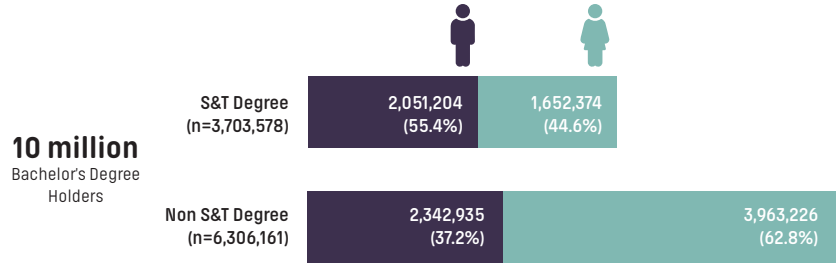


FIGURE 15: Number of Bachelor's Degree Holders by Type of Degree and Sex, 2015.

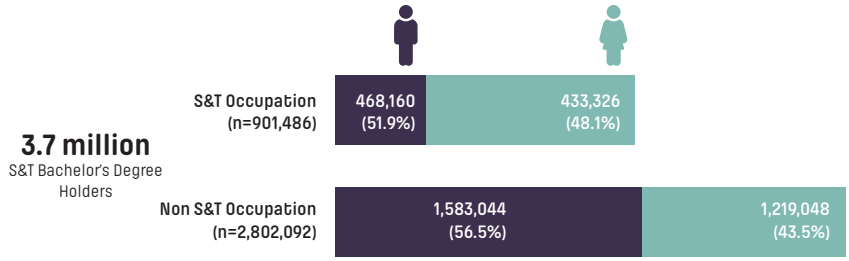


FIGURE 16: Number of S&T Bachelor's Degree Holders by Type of Occupation and Sex, 2015.

In 2015, the demographic profile of the female S&T workforce, based on median age, is relatively younger than the males. Interestingly, these young S&T personnel are ICT, Engineering, Health, and medical practitioners (Figure 18 and Table 2).

As various gender issues that implicate S&T HRD initiatives have been identified and given careful consideration, this report reflects the notion that there is still more work to be done, particularly in crafting and implementing policies to empower women in STEM education and S&T workforce. Moreover, the value of producing competent females in the S&T population is crucial in delivering the kind of S&T services needed by the country for development.

TABLE 35: Mean and Median Age of S&T Workforce by Sex, 2015

	FEMALE	MALE	TOTAL
Mean Age	34	37	**35**
Median Age	30	34	**32**

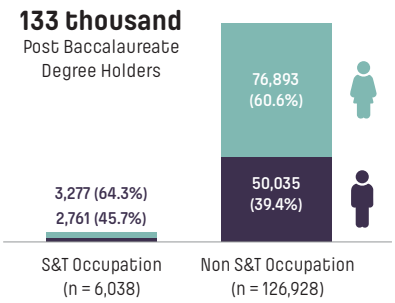


FIGURE 17: Number of Post Baccalaureate Degree holders by type of occupation and sex, 2015

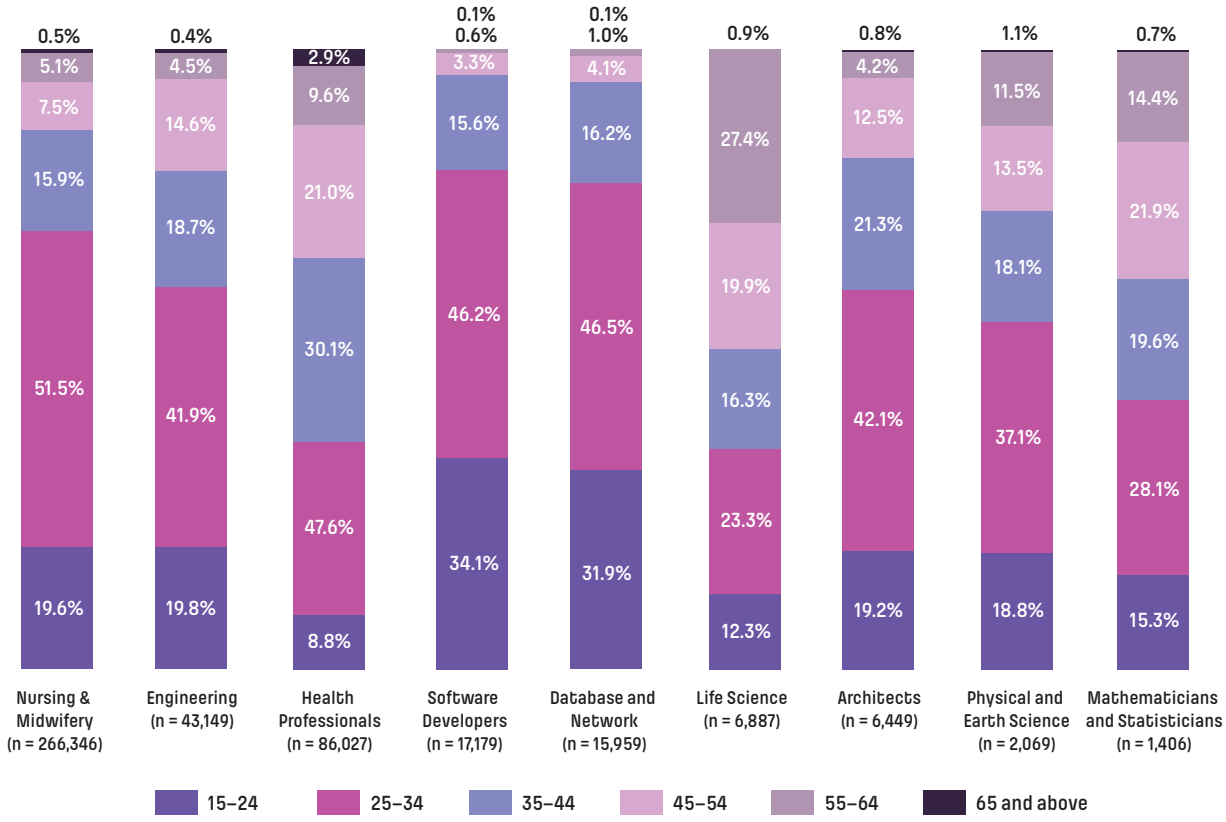


FIGURE 18: Number of S&T Bachelor's Degree Holders by Type of Occupation and Sex, 2015.

DOST Endorses Applicants for S&T Eligibility Specialists

In 2021, the Science Education Institute, as the implementing agency of the Presidential Decree (PD) No.997, continued to accept, evaluate, and process applications coming from the various parts of the country. Out of 82 applications received, 41 were approved and endorsed by the DOST Secretary to the Civil Service Eligibility (CSC) Central Office and various concerned CSC Regional Offices for the grant of S&T Eligibility Specialist under PD No. 997.

PD No. 997 is a law conferring civil service eligibility on scientific and technological specialists on the bases of their qualifications and the requirements of public service. It is designed to encourage more S&T professionals to get into public service and contribute to research and innovation in the country.

The applicants were evaluated by the Technical Working Group and the Presidential Committee on the bases of their qualifications and the requirements of public service, as provided by the Law. The table above shows the number of qualified applicants according to the bases of their qualification by sex.

TABLE 36: Number of Qualified Applicants by S&T Fields: PD No. 997, 2021

BASES FOR QUALIFICATION	SEX		TOTAL
	MALE	FEMALE	
Master's Degree			
MS Biology	2	2	4
MS Marine Biology	1	1	2
MS Microbiology		1	1
MS Applied Physics	3	1	4
MS Physics	3	1	4
MS Applied Mathematics		1	1
MS Statistics	2		2
MS Information Technology	4	5	9
MS Computer Science	2		2
MS Computer Engineering	1		1
MS Industrial Engineering	1	1	2
MS Environmental Science	1		1
Teaching Experience	2	2	4
Research Experience	2	2	4
TOTAL	**24**	**17**	**41**

— SECTION 2 —

RELENTLESS INNOVATION IN EDUCATION

The record turnout in our scholarship programs in 2021 serves as a strong indicator of the desire of Filipino students to learn and grow amid–and, perhaps, especially during—challenging times.

Thus, we at the Institute strove to make good on our promise to create, provide, and extend learning avenues for our future innovators. This chapter covers the wide-ranging innovations we have introduced to advance the S&T and education sectors, including those that foster interest among the youth and simplify the delivery of STEM education and scholarship opportunities.

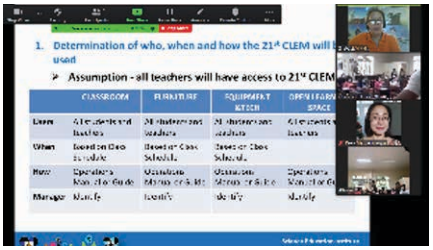
21st Century Learning Environment

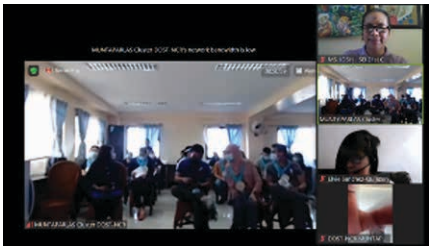
As the educational teaching and learning landscape shifted away from the traditional format of face-to-face classes, ubiquitous learning through virtual means gained momentum.

Early adopters of the SEI 21st-century learning environment model remained undeterred by the sudden shift, as students and teachers managed to maximize the use of the facility, utilizing it as a development center for modules. It also served as a venue to develop and produce radio-based instructions and modules for video platforms.

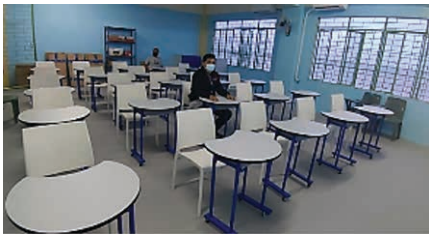
Meanwhile, virtual seminars discussed how learning processes could continue in the new normal. The project was presented to potential school adopters, stakeholders and interested parties.

With Teaching Staff of Bayambang NHS, LGU-Bayambang, SEI and DOST-PSTC Pangasinan (left) and Bacarra CES (right) during a technical consultation on adopting and setting up the 21st CLEM





Virtual technical assistance conducted for Bacarra CES and Cupang Senior HS



Classrooms at the Bacarra Central ES, Ilocos Norte (left) and Cupang Senior HS, Munitnlupa City (right) 21st CLEM

Schools Adopt and Adapt to the new normal

As the education system gets refigured post-pandemic, new schools adopt the 21st Century Model Classroom of DOST-SEI. Meanwhile, pre-pandemic adopters prepare their 21st Century Learning Environment Model (21stCLEM) for the pilot-testing of face-to-face classes.

Two new school-adopters, Kidapawan City National High School and Bayambang National High School of Pangasinan, were briefed on the features and requirements of the 21st CLEM. Bacarra Central Elementary School of Ilocos Norte and Cupang Senior High School of Muntinlupa City were provided with technical assistance on how to set up the technologies and equipment in their respective 21st CLEM.

With the addition of two new school adopters in 2021, the total number of 21st CLEM adopters rose to 25. Other potential schools also signified their interest to join the growing network.

TABLE 37: Number of 21st Clem School-Adopters

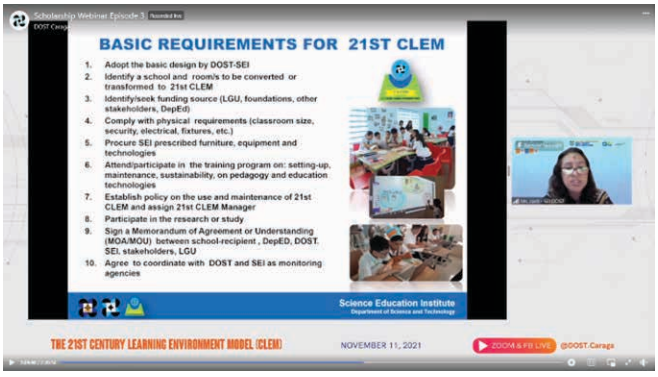
REGION	PROVINCE	DIVISION/DISTRICT	NO. OF SCHOOL-ADOPTER
1	Ilocos Norte	Bacarra	1
		Burgos	2
		Pagudpud	2
2	Isabela	Cauayan	1
3	Bataan	Balanga City	2
	Pampanga	Angeles City	1
4A	Batangas	Lipa City	5
	Laguna	Binan City	1
		Calamba City	3
		Los Baños	2
		San Pablo City	2
5	Masbate	Masbate City	1
12	Kidapawan	Kidapawan City	1
NCR	Muntinlupa	Muntinlupa City	1
7 Regions	**9 Provinces**	**14 Divisions**	**25 Schools**

TABLE 38: Number of Participants of the Webinar on 21st CLEM.

HOST DOST RO	DEPED DIVISION/S	NO. OF PARTICIPANTS	N FEMALE	N MALE	SOCMED PERFORMANCE
1	Ilocos Norte Ilocos Sur Pangasinan	953	667	286	3,200 views 403 likes 104 shares
2	Cagayan Isabela Quirino Nueva Vizcaya	97	68	29	1,900 views 57 likes 22 shares
4B MIMAROPA	Or. Mindoro Occ. Mindoro Marinduque Romblon Palawan	50	35	15	300 views 17 likes 22 shares
CARAGA	Surigao DN Surigao City Siargao Agusan DN Agusan DS Bayugan Butuan City Bislig City Cabadbaran Tandag City	171	120	51	1,300 views 130 likes 35 shares
4	**23**	**1,271**	**890**	**381**	**6,700 Views 607 Likes 183 Shares**

DOST RO 1-hosted webinar on 21st CLEM

DOST RO 2-hosted webinar on 21st CLEM



DOST RO CARAGA-hosted webinar on 21st CLEM

Webinar on 21st Century Learning Environment Model (21st CLEM)

In coordination with DOST Regional Offices (DOST-ROs) and DOST Provincial Science and Technology Centers (PSTCs), a series of webinars on DOST-SEI's 21st Century Learning Environment Model (21st CLEM) was mounted for teachers, head teachers, principals, provincial schools division supervisors and education program supervisors from several DepEd divisions.

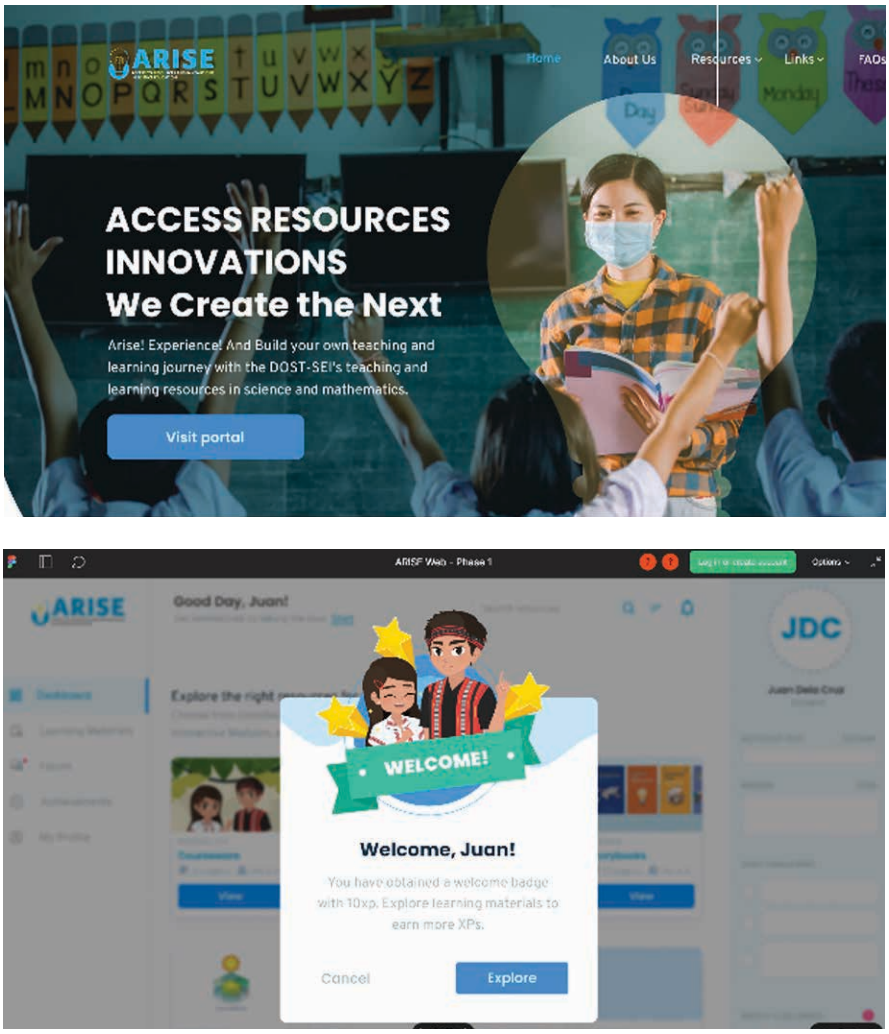
The participants were oriented on the 21st CLEM components, namely, 1) The Classroom, 2) Training Program 3) Integration of 21st Century Teaching and Learning Practices and 4) Monitoring, Evaluation and Research. Also discussed were the modern infrastructure required, education and information and communication technologies to be installed and the Open Learning Space (OLS). Schools that adopted the model were likewise featured in the webinar.

The session was conducted by program leader Josephine S. Feliciano of SEI, who also served as the resource person. The SEI 21st Century Model Classroom can be found at DOST-SEI in Bicutan, Taguig City. For more information, follow the ARISE FB page or email 21stclemph@gmail.com.

ARISE Portal

An education portal that also serves as a content and learning management system, the ARISE Portal was designed to ensure access to emerging and integrative educational and instructional technologies. The idea is to make teaching and learning more relevant through a centralized repository of knowledge, expanding access to learning opportunities for everyone.

The ARISE Portal grants free access to SEI-produced teaching and learning resources in science and mathematics. The featured formats include multimedia interactive software, videos and other technology-driven knowledge products developed in digital multi-platforms for desktop and mobile use.



The ARISE Portal interface

Innobox for Remote Teaching and Learning

Year 3 of the InnoBox competition opened another opportunity for teachers to showcase their innovations for remote teaching and learning. This time, the contest welcomed proposals from teachers on how they continued to perform their duties using various platforms.

Compared to the previous iterations of the competition, the search featured two main categories: The digital tool as well as the teaching and learning resources for both high school and elementary school.

Out of 106 proposal submissions, 20 pitched their projects online in June 2021. Only 11 made it to the final stage, wherein they were granted Php 50,000.00 to fund the development of their innovation.

The technical committee will then select the final winners in 2022 after observing how the innovation applies in a classroom setup. The project hopes to select the most innovative teaching and learning resources that best respond to the needs of blended learning.

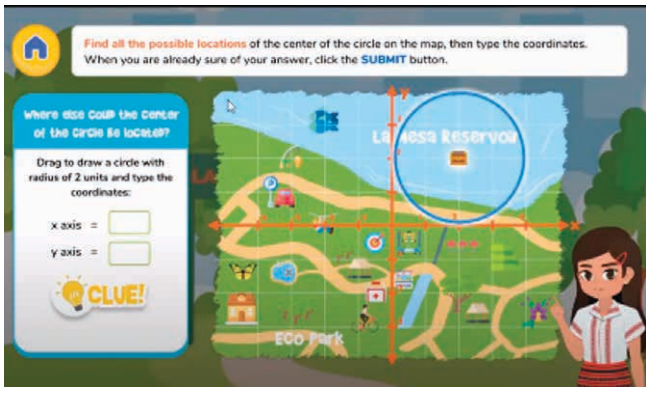
Digitization of Grades 9-10 Science and Mathematics Courseware

A total of 42 modules in science and mathematics for Grades 9-10 were digitized into modules, adding to the hundreds of free DOST Courseware for Android, Apple iOS, MS Windows and Web (Browser-based) multi-platforms. For Grade 9, 23 science and seven mathematics modules were produced. For Grade 10, four science and eight mathematics modules were likewise digitized for a total of 30 and 12, respectively, for each grade level. The following is the list of modules that will be available in 2022.

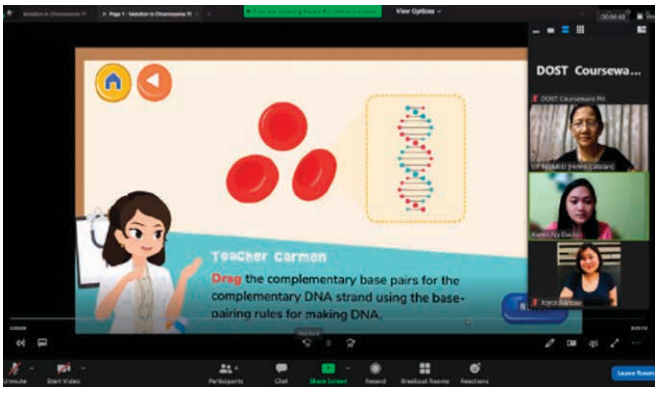
The Alpha Version review (first review) was likewise conducted virtually via Zoom throughout ten sessions between September and November 2021, with eighteen writers and experts from University of the Philippines National Institute for Science and Mathematics Education (UP-NISMED), SEI Courseware Project Lead and PCI Technologies, Inc. as external provider.

TABLE 39: Courseware in Grades 9-10 Lessons

SUBJECT	GRADE	LESSON TITLE
Earth and Space	10	Plate Tectonics: Where are the plate boundaries?
	10	Plate Tectonics: What happens when plates move apart?
	10	Plate Tectonics: What happens when plates collide?
	9	Difference Between Weather and Climate
	9	Factors that Affect Climate (Latitude)
	9	Factors that Affect Climate (Altitude)
	9	Draw a Constellation
	9	Constellations Each Month
	9	Constellations in the Sky
Biology	9	Respiratory and Circulatory System
	9	Photosynthesis
	9	Biodiversity and Evolution: Can species be lost forever?
	10	Mutation in Chromosome 11
Chemistry	9	Valence Electrons
	9	Covalent Bonding
	9	Ionic Bonding
	9	Metallic Bonding
	9	Boyle's Law
	9	Charle's Law
	9	Introduction to the Mole Concept
	9	Chemistry of Carbon
Physics	9	Geothermal Power Plant
	9	Power Transmission and Distribution
	9 & 10	Introduction to Energy
	9	Hydroelectric Power Plant
	9	Household Electric Consumption
	9	Energy Transformation in Generator
	9	Wind Energy



Courseware digitized module on Shifted Circle lesson



Virtual Alpha Version review session with writers and external provider.

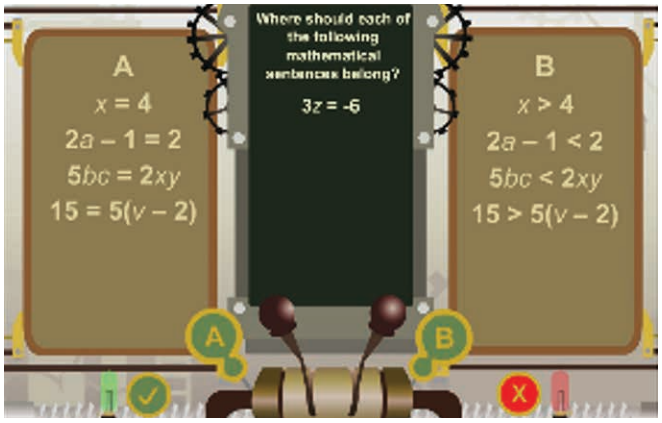
STEM Mobile Learning New Modules

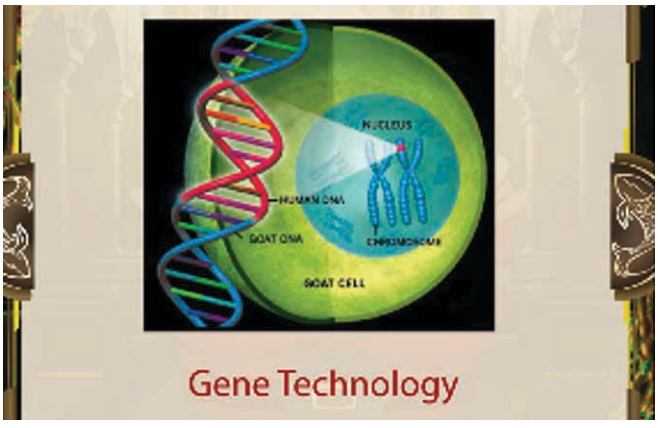
Twenty more modules were converted from MS Windows format to Android, bringing the total modules available on Google Play Store to 132 Courseware Mobile Applications (CMAPP). These are:

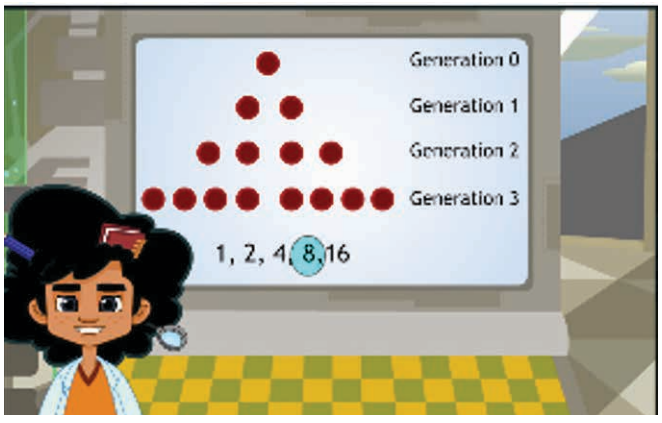
- **Grade 7 Science**
  - Mountain Building
  - What is force?
  - Ecosystems Are Interconnected
  - Differentiating Substances and Mixtures
  - Symbols of Atoms and Molecules
- **Grade 7 Mathematics**
  - Adding and Subtracting Similar Fractions and Mixed Numbers
  - Expressing Fraction in Simplest Form
  - Equations Versus Inequalities
  - Factoring a Sum or Difference of Two Cubes
  - Use Special Products and Factoring to Solve Problems
- **Grade 8 Science**
  - Gymnosperm
  - Theories of Evolution
  - Codominance (Multiple Alleles)
  - Gene Technology
  - Roots
- **Grade 8 Mathematics**
  - The nth Term of an Arithmetic Sequence
  - The nth Term of a Geometric Sequence
  - Simplify Expressions with Rational Exponents
  - Solution of Systems of Linear Equations in Two Variables by Substitution
  - Simplifying Complex Fractions and Complex Rational Algebraic Expressions

The DOST Courseware is a Filipino-produced, all-original highly interactive multimedia educational resource package in MS Windows, Android, Apple iOS and Web-Based platforms. Conceptualized, produced and spearheaded by the Science Education Institute (SEI-DOST) in 2006 in partnership with the Advanced Science and Technology Institute (ASTI-DOST) and in cooperation with the Department of Education (DepEd), Philippine Normal University (PNU) and University of the Philippines-National Institute for Science and Mathematics Education (UP-NISMED), its primary goal is to develop information and communication technology learning innovation to support the upgrading and improvement of science and mathematics education in the country.

The DOST Courseware is provided for free to schools and made available online as supplemental resources for teachers and students. It is a fun and interactive approach to e-learning and blended learning.







New set of Courseware mobile applications for Android.

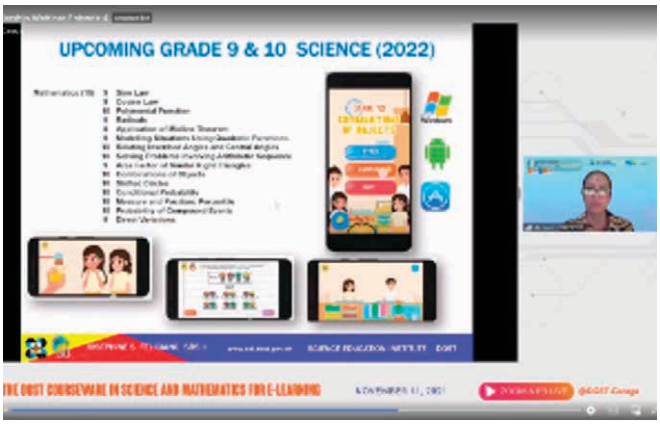
Webinars on DOST Courseware in Science and Mathematics for E-Learning

A webinar series was conducted to discuss DOST-SEI's Teaching and Learning Resource and the DOST Courseware in Science and Mathematics for Grades 1 to 8, particularly its features, accessibility and vital role to the alternative delivery mode for flexible teaching and learning. The effort was mounted in cooperation with DOST Regional Office (DOST-RO) DOST-Provincial Science and Technology Office (PSTO) and Department of Education (DepEd) Division Office.

Twenty-five sessions were conducted using video conferencing applications Zoom and MS Teams, allowing educators to interact and discuss the locally-produced educational software application. The webinar series ran from February to December 2021 with 2,210 teachers, head teachers, principals and supervisors participating from nine regions in different events. Project leader Josephine S. Feliciano of DOST-SEI served as the resource person.

TABLE 40: Webinars Conducted on DOST Courseware For 2021

WEBINAR TITLE	PARTICIPANTS	FEMALE	MALE	REGION
Virtual Upskilling And Reskilling Of Kinder To Grade 3 Teachers On Teaching In The New Normal	310	217	93	CARAGA
Virtual Orientation on DOST Courseware for Grades 1-8 Science and Mathematics Teachers in Albay	554	388	166	5
DOST Courseware in Science and Mathematics for E-Learning	61	43	18	10
SCRIBBLE-Skillful-Creation-of-Resource-Integrated-with-Blended-Learning-e-Strategies-Responses	150	105	45	NCR
DOST Courseware in Science and Mathematics for Blended Learning	383	268	115	10
DOST Courseware in Science and Mathematics for E- Learning	458	320	138	4A
DOST Courseware in Science and Mathematics for E- Learning	154	108	46	CARAGA
DOST Courseware in Science and Mathematics for E- Learning	50	35	15	4B MIMAROPA
DOST Courseware in Science and Mathematics for E- Learning	90	63	27	2
TOTAL	**2,210**	**1,547**	**663**	**9**



Virtual Courseware Webinar Sessions

Courseware Installs and Access

The number of downloads and installs for all platforms continued from different access points, which may be attributed to the webinars conducted from February to December 2021. Compared to 2019's total of 14,119 and 2020's 33,730, 2021 saw 16,284 installs from Google Play Store. That's a total of 100,835 since 2016. Meanwhile, in Apple Store, the year also recorded 698 installs, bringing the total to 2,819 since 2018.

The number of hits in the Courseware download link at SEI website likewise recorded strong numbers despite the pandemic. From 28,529 in 2019, the figure grew to 41,616 in 2020 and 30,417 in 2021. This represents a total of 100,562 since its activation in September 2018.

At least 1,424 users for 2021 registered on the download access page where all the applications on all platforms are uploaded.

The bulk of registered users came from Regions IVA, 1, X, NCR and VII. Around 73% are female and twenty-seven 27% are male. Teachers downloaded the applications the most at 85% followed by students and parents.

All the Courseware platforms in MS Windows (413 modules), Android (152 apps) and Apple IOS (20 apps) can be downloaded for free from the SEI website at http://www.SEI.dost.gov.ph/index.php/programs-and-projects/innovations/83-courseware. The mobile application versions are available on Google Play or Apple Store. For more information, follow the DOST Courseware FB page or email dostcoursewareph@gmail.com.

TABLE 41: Number of Installs by Grade Level & Subject from Google Play Store

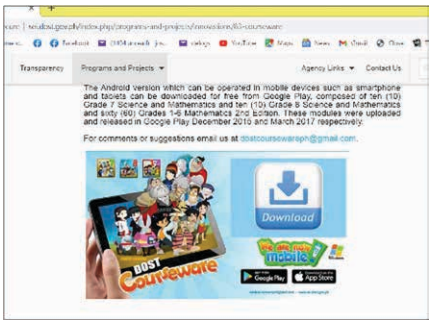
GRADE/SUBJECT	NO. OF INSTALLS 2021	TOTAL NO. OF INSTALLS (SINCE 2016)
Grade 1-6 Mathematics	4,269	47,999
Grades 3-6 Science	1,057	4,677
Grade 7 - Science	2,411	11,310
Grade 7 – Mathematics	3,697	12,138
Grade 8 - Science	1,953	10,935
Grade 8 – Mathematics	2,897	13,776
Total	**16,284**	**100,835**

TABLE 42: Number of Installs by Grade Level & Subject from Apple Store

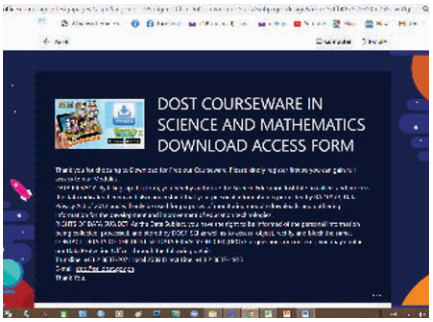
GRADE/SUBJECT	NO. OF INSTALLS 2021	TOTAL NO. OF INSTALLS (SINCE 2018)
Grade 7 - Science	142	656
Grade 7 – Mathematics	131	447
Grade 8 - Science	306	1,141
Grade 8 – Mathematics	119	575
Total	**698**	**2,819**

TABLE 43: Number of Visits in Courseware Download Link for all Platforms at SEI Website

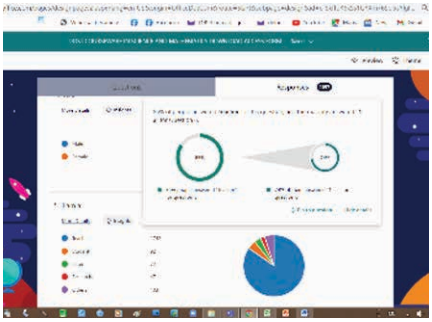
MONTH	NO. OF MONTHLY HITS	TOTAL NO. OF HITS (CUMULATIVE SINCE 2019)
January	1,033	71,178
February	1,477	72,655
March	1,618	74,273
April	1,538	75,811
May	1,063	76,874
June	1,996	78,,870
July	5,036	83,906
August	6,018	89,924
September	1,929	91,853
October	2,647	94,500
November	3,648	98,148
December	2,414	100,562
Total	**30,417**	**100,562**



Download page link of the DOST Courseware at the SEI Website



Download Access Registration Form



Courseware download data dashboard

Augmented Reality (AR) as a Teaching Tool

The DOST-SEI conducted training for secondary (Grade 8) teachers from Caraga region on the use of SIMaTAR (*Strategic Intervention Materials for Teaching with Augmented Reality*), an innovative teaching-learning resource material that SEI developed as the winning entry in the competition for teaching innovations. The training, which aims to upgrade the teaching skills of science and mathematics teachers through the integration of emerging technologies and innovative resource materials, was conducted as part of *Innovative Teaching and Learning Resources in Science and Mathematics Education*, a project that ran from December 1-3, 2021.

SIMaTAR comes with the following printable *Strategic Intervention Materials* (SIMs) in science (Grades 7 and 8) that were provided to the participants.

- Journey into the Cell: The Basic Unit of Life (*Grade 7*)
- A Storm is Born: Understanding Formation of Typhoon (*Grade 8*)
- Break on the Move: Earthquake and Faults (*Grade 8*)
- The Amazing Visitors of Planet Earth: Comets, Meteors and Asteroids (*Grade 8*)
- What's the Matter: The Particle Nature of Matter (*Grade 8*)

The training welcomed 61 participants (47 females and 14 males) from 30 schools in Caraga region on the use of AR in teaching. One of the trainers was the national winner of the competition "Search for the Most Innovative Practices in Managing Large Classes," along with three others who were involved in the implementation of the SIMaTAR project. Table 1 shows the distribution of participants by province in Caraga region.

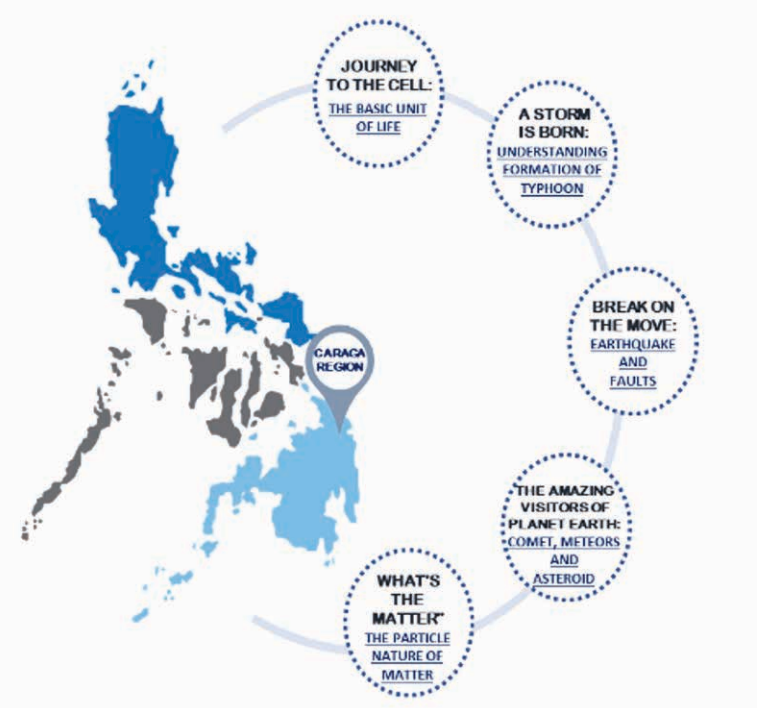
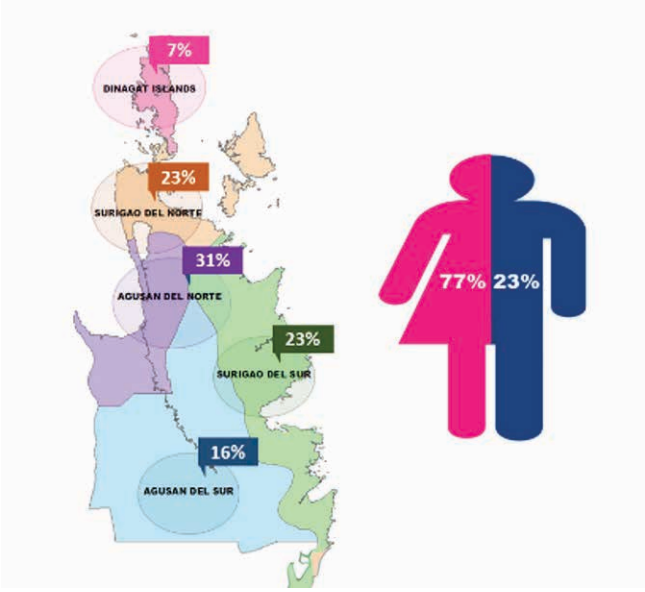


TABLE 44: Distribution of participants by province

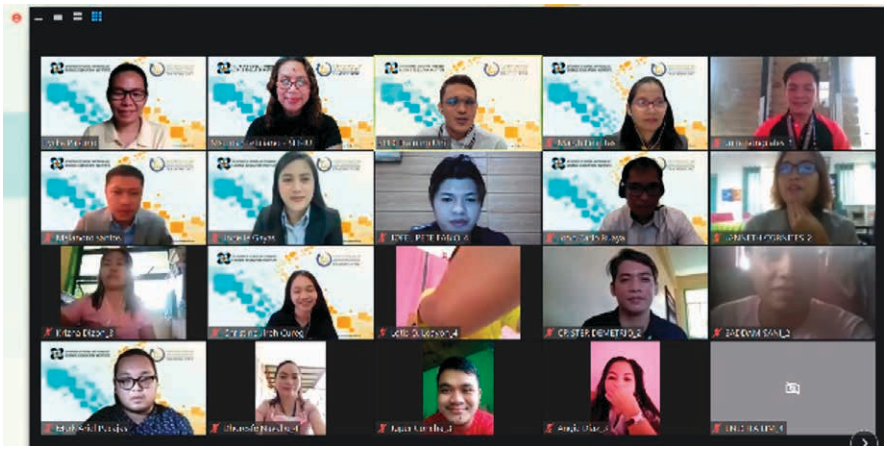
PROVINCE	NUMBER OF PARTICIPANTS
Surigao Del Norte	14
Surigao Del Sur	14
Agusan Del Norte	19
Agusan Del Sur	10
Dinagat Islands	4
Total	**61**



Strategic Intervention Material for Teaching with Augmented Reality (SIMaTAR)

Pilot Training on the Use of SIMaTAR

To familiarize teachers with the features of SIMaTAR as a teaching-learning resource with augmented reality, a pilot training was conducted as organized by SEID-Training Unit. A total of 60 selected teachers from Caraga participated for two days from December 1 to 2, 2021, featuring writers and researchers of SIMaTAR modules as resource persons. The output of each group included a presentation integrating SIMaTAR in lesson plans.



Online Participants to the SIMaTAR Pilot Training

Comments from the participants include:

"The module and application are very useful and timely, especially to the type of learners we have now. I'm looking forward to wider use of SIMaTAR in any subjects and competencies and additional feature which is manipulative."

"SIMaTAR modules are so useful for us teachers in teaching our students the lessons in science as they can see the augmented reality. It is easy to use also as long as the students have a copy of modules and android phone."

"The SIMaTAR is very nice and engaging. I would definitely use this in my class."

Research on Classroom Use of SIMaTAR

To determine the effect of SIMaTAR, Melandro D. Santos of Tondo High School conducted a study, titled "Effect of Strategic Intervention Material with Augmented Reality on Improving Students' Engagement, Comprehension, and Attitude Towards Science."

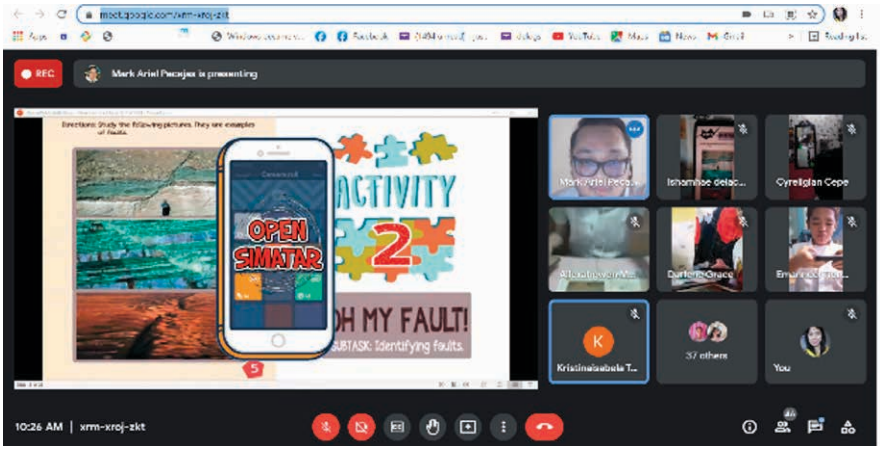
The researchers underscored the relevance of SIMaTAR during this time of the COVID-19 pandemic since AR technology can help students be independent learners. It can also create a positive impact on student-teacher engagement and interaction. The study revealed that there is a significant improvement in students' learning outcomes as well as their level of engagement in online science. Meanwhile, there is no change in all indicators of students' attitudes towards science after Augmented Reality (AR) implementation.

A series of online observations using the SIMaTAR was conducted where students used the SIMaTAR in their virtual classroom.

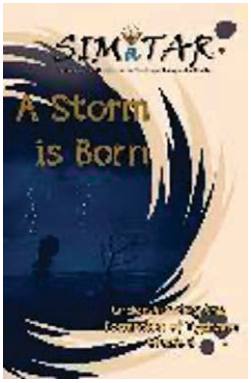
Strategic Intervention Material for Teaching with Augmented Reality (SIMaTAR) is a supplementary teaching and learning resource which comes with a mobile application for each lesson that can be downloaded from Google Play Store and Apple App Store for free. This material uses Augmented Reality technology which superimposes a computer-generated image on a user's view of the real world, thus providing a composite view.

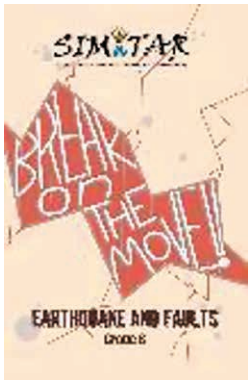
The SIMaTAR modules include:

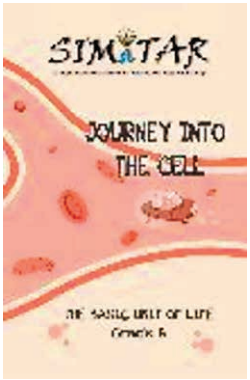
1. A Storm is Born: Understanding Formation of Typhoon
2. Break on the Move: Earthquake and Faults
3. Journey Into the Cell: The Basic Unit of Life
4. The Amazing Visitors of Planet Earth: Comets, Meteors and Asteroids
5. What's the Matter: The Particle Nature of Matter

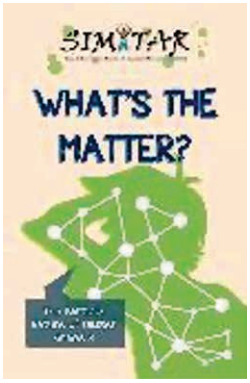


Students of Tondo High School use SIMaTAR during a virtual class







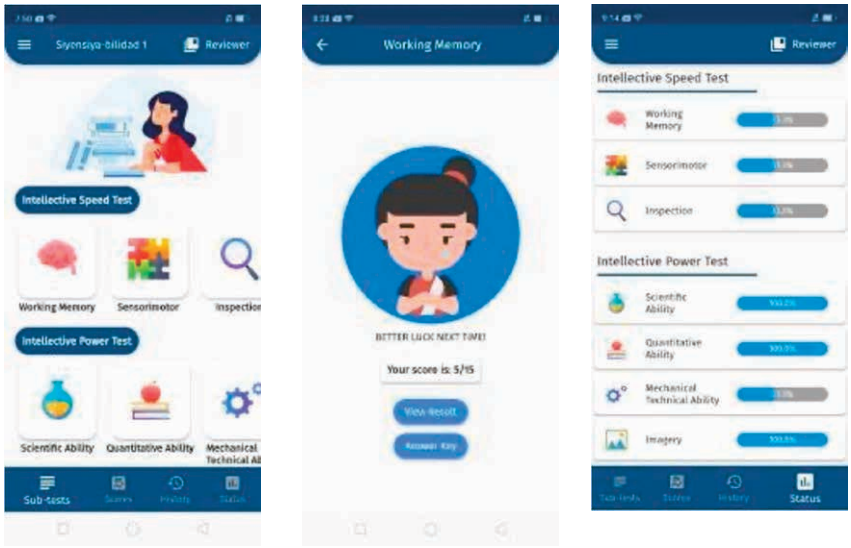


S&T Scholarships Mobile Application Reviewer

DOST S&T Undergraduate Scholarship Examination Reviewer – Siyensya-bilidad is a mobile application that provides a different approach from the normal lecture and module-based review. It focuses on answering questions and developing one's skills in test-taking by simulating DOST S&T Exam questions and providing well-structured solutions to each question. It is also designed to test the grasp of basic knowledge and level of retention of subjects and topics from the K-12 curriculum and guides the student-reviewer in the mastery of each subject.

It is composed of a pool of 393 test items on linguistic ability, logical reasoning and power tests on English, Science, Mathematics and Mechanical Technical from the two print volumes of Siyensya-bilidad, which can be accessed and operated offline once installed on Android-based mobile devices. It presents the following features:

- Self-pacing Reviewer
- Can be used Offline
- Contains two volumes of Siyensyabilidad test items
- Test Timer
- Scoring system
- Answer Key to Correction
- Data Analytics
- User dashboard and profiling
- Administrator Dashboard
- Platform - Android Mobile Application



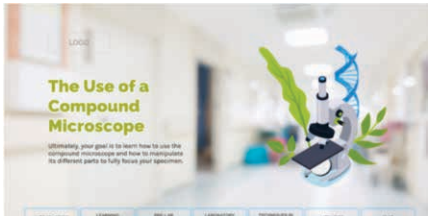
Syensya-bilidad Mobile Application Interface

Virtual Laboratory Application in Science (VLAS)

The virtual laboratory (VL) is a simulated learning environment that allows students to have a complete experience of online laboratory experiments without going into a physical laboratory. Similar to the traditional laboratory experience, the virtual laboratory simulations support science teaching through the demonstration of theoretical concepts, helping students familiarize themselves with scientific apparatus, and helping them understand the scientific method. The VL also allows students to perform and repeat experiments without any risk of danger.

For 2021, VLAS kicked off the digitization of lessons and development of simulations in Biology on the following:

1. Introductory Laboratory
2. Laboratory Safety
3. Microscopy
4. Levels of Biological Organization
5. Comparing Plant and Animal Cells
6. Fungi, Protist, Bacteria with comments ASB



VLAS prototype menu for Microscopy

7. Sexual and Asexual Reproduction
8. VLAS prototype menu for Microscopy

Development of Children's Storybooks in Science and Mathematics

To encourage teachers to use storybooks for fostering their students' interests in science and mathematics, the Department of Science and Technology, through the Science Education Institute, initiated the development of storybooks designed for children aged three to six years old. For 2021, a total of 15 storybooks were produced.

The storybooks were written by child development experts from UP College of Home Economics, illustrated by freelance artists, and proofread by an expert from UP College of Arts and Letters. The books contain the following elements: Back and Front Covers; Inside Front Cover and Title Page; Illustrated Scenes with Texts of Story written in Filipino and in English; Suggested Post-Reading Activity; Storytelling Guide and Unlocking of Words; and Publishing Page and Project Management Staff.

The following are the storybook titles developed:

1. Ang Unang Linggo
2. Hmm, Anong Oras na Kaya?
3. Kuya Mansi at Kala
4. Panahon Na!
5. Kaninong Anino?
6. Aking Higante
7. Dagdag Bawas
8. Ang Panukat ni Kat
9. Si Kuya at Ako
10. Bulaga!
11. Ang Aming Palamig
12. Halakhak
13. Paulit-ulit
14. Inspektor Pekto
15. Yakap na Mahigpit

The move to develop storybooks in science and mathematics was initiated based on various studies that show the importance of storybook reading for the development of early language and literacy of young children. Research also shows that children who learn to read early are those who have been read to.

These are the covers of the storybooks produced in 2021:

VLAS prototype menu for Microscopy

Evaluation of Children's Storybooks In Science And Mathematics

With many pieces of literature recognizing the benefits of storybooks in Science and Mathematics for children, it is indeed important to optimize these resources. Hence, the Department of Science and Technology, through the Science Education Institute, initiated the evaluation of the storybooks they developed in 2018 and 2019 for preschool and school-aged children. The project was outsourced to the Department of Family Life and Child Development of the UP College of Home Economics, UP, Diliman, Quezon City in October 2020 and was completed in September 2021.

The study is aimed at evaluating the storybooks based on three phases that include Technical Evaluation (Phase 1), Workshop and Module Development for Storybook Implementation (Phase 2), and Evaluation for Further Development of Storybooks in Science and Mathematics (Phase 3). The results of this study will serve as the initial research to effectively come up with efficient storybooks that will promote numeracy and science concept skills to Filipino children.

The results of the project showed that the developed storybooks indeed presented Science and Mathematics concepts in a creative and developmentally appropriate manner for children aged 3 to 5 and 6 to 8 years old. It revealed that both parents and teachers see the potential of storybooks in introducing various concepts in these subject matter areas with engaging stories and vivid illustrations. The evaluation study strongly recommends the need for more local developmentally appropriate storybooks in Science and Mathematics for early childhood development and early grades.

2018 Storybooks

2019 Storybooks

Video Storytelling

Long before the emergence COVID-19 pandemic, the Department of Science and Technology (DOST), through the Science Education Institute (SEI), has already been developing new solutions and innovations that will deliver basic education more effectively. One of these is the development of children's storybooks in science and mathematics.

The DOST-SEI was able to produce a total of 18 storybooks from 2018 to 2019. These storybooks were printed and disseminated to selected schools nationwide. However, to disseminate more copies of the storybooks to its intended users, there is a need to print more. Considering the required time and resources to carry out the effort, the DOST-SEI initiated the implementation of the project "Video Storytelling." Video Storytelling involves the conversion of all the storybooks developed in 2018 and 2019 into video format.

For 2021, a total of eight storytelling videos were developed. Six of these comprised 2D animations based on the available artworks or PSD/layered files submitted by the artists, voice-over, and background music. Meanwhile, the other two involve the actual shoot with

the actors and actresses, 2D animations, voice-over, and background music.

To reach more beneficiaries, these videos will be uploaded and made available on social media sites (e.g. Facebook, Twitter, etc.) and Youtube. The DOST-SEI will also develop a Learning Management System or a portal where all the developed innovative science education resources will be uploaded. These resources can be downloaded by the interested parties free of charge.

Development of Grades 3-6 Lessons In Science

In 2006, the Department of Science and Technology (DOST), through the Science Education Institute (SEI), started the development and implementation of locally produced interactive courseware materials. Thes were developed in collaboration with their partner institutions such as the University of the Philippines National Institute for Science and Mathematics Education Development (UP NISMED), Department of Education (DepEd), Philippine Normal University (PNU), and the DOST-Advanced Science and Technology Institute (DOST-ASTI). Among the courseware modules that they developed are the following:

1. Modules in Science and Mathematics for Elementary Schools (1st Release, 2006) – 102 Modules
2. Grades 1-6 Mathematics K12 (2nd Release, 2014) – 60 Modules
3. Grade 7 Science and Mathematics (Third Release, 2014) -133 Modules
4. Grade 8 Science and Mathematics (Third Release,2014) – 118 Modules

The success of implementation and the impact created by these courseware modules on students were measured through various pilot-testing methods and the evaluation study of the currently available DOST courseware materials. The courseware modules inspired the development of the Grades 3-6 lessons/ contents in science in 2021.

As a result, a total of 60 modules in Science for Grades 3 to 6 and accompanying teaching guides were developed. These modules will be digitized in 2022.

2021 Climate Science Youth Camp Introduces Research as Career Path to Students

The Climate Science Youth Camp (CSYC) is designed to provide experiential learning among high school students and teachers into the real-life work of professionals, including marine scientists, geologists, and meteorologists. The idea is to encourage students to pursue careers in Science, Technology, Engineering and Mathematics (STEM).

The project, which began in 2010, aims to bring the best out of students academically through lectures and hands-on laboratory activities, and on-site field activities. The program instills deep understanding and appreciation of S&T, and provides an avenue to establish rapport with experts, scientists, and researchers.

The Science Camp bridges the basics of climate science and hazards assessment and reduction with the concepts of innovation and leadership among public high school students by allowing them to explore the dynamics between the atmosphere and landforms, the river systems and the oceans, and infer the effects of climate change on the earth systems.

Among the main partners are scientists from the University of the Philippines' Marine Science Institute (MSI) and National Institute of Geological Sciences (NIGS), and DOST's Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA).

For 2021, given the challenges in mobility and prohibition on conduct of face-to-face programs, the project conducted a virtual mentoring mode. Dubbed as Virtual Climate Science Youth Camp (VCSYC), it focused on integrative learning in climate science and resource management through a five-day online engagement featuring lectures, career talks, and workshops. It was held on November 8-12, 2021 from 10:00 AM to 12:00 NN via Zoom platform.

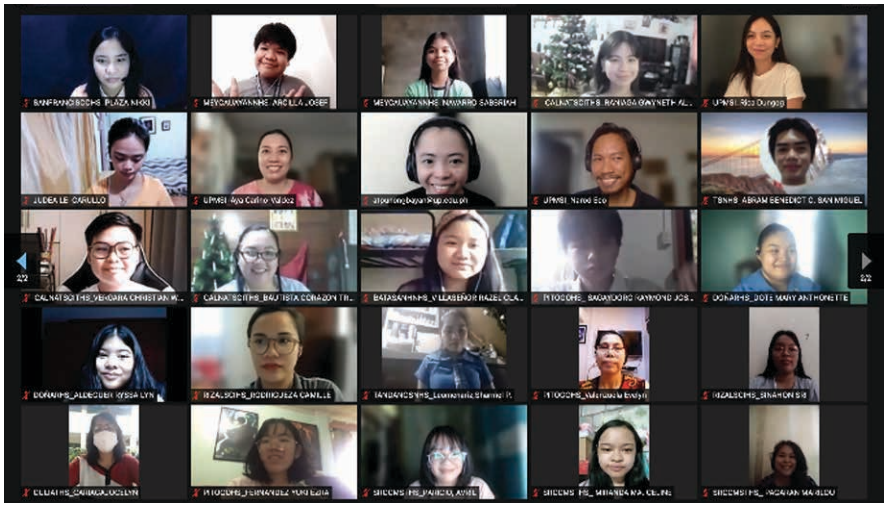
The virtual camp was facilitated by researchers from UP MSI, who are directly involved in a project called *"Hazard Detection and Mitigation Tools for Algal Blooms in a Changing Environment,"* also known as the *HABHazard program*. The project is funded by the Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development (DOST-PCAARRD).

VCSYC's theme, titled *"Finding Career Path thru Research,"* showcased potential careers related to UP MSI's research project on harmful algal blooms (HABs). Four (4) project researchers, who are experts in various field of sciences, served as speakers to share their roles in the project and demonstrate how a research project cuts across various disciplines in science while emphasizing the connections between different disciplines and their relationship to the research project. Moreover, this virtual camp allowed the participants to turn questions into research topics, helping them decide on which science courses to pursue.

A total of 43 participants (composed of 34 students and 9 teachers) from 12 high schools attended the VCSYC. Below is the list of the 12 schools:

1. Angono National High School
2. Batasan Hills National High School
3. Caloocan National Science and Technology High School
4. Culiat High School
5. Doña Rosario High School
6. Pitogo High School
7. San Francisco High School
8. Sen. Renato "Compañero" Cayetano Memorial Science & Technology High School
9. Tandang Sora National High School
10. Meycauayan National High School
11. Meycauayan National High School – Annex
12. Rizal National Science High School

Event Poster of Virtual Climate Science Youth Camp.



Participants of Virtual Climate Science Youth Camp (VCSYC) with Dr. Josette T. Biyo, Director of DOST-SEI, Dr. Aletta T. Yñiguez, Ms. Andalus Punongbayan, Ms. Ma. Rica Teresa Dungog and Mr. Rodrigo Narod Eco.

Radyoeskwela and Tuklasiyensya: An Alternative Learning Delivery for STEM Promotion

In 2021, the Science Explorer project continued to bring science, technology, engineering, and mathematics (STEM) closer to the youth through novel alternative learning methods and platforms.

Produced in 2020, the project continued to air and promote episodes of RadyoEskwela and TuklaSiyensya on online media and radio networks. Nine (9) RadyoEskwela episodes and ten TuklaSiyensya episodes, both from the project's Season 1 run, were aired on different radio networks such as DZRH, RadyoHenyo and Radyo Natin and on social media platforms.

The project also produced new story-based video episodes for the Season 2 of RadyoEskwela sa Siyensya. Meanwhile, TuklaSiyensya sa Eskwela produced new STEM modules for its Season 2 video production.

Through a partnership between the Department of Education (DepEd), Knowledge Channel and the DOST, the radio and video episodes have also been promoted as a complementary STEM learning resource for K-12 students.

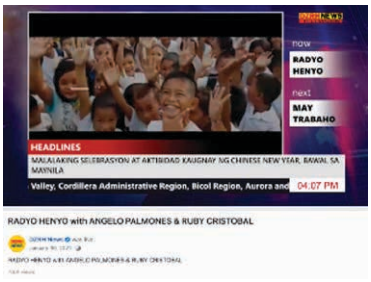
New Episodes of RadyoEskwela include:
1. Density
2. Money Matters
3. Plant Propagation
4. Rate and Ratio
5. Solar Eclipse
6. Lindol
7. Sponge
8. Chemistry of Colors
9. Bakit Blue Ang Langit
10. Kiwot Bees
11. Vaccines
12. Volcanoes
13. Gagambahay
14. Area and Volume
15. Vitamins and Minerals

TABLE 45: The RadyoEskwela Season 1 Episodes Aired in 2021

EPISODES	AIRING SCHEDULE	VIEWS AS OF OCTOBER 2021 (DZRH FACEBOOK)
Karagatan	January 3, 2021	6,100.00
Carbon Footprint	January 10, 2021	7,600.00
Day and Night	January 17, 2021	2,700.00
Biodiversity	January 24, 2021	11,000.00
Soap	January 31, 2021	4,700.00
Thunderstorm	February 7, 2021	3,600.00
Fractions	February 21, 2021	3,200.00
States of Matter	February 28, 2021	3,200.00
Genetics	March 7, 2021	3,800.00

TABLE 46: The TuklaSiyensya Season 1 Episodes Aired in 2021

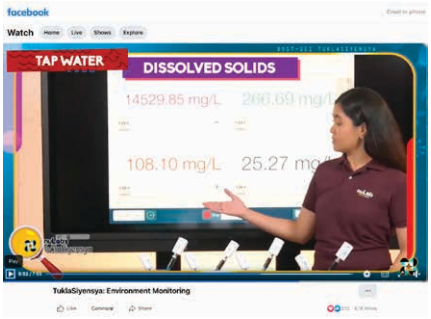
EPISODES	AIRING SCHEDULE	REACH (FACEBOOK)	FACEBOOK VIEWS AS OF OCTOBER 2021
Climate Change	January 8, 2021	33,442	5,500
Common Errors in Algebra	January 12, 2021	32,895	8,200
Environmental Monitoring	January 19, 2021	16,444	9,000
Rivers and Watershed	January 28, 2021	17,725	3,700
Oceanography	February 3, 2021	6,248	5,500
Chemical Bonding	February 11, 2021	873	2,500
EM Waves	March 2, 2021	8,231	4,600
Space Science	April 20, 2021	14,822	4,800
Nuclear Physics	May/10/2021	6,516	5,200
Stoichiometry	June 20, 2021	33,442	2,200



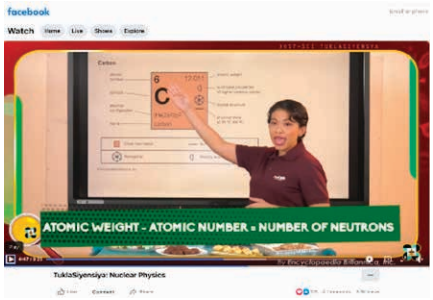
Some Photos of RadyoEskwela Season 1 Airing and Season 2 Production:

Season 2 Production. Different layout and character drawings for new season of RadyoEskwela

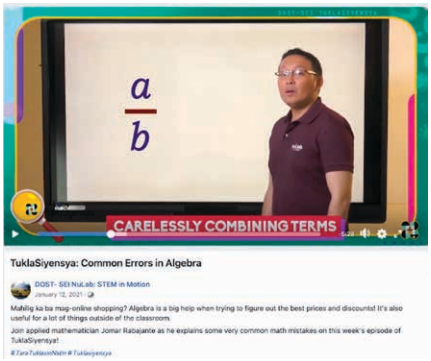
Some Photos of TuklaSiyensya Season 1 Airing



DOST scholar and geologist Pamela Tolentino discusses the different water quality parameters using analog and digital sensors to explain the chemical, physical and biological characteristics of water.



PNRI Deputy Director and DOST scholar-graduate, Dr. Vallerie Ann Samson explains the composition of atoms and molecule, and its relevance to nuclear physics in this episode of TuklaSiyensya. PNRI Deputy Director and DOST scholar-graduate, Dr. Vallerie Ann Samson explains the composition of atoms and molecule, and its relevance to nuclear physics in this episode of TuklaSiyensya.



UPLB Graduate School Dean and DOST Scholar-Graduate, Dr. Jomar Rabajante shares common mistakes in high school algebra

#Push4Science: Maging DOST Scholar Ka!

Expanding the Reach of the DOST Scholarship Program to Priority Municipalities

With 2020 having been an extraordinary year due to the pandemic, the campaign viewed 2021 as a crucial year of transition into new modes of reaching students, as well as the adoption of best practices in science communication using online platforms. The project again focused its strategies on traditional (i.e. radio, print, and television) and new media (i.e. Web 2.0, social network, etc.) to engage aspiring scholars through various online campaigns. Through audiovisual presentations, posters, and the quarterly online career talks, the project managed to reach thousands of students and teachers from all over the country, especially from municipalities with a low rate of application.

The project goals remain focused on improving access to quality Science, Technology, Engineering and Mathematics (STEM) education, and helping produce world-class Filipino science professionals. Specific objectives include the following:

- Promote DOST-SEI's Undergraduate and Graduate Scholarship Programs through design, production and dissemination of various information, education and communication (IEC) materials; and conduct of online career/scholarship orientations;
- Collaborate with the SEI's science advocacy projects (i.e. nuLab, Strategic Communication, etc.) and DOST's national events (i.e. National S&T Week and National Biotechnology Week) in capturing aspiring scholars in campaign activities; and,
- Mobilize DOST Regional Offices, Provincial S&T Centers (PSTC), and DOST Scholars' Associations in campaigning for the S&T Scholarships.

Online Campaigns

The team organized three (3) online campaigns in April, September, and November, utilizing Zoom and Facebook Live as channels to reach the target audiences. The summary of reach is as follows:

TABLE 47: #Push4Science Online Campaigns

EVENT TITLE/THEME	DATE	RESOURCE SPEAKERS	REACH
"The Winning Women in Science"	April 16, 2021 10:00am	• Shana Genavia, ASTHRDP Scholar-Graduate • Sr. SRS, Philippine Genome Center - DNA Sequencing Core Facility • Dr. Ma. Ruth Pineda-Cortel • DOST- PCHRD Scholar • Associate Professor at the Department of Medical Technology, Faculty of Pharmacy, UST	Attendees: 120 participants (Male: 59; Female: 68) FB views: 5,600
"Engineering the Future x The Future is Engineering"	Sept. 29, 2021 10:00 am	• Engr. Lorenzo Moron • RA 7687 Scholar-Graduate • Senior Weather Specialist, PAGASA • Engr. Elgelyn Bardelosa • RA 7687 Scholar-Graduate • Electrical Design Engineer	Attendees: 318 (Male: 145; Female: 173) FB views: 5,900
STEM Career Talk @ 2021 NSTW "Building a Future of Resiliency through Health Research & Development"	Nov. 23, 2021 10:00am	• Dr. John Carlo Malabad • RA 7687 / ASTHRDP Scholar-Graduate • Assistant Scientist, DOST PCHRD • Dr. Sheriah de Paz-Silava Merit / ASTHRDP Scholar-Graduate • Associate Professor, UP Manila	Attendees: 201 FB views: 5,700

Project Collaborations

The team also participated as guests in other online events organized by partner institutions, summarized as follows:

TABLE 48: #Push4Science Online Events Collaborations.

EVENT TITLE/THEME	DATE	REACH
First Manila Intellectual Property, Innovation, and Business Expo	April 26, 2021	Attendees: 3,000
Push4Science at Galing UPLB	May 7, 2021	Attendees: 87
Push4Science at DOST I's Agyamanak: Makabayang Iskolar Ako! Episode 9	July 14, 2021	Attendees: 1,500
Push4Science participation in DOSTv's "The DOST Report" for the whole month of July	All Fridays of July	No data from DOSTv

STRATCOM: Bridging Gaps Through Innovative vOnline Communication Solutions

After shifting to a more intensified online presence, DOST-SEI focused on connecting and communicating various DOST scholarships, STEM promotions, and STEM education innovations programs through innovative strategies. The Institute also utilized online platform affordances to maintain engagement and connection with stakeholders and sustain the impact of the projects.

National Science and Technology Week

The Institute showcased its programs for the youth by participating in the 2021 Online National Science and Technology Week with the theme, "Agham at Teknolohiya: Tugon sa Hamon ng Panahon."

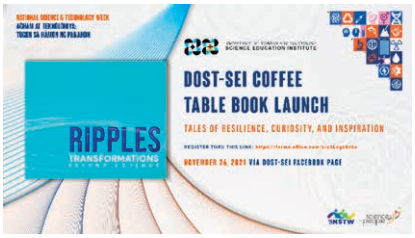
During the week-long celebration, DOST-SEI organized the following online events:

1. **STEM Career Talk** – Nov. 23, 2021
   The DOST-SEI, through its PUSH4Science: Maging DOST Scholar Ka! Project, hosted an online STEM Career Talk for students. The talk was also streamed live via the DOST-SEI Facebook, garnering 5,700 live viewers.

2. **DOST-SEI Coffee Table Book Launch** – Nov. 26, 2021
   The DOST-SEI, together with the Philippine Social Science Council, conducted a qualitative study to track the progress of participants across SEI programs: STEM Promotions, Science and Math Teacher Training, and S&T Scholarships. The report,

titled "Most Significant Change Stories of Beneficiaries of the DOST-SEI Programs and Projects," focused on the tales of resilience, curiosity and inspiration to promote the importance of STEM. It also produced a coffee table book, titled "DOST-SEI Ripples: Transformation Beyond Science."

The online launch event of the coffee table book had 118 live viewers and garnered 824 reactions, comments, and shares.



3. **Science Film Festival 2021 Online Screening Event** – November 24, 2021

DOST-SEI's partnership with the Goethe-Institut Philippinen continues with the celebration of the 2021 Science Film Festival (SFF). This year's SFF carried the theme "Better Health through Better Understanding."

The online screening event organized by SEI featured the documentary "Manufacturing Ignorance," focusing on the concept of "Agnotology," or the study of deliberate and culturally induced ignorance or doubt through the manufacturing of inaccurate or misleading scientific data. Before the film's showing , Mr. Timothy James Dimacali, a former fellow at Massachusetts Institute of Technology, discussed agnotology.

The event hosted 76 attendees via online conferencing.

Media Placement

To further the reach of SEI programs and projects, the DOST-SEI communications team developed and disseminated 27 press releases to various mass media outlets, generating at least 214 media placements, including TV and radio spots across multiple community and major broadcast networks. Online placements remain the main driver of the dissemination, with articles getting mirrored 121 times in various online media outlets.

Social Media Engagement

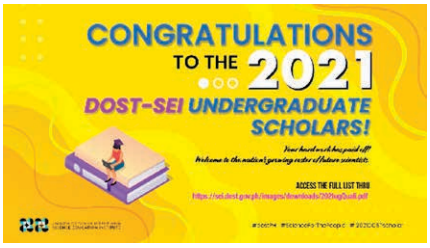
Despite the ever-changing digital landscape, the DOST-SEI was able to launch innovative ways to connect to its stakeholders and target audience through various solutions in managing its social media pages. The Institute's Facebook page streamed online events for different SEI programs and projects. It has also been utilized to post announcements, reminders, and official messages.

The "Science Education Institute – Department of Science and Technology" Facebook page registered 79,660 new followers/likes and a total of 275,831 followers as of December 31, 2021. For 2021, the page also reached 6.7 million people and had 840,785 visits.

Original content produced through the SEI Facebook page include:

1. Science Trivia

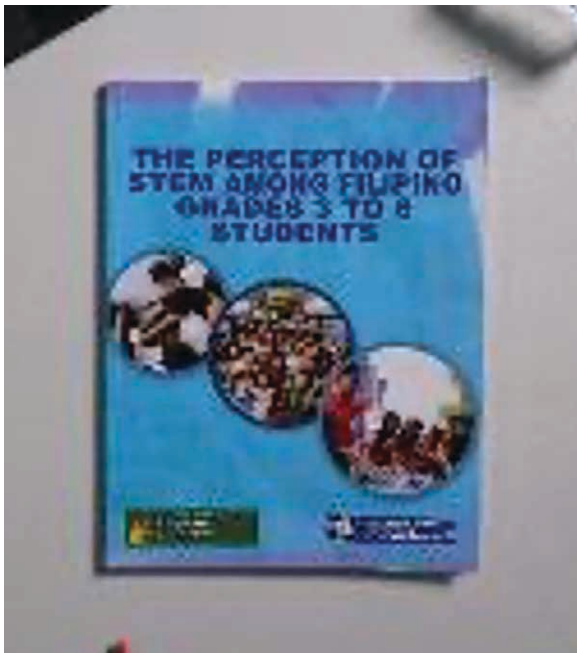
2. Official Announcements/Reminders



3. Congratulatory Posts
   The announcement of qualifiers for the 2021 DOST-SEI Undergraduate Scholarship gained the highest stats with 93,289 reactions and 8,772 shares.

Appreciating Science: A Project on Perception of Science Among Filipino K3 to K6 Students in the Philippines (Year 1)

In partnership with the University of the Philippines College of Mass Communication Foundation, Inc (UPCMCFI), the Department of Science and Technology–Science Education Institute (DOST – SEI) concluded the first year of its three-year comprehensive study that explores the attitudes of K-12 students towards science, technology, engineering, and mathematics (STEM).



Key findings of the survey conducted to almost 1,100 K3 to K6 students, followed by several FGDs, were further investigated in a round table discussion with experts from relevant fields. The discussion highlighted neutral to positive awareness and knowledge of STEM subjects even if students perceive it to bedifficult. In addition, both survey and FGD revealed that intentions to pursue

STEM originates in internal support and field exposure. Learning through reality integration also manifests its role in cultivating the interest in the field. This can be an opportunity to give the spotlight to our Filipino scientists and their significant works to invigorate students' curiosity towards STEM fields. This study also reveals that connecting to the world is an integral part of K3 to K6 students' perception, learning, and appreciation of STEM.

Together with the DOST – SEI officials, UPCMCFI researchers, and various experts from the field of education, the round table discussion was conducted online on August 26, 2022, titled "Kuwela pa ba ang Siyensya?"

— SECTION 3 —

SUSTAINING OUR GAINS

We at the Institute take pride in delivering on our goals, which include those that predate the pandemic. While much of our efforts these past couple of years were directed towards responding to the global health crisis, the goals we set were not lost on us in any way.

In fact, one of the key focuses of the Institute in 2021 was to keep the momentum going for our existing programs and sustain our gains. We have made great strides this year in many long-standing focus areas, including enhancing teaching proficiencies and conveying new knowledge, which are discussed in detail in this chapter.

Science Teacher Academy for the Regions (STAR)

2020 Brightest STAR: Final Competition and Awarding

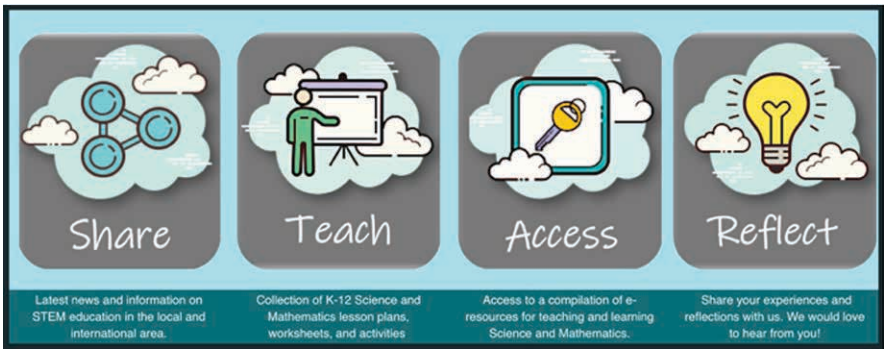
Six teachers – three for science and three for math – were selected as national finalists for this competition. In February 2021, the national finalists underwent a final screening, which included the virtual teaching competition and interview. These two final steps determined the 2020 Brightest STAR for Science and Mathematics. On March 3, 2021, the virtual awarding ceremony was held. Don King Evangelista of Navotas National Science HS (NCR) emerged as the Brightest STAR for Science; Janice Baldelovar of Don Restituto ES (Region 10) emerged Brightest STAR for Math.

Online Resources through e-STAR

For better access to learning resources like research lessons, STEM activities, and experiments, the online facility called e-star (www.e-star.ph) continued to be accessible to teachers. It served as a venue for disseminating information about the services and activities of STAR to a wider population, as well as a platform for collaboration among science and mathematics teachers and educators locally and globally.

Through the four main features of e-STAR, which are Share, Teach, Access and Reflect, the website allowed teachers to get updated to the trends in education, download lesson plans that were authored by select STAR teachers for free, gain access to various teaching and learning resources and share their reflections on STEM Education as a teacher.

As of December 2021, 78 lesson plans in science and mathematics are available for free download: 46 are lessons in Mathematics for Grades 1 to 11; and 32 are Science lessons for Grades 6 to 12. These lesson plans were done by teachers coming from the 16 regions where STAR trainings were held.



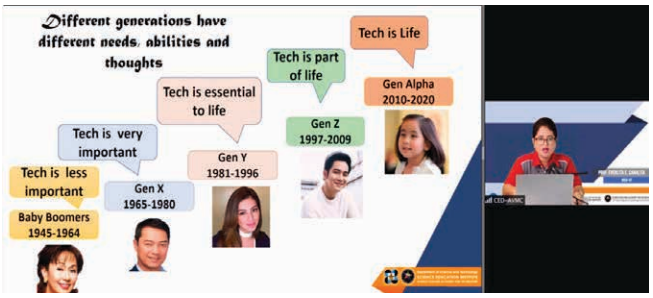
STAR Regional Trainings

Having adapted to the new normal, Project STAR resumed the implementation of regional training sessions on the topic "Design Thinking for K-3 Science and Mathematics Teaching" in a virtual platform. Two sets of special training sessions were also conducted in collaboration with DOST Regional Office I and DOST PSTC Davao Occidental, respectively. All the training sessions were awarded with CPD points by the Professional Regulation Commission (PRC) ranging from 8-15 points. Below is the list of training sessions conducted with the total number of attendees.

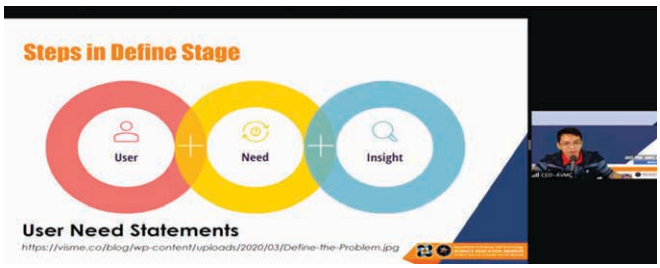
TABLED 49: STAR Trainings Conducted.

EVENT	DATE	REGION	CPD UNITS	TOTAL
Design Thinking in K-3 Science and Mathematics Teaching	April 21-23, 2021	10	15	67
Design Thinking in K-3 Science and Mathematics Teaching	May 19-21, 2021	5	12	77
Design Thinking in K-3 Science and Mathematics Teaching	June 9-11, 2021	6	12	81
Design Thinking in K-3 Science and Mathematics Teaching	June 23-25, 2021	12	12	66
Design Thinking in K-3 Science and Mathematics Teaching	July 14-16, 2021	4B	8	53
Design Thinking in K-3 Science and Mathematics Teaching	July 21-23, 2021	11	8	77
Design Thinking in K-3 Science and Mathematics Teaching	August 3-5, 2021	7	15	89
Design Thinking in K-3 Science and Mathematics Teaching	September 2-4, 2021	1	10	96
Special Training: Language Strategies in Teaching Science and Mathematics (in partnership with DOST-R1)	September 14-16, 2021	1	15	80
Design Thinking in K-3 Science and Mathematics Teaching	October 5-7, 2021	3	15	80
Design Thinking in K-3 Science and Mathematics Teaching (in partnership with DOST-R1)	October 14-16, 2021	1	15	76
Special Training: Language Strategies in Teaching Science and Mathematics (in partnership with PSTC Davao Occidental)	October 18-20, 2021	11	15	51
Design Thinking in K-3 Science and Mathematics Teaching	October 19-21, 2021	IVA	15	80
Special Training: Design Thinking for K-3 Science and Mathematics Teaching	October 25-27, 2021	Nationwide	15	81
Design Thinking in K-3 Science and Mathematics Teaching	October 28-30, 2021	2	15	72
Design Thinking in K-3 Science and Mathematics Teaching	November 10-12, 2021	11	15	70
Design Thinking in K-3 Science and Mathematics Teaching	November 22-24, 2021	CARAGA	15	60

Mr. Joneil Medina of MSU-IIT presenting the topic "Define"



Ms. Everlita Canalita of MSU-IIT presenting "Understanding Generational Differences"



1. **STAR Webinars** – Webinars on relevant science and mathematics topics were continued for 2021 via Zoom and Facebook. Some webinars were awarded CPD points. Shown below are banner announcements posted on the STAR Facebook page, which show the list of webinars.

TABLE 50: List of STAR Webinars Conducted.

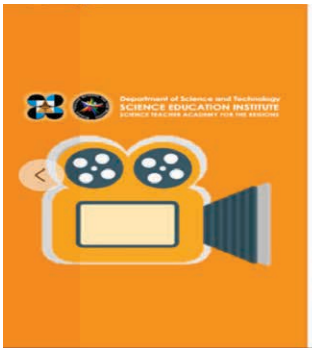
EVENT	DATE	CPD UNITS	TOTAL
Learner-Centered Pedagogy and Differentiated Instruction	March 31, 2021	12	408
Assessment and Grading in the Remote Learning Environment	April 14, 2021	-	419
Strategies in Addressing ICT Inequality in Remote Learning: The Community-Based Academic Network	May 12, 2021	-	143
Whole Child Approach Integrating 21st Century Skills and Financial Literacy	June 16, 2021	3	131
Humanizing Flexible Learning Instruction	July 28, 2021	3	123
Mental Health and Wellness	August 25, 2021	3	108
Homelabs: Chem and Physics Activities for the Housebound Student	November 25, 2021	3	502

TABLE 51: Star Webinars Resource Speakers

Dr. Ricky Magno West Visayas State University
Ms. Micah Pacheco DepEd NCR
Prof. John Paul F. Maligalig UP College of Education
Dr. Maria Corazon M. Samorin West Visayas State University
Dr. Lorelei R. Vinluan University of the Philippines - Diliman
Prof. Jo-Ann Cordovilla Bicol University
Dr. Crist John Pastor Philippine Normal University

2. **STAR Quarterly** – For a wider reach, STAR published "STAR Quarterly" – a newsletter which was virtually disseminated to stakeholders.

3. **STEM Video Challenge** – STAR also opened a video competition for teachers in the elementary, high school, and college levels called the "STEM Video Challenge." These are three to five-minute videos that focus on the more difficult topics to teach and learn in science or mathematics. The first prize is PHP50,000, the second prize is PHP30,000 and the third prize is PHP20,000. From a total of 64 entries, 25 made the cut. The top three were chosen and seven more entries were given consolation prizes. The awarding was held on December 14, 2021.



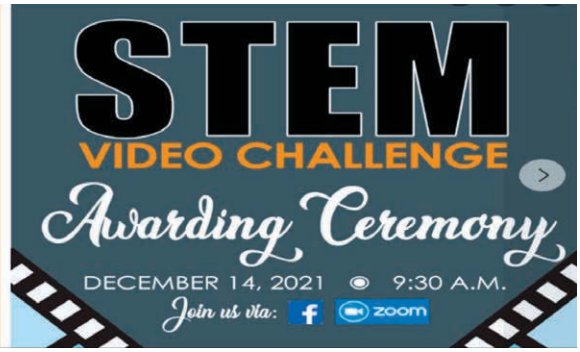


TABLE 52: STEM Video Challenge Top 10

ENTRY TITLE	AUTHOR/S	RANK
Calculating Percentage Composition of a Compound	Catherine Ala	1
Acceleration	Liezel Sampaga, Catherine Esguerra and Sunshine Juganas	8
Microlectures-Photosynthesis	Leonardo M. Francisco, Jr.	4
Free Fall	Conelisa N. Hubilla	10
Recombinant DNA Technology	Evelyn Dellomas, Cesar Leones II, Melalaine Austria, Eden Torre and George Emanuel Martin	9
You Light Up my Life: Nature of Light and Photoelectic Effect	Mary Mel B. Baynosa	3
OOMCE: Lenz's Law in Five Steps	Cesar F. Navales Jr.	2
Colors of Light: Unity in Diversity	Senen L. Salubayba, Gerardo A. Laguador and Cristy A. Ladines	5
Interpreting and Graphing Motion of an Object	Cristina D. Valdepeña, Richilyn S. Pagana and Ma. Kristel Mabilin	7
Learning EM Waves at Home	Margaret Elaine Calvendra,Monica A. Jardin and Ladessa R. Padua	6

Evaluation of the Effectiveness of Star Trainings

In order to determine the effectiveness of our STAR trainings, a study on "Evaluation of the Effectiveness of STAR Trainings" was conducted from July to October 2021. The evaluation was facilitated by SEID – PDU with the assistance of the three partner universities and DepEd regional offices from Region IV-A, VIII, and XII. There, 648 science and mathematics teachers were trained on the topics of Interdisciplinary Contextualization (ICon), Language Strategies, Inquiry-based Approach in Teaching Science and Teaching Mathematics through Problem Solving from 2017 to 2019.

To achieve the objectives of the study, the following activities were conducted: an online survey, virtual focus group discussion, lesson plan content analysis, virtual teaching, and interviews. To compile the professional profile of the teachers and determine which of the trainings attended were useful, an online survey was conducted. At least 50% of the teachers trained in science and mathematics responded. To understand the extent and quality of the adoption of the training content, virtual focus group discussions, lesson plan content analysis and virtual teaching demonstration, and interviews were conducted. All activities were implemented online which is among the challenges encountered during the gathering of data. The data analysis, generation of tables, figures, frequency counts, percentages, and other relevant statistics were done for the quantitative data. Thematic analysis was used for the qualitative data to draw out salient patterns from the teachers' responses.

Some of the findings include positive changes in teachers' lesson planning, communication, classroom management skills and leadership through the sharing of best practices from small groups of teachers to division and regional-level trainings in DepEd. With the increasing number of teachers joining trainings with positive feedback, continued support to in-service teachers, development of content-enrichment trainings along with pedagogy and development of research lessons were among the recommendations.

This evaluation study did not only document the implementation of skills and competencies gained by the teachers but also showed the impact of STAR trainings on their personal and professional lives. The hope is that the results of this evaluation provided information for the improvement of the project and the development of new activities that will equip teachers with better approaches to the teaching of science and mathematics. The national report is expected to be completed by the end of the first quarter of 2022.

Establishing Linkages Through Academe, Industry and Research Institutions for Capacity Building in STEM

Participation of STAR Trainers and SEI Staff in the IMPULS Online Professional Development Course 2021 in Japan entitled "Teaching Through Problem-Solving in Japan"

Four STAR trainers and two SEI staff participated in the online course "Teaching Mathematics through Problem Solving" by the IMPULS of Tokyo Gokongwei University focusing on two specific modules:

1. Module 2 Congruent Triangles and Quadrilateral – June 21-25, 2021
2. Module 3 Division with Remainders – October 19-25, 2021

2nd DOST-SEI Project STAR International Conference

DOST-SEI Project STAR hosted its second international conference on November 16 to 18, 2021, titled "*Innovations, Challenges and Transformations in STEM Education: Moving Forward in a Post-Pandemic World.*" This three-day event included seven (7) plenary sessions, ten (10) workshops, forty nine (49) paper presentations, and stories from six Brightest STAR Teachers. There were also virtual exhibits of 10 STEM learning resources. The conference was held on vFairs, a virtual platform that enables speakers and participants to join from anywhere in the world. Over 3,000 public and private school teachers, administrators, and teaching and non-teaching personnel from the Department of Education (DepEd) and educational institutions attended the event.

Some participants of the conference in a photo op.

As the COVID-19 pandemic significantly reshaped the educational landscape in the Philippines, it highlighted issues on teachers' readiness and access to technology and other instructional resources. For three days, speakers and participants discussed the current state and future direction of local and international science and mathematics education. The event also served as an avenue for exchanging ideas, perspectives and experiences, innovations, and exemplary teaching practices with the goal to elevate the quality of teaching science and mathematics in the Philippines. All participants who completed the event and submitted the evaluation will receive a Certificate of Participation with 15 CPD points.

Strengthening the Capacity of Science and Mathematics Teachers on Disaster Risk Reduction and Management (DRRM)

Two virtual trainings were implemented, one held in Zambales and the other one in Surigao, with resource persons coming from PAGASA, PHIVOLCS, OCD, MGB and DepEd. Both trainings were awarded 15 CPD points by the Professional Regulation Commission as depicted in the table. Shown below also is the program of activities of the trainings conducted.

TABLE 53: DRRM Trainings Conducted.

EVENT	DATE	REGION	CPD UNITS	PARTICIPANTS		TOTAL
				MALE	FEMALE	
Online Training on Strengthening the Capacity of STEM Teachers on Disaster Risk Reduction and Management	October 6-8, 2021	Zambales (Region 3)	15	18	39	57
Online Training on Strengthening the Capacity of STEM Teachers on Disaster Risk Reduction and Management	November 3-5, 2021	Surigao	15	12	23	35
			TOTAL	30	62	92

Participants of the virtual training on DRRRM in a photo op.

Intensifying specialized Stem Teacher Trainings Amidst Pandemic

As the country continues to deal with the ongoing health crisis, the transition from traditional to blended learning remains a challenge for teachers in ensuring that the quality of learning is upheld despite the absence of face-to-face interactions. To address this issue, SEI continues to provide online trainings and webinars for science and mathematics teachers.

- **Training for Non-Major Science Teachers on Content and Pedagogy.** In 2021, four batches of training sessions were conducted online via Zoom for science teachers who were teaching Grade 8 physics to non-physics majors. A total of 191 teachers from different DepEd divisions in Regions VI, II, VIII and IX participated in the online training on the following dates:

Participants highly commended the topics covering the *Force, Motion, and Energy*. The training also proved that engaging lectures and activities can be applied both in face-to-face and remote learning set-ups. The student-participants also received a copy of the Grade 8 Physics module to serve as a reference in delivering the topics effectively to their students.

TABLE 54: Trainings Conducted by Region.

BATCH	DATE	REGION	NUMBER OF PARTICIPANTS
1	July 12 – 16, 2021	VI	49
2	July 26 – 30, 2021	II	40
3	October 4 – 8, 2021	VIII	49
4	December 13 – 17, 2021	IX	53
		Total	**191**

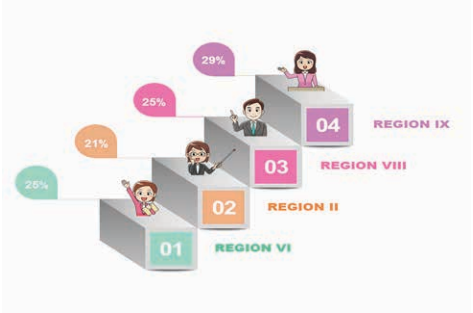
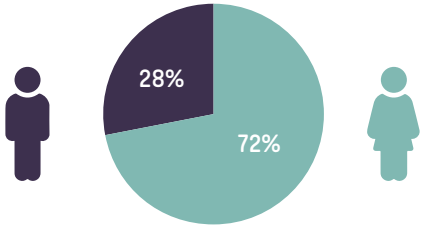
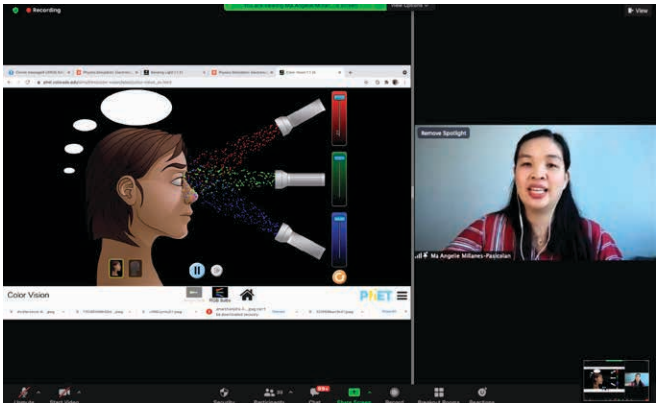


TABLE 55: Distribution Of Participants According to Sex

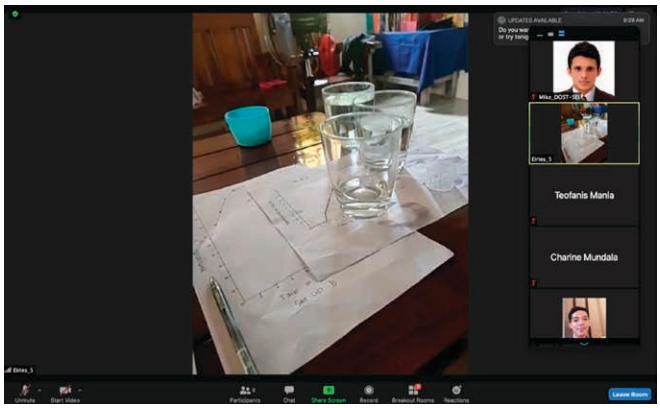
BATCH	FEMALE	MALE
1	34	15
2	31	9
3	36	13
4	37	16
Total	**138**	**53**



Sex-distribution of participants



How humans perceive the colors of light is demonstrated and explained by Ms. Maria Angelie Millanes-Pasicolan (UP RHS) using PHET simulation



An experiment activity done by the teacher-participants during the topic, Heat and Temperature

- **Development of Grade 10 Chemistry Modules.**
  As part of the DOST-SEI's initiative to equip non-science major teachers in the teaching field, the Institute commissioned subject matter experts from UP Diliman, UP Integrated School, UP Rural High School, and Pampanga High School to develop Grade 10 Chemistry modules. The move aims to enhance the content and pedagogy of teachers in teaching Chemistry. The topics include Gas Laws, Biomolecules, Chemical Reactions, and Rates of Reaction which will be pilot-tested in 2022. The modules will be used for teachers who are non-Chemistry majors.

- **Training for the Science and Math Teachers 56+ online.**
  As we embrace digital transformation and ensure that our students achieve optimum learning, we must also consider the welfare of our senior citizens who are part of the high-risk population. This is why SEI continues to cater to the older population group.

  An onlne training for science and mathematics teachers ages 55 to 65 years old was conducted on November 25-26, 2021. The topics covered include purposeful retirement, proper nutrition, an overview of the rights and privileges of senior citizens, and the DOST Small Enterprises Technology Upgrading Program

TABLE 56: Distribution of participants by sex

GENDER	TOTAL
Female	82
Male	1
Total	**83**

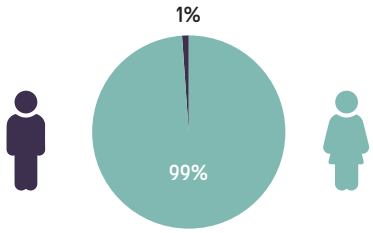
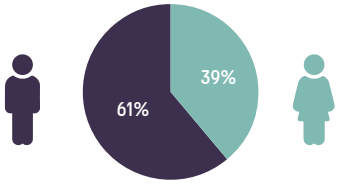


TABLE 57: Distribution of participants by region

REGION	TOTAL
IV-B	32
V	51
Total	**83**



RESOURCE PERSONS IN THE ONLINE TRAINING FOR SENIOR CITIZENS

Mr. Al Marcial Benco
Chief Learning Architect, The Foundry Learning Lab
Purposeful Retirement Workshop

Dr. Imelda A. Agdeppa
Director, DOST-FNRI
Nutrition for Older Adults

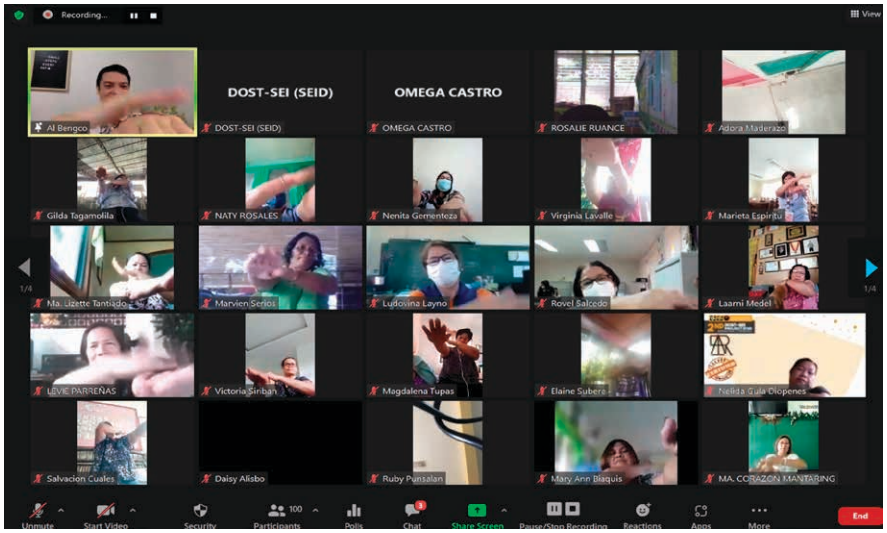
Mr. Adelo P. Natividad
Consultant, OSCA Manila
Overview of Rights and Privileges of Senior Citizens

Ms. Jelyn E. Doctor
Supervising SRS, DOST-IV-B
DOST-SETUP

(SETUP). The training aimed to equip science and mathematics teachers nearing retirement age to be self-reliant and active members of society post-retirement.

The online training accommodated 83 elementary and high school science and mathematics teachers from Regions IV-B and VI. Although the activity was online, the teachers actively participated in the discussions. They also asked questions, especially on the topics of nutrition for older adults and the rights and privileges of senior citizens.

DOST's SETUP project was tapped during the training sessions to give participants information about starting a business post-retirement. The training inspired in them the mentality of being productive, by providing a positive outlook on aging.



An experiment activity done by the teacher-participants during the topic, Heat and Temperature

- **Last Leg of Training for Math Teachers with Visually Impaired (V.I.) Learners**
  In cooperation with Resources for the Blind, Inc., Overbrook School for the Blind, and the Department of Education, the last leg of the training for Grades 2, 3, and 4 mathematics teachers was conducted last August 18 to 26, 2021 via Zoom.

  A total of 38 mathematics teachers from the regions in Mindanao were trained by some of the most coveted veterans in the field of special education in the country.

TABLE 58: Distribution of participants by sex

GENDER	TOTAL
Female	35
Male	3
Total	38

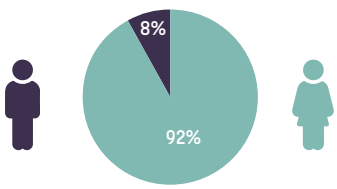
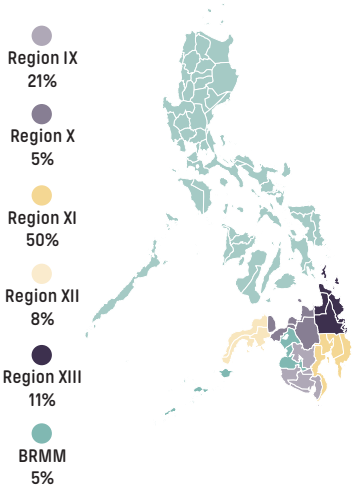


TABLE 59: Distribution according to grade level being taught, if available

REGION	TOTAL
IX	8
X	2
XI	19
XII	3
XIII	4
BARMM	2
TOTAL	**38**



The first two clusters of training were conducted on March 28 to 30, 2020 for teachers in Luzon and November 28 to December 1, 2021 for the teachers in Visayas. While challenging, the situation did not hinder us from serving our teachers all over the country.

TABLE 60: Resource Persons during the online training

Dr. Jasmine Samonte Resident Low Vision Optometrists/ Internship Preceptor, RBI Understanding Visual Impairment
Dr. Jasmine Samonte Resident Low Vision Optometrists/ InternshipPreceptor, RBI Understanding Visual Impairment
Dr. Jasmine Samonte Resident Low Vision Optometrists/ InternshipPreceptor, RBI Understanding Visual Impairment
Dr. Jasmine Samonte Resident Low Vision Optometrists/ InternshipPreceptor, RBI Understanding Visual Impairment
Dr. Jasmine Samonte Resident Low Vision Optometrists/ InternshipPreceptor, RBI Understanding Visual Impairment
Dr. Jasmine Samonte Resident Low Vision Optometrists/ InternshipPreceptor, RBI Understanding Visual Impairment
Dr. Jasmine Samonte Resident Low Vision Optometrists/ InternshipPreceptor, RBI Understanding Visual Impairment

One of the teacher-participants presents her originally made assistive material/manipulative that can be used to teach math lessons, both on regular and visually impaired or low-visioned students.

The teachers were very appreciative, especially on the topic of dealing with their learners with visual impairment. Being able to understand their students inspired them to be more creative on how they can make their strategies work.

Topics include discussion on how the educational system affects the learning style of a visually impaired learner and how the teacher can help in making the learning environment of the students more meaningful and effective. The teacher's role in facilitating learning, regardless of the child's physical limitations, is very important. It can either make or break the child's potential for a brighter future.

Mental Math and Math Speaks by Mr. Ryan Operario was really an enjoyable and amazing showcase of how math is complicated and simple at the same time. Most of the techniques Mr. Operario presented were doable even by regular students to help them with solving mathematical problems and equations easily.

The most crucial part of the training was the workshop on creating manipulatives and assistive devices in teaching math topics that will suit the age of the students. The teachers' creativity was challenged and their outputs and ideas did not disappoint. With the guidance of the resource persons, they were able to come up with good outputs..

This training is proof that despite the distance or the ongoing health crisis, our service for the teachers and our pursuit towards inclusivity will not stop.

- **Scholar-Graduates online trainings on pedagogy**
  DOST-SEI's support to the science scholars is not merely on the provision of scholarship grants. Rather, it is extended to achieve a vision of a scholar for the nation – a leader and a specialist in the field of STEM that cares for the nation. In support of the JLSS scholars who will serve as STEM teachers to senior high school as part of their return service, DOST-SEI implements the training "Capacitating Scholar-Graduates with Pedagogical Skills." This is also a response to the shortage of qualified teachers needed to teach in senior high schools.

With the success of the first online training implemented in November 2020, SEI was able to conduct three batches of training in three different regions in partnership with the State Universities and Colleges in the region for a more context-based approach during the training.

All the topics were carefully selected and planned to give as much information with the little time that was allotted for each training. One of the highlights and the most informative part of the training is the lesson plan preparation which the participants from the three regions greatly appreciated.

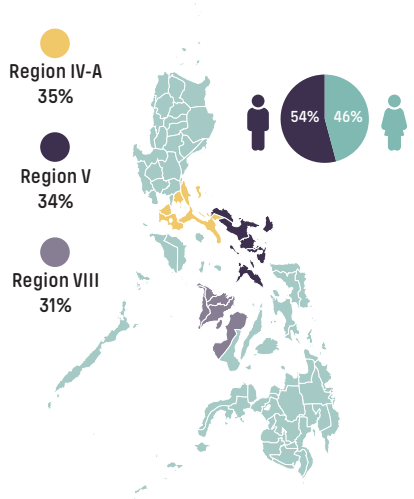
With the help and support of the DOST Regional Offices, the coordination with the scholars was made fast and smooth, contributing to the good number of beneficiaries from each region in this year's training. We were able to train scholar graduates who are about to start their return teaching service.

The training is vital in equipping the scholars with essential skills in teaching and pedagogy. Their positive feedback made it clear that these trainings should be a priority before they start teaching to give them guidance and prepare them on what to expect in the teaching-learning environment.

These trainings aim to complement the efforts of PNU for the intense training they prepared for the DOST JLSS Scholar-Graduates. DOST-SEI believes that helping the scholars with this training will boost their confidence and make them prouder of being a DOST Scholar. DOST-SEI intends to help and reach more scholars under the same program all over the country in the coming years.

TABLE 61: Distribution of participants by sex and region

REGION	FEMALE	MALE	TOTAL
Region IV-A	22	25	47
Region V	24	24	48
Region VII	18	26	44
Total	**64**	**75**	**139**



Online Support to Teachers from Small Private Schools

The DOST-SEI invited elementary teachers from private schools nationwide to a five-day training conducted via Zoom in three batches: Batch One - May 4, 6, 7, 11 and 13, 2021; Batch Two - August 4, 6, 7, 11 and 13, 2021; and Batch Three - November 2-6, 2021.

With the assistance and guidance of Dr. Nympha B. Joaquin of the UPD College of Education, the teachers improvised manipulatives which they can use in teaching mathematics concepts in their classes to help in the learning process. Some showed the manipulatives they have been using in their classes. Additionally, some misconceptions on certain mathematics concepts were discussed, clarified, and corrected.

"Math as an Art". Grades 5-6 teacher-participants from different private schools nationwide designed and created a prototype bag in one of the activities during the online training. The design-thinking activity proves that teaching math is not just only about numbers but can also uncover the creativity among the students.

A total of 70 elementary teachers from 50 private schools benefited from the training. The distribution of gender is shown in the table below.

TABLE 62: Distribution of participants by sex

GENDER	TOTAL
Male	17
Female	53
Total	**70**

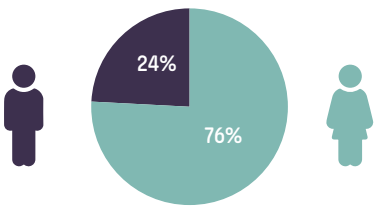
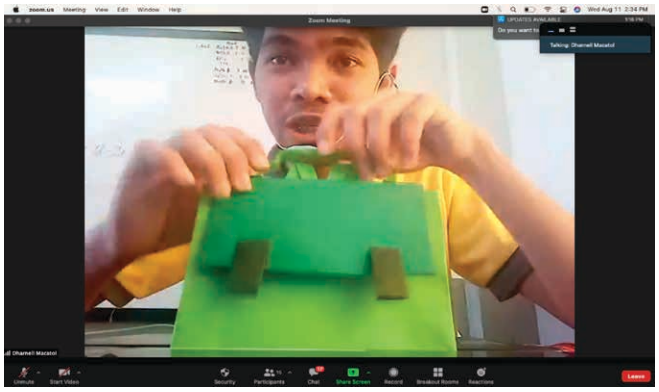


TABLE 63: The resource persons for the training in Region VIII

REGION IV-A BATANGAS STATE UNIVERSITY
Dr. Rowena R. Abrea *Dean, College of Teacher Education*
Dr. Bryan P. Manalo *Instructor*
Dr. Celso G. Zara *Instructor*
Mr. Amiel A. Abacan *Instructor*
Ms. Sherryl M. Montalban *Associate Professor*
Dr. Charity A. Aldover *Instructor*
REGION V BICOL UNIVERSITY
Dr. Lorna M. Miña *Dean, College of Education*
Mr. Saturnino L. Macasinag *Instructor*
Ms. Jo-ann M. Cordovilla *Instructor*
Dr. Ma. Teresa M. Abainza *Associate Professor*
Dr. Marcia Corazon Rico *Instructor*
Dr. Domingo B. Tuazon *Instructor*
REGION VII LEYTE NORMAL UNIVERSITY
Ms. Chrischelle Bullecer *Instructor*
Mr. Michael Jun Ponciano *Instructor*
Ms. Emmeline Garcia *Instructor*
Dr. Cristina Estolano *Instructor*
Dr. Rufo A. Labarrete *Associate Professor*
Mr. Orlando P. Vinculado Jr. *Instructor*



"Math as an Art". Grades 5-6 teacher-participants from different private schools nationwide designed and created a prototype bag in one of the activities during the online training. The design-thinking activity proves that teaching math is not just only about numbers but can also uncover the creativity among the students.

A teacher-participant presents his output on tessellations.

Indigenized Math Lesson Plans for the IP Learners

Through a series of online meetings and training sessions, the project team started the process of indigenizing lesson plans for the IP learners in Region 1. The teacher-participants from the six identified beneficiary schools (Table X) in the Divisions of Ilocos Sur and La Union have developed 14 indigenized lesson plans (seven in Ilocos Sur and seven in La Union) for Grades 2 to 4 which were subsequently validated in their respective schools in the following schedules:

The validated indigenized lesson plans will be field tested in March 2022 and will be turned over to DepEd Region 1.

Ilocos Sur	
Sugpon CS	September 07
Anaao ES	September 08
Amilongan ES	September 21, October 1
La Union	
Binatadan ES	September 23
Porporiket ES	September 29
Linuan ES	September 30

TABLE 64: List of School-Beneficiaries.

DIVISION	DISTRICT	NAME OF SCHOOL
Ilocos Sur		
	Alilem	Amilongan ES
	Alilem	Anaao ES
	Sugpon	Sugpon CS
La Union		
	Santol	Binatadan School
	Burgos	Linuan ES
	Sudipen	Porporiket ES

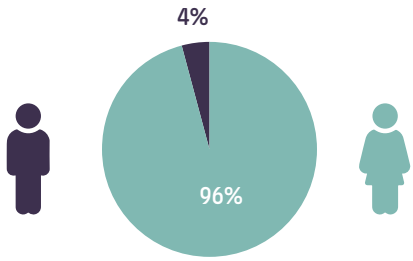
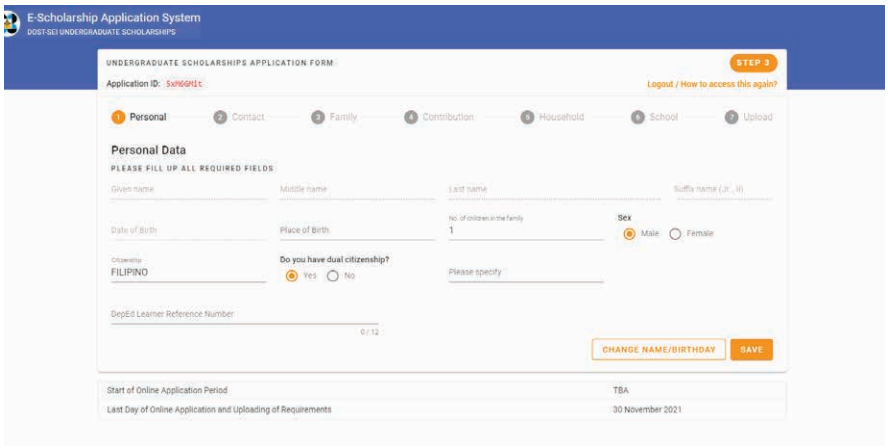


TABLE 65: Gender Distribution of IP Participants.

GENDER	NUMBER OF PARTICIPANTS		
	Ilocos Sur	La Union	Total
Male	1	-	1
Female	12	12	24
Total	13	12	25

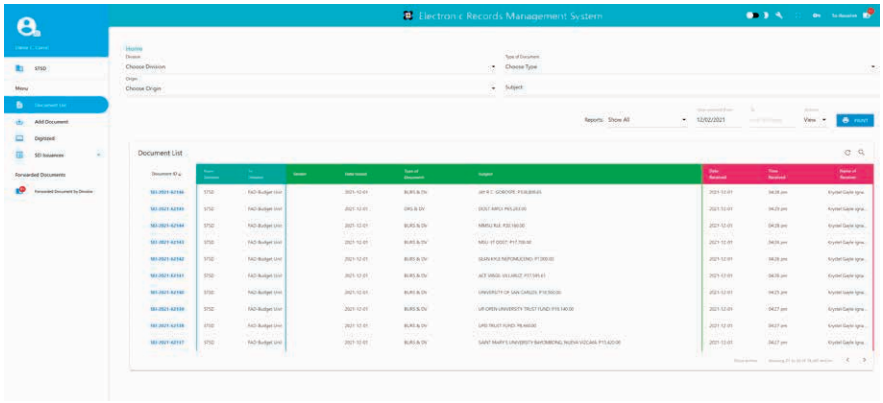
Full Implementation of the Online Undergraduate S&T Scholarship Application and Development of Other Information Systems

Adapting to developments in the field of Information and Communications Technology (ICT) is imperative for organizations to improve and sustain productivity and efficiency, especially in the new normal. The DOST-SEI's Management Information System Unit (MISU) moved into high gear to accommodate the sudden demand for alternative working arrangements during the pandemic, and to enhance the Institute's capabilities to connect with the public. Through the full implementation of the e-Scholarship Application System for the scholarship application for 2021-2022 Undergraduate S&T scholarships, applicants can now submit and upload documentary requirements for both the Junior Level Science Scholarships and the Undergraduate Scholarship Program via https://www.science-scholarships.ph/.



The e-Scholarship Application System

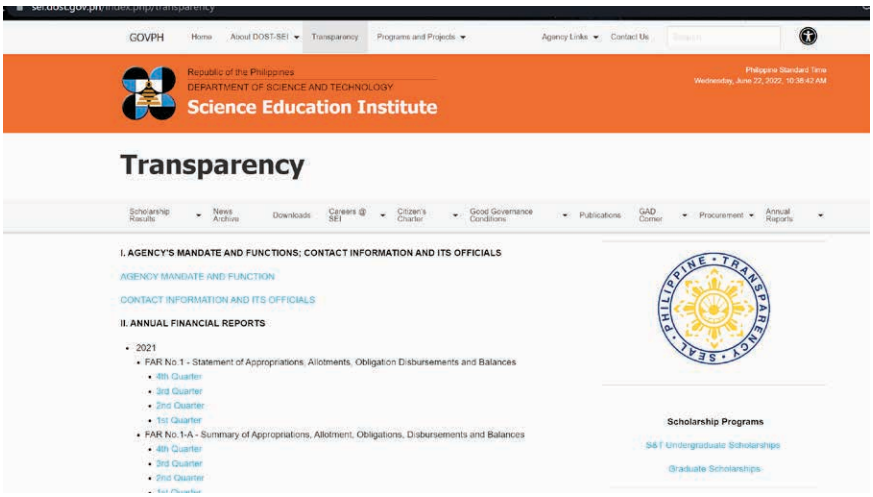
The MISU also implemented the use of Electronic Records Management System, a centralized automated record system that efficiently manages the electronic records of documents of the Institute. It keeps track of the incoming and outgoing official documents of every division.



The Electronic Records Management System

Administration of the DOST-SEI Official Website

The MISU continuously maintains and updates the Institute's website to provide current, relevant, and accurate information on its programs and services while ensuring compliance with the Department of Budget and Management's Transparency Seal requirements.



The Science Education Institute's Website

Co-located Network and Data Center Established

To keep up with the demands of its stakeholders, SEI continues to provide and enhance its ICT infrastructure and services. The MISU relocated network

operations and data center off-site for business continuity in time for the quarantine and the adjustments in work arrangements. Specifically, 18 servers are currently maintained inside the Network and Data Center Colocation Facility, which houses the public servers for the Institutes' website and online application systems. The facility is continuously upgraded for the programs and projects that need ICT network service to reach more clients across the country.

Fast, Reliable Internet Connection and Communication Systems Installed

As most activities remained online, the internet connection speed was upgraded from 50Mbps to 65MBps, 100 Mbps and additional 150Mbps. Endpoint security solutions were also installed in the employees' workstations to ensure secure data transfer and protection from malware and viruses. Preventive maintenance was conducted for all devices connected to the local area network to ensure these are working effectively and efficiently for service delivery.

To improve communication system, the MISU set up an automatic telephone switching system. Fifty (50) units of IP Phones capable of video calls, conference calls, and handling GSM Mobile calls were installed during the year. The whole system was proposed to connect with the existing analog telephone lines to handle calls from clients and stakeholders.

Capacitating ICT Network Users on Various Applications and Systems

The move to use online applications for meetings and collaborations required capacity building initiatives among employees. Towards this end, the MISU conducted the following ICT Workshops and Orientations to train the employees on the use of ICT technologies and their policies and security protocols:

Additionally, MISU conducted a series of online ICT Security Awareness Training to equip the Institute's employees with the skills in handling ICT threats and vulnerabilities. Employees assessed their skills through a Phish Threat simulation activity. The training consisted of the following topics:

1. Physical Security and Data Protection
2. Smishing
3. Ransomware
4. Introduction to Phishing
5. Internet of Things (IoT)
6. Mobile Device Charging
7. Spear Phishing
8. Social Engineering Overview
9. Working from Home
10. Clean Desk Policy

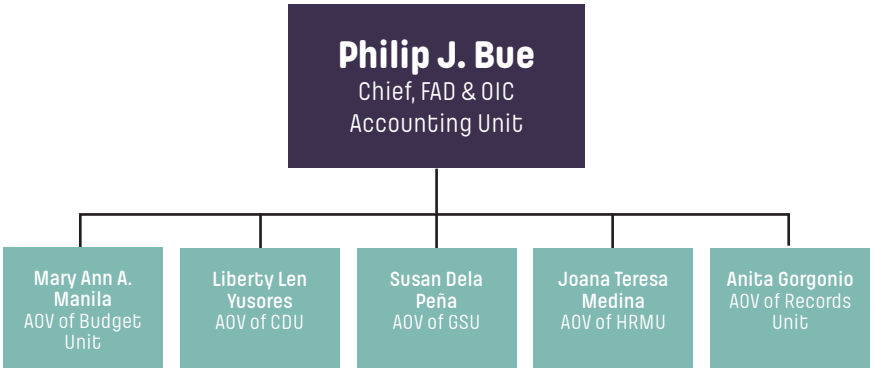
TABLE 66: Training-Workshops and Orientation Conducted by STMERPD-MISU.

NO.	DATE	ICT ORIENTATION	MALE	FEMALE	TOTAL NO. OF PARTICIPANTS
1	28 July 2021	Microsoft Teams for SEI Personnel	4	19	23
2	18 August 2021	IP Phone System for SEI Personnel	5	19	24
3	25 August 2021 (AM)	Microsoft Outlook for SEI Personnel	2	25	27
4	25 August 2021 (PM)	Microsoft OneDrive for SEI Personnel	3	26	29
5	08 September 2021	Network Storage for SEI Personnel	5	22	27
6	10 September 2021	Microsoft SharePoint for SEI Personnel	4	19	23
7	22 September 2021	Microsoft Outlook for SEI Personnel	8	13	21
8	06 October 2021	Microsoft Teams for SEI Personnel	9	12	21
9	13 October 2021	Network Storage	5	12	17
10	29 October 2021	Microsoft OneDrive for SEI Personnel	4	16	20
		Total	**49**	**183**	**232**

Updates in Finance and Administrative Division (FAD)

The SEI-Finance and Administrative Division (FAD), composed of 48 employees (10 Regular, 38 Assigned Personnel), delivers valuable services and financial information to the Office of the Directors and Deputy Director, and all Project Leaders.

In 2021, the division reorganized its leadership with the retirement of Ms. Luz Rimorin, former FAD-Chief, and the sudden passing of Ms. Racquel Tolentino in the year 2020. Currently, the Finance and Administrative Division leadership is composed of:



Finance Group

The Science Education Institute's 2021 GAA budget is ₱6,466,643,229.00 and the actual obligated budget is ₱6,921,731,905.47 with a 99.35% utilization rate. The 2021 budget received by the Institute is the highest in the DOST system for the year, demonstrating the high regard for the government in supporting DOST-SEI's S&T scholarship programs.

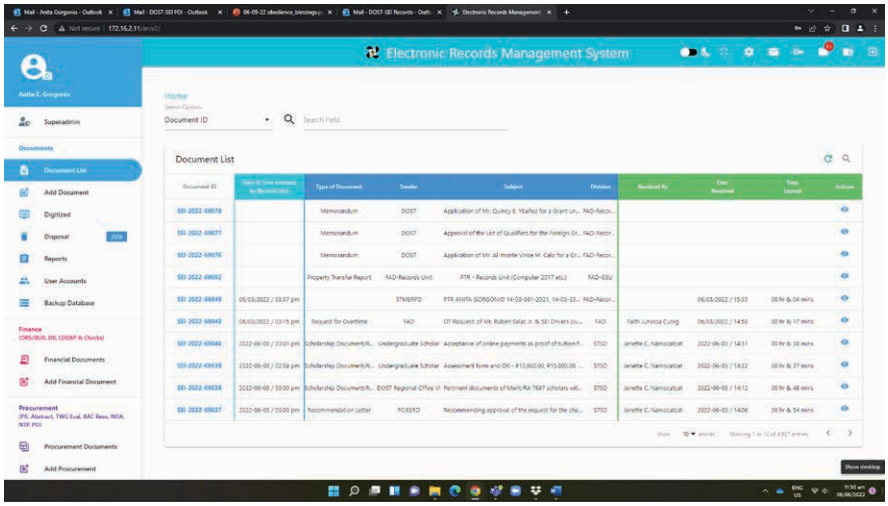
The Bureau of the Treasury on April 25, 2019, issued the Revised Omnibus Regulations Governing the Fidelity Bonding of Accountable Public Officers which aims to streamline documentary requirements and bonding procedures and launched the online Fidelity Bonding System last May 3, 2021. In compliance with the new regulation, the Institute accordingly enrolled a system administrator and agency approver as required by the system and all accountable officers were briefed on September 4, 2021, regarding the transition to the new online facility for their bonding applications and renewal. System user accounts were enrolled thereafter.

Development of SEI Electronic Records Management System (ERMS)

With the growing emphasis on the importance of proper management of records in government offices, the Automated Records Center (ARC) was developed as a solution to improve DOST-SEI's efficiency of manual records system in 2013. It was developed with the basic capabilities of monitoring the distribution of documents from one division to another. Through time, the system has been enhanced with advanced features, incorporating the requirements of ISO Quality Management System Standards and the National Archives of the Philippines (NAP).

For the year 2021, the system was renamed to SEI Electronic Records Management System (ERMS) to harmonize with the DOST-ERMS. Currently, the SEI-ERMS allows the respective Records Custodians of every division to perform document management functionalities, sending of incoming and outgoing documents, and monitoring of paper trail. The system records every action taken by the staff on a certain document and monitors every process it must undergo. It also features a document tagging system using barcode technology.

With the development of ERMS, duplication of efforts by the employees and staff was significantly reduced. Also, the retrieval of information and



documents has been more efficient since data were securely stored and organized in one harmonized system, thus establishing standardization in the records management of SEI.

Human Resource Management Unit

To meet the demands of the Institute, the HRMU with the help of HRMPSB successfully processed the recruitment and hiring of 4 (four) original appointed and 7 (seven) promoted employees. They were assigned to the different Divisions of the Institute.

The FAD-HRMU also welcomed 30 new assigned personnel to complement SEI's roster of employees. The Institute offers opportunities to young talented and capable individuals to showcase their skills and a platform to start their career in the government service.

Process of Tooling and Sharpening
To effectively deliver services, the HRMU conducted and facilitated 12 in-house training and sent employees for 8 public trainings. These includes:

1. Training on Data Privacy
2. Orientation on the Use of Competency-Gap Analysis Form
3. Orientation and Reorientation on PRIME-HRM
4. Orientation on Proper Contact Tracing
5. Government Procurement Reform Act & Its Revised IRR and Updates
6. Data Privacy Act Compliance training/Workshop
7. Orientation on the Use of Coaching and Mentoring Journal
8. Preparation of Project Procurement Management (PPMP) and Annual Procurement Plan (APP)
9. Adobe Photoshop Essential
10. Adobe InDesign Essential
11. Adobe Illustrator Essential
12. Occupational First Aid and Basic Life Support

To help employees cope as well with the psychological strains experienced during the pandemic, the HRMU facilitated the Listening Room Online Counseling Platform which provided space for SEI employees to vent-out their stress, worries and fears as well as to receive advice and comfort.

Journey to PRIME-HRM

Since 2018, SEI worked hard to obtain the Civil Service Commission (CSC)'s Program to Institutionalize Meritocracy and Excellence in Human Resource Management (PRIME-HRM).

Through the years, the HRMU together with the HR-related committees and support of the entire SEI workforce accomplished the following:

1. Conducted different orientation and trainings, policy reviews and revision
2. Implemented new programs and activities, and
3. Created the Competency-Based Human Resource Management System Manual

On June 2021, SEI underwent the PRIME-HRM assessment which was conducted by the CSC National Capital Region (NCR) office. On December 3, 2021, CSC Resolution No. 2101033 was promulgated awarding SEI the PRIME-HRM Bronze Award-Maturity Level II.

General Services Unit

The General Service Unit timely assisted in the preparation and submission of the procurement related reports such as the Indicative APPs and APP-CSE 2022. The Unit also assisted in the conduct of eighteen (18) public biddings for CY 2021 plus seven (7) public biddings for CY 2022 Early Procurement Activity.

Building and Maintenance Services (BMS)

For the improvement of SEI's Offices and Facilities, the FAD-BMS unit managed the following:

1. Installed UVC Retrofit Boxes with disinfection system in receiving areas
2. Installed new blinds
3. Pre-laid out CCTV system
4. Installed acrylic barriers for workstations and service vehicles
5. Outsourced maintenance for air conditioning unit
6. Conducted periodic pest control treatment
7. Improved and converted SEI's second floor balcony into a mini garden
8. Beautification of front and back lobbies

— SECTION 4 —

MAINTAINING AND RECOGNIZING EXCELLENCE

By being mandated to accelerate the development of S&T human resources in the country, the Institute holds its standards to world-class specification. It's a culture of excellence that starts from the Institute and resonates in all our efforts and programs.

In presenting the competitions and top awards of the Institute in 2021, this section proudly shows to our stakeholders locally as well as globally our great progress in cultivating our S&T students and human resources.

4th imake.wemake: Create. Innovate. Collaborate.

Despite the challenges brought by the pandemic, imake.wemake, together with the Gokongwei Brothers Foundation (GBF), keeps pursuing to develop the students' communication, computation, technology, critical thinking, and problem-solving skills out of its original face-to-face engagements using online webinar platforms. The online training comprises videos about electronics, microcontrollers, the Internet of Things (IoT), sensor applications, and programming.

The competition garnered 30 project proposals. Half of them became the top finalists that competed in the virtual final presentation and awarding ceremony held from June 28 to 30, 2021, via Zoom and Facebook platforms.

Three schools stood out and won the Youth Innovation Prize (YIP): **(1) Cavite Science Integrated School** with their project, "*ABSCISA: An Arduino-Based Smart Contactless Interface Integrated with SMS Alert and Monitoring System for Fomite Transmission Mitigation;*" **(2) Ramon Teves Pastor Memorial – Dumaguete Science High School** with their project "*PROJECT FAMALIA: IoT-based Filtering and Monitoring of Laundry Wastewater for Agricultural Land Irrigation using Arduino Microcontroller and Tangan-tangan (Ricinus communis) Plant;*" and **(3) Science and Technology Education Center Cebu** with their project "*Project Blindspot: Arduino-based Object Distance Measurement and Identification using YOLO Algorithm.*"

With the partnership between DOST-SEI and Gokongwei Brothers Foundation (GBF), the Foundation will select three GBF Young Scientist Awardees from the finalists of the ongoing 4th imake.wemake competition. The awardees will receive conditional scholarship offers amounting to P85,000 per academic year courtesy of GBF. This is on top of the three YIP Awards and the P200,000 cash prize that DoST-SEI will bestow on the teams with the best innovations. The three winners of this special award were: **(1) John Kenneth V. Sanchez** of Cavite Science Integrated School, **(2) Anjeli L. Merecido** of Ramon Teves Memorial – Dumaguete Science High School and **(3) Jimuel Clarence Z. Malimban** of Cavite Science Integrated School.

The panel of judges is composed of UP Electrical and Electronics Engineering Institute Engr. Percival Magpantay, Ateneo de Manila University Prof. Engr. Carlos Matti Oppus, and Engr. Edison Roxas of the University of Santo Tomas. The panel judged the projects based on their viability and potential to address community issues.

As the fourth cycle concluded, the fifth cycle of imake.wemake was launched during the awarding ceremony until the end of 2021.

15 school finalists

1. Alabel National Science High School
   PROJECT MIASMA - An Indoor Air Quality (IAQ) Monitoring Device based on IoT with Forecasting and Predictive Modelling using Machine Learning for Hospital Buildings
2. Antique National School
   CorALARM: The Guardian of the Coral Reefs
3. Bansud - National High School
   Convolutional Neural Network based Image-processing for the Detection of Microplastics in Fish Sanctuaries Using a Marine Buoy System
4. Calamba City Science Integrated School
   KEVLOCKS: KEy-less Vehicle UnLOCKing System Utilizing RFID License Checking, Fingerprint Scanning, and Alcohol Influence Detection Technologies
5. Cavite Science Integrated School
   ABSCISA: An Arduino-Based Smart Contactless Interface Integrated with SMS Alert and Monitoring System for Fomite Transmission Mitigation
6. Dr. Yanga's, Inc.
   The BAYANI Project - Battling Atrocities through the Youth's Automated and Novel Initiative
7. Florita Herrera Irizari National High School
   Automated Queueing Counter with Hand sanitizer and Temperature Checker
8. La Consolacion College Bacolod
   Project C.R.O.W. (Courier Robot On Wheels): A Gesture- Controlled, -Parcel Disinfecting, and Transporting Device
9. Mainit National High School
   PHYSICAL DISTANCE DETECTOR with CONTACT TRACER
10. Manila Science High School
    Touchless Active Pointer Interface (TAP Interface)
11. PSHS - Central Luzon Campus
    HERMIT-A-BOT: An IoT-based Smart Deployable Crab Bot for Autonomous Plastic Collection in Coastal Environments and Muddy Terrains
12. Ramon Teves Pastor Memorial - Dumaguete Science High School
    PROJECT FAMALIA: IoT-based Filtering and Monitoring of Laundry Wastewater for Agricultural Land Irrigation using Arduino Microcontroller and Tangan- tangan (Ricinus communis) Plant
13. Sta. Cruz National High School
    Solar-Powered Automatic Aquaculture Pond Monitoring, Notification, and Control System (SPAAPMNCS)
14. Science Technology Education Center - Senior High School
    Project Blindspot: Arduino-based Object Distance Measurement and Identification using YOLO Algorithm
15. Valenzuela City School of Mathematics and Science
    PPEase: A Personal Protective Equipment (PPE) - Integrated Monitoring System for Healthcare Workers (HCWs)

Youth Innovation Prize awardees:

1. Cavite Science Integrated School
   ABSCISA: An Arduino-Based Smart Contactless Interface Integrated with SMS Alert and Monitoring System for Fomite Transmission Mitigation
2. Ramon Teves Pastor Memorial - Dumaguete Science High School
   PROJECT FAMALIA: IoT-based Filtering and Monitoring of Laundry Wastewater for Agricultural Land Irrigation using Arduino Microcontroller and Tangan- tangan (Ricinus communis) Plant
3. Science Technology Education Center - Senior High School
   Project Blindspot: Arduino-based Object Distance Measurement and Identification using YOLO Algorithm

5th Indie-Siyensya Filmmaking Competition

The annual Indie-Siyensya Filmmaking Competition launched its fifth year on July 21, 2021, via its official Facebook page and the Department of Science and Technology – Science Education Institute website, reaching more than a hundred thousand viewers.

The competition intends to promote and develop the culture of Science to the youth and general public through film.

To raise the interest of the youth and the general public by producing science films, the Department of Science and Technology – Science Education Institute conducted a free online seminar about Science Communication and Basic Film Cinematography on August 23, 2021. The event was hosted by the Board of Judges: Prof. Patrick Campos, Associate Professor, Film Institute College of Mass Communication UP Diliman; Mr. Garry Montematoyor, Asst. Professor 7 of Department of Science Communication, College of Development Communication, UP Los Baños (Science Communication Using Film); and Dr. Aimee Lyn B. Dupo, Faculty Regent and Scientist III Institute of Biological Sciences, UP Los Baños (Scientific Content).

The competition received a total of 63 entries nationwide. While the number is lower than the previous year, it showed that many young science filmmakers went out of their way to create short documentaries, animations, and explainer videos. The entries captured the theme "The Scientist in Me," as the films sought to showcase the scientific concepts behind everyday things and occurrences.

The board and judges deliberated and judged the film entries in November, and the chosen films were made available for viewing on Youtube from November 23 to December 7, 2021.

On December 13 and 14, 2021, an online talkback series was administered where the top finalists of youth and open categories were invited to discuss their films, the challenges they encountered, and the inspiration for their films.

The online Awarding Ceremony was conducted on December 15, 2021. It broadcasted on the Indie-Siyensya Facebook and gained 232 total audience engagements, 28 shares, 58 comments, and 146 reactions.

The winners in the Youth Category were:

1. "Snooze," a documentary on the science of sleep by Micah Paulina C. Limlengco of Philippine Science High School - Southern Mindanao Campus
2. "Agam-Agham," a Filipino-language investigation of vaccine hesitancy, by Mary Antonette G. Agapito, Malena Riz C. Ballon, Juliana Krishna W. Guevarra, Val Allen U. Eltagonde, and Divine Mae R. Manadong of Rizal National Science High School (Region 4-A)
3. "Marvels of Science: Non-Newtonian Fluid," an exploration of the strange properties of a homemade material, by De La Salle University Integrated School - Manila (NCR).

For the Open Category, the winners were:

1. "Sinag," a look at the surprising science of solar power, by Richelle Joan Gareza Enriquez of the Polytechnic University of the Philippines (NCR)
2. "Super Sci Yan," an exploration of alternative energy sources, by Kenneth Peterson F. Leviste of Arkos Digital (NCR)
3. "Yankaw," an investigative documentary of a sustainable traditional Filipino fishing practice, by Khristine L. Sandoval of NU Sports Academy (Laguna, Region 4A)

The films were judged based on scientific content, idea execution, and filmmaking technique. The winners of each category received trophies, certificates of recognition, and cash prizes worth PHP100,000 for the Best Film, PHP50,000 pesos for the second prize, and PHP30,000 for the third prize.

The cash prize amounting to PHP20,000 for the special award was received by "Marvels of Science: Non- Newtonian Fluid" and "Yankaw".

The Tagisang Robotics Competition Makes a Comeback!

Continuing the ideas of *"Pagyabong, kalinangan at pagkakaisa sa gitna ng pakikipagtunggali,"* the Tagisang Robotics 2.0 made its official comeback after years of hiatus. Although minimized to conform with the current COVID-19 protocols, winners have crowned during its recent cycle conclusion.

In 2021, the TRC Technical Working Committee, made up of engineering and robotics experts and serves as the competition's Board of Judges, overhauled the contest to accommodate the ongoing pandemic. A table-top hybrid game was designed wherein it focused on using motors and different sensors controlled by an Arduino-compatible board, thus producing a grid-designed playing field and an omnidirectional robot. Likened to technologies of Amazon warehouses in which robotics is being used in their logistics, the TRC aligned with the theme "DELIVERED."

Set with a fictional counterpart, the TagRobo Research Center or TRC – a Premiere Science and Technology Hub in the country, is in search of new managers for their logistics arm. A total of 15 batches of Cadet Engineers were hired to undergo Technical Training and Workshop and were commissioned to complete a series of tasks called Qualifying Heats to determine the top eight batches. To finally determine the managers of TRC, a Final Competition will be held to decide the best among the batches.

Before the Technical Training and Workshop, DOST-SEI invited 15 School-teams consisting of four students and one coach. They received a kit-of-parts containing a mobot similar to the one used during the Qualifying Heats and Final Competition and four student-training kits for each student to use during the training. The workshop was held using a web conferencing platform from December 13 to 17, 2021, and was led by the institute's training partner and TRC Technical Team, ThinkLab. In total, there were 60 students and 15 coaches, of which 37 were male, and 38 were female. After the online technical training and workshop, participants were given almost two months to familiarize themselves with the programming of their robots.

The Qualifying Heats were then hosted by the Technical Team along with the Board of Judges. These three Heats were conducted and played in a remote area with the on-site mobots and playing field every month. Dates were set for participants to present their code remotely, while the technical team, with programs coming from the students, would upload submitted codes and then do the required tasks while viewing on a web conferencing platform. For tasks accomplished in the Heats, corresponding scores are given. In each Heat, rankings are posted. A new heat is conducted every month as the tasks' complexity increases. At the end of the third Heat, the top eight schools will be determined with them advancing to the Final Competition. Also, to incentivize schools to perform well during the Qualifying Heats, a Most Valuable Team award shall be bestowed to the school with the best performance record based on aggregated scores from the first to the third Qualifying Heat. The school team shall win a 3D-printed trophy and a total of PHP100,000, with PHP80,000 going to the student participants and PHP20,000.00 to the school's coach. The award was given to Rizal National Science High School for scoring 3,290 points during Qualifying Heat.

DOST-SEI culminated the program with the Final Competition at the Philippine International Convention Center last May 2022 through hybrid means. Similar to the setup done during the Qualifying Heat, an on-site playing field and robot was programmed by ThinkLab's Technical Team while communicating with the top eight school teams. The program was held via web conferencing with the TRC Board of Judges headed by Engr. Carlos M. Oppus of the Ateneo de Manila University, together with Engr. Percival Magpantay of the University of the Philippines – Diliman and Dr. Edison A. Roxas of the University of Santo Tomas in physical attendance. To welcome the participants and players, Engr. Albert G. Mariño, Deputy Director of the Department of Science and Technology – Science Education Institute, gave the opening message before Dr. Roxas then presented the Final Competition Guidelines to the remaining school teams. Dr. Ruby R. Cristobal, Chief of the Science and Technology Manpower Education Research Division, formally opened the games.

The games concluded with Pitogo High School capturing the Tagisang Robotics Championship. Their program and mobot finished in record time while finishing all tasks. Caloocan National Science and Technology High School finished second, and Taguig Science High School in third. Winners received a 3D-printed trophy and corresponding cash prizes, with the Champion School team receiving PHP120,000 and their coach PHP30,000, the First Runner-Up received PHP80,000 and PHP20,000 to their coach, while the Second Runner-Up received PHP40,000 and Php 10,000 to their coach. The trophies and certificates were hand-delivered to their respective schools by DOST-SEI.

The 2022-23 edition of the Tagisang Robotics Competition is still in the works.

Youth Excellence In Science (YES) Awards

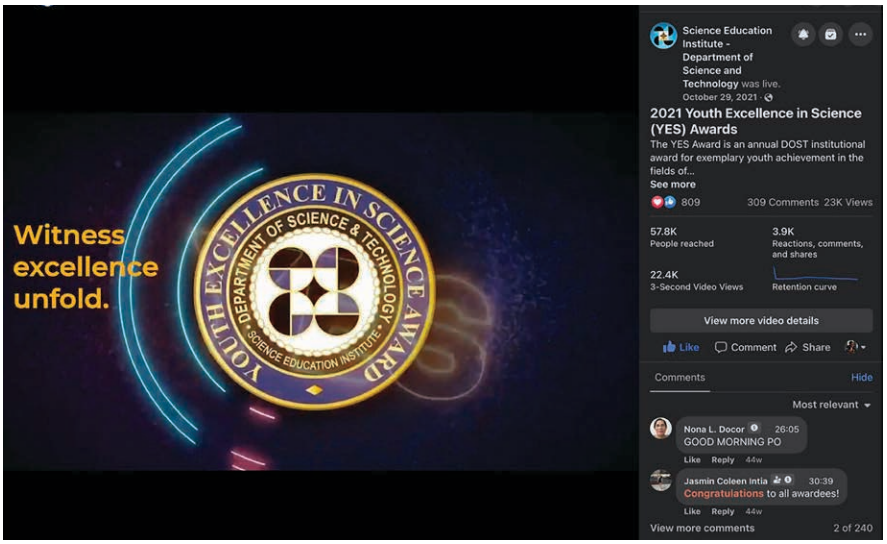
Youth Excellence in Science (YES) Award is an annual institutional award from the Department of Science and Technology (DOST) for the exemplary achievement of the youth in the fields of science, technology, engineering, mathematics (STEM). It is awarded by the DOST Secretary or the DOST Regional Director in a fitting ceremony either toward the end of the year or in the early months of the succeeding year in the form of a medal of distinction.

In its 15th year, the Department of Science – Science Education Institute (DOST-SEI) honored 1,395 elementary and high school students who won gold, silver, and bronze in various international competitions. There were 3,672 awards received from 67 competitions attended. The awarding was held virtually last October 29, 2021, via DOST – SEI's official Facebook page.

This year, the Gold Ribbon School Award was given to St. Jude Catholic School, Philippine Science High School – Main Campus, and De La Salle Santiago Zobel for gaining the most YES awardees over the previous three years.

"Your successes are the nation's pride. But more than that, you are also sources of strength and inspiration for us all. You remind us that we can still persevere and triumph even amidst adversity . You give us hope that our nation's future is in very good hands. "said DOST Secretary Fortunato dela Peña.

Through its partners, the institute continues to monitor activities in international STEM competitions.



The 2021 Virtual YES Awarding Ceremony on October 29, 2021

Recognition of Gold Ribbon Award


DOST Secretary de la Peña giving an Opening Message during 2021 Virtual YES Awarding Ceremony

NAST International Publication Award for DOST-SEI's Will-Skill-Tool Research

A research article entitled "Will-skill-tool (WST) Model of Technology Integration in Teaching Science and Mathematics in The Philippines" received the International Publication Award from the National Academy of Science and Technology (NAST).

Published on March 9, 2021 in the Journal of Computers in Education, the article on the dynamics of attitude toward ICT (Will), ICT skill (Skill), access to ICT (Tool) and technology integration in teaching science and mathematics is the Institute's first publication in a scientific, peer-reviewed journal.

The paper highlighted that while past studies on the WST model focused on the general effects of will, skill, and tool on ICT integration into teaching of a single subject area or general teaching level, this study provided differential analysis of these predictors between two subject teaching areas (i.e., science and mathematics).

The researchers noted that "Will" is a more important factor for science teachers, whereas "Skill" is more important for mathematics teachers when it comes to integrating ICT into the classroom. They recommended that science teachers first develop positive attitude toward ICT as a foundation for their teaching skills, whereas mathematics teachers need more specific ICT skills training due to the technical nature of their work.

Among science teachers, the importance of ICT integration in teaching should be highlighted first to increase their level of attitude toward ICT prior to skills development, the paper revealed. Meanwhile, ICT knowledge and skills should be a primary focus in providing teacher training programs for mathematics teachers who may have technical requirement to facilitate integration of ICT in teaching the subject.

This WST model of technology integration in the classroom has proven useful in understanding how technology can better be used to complement and improve traditional blackboard and pen-and-paper teaching methods.

Four SEI officials – Dr. Josette T. Biyo, Dr. Ruby R. Cristobal, Imelda S. Sario, and Randolf S. Sasota – authored the research paper together with Joselito C. Magadia of the School of Statistics, UP Diliman. Biyo is the Director of the DOST-SEI, while Cristobal is chief of the DOST-SEI's Science Technology Manpower Education Research Promotion Division (STMERPD). Sario and Sasota are Supervising Science Research Specialist and Senior Science Research Specialist, respectively, under the STMERPD.

On December 6, 2021, the authors received the NAST Award. The journal article is now indexed by Web of Science with 2 citations and by Scopus with 3,797 accesses and 5 citations.

The article is Open Access licensed under a Springer Creative Commons Attribution 4.0 International License: *https://link.springer.com/article/10.1007/s40692-021-00185-w*

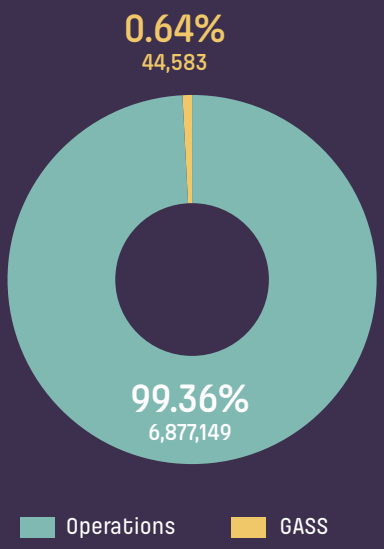
MANAGING RESOURCES

Statement of Allotment and Obligations
(Amount in Thousand Pesos)

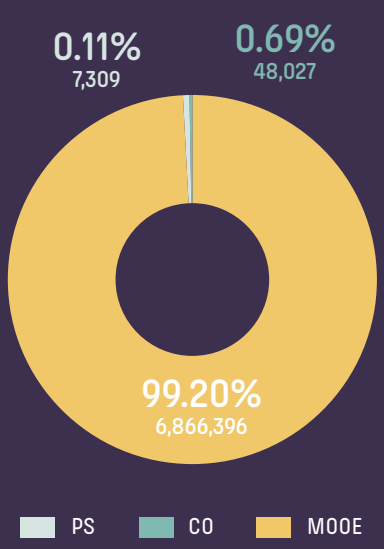
PAPS	PS		MOOE		CO		TOTAL		% UTILIZATION
	ALLOTMENT	OBLIGATION	ALLOTMENT	OBLIGATION	ALLOTMENT	OBLIGATION	ALLOTMENT	OBLIGATION	
General Administration and Support Services (GASS)	23,284	22,303	21,624	14,971	8,870	7,309	53,778	44,583	82.90%
	23,284	22,303	21,624	14,971	8,870	7,309	53,778	44,583	82.90%
OPERATIONS									
Development and Administration of S & T Scholarship Programs, Awards and Grants for Graduate Level	3,281	2,978	3,472,808	3,445,961	-	-	3,476,089	3,448,939	99.22%
Development and Administration of S & T Scholarship Programs, Awards and Grants for Undergraduate Level	5,667	5,667	3,369,612	3,369,315	-	-	3,375,279	3,374,982	99.99%
S & T Education Development Program Research, Promotion and Dev. of S&T Education & Training	17,200	17,079	42,997	35,038	-	-	60,197	52,117	86.58%
Support to the Presidential Committee implementing PD 997			1,300	1,111	-	-	1,300	1,111	85.46%
	26,148	25,724	6,886,717	6,851,425	-	-	6,912,865	6,877,149	99.48%
TOTAL BUDGET	**49,432**	**48,027**	**6,908,341**	**6,866,396**	**8,870**	**7,309**	**6,966,643**	**6,921,732**	**99.36%**

Budget Distribution
(Amount in Thousand Pesos)

Actual Expenditure (FY 2021)

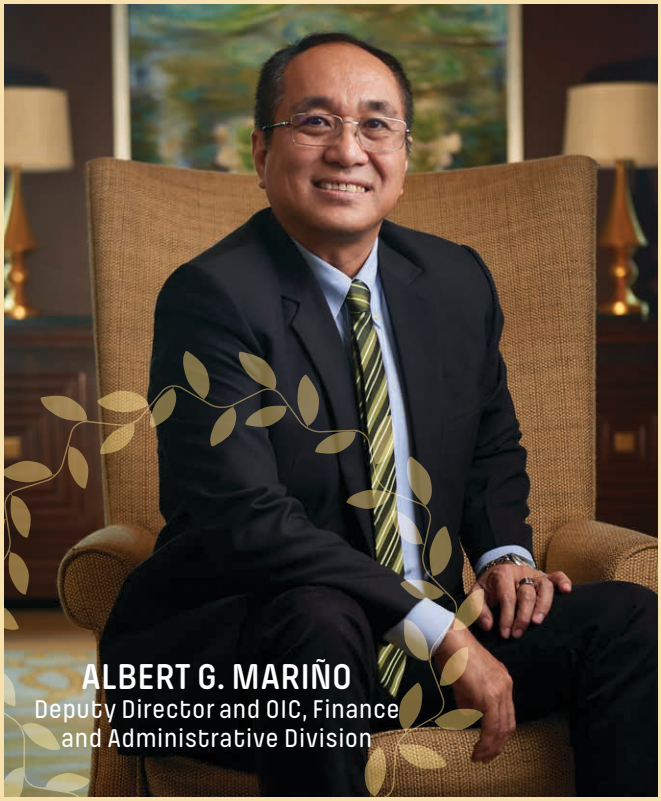


Per Major Expense and Major Final Output



KEY OFFICIALS

JOSETTE T. BIYO
Director



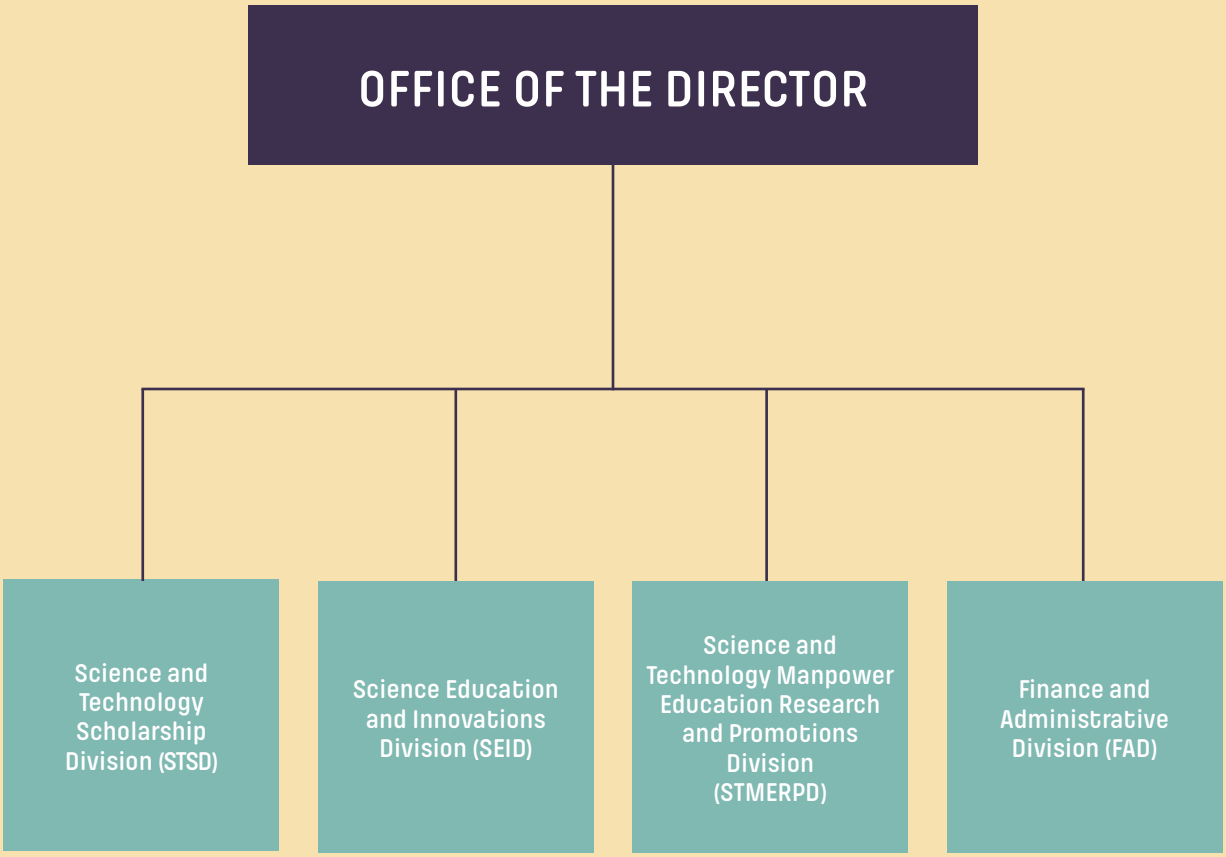
ALBERT G. MARIÑO
Deputy Director and OIC, Finance
and Administrative Division

RUBY R. CRISTOBAL
Chief, Science and Technology
Manpower Education Research
and Promotions Division

RUBI CAROLIZA D. LAÑA
Chief, Science Education and
Innovations Division

OFFICERS AND STAFF

ORGANIZATIONAL CHART



PUBLICATION COMMITTEE

JOSETTE T. BIYO
Chairman

ALBERT G. MARIÑO
Co-Chair

RUBY R. CRISTOBAL
Editor

Members
Imelda S. Sario
Peter Gerry P. Gavina
Liezl M. de Lara
Anita E. Gorgonio
Mary Angelica D.C. Palomo
Gaius Karl G. Noble
Jemmalyn C. Miniao

S&T EDUCATION AND SCHOLARSHIPS

WINNING AT THE FRONTLINE

2021 SEI ANNUAL REPORT

MANDATE PER EO 128

- Undertake science education and training;
- Administer scholarships, awards and grants;
- Undertake science and technology manpower development; and
- Formulate plans and establish programs an dprojects for the promotion and development of science and technology education and training in coordination with DepEd, CHED and other institutions of learning.

VISION

DOST-SEI shall develop the country's human resource capacity in science and technology required to produce deman-driven outputs that meet global standards.

MISSION

DOST-SEI's mission is to accelerate the development of S&T human resources of the country by administering undergraduate and graduate scholarships and advanced specialized trainings; promote S&T culture and develop innovative science education programs.

DEPARTMENT OF SCIENCE AND TECHNOLOGY
Science Education Institute

1F/2F Science Heritage Building
DOST Compound
General Santos Avenue, Bicutan
Taguig City
www.SEI.dost.gov.ph