TRAINING-WORKSHOP IN INCLUSIVE SCIENCE EDUCATION FOR LINGUISTIC AND CULTURAL DIVERSITY

TECHNICAL REPORT

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About ESTA

Background of the Project

EU-report on science education for responsible citizenship and the Paris declaration recommend teaching all students for our better future. In Georgia, the Philippines, and Bosnia and Herzegovina, a large number of young people do not meet basic requirements in science. In international assessments of science performance, all three countries scored very low. One great challenge for science education in Georgia, Bosnia and Herzegovina, and the Philippines are the countries' plurality of languages and cultures. While the education system in Georgia, and Bosnia and Herzegovina, underwent major changes after the fall of the Soviet Union and the subsequent conflicts in power relations, colonialism has left its imprint on the Philippine education system. Science education in all three countries takes place amidst political and ethnic divides that translate into linguistic heterogeneity and cultural diversity.

Main Strategy

Building a transnational network of university science teacher educators in which evidence for the effectiveness of new approaches to science teaching and learning will be shared and discussed in order to implement only the most effective and efficient measures.

About ESTA

Goals of the Project

Improving the level of competencies in HEI in partner countries by professionalization and development of university science teacher educators regarding diversity in science classes (focus on language and culture). Teacher educators, in turn, will share their knowledge and skills with in-service and pre-service science teachers, and thereby contribute to a more inclusive and higher quality science teaching.

ESTA

Co-funded by the
Erasmus+ Programme
of the European Union

ESTA-PNU

Description of the University

The Philippine Normal University (PNU) was established on September 1, 1901 as Philippine Normal School, and as the first higher institute of learning organized during the American occupation. Renamed Philippine Normal College in 1949, it became a university in 1991. In 2009, PNU was designated as the National Center for Teacher Education under Republic Act No. 9647. It has four hubs located strategically in the archipelago: The Technology and Livelihood Hub in Southern Luzon, The Multicultural Hub in Mindanao, The Indigenous Peoples Hub in Northern Luzon, and The Environment and Green Technology Hub in the Visayas.

Influence of the project to the institution (also translation for this expression)

As the NCTE (National Center for Teacher Education), ESTA propels the University to initiate country program in teacher education curriculum to achieve teacher quality especially in the field of Sciences. This may be model science programs for pre-service and in-service Filipino teachers in all Normal Schools and government-owned Teacher Education Institutions (TEIs). Furthermore, ESTA may provide significant contribution to Philippine IP (Indigenous Peoples) Education through model IP frameworks and curricula for IP teachers and to support the IP basic education (elementary and secondary) of the country.

Executive Summary

Happier teachers would somehow equate to more engaged students (Archer, 2017). Hence SDG 4 that banners quality education stipulated training and recruitment of quality teachers as an important aspect to ensure inclusive quality education (Nilsen & Gustafsson, 2016; Seebruck, 2015). The Philippine's elaboration of SDG 4's call for quality education is an emphasis on Talent Retention and Science Education specified in its country document, PAGTANAW 2050 (Rodil, 2021). As a priority area of PAGTANAW 2050, the country highlights plans and programs to address poor qualifications of science teachers and to compensate for the loss of good science teachers who have gone abroad. Within this spectrum, the Philippine Normal University, as the National Center for Teacher Education engages on capacity building and retooling of its University Science Educators through the ESTA program to better enact science teacher education programs for a more inclusive science education.

Educating Science Teachers for ALL (ESTA) is an international program for capacity building of science teachers in countries where plurality of languages and cultures exist, where science education takes place amidst political or ethnic divides that translate into linguistic heterogeneity and cultural diversity. As one of the partner countries and institutions, the aim of ESTA is to improve the level of competencies in the institution by professionalization and development of university science educators regarding diversity in science classes, particularly in linguistics and cultural aspects. Hence, training workshops were designed to address the aforementioned goal.

The document reports on the proceedings of a training workshop (Training Workshop in Inclusive Science Education for Linguistic and Cultural Diversity) that focused on training University Science Educators to enact an inclusive pre-service science education. Furthermore, the training workshop highlights strategies, processes, protocols in addressing diversity and heterogeneity in class.

The training was designed using the ESTA-PNU framework, Science Education for Linguistic and Cultural Diversity in Philippine Higher Education (SELC-PhPHiEd). Designed as a 2-phased training workshop, phase 1 emphasized inputs covering the ESTA program, ESTA-PNU framework, science education, concepts on culture and language in and for science, and engagement in activities that could be conducted in science classrooms to address diversity collectively categorized as Academic Staff Tour (AST). Phase 2 of the training focused on mentoring the University Science Educators for them to craft their unique Lesson Exemplars anchored on ESTA-PNU framework to enact an inclusive pre-service science education. Furthermore, the document features sample products of the university science educators (e.g., sample Lesson Exemplar, reflection) that presents how they were able to acquire and exercise their 'agency' (Andrée & Hansson, 2020) to an inclusive quality science education.

References:

Andrée, M., & Hansson, L. (2020). Industry, science education, and teacher agency: A discourse analysis of teachers' evaluations of industry-produced teaching resources. Science Education, 105(2), 353–383. https://doi.org/10.1002/sce.21607

Archer, L. (2017). Happier teachers and more engaged students? Teachers developing a pedagogical approach in collaboration with researchers. Research in Teacher Education, 7(1), 29–32. https://repository.uel.ac.uk/item/891xw

Nilsen, T., & Gustafsson, J-E. (2016). Teacher Quality, Instructional Quality and Student Outcomes. Springer, Cham. https://doi.org/10.1007/978-3-319-41252-8.

Rooney, A. L., & Van Ostenberg, P. R. (1999). Licensure, Accreditation, and Certification: Approaches to Health Services Quality: Vol. Quality Assurance Methodology Refinement Series. Center for Human Services (CHS). Retrieved June 20, 2022, from https://www.globalhealthlearning.org/sites/default/files/reference-files/rooneu.pdf

Seebruck, R. (2015). Teacher Quality and Student Achievement: A Multilevel Analysis of Teacher Credentialization and Student Test Scores in California High Schools. McGill Sociological Review, 5, 1-18.

About the Training

Rationale

Science teachers in the country encounter issues on and struggle against plurality of language, diversity, and heterogeneity of learners. The Philippine plurality of language and culture is sourced from the cultural and linguistic profile of the Filipino people with about 110 indigenous groups and more than 170 languages spoken as first languages from a multitude of regional dialects and languages (Philippines, 28 September, 2017). Hence, it may be assumed that science education in the country takes place amidst ethnic divides that translate into linguistic and cultural diversity. Such social conditions in the school or classroom may hamper meaningful learning of science concepts.

Several research claim the vital contribution of teacher quality to student learning and achievement in general (Nilsen & Gustafsson, 2016; Seebruck, 2015). In fact, SDG 4 that promotes quality education, identifies recruitment and training of quality teachers as an important aspect to ensure inclusive quality education. Similarly, with the University's aim to produce quality teachers, there may be a need to promote programs on capacity building and the retooling of university science educators to better enact teacher education programs.

Educating Science Teachers for All (ESTA) is a specially designed international project and program that seeks to contribute to the retooling program of the University through disseminating science teaching approaches in linguistically and culturally diverse contexts. Cognizant of these conditions, ESTA-PHIL-PNU team conducted an intensive training workshop to university science teacher educators in all campuses (PNU system) for inclusive science education.

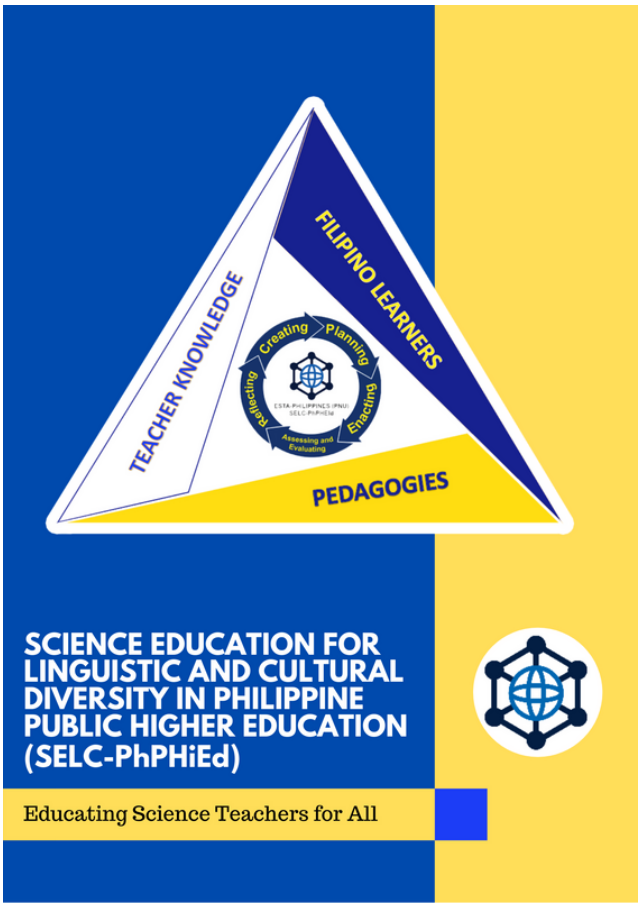
Major Goal and Objectives

The training workshop aims to train university science educators in the aspect of providing an avenue to successfully manage diversity in science classes within the context of the country's language and culture. Specifically, the workshop aims to:

1. Provide inputs to university science educators on the concepts and constructs of science education, language for the sciences, and the contextualization of lessons;
2. Acquaint the university science educators with strategies in managing diverse science classrooms.
3. Orient the university science educators on the Science Education for Linguistic and Cultural Diversity in Philippine Public Higher Education (SELC-PhPHiEd) framework and other ESTA products.
4. Facilitate the development and validation of Lesson Exemplars.

Materials and Instruments

1. Framework



The framework for Science Education for Linguistic and Cultural Diversity in Philippine Public Higher Education (SELC-PhPHiEd) is visualized to encompass three major components: the Filipino learners, the pedagogies and pedagogical frameworks, and the teachers' knowledge system in terms of enacting the science curriculum. SELC-PhPHiEd presents the general constructs of focus in undertaking curricular modifications, enhancements, and enactment. These general constructs outline how the blueprint may also inform the different teacher education processes that inform teacher's knowledge, trainings and research in pedagogies, and the development of products for teaching and learning such as lesson exemplars, modules, and assessment within the bounds of linguistic and cultural inclusivity. SELC-PhPHiEd is PNU's vehicle to concretely advocate transfer of technology and disseminate knowledge on linguistic and cultural inclusivity to other Teacher Education Institutions for higher quality science education in the country.

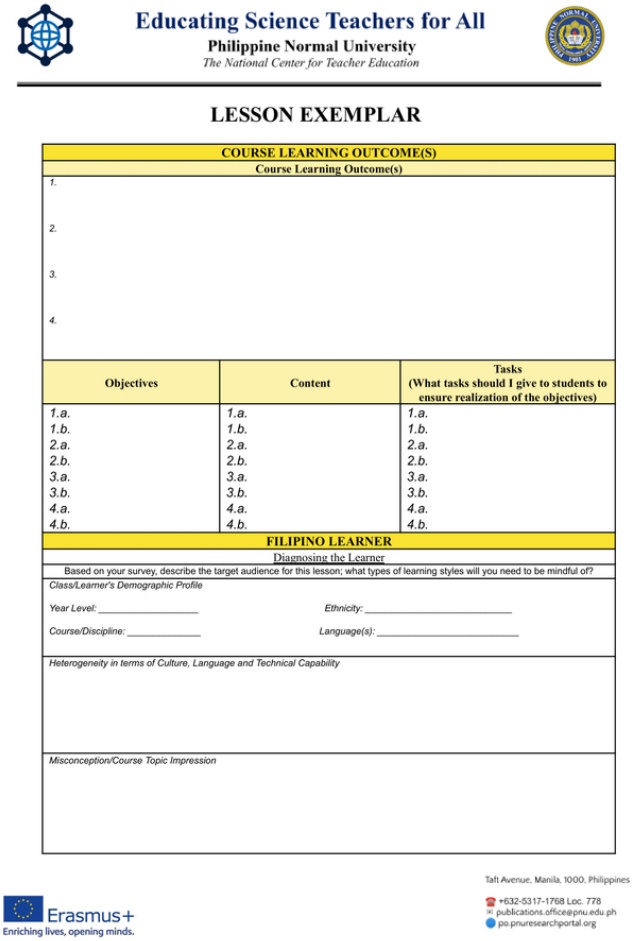
Source: https://pnu-onlinecommons.org/omp/index.php/ESTA/catalog/book/1181

Materials and Instruments

2. Instruments

LESSON EXEMPLAR

This template designed based on the SELC-PhPHiEd framework served as guide to participants in the design and development of their respective Lesson Exemplars and all attached documents [e.g., worksheets, assessment].



Educating Science Teachers for All
Philippine Normal University
The National Center for Teacher Education

LESSON EXEMPLAR

COURSE LEARNING OUTCOME(S)		
Course Learning Outcome(s)		
1. 2. 3. 4.		
Objectives	**Content**	**Tasks (What tasks should I give to students to ensure realization of the objectives)**
1.a. 1.b. 2.a. 2.b. 3.a. 3.b. 4.a. 4.b.	1.a. 1.b. 2.a. 2.b. 3.a. 3.b. 4.a. 4.b.	1.a. 1.b. 2.a. 2.b. 3.a. 3.b. 4.a. 4.b.
FILIPINO LEARNER		
Diagnosing the Learner		
Based on your survey, describe the target audience for this lesson; what types of learning styles will you need to be mindful of?		
Class/Learner's Demographic Profile *Year Level:* _____ *Ethnicity:* _____ *Course/Discipline:* _____ *Language(s):* _____		
Heterogeneity in terms of Culture, Language and Technical Capability		
Misconception/Course Topic Impression		

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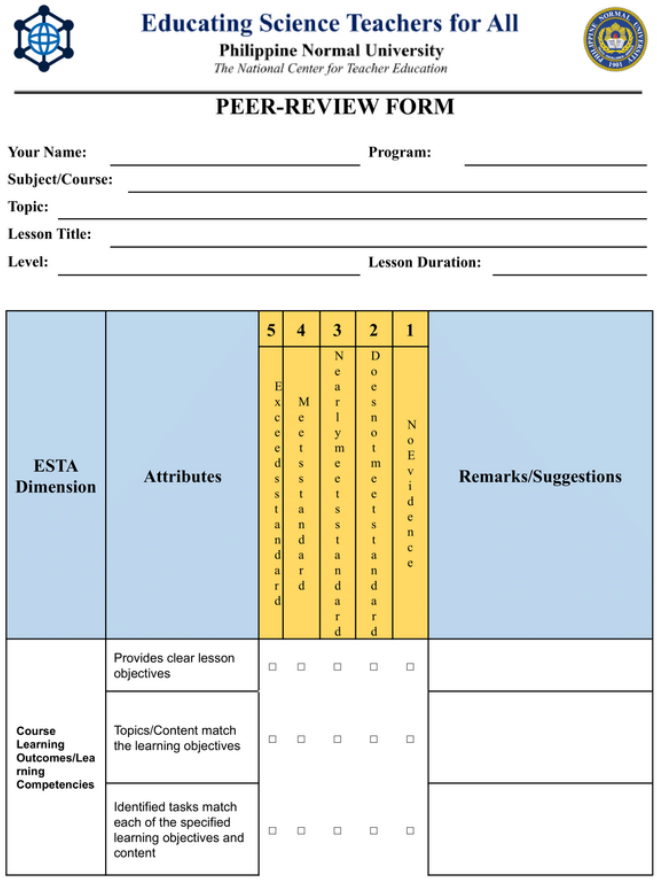
Materials and Instruments

2. Instruments

PEER REVIEW FORM

This form is an evaluation tool utilized in the first level quality assurance of the developed Lesson Exemplars



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Philippine Normal University
The National Center for Teacher Education

PEER-REVIEW FORM

Your Name: _____ **Program:** _____
Subject/Course: _____
Topic: _____
Lesson Title: _____
Level: _____ **Lesson Duration:** _____

ESTA Dimension	Attributes	5 Exceeds standard	4 Meets standard	3 Nearly meets standard	2 Does not meet standard	1 No Evidence	Remarks/Suggestions
Course Learning Outcomes/Learning Competencies	Provides clear lesson objectives	□	□	□	□	□	
	Topics/Content match the learning objectives	□	□	□	□	□	
	Identified tasks match each of the specified learning objectives and content	□	□	□	□	□	

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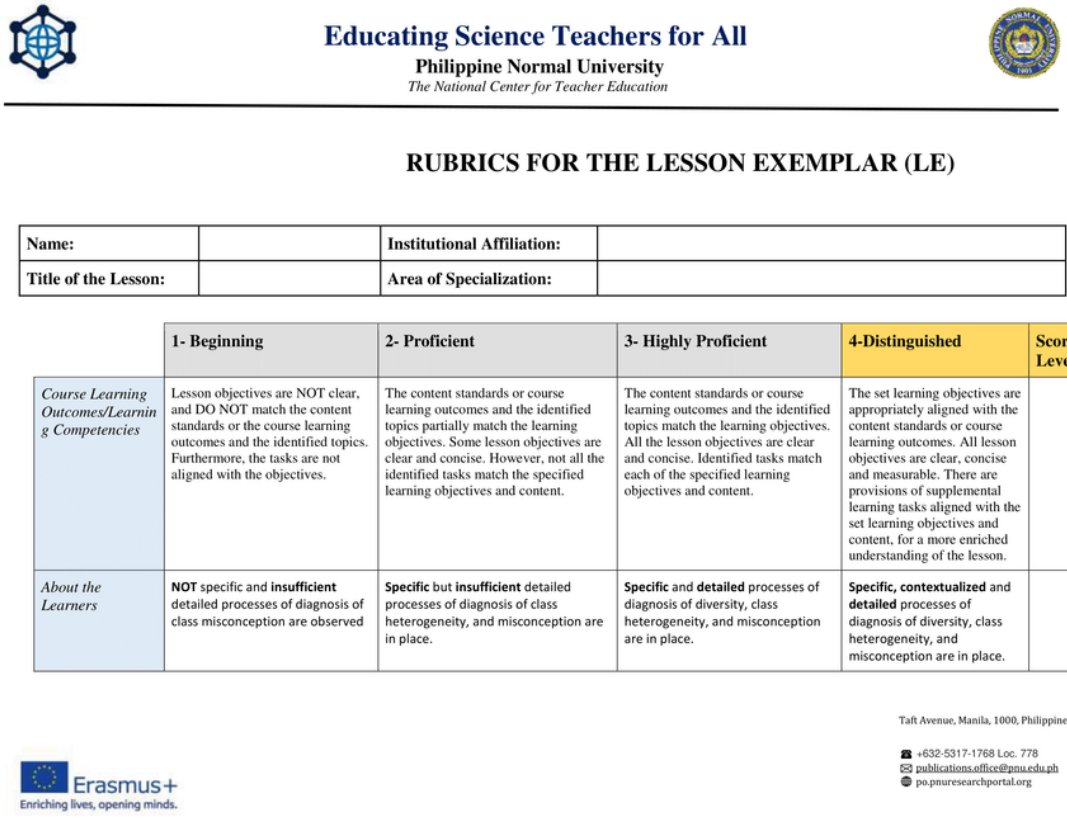
2. Instruments

EVALUATION RUBRIC

The LE template comes with an evaluation Rubric designed to frame the criteria for exemplars. The same tool utilized in the
panel critiquing.



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RUBRICS FOR THE LESSON EXEMPLAR (LE)

Name:		**Institutional Affiliation:**	
Title of the Lesson:		**Area of Specialization:**	

	1- Beginning	2- Proficient	3- Highly Proficient	4-Distinguished	Score/ Level
Course Learning Outcomes/Learning Competencies	Lesson objectives are NOT clear, and DO NOT match the content standards or the course learning outcomes and the identified topics. Furthermore, the tasks are not aligned with the objectives.	The content standards or course learning outcomes and the identified topics partially match the learning objectives. Some lesson objectives are clear and concise. However, not all the identified tasks match the specified learning objectives and content.	The content standards or course learning outcomes and the identified topics match the learning objectives. All the lesson objectives are clear and concise. Identified tasks match each of the specified learning objectives and content.	The set learning objectives are appropriately aligned with the content standards or course learning outcomes. All lesson objectives are clear, concise and measurable. There are provisions of supplemental learning tasks aligned with the set learning objectives and content, for a more enriched understanding of the lesson.	
About the Learners	**NOT** specific and **insufficient** detailed processes of diagnosis of class misconception are observed	**Specific** but **insufficient** detailed processes of diagnosis of class heterogeneity, and misconception are in place.	**Specific** and **detailed** processes of diagnosis of diversity, class heterogeneity, and misconception are in place.	**Specific, contextualized** and **detailed** processes of diagnosis of diversity, class heterogeneity, and misconception are in place.	

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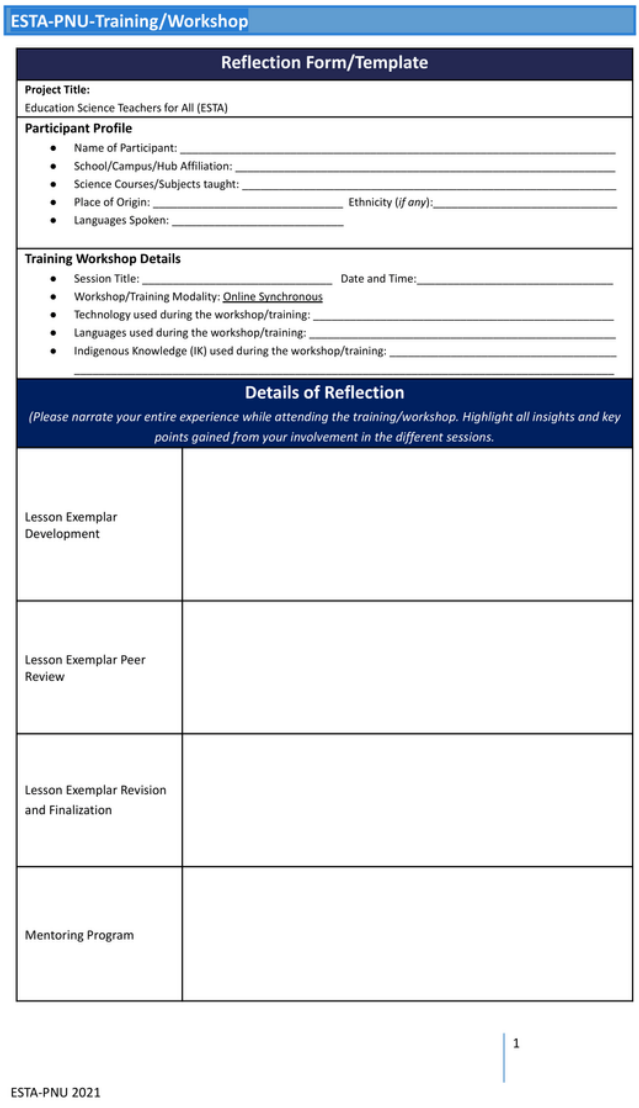
Materials and Instruments

2. Instruments

REFLECTION TEMPLATE

This template was utilized to help our participants document their journey in the training program in case they want to craft their manuscript.



ESTA-PNU-Training/Workshop

Reflection Form/Template

Project Title:
Education Science Teachers for All (ESTA)

Participant Profile

- Name of Participant: _____
- School/Campus/Hub Affiliation: _____
- Science Courses/Subjects taught: _____
- Place of Origin: _____ Ethnicity (*if any*): _____
- Languages Spoken: _____

Training Workshop Details

- Session Title: _____ Date and Time: _____
- Workshop/Training Modality: Online Synchronous
- Technology used during the workshop/training: _____
- Languages used during the workshop/training: _____
- Indigenous Knowledge (IK) used during the workshop/training: _____

Details of Reflection

(Please narrate your entire experience while attending the training/workshop. Highlight all insights and key points gained from your involvement in the different sessions.

Lesson Exemplar Development	
Lesson Exemplar Peer Review	
Lesson Exemplar Revision and Finalization	
Mentoring Program	

1

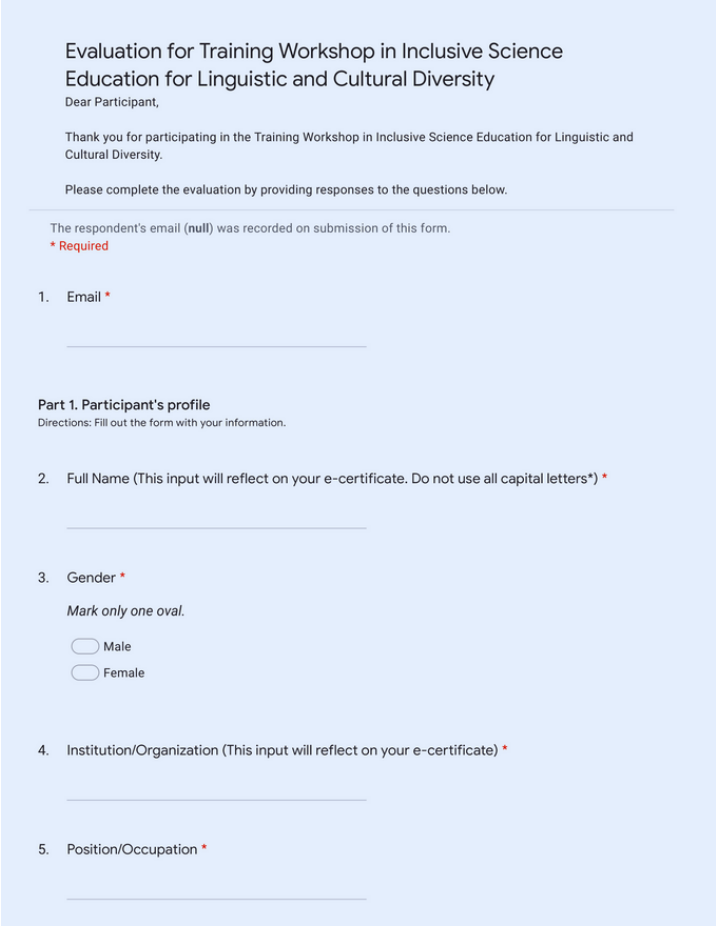
ESTA-PNU 2021

Materials and Instruments

2. Instruments

EVALUATION FORM

This form was administered to the participants to assess the overall management of the training program and the attainment of the aforementioned objectives of the training.



Evaluation for Training Workshop in Inclusive Science Education for Linguistic and Cultural Diversity

Dear Participant,

Thank you for participating in the Training Workshop in Inclusive Science Education for Linguistic and Cultural Diversity.

Please complete the evaluation by providing responses to the questions below.

The respondent's email (**null**) was recorded on submission of this form.

* Required

1. Email *

Part 1. Participant's profile

Directions: Fill out the form with your information.

2. Full Name (This input will reflect on your e-certificate. Do not use all capital letters*) *

3. Gender *

Mark only one oval.

- Male
- Female

4. Institution/Organization (This input will reflect on your e-certificate) *

5. Position/Occupation *

Training Design

The training will include two phases: Plenary sessions and Mentoring Sessions. In the plenary sessions, major concepts and principles will be discussed together with strategies on how to: (1) manage diverse and heterogeneous classes, and (2) integrate culture and language in teaching science concepts.

A. Plenary Session

Date and Time	Activity	Person-In-Charge
December 9, 2021 1:00-4:30 PM	Opening Program Topic 1: Purpose of Science Education AST 1: Diversity in Class	ESTA-PNU Team Dr. Marie Paz E. Morales
December 10, 2021 1:00-4:30 PM	Topic 2: Language for Sciences AST 2: Conceptual Change	Dr. Ruth A. Alido Dr. Leah Amor S. Cortez Prof. Alfons Jayson O. Pelgone
January 6, 2022 1:00-4:30 PM	Topic 3: Contextualization • Culture for Sciences • Culture Integration AST 3: Chemistry self-concepts: gender and culture, and the impact of chemistry self-concept on learning behavior AST 4: Acquisition of Science Capital in Chemistry	Dr. Zenaida Q. Reyes Dr. Crist John M. Pastor Dr. Arlyne C. Marasigan Dr. Crist John M. Pastor
January 7, 2022 1:00-4:30 PM	AST 5: Flipped Classroom AST 6: Technology Integration Topic 4: Orientation to Lesson Exemplar (LE) Development Workshop • Agreements for Part 2: LE Development Workshop • Groupings for Consultation and Mentoring	Dr. Brando C. Palomar Prof. Ruel A. Avilla Dr. Palomar and Prof. Avilla

B. Workshop on LE Development

Date and Time	Activity	Person-In-Charge
Week 1	LE Development [Asynch]	ESTA-PNU Team
Week 2 Week 3	LE Peer Review LE Revision	ESTA-PNU Team
Week 4	Panel Critiquing	ESTA-PNU Team with one inviting faculty

Training Proper

Training Program

Phase 1: Synchronous Phase

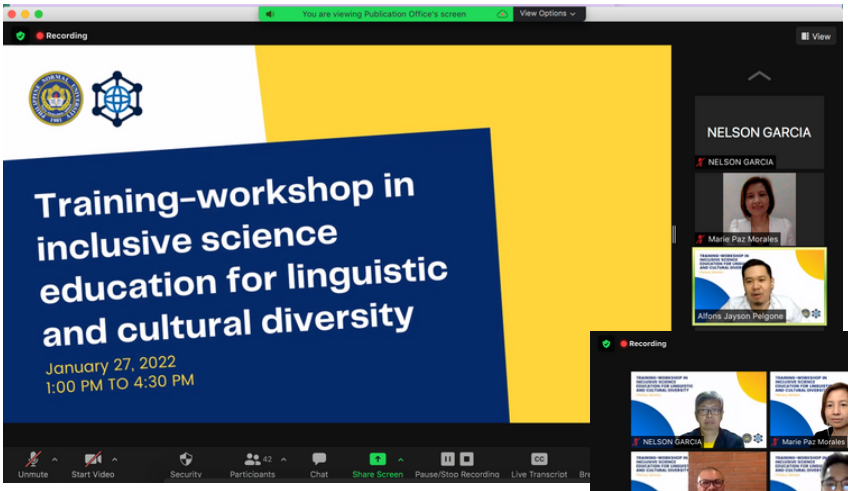
Day 1 (January 27, 2022)

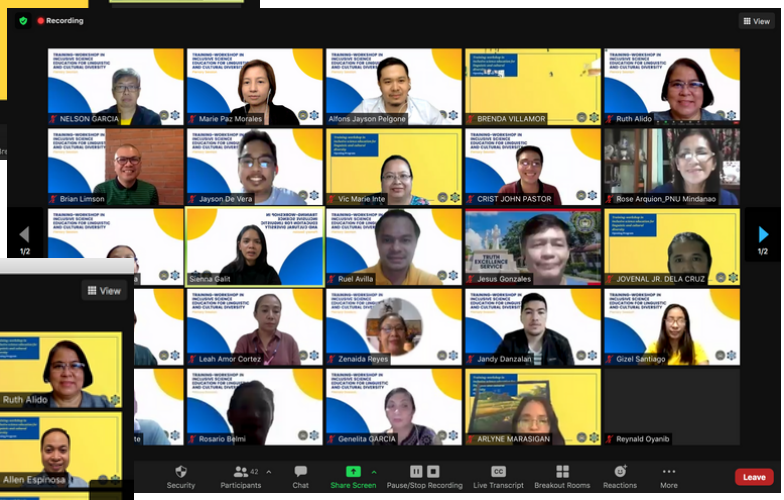
The first day of the intensive training commenced with a warm greetings from the master of ceremonies, Prof. Alfons Jayson O. Pelgone, followed by an opening prayer and the presentation of vision, mission, and quality policy of the University. He then introduced the Vice President for Research, Planning, and Quality Assurance, Dr. Adonis P. David, for his opening remarks. Soon after, Dr. Jennie V. Jocson gave her message and commended the ESTA-PNU team for their dedication to help the participating faculty on managing diversity in science classes. A statement of purpose was discussed by Dr. Brando C. Palomar to highlight the objectives of the training.

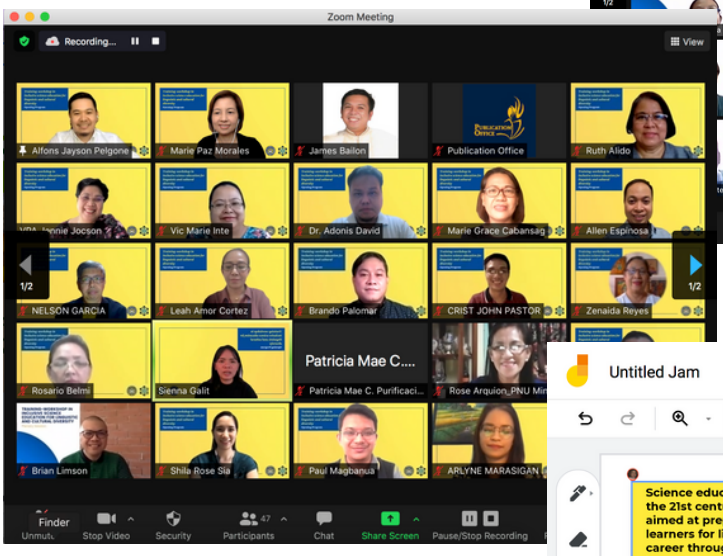
On the same day, Dr. Marie Paz. Morales, Project Lead, presented the topics, "Purpose of Science Education" and "Academic Staff Tour (AST) 1: Diversity in Class," where she underscored the role of science education in achieving and realizing Education 4.0. The discussions were followed by a breakout session to engage the participants in a role play task.

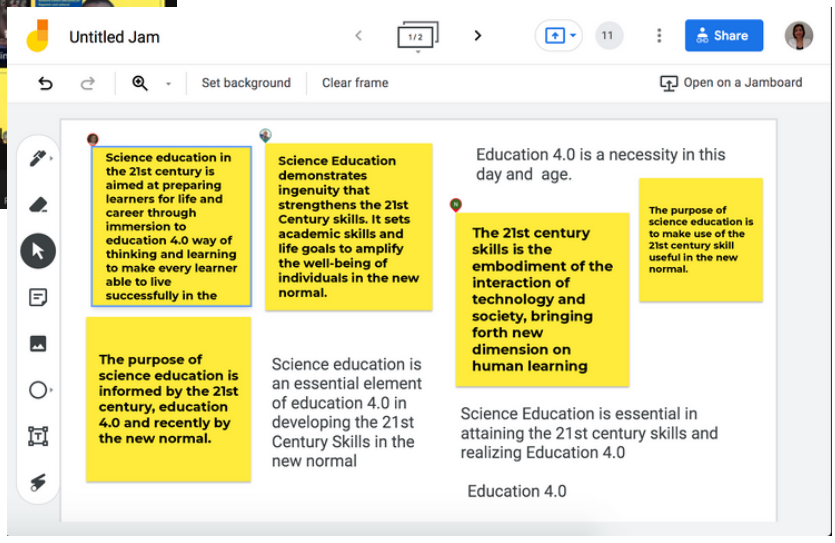
Concluding the first day, Prof. Pelgone thanked the participants for their active participation and discussed few reminders for the upcoming sessions.

Day 1 (January 27, 2022)









Phase 1: Synchronous Phase

Day 2 (January 28, 2022)

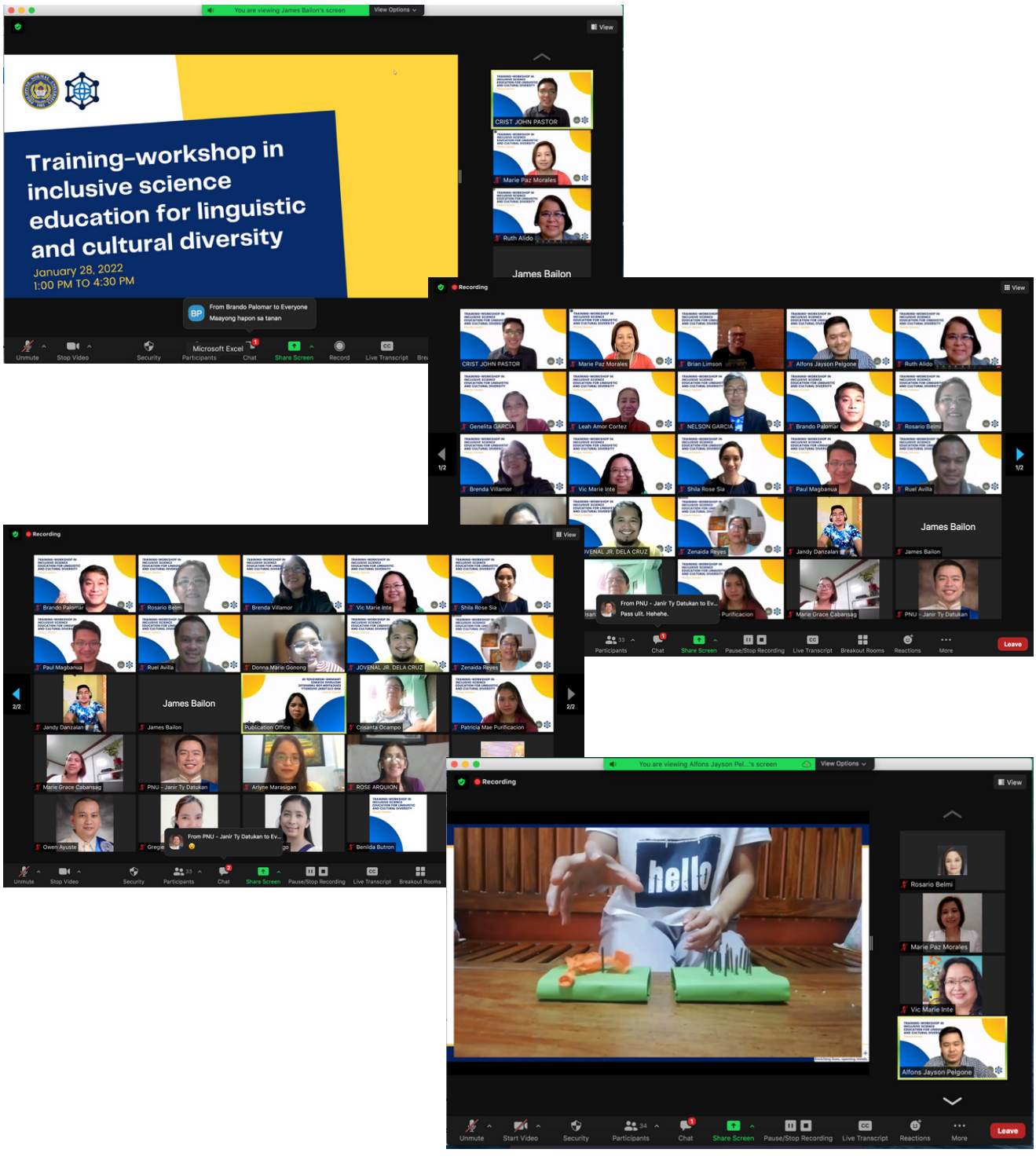
Commencing the second day of the training, Dr. Crist John M. Pastor as master of ceremonies, greeted the participants with a warm welcome. He then introduced Mr. Jayson L. De Vera to share a glimpse of the first day through a recap. Emphasizing the significant role of language in science education, Dr. Ruth A. Alido, discussed the topic, "Language for Science." The discussion highlighted difficulties of students in the language of science, language of thought patterns in the sciences and specialized techniques for reading the sciences.

For the topic, "AST 2: Conceptual Change," Dr. Leah Amor S. Cortez discussed interest and science education. She emphasized the components of interest and introduced some strategies to make science teaching more interesting to learners. At the end of her talk, Dr. Cortez presented the official framework of the ESTA project, Science Education for Linguistic and Cultural Diversity in Philippine public higher education (SELCPhPHiEd).

To further accentuate the importance of engaging students in a class, Prof. Alfons Jayson O. Pelgone, introduced a strategy called "hooks" that may engage students to learning science concepts. He also presented the sample hook videos created by his students incorporating language and cultural contexts to address diverse learners in a class.

Wrapping up the second day, Dr. Pastor thanked the resource persons for their substantial discussions.

Day 2 (January 28, 2022)



Phase 1: Synchronous Phase

Day 3 (February 3, 2022)

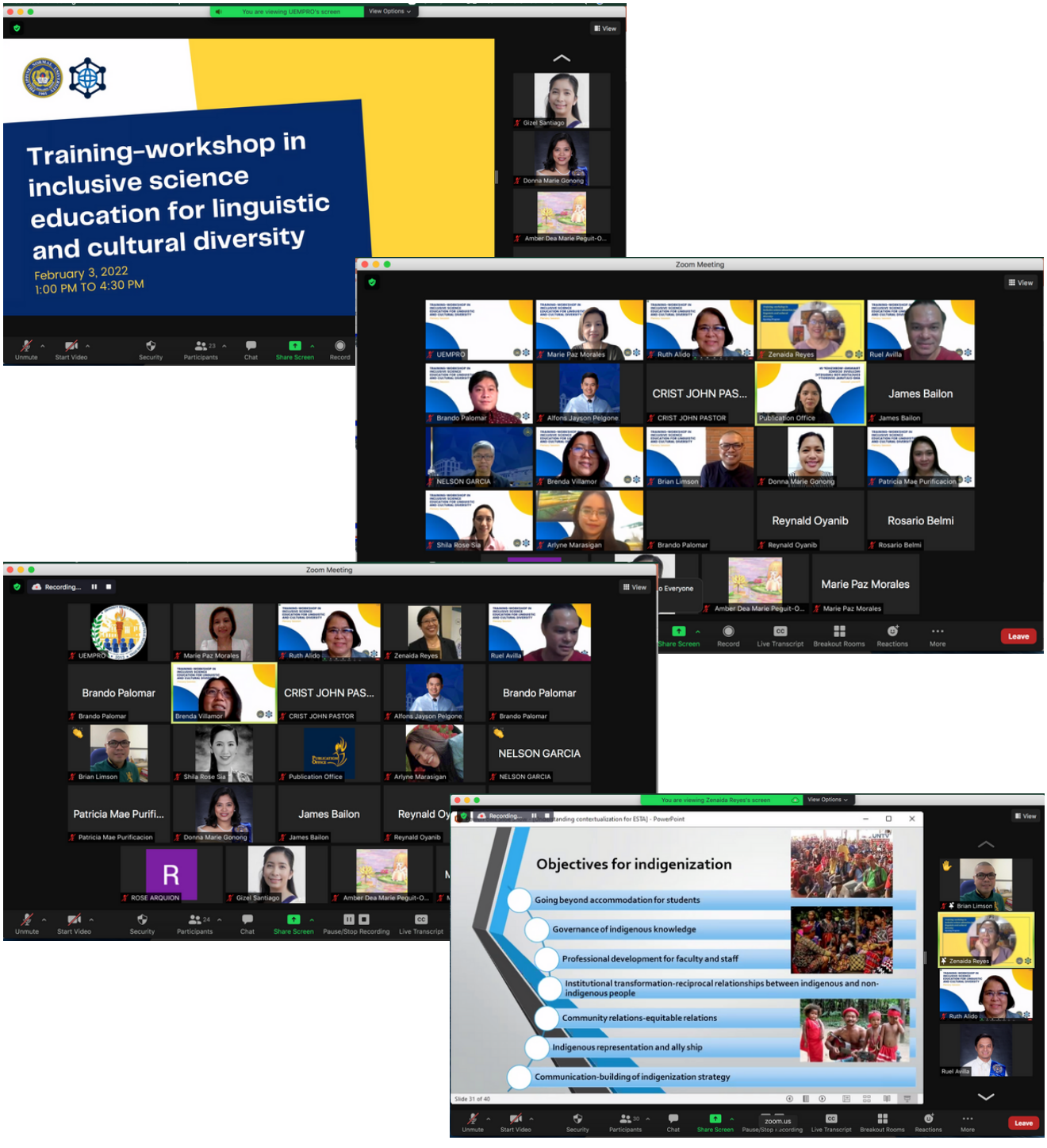
The third day of the training was packed with insights and discussions on culture integration as stated by the master of ceremonies, Prof. Ruel A. Avilla. A recap on the second day was facilitated by Ms. Brenda B. Villamor followed by the introduction to speakers by Prof. Avilla.

Dr. Zenaida Q. Reyes, discussed the topic, "Understanding Contextualization in Education," featuring the background of contextualization, its relative concepts and processes, and implications to education. At the middle of the session, participants were asked about their concept of contextualization. Soon after, Dr. Crist John M. Pastor, discussed the topic, "Culture Integration," where he featured the steps in contextualizing teaching.

For the second part of the session, Dr. Arlyne C. Marasigan discussed, "AST 3: Chemistry Self-concepts: Gender and Culture, and the Impact of Chemistry Self-concept on Learning Behavior," while Dr. Pastor discussed, "AST 4: Acquisition of Science Capital in Chemistry," citing the papers published in the reputable journals which introduced the crucial role of gender and culture in the Chemistry concept of learners and in obtaining science capital in Chemistry.

Succeeding the session, Prof. Avilla once again thanked the resource persons for the insightful discussions.

Day 3 (February 3, 2022)



Phase 1: Synchronous Phase

Day 4 (February 4, 2022)

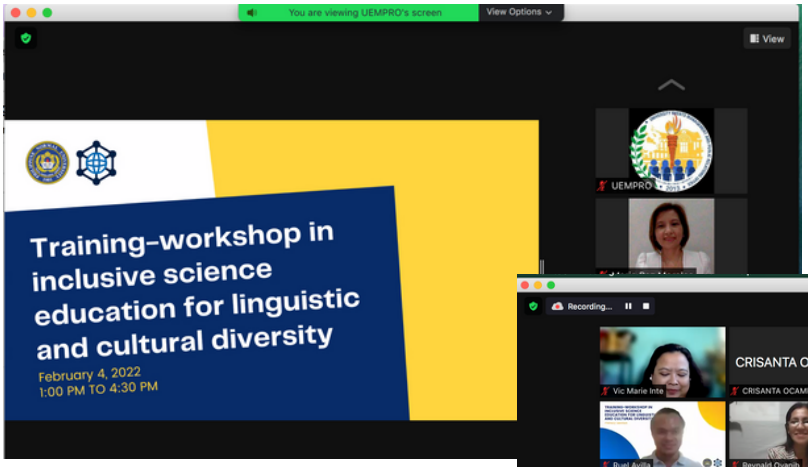
Paving the way to a successfully managed diversity in science classes as aimed by the training, the fourth day started with a recap of the third day's session facilitated by Dr. Brian M. Limson who briefly expressed his gratitude to the team for the learning from day 1 to day 3.

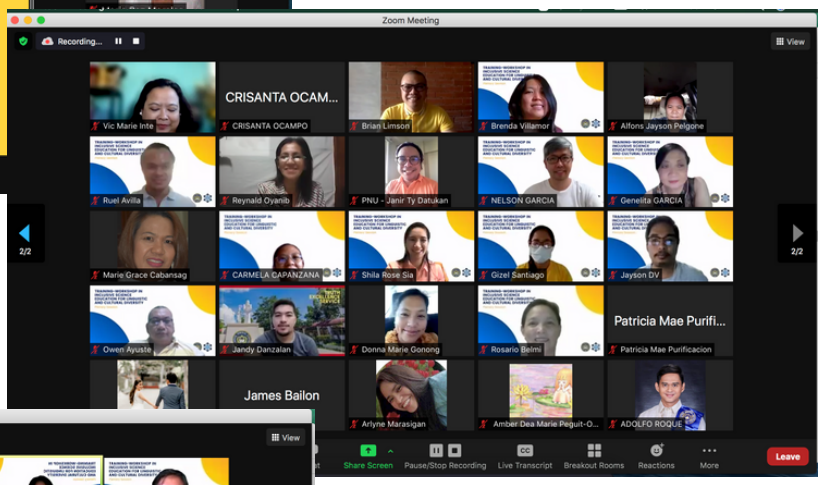
Intended to change the learning to a learner-centered approach, AST 5: Flipped Classroom, was discussed by Dr. Brando C. Palomar. The discussion included background of the approach, process and components, and the sample local study of the approach. Succeeding such, Prof. Ruel A. Avilla discussed the concepts and facts related to the topic, AST 6: Technology Integration. A paper published through a project, TPACK in Philippine STEAM Education, was also presented to emphasize the technology tools used by STEAM teachers.

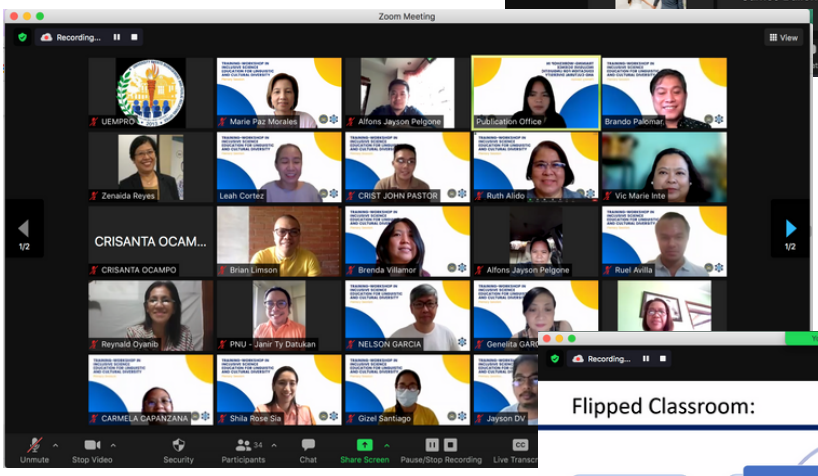
For the last topic, Prof. Avilla presented and discussed the lesson exemplar as one of the major outputs of the training. He emphasized the timeline for the said deliverable in asynchronous sessions with the mentors from ESTA-PNU team members. Subsequently, Dr. Palomar discussed the groupings of mentoring sessions along with the agreements and the schedules.

The four-day intensive training concluded with expressions of appreciation and gratitude from participants and with the singing of the PNU Hymn.

Day 4 (February 4, 2022)







Phase 2: Asynchronous Phase

Aiming to train the participating university science educators in developing the Lesson Exemplar (LE), a month long asynchronous sessions was dedicated to mentoring sessions in small groups according to participants' specialization with mentors from ESTA-PNU team.

Week 1 [Lesson Exemplar Development]

The session focused on facilitating participants where they were able to draft and craft their Lesson Exemplars. Informal sharing was done within and across groups and disciplines to exact the finest Lesson Exemplar for a particular science lesson or topic.

Week 2 [Lesson Exemplar Peer Review]

In this session, crafted and designed Lesson Exemplars for science lessons or topics were subjected to peer review (by fellow participants) that help the developers provide varied perspectives through while peers assessed their Lesson Exemplars. The session provided constructive remarks for the improvement or enhancement of developed Lesson Exemplars and determined alignment of designed Lesson Exemplars to the aforementioned models and frameworks.

Phase 2: Asynchronous Phase

Week 3 [Lesson Exemplar Revision]

In this session, developers of Lesson Exemplars engaged in revising their products based on the comments and suggestions of their peers. This is a prerequisite to the next activity that focused on presentation of the revised Lesson Exemplars to the ESTA-Philippines-PNU Team and critiquing of the panel of evaluators.

Week 4 [Lesson Exemplar Presentation and Panel Critiquing]

In this session, crafted and designed Lesson Exemplars for science lessons or topics were presented to the participants and experts. Critiquing was done to provide constructive remarks for the improvement or enhancement of presented Lesson Exemplars and determined alignment of designed Lesson Exemplars to the aforementioned models and frameworks with a panel members from ESTA-PNU team held during the Closing Activity on March 16, 2022.

Phase 2: Asynchronous Phase

Phase 2: Asynchronous Phase

Group 3
Members

Carmela O. Capanzana
Adolfo P. Roque
Janir T. Datukan
Benilda R. Butron

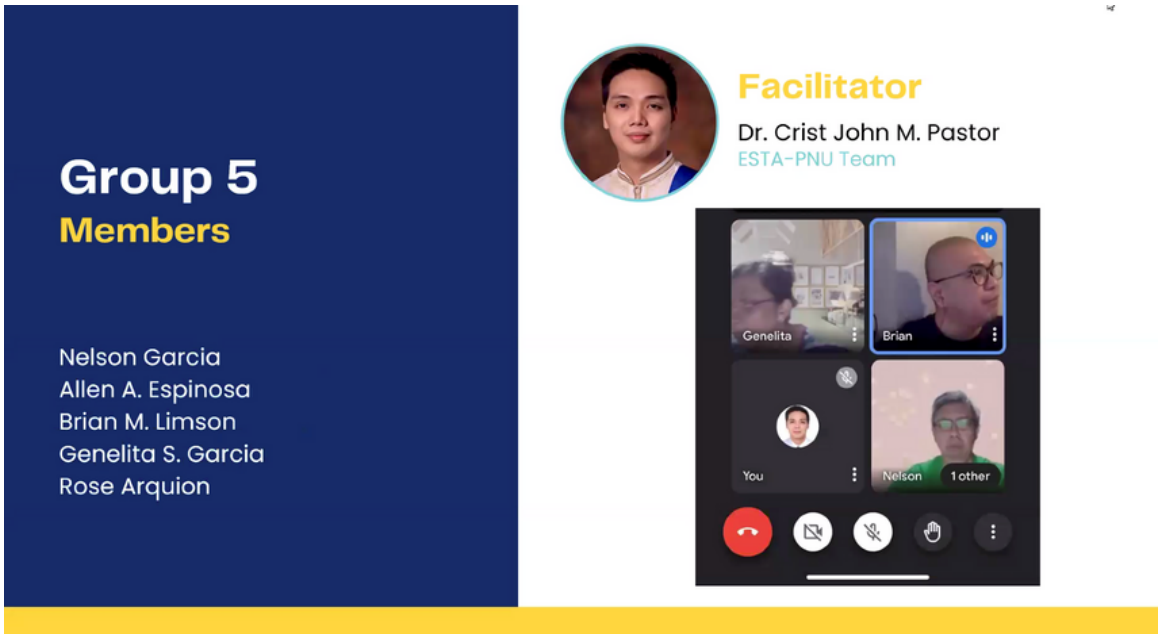
Facilitator
Prof. Ruel A. Avilla
ESTA-PNU Team

Group 4
Members

Jovenal V. Dela Cruz Jr.
Jandy S. Danzalan
Vic Marie I. Camacho
Josephine E. Tondo

Facilitator
Dr. Arlyne Marasigan Marquez
ESTA-PNU Team

Phase 2: Asynchronous Phase



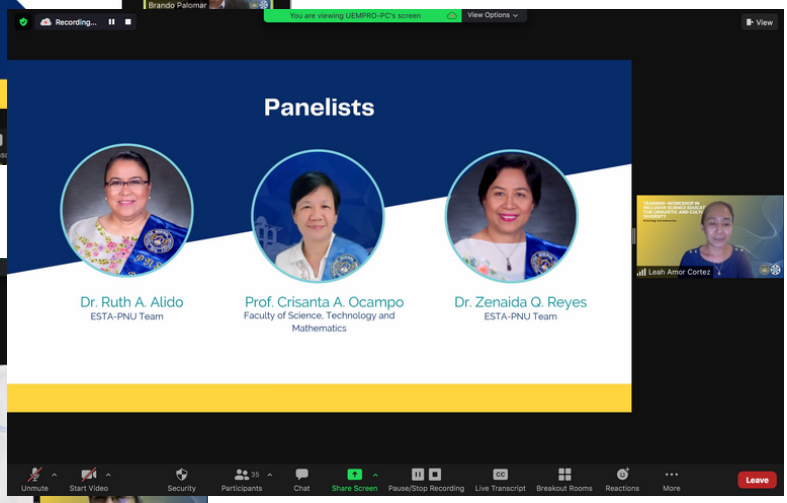
Closing Activity

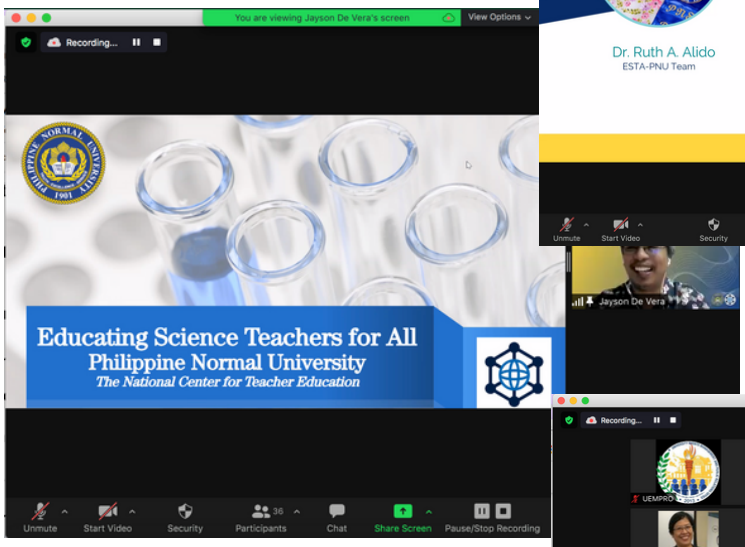
March 16, 2022

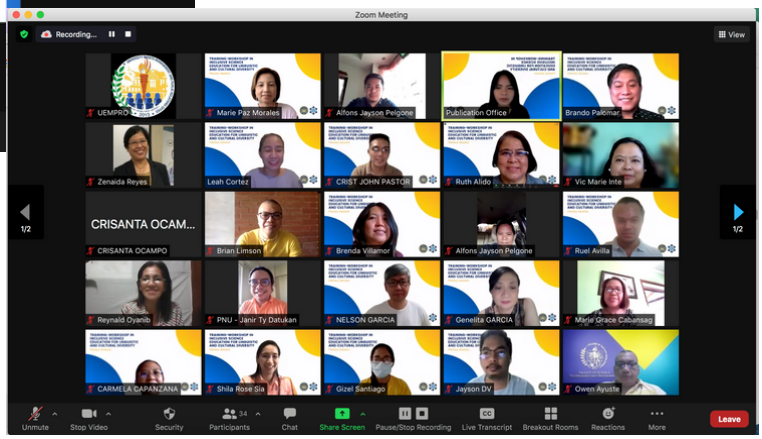
Concluding the two-phase intensive training, a Closing Activity was held on March 16, 2022 with Dr. Brando C. Palomar as master of ceremonies. The program was graced by Dr. Jennie V. Jocson, Vice President for Academics, with her opening remarks. She congratulated the participants for their dedication and commitment in completing the tasks for the training. Succeedingly, Dr. Ruth A. Alido facilitated the recap of the four-day synchronous sessions highlighting the significant discussions in each session. Guidelines on panel critiquing and introduction of panelists and groups with corresponding mentors were facilitated by Dr. Leah Amor A. Cortez. The presentation and critiquing of developed Lesson Exemplars (LE) were thoroughly conducted through a breakout session. Inputs and comments of panelists were considered by the participants for the refinement of their LEs.

To formally close the program, Dr. Zenaida Q. Reyes facilitated the synthesis and closing remarks of the training. She expressed her sincere gratitude to the University officials for their unwavering support, to the UEMPRO and team for facilitating the online event, to the faculty members for their active participation, the facilitators from Publication Office and the entire ESTA-PNU team. She ended her talk with a quote from Ms. Irina Bokova, Director-General of United Nations Educational, Scientific and Cultural Organization (UNESCO) which states, "***Quality science education is a pillar for a more sustainable future– we must invest in it, to empower every woman and man, to catalyse the innovation and creativity we need for the century ahead***." She further encouraged educators to celebrate the power of Science Education and to work together for liberating the Science classroom toward responsive and relevant content knowledge.

Closing Activity (March 16, 2021)







Closing Activity Program

Sample Outputs

Lesson Exemplar

Educating Science Teachers for All
Philippine Normal University
The National Center for Teacher Education

LESSON EXEMPLAR

COURSE LEARNING OUTCOME(S)		
Course Learning Outcome(s)		
Prudent action on how to lessen the risk caused by typhoon		
Objectives	**Content**	**Tasks (What tasks should I give to students to ensure realization of the objectives)**
Relate the Philippines' geographical location and its weather and weather patterns as to: a. how typhoons are formed b. how Philippine Area of Responsibility (PAR) is determined	Why inculcating awareness on weather and weather patterns is an individual responsibility for every Filipino? • Weather and Weather patterns ✓ Monsoon, ITCZ ✓ Typhoons, PAR	1. Watch movie clips (available on youtube) about the latest weather forecast for the period a. July to December b. January to June The choice of the video will be those reported in their area/region. 2. Discuss the concepts embedded from the video using graphic organizers, but not limited to concept map, mind map and flowchart 3. Discuss how it affects the culture and livelihood of the people residing in the three major islands of the Phils. 4. Create an infographic material for the following: ➢ How typhoons are formed ➢ How to lessen the disaster brought about by typhoon.

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Lesson Exemplar

FILIPINO LEARNER
Diagnosing the Learner
Based on your survey, describe the target audience for this lesson; what types of learning styles will you need to be mindful of?
Class/Learner's Demographic Profile *Year Level: 3RD Year* *Ethnicity: inclusive* *Course/Discipline: Science (bio, chem, physics)* *Language(s): filipino, english*
Heterogeneity in terms of Culture, Language and Technical Capability Being an archipelago; Philippine island – LUZON, VISAYAS & MINDANAO; will entail the use of different terms but convey the same meaning or context.
Misconception/Course Topic Impression To verify or refute the following but not limited to: 1. Superstitions and religious rituals *God's wrath, Sta. Clara offering* 2. Media/movie *Rainmaker dance, tribal offerings, prediction for the year by astrologers* 3. Observed environmental changes and animal behavior *Dark cloudy skies, warm days, frog crocking*

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Lesson Exemplar

PEDAGOGIES	
What skills will be addressed by this lesson?	*What activities may be integrated in each to help enhance the learning of the content? [CLIL]*
Cognitive Skills	**Language Function**
1. Define the terms as used in context. 2. Classify/Differentiate/distinguish the presented data 3. Clarify and evaluate the data: how and when it was obtained. 4. Interpret/forecast	1. *Reading* Actively evaluating the information being presented Information: Graphs, charts and tables Bulletin reports issued by Government agencies News or video Social media 2. *Listening* Actively evaluating the information being presented Information: Radio announcements Social community (barangay, family members) 3. *Writing* POSITION PAPER/PUBLICATION MATERIAL Exposition clarity of a material ➢ *In logical sequence (increasing complexity)* ➢ *Chosen words are in context* ➢ *Terms or phrase are appropriate for the cognitive level of the audience* ➢ *Transition from one thought to another is smooth (can be followed)* 4. *Speaking* DEBATE/CAMPAIGN/ADVOCACY Presentation clarity ➢ *In logical sequence (increasing complexity)* ➢ *Chosen words are in context* ➢ *Terms or phrase are appropriate for the cognitive level of the audience* *Creation of campaign/advocacy/short video using multi-media*
Science Process Skills	
1. Communication 2. Charting of PAR 3. Inferring 4. Predicting	
Future Skills	
Being equipped with the foundational knowledge needed for the deepening of their disciplinal knowledge, the student will now be able to ❖ integrate/relate the disciplinal knowledge with the topic ❖ make sense of the data being presented or obtained ❖ decide whether the information is relevant and in context. ❖ act prudently, being mindful to exude courtesy and respect with views that are opposite (totally or partial) with theirs.	
Scientific Attitudes and Filipino Values	
Scientific attitudes 1. Keen observer, logical, objectivity 2. Evaluating and Valuing information/data 3. Analytical and critical thinking Filipino values 4. Grit and resiliency 5. Curiosity and innocence 6. Empathy *(malasakit at kapwa tao)*	
Interdisciplinarity: **(What specific activities will integrate STEAM?)**	
S: Physical properties of water: droplets and microstructures allowing visibility from space	
T: How satellite imaging works	
E: How satellite imaging data are processed to assess the possibility of a typhoon being formed.	
A: Pictures/images of the event (before and after)	
M: Projections of financial loss brought by typhoon	

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Lesson Exemplar

What are the action words and vocabulary for this lesson? Please provide Mother Tongue translation for each identified vocabulary [MTB-MLE]	*Choose any two or more of these pedagogies in implementing the identified Lesson: (STEAM Approach, CLIL, 7E's, Bagong Kadawyan, Constructivism and Social constructivism Theory, Second Language Acquisition Theory, Experiential Learning Theory) in implementing the lesson.*
Key Language (What children need to recognize/produce)	**Strategy/Pedagogy (Please describe what pedagogy and how will it be implemented in the lesson)**
Action Words ➢ *Read (the bulletin report) and interpret (charts and graphs)* ➢ *Act (decide and execute the action)*	**Constructivism and Social construction theory** On the premise that: The possibility the learner had already experienced the natural event, in this case, typhoon, at that very moment, the five senses as the primary faculty that will enable the student to survive; physically, mentally and emotionally; without regard yet for the ability to fully comprehend the situation. The activities presented in this lesson hope to bring the student to a level where their experience and the meta cognition are brought together, resulting to learning. Furthermore, it can bring up, to an extent, the mental consciousness (from unconsciousness to consciousness) of the event towards mental health and over-all well-being.
Vocabulary Define VOCABULARY – scientific terms and cite examples.	
Language Structure	

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Lesson Exemplar

Assessment of Learning (Summative Assessment)	Readings/Materials/Tools
1. How do you know students met the learning objectives and targets? Able to design/implement prudent actions based on the data presented.	*What materials, readings, tools do you need to improve your competence and confidence in teaching the topic?* Employ modeling and simulations to create "what-if" scenario.
2. What technology will you use to facilitate assessment of learning? Use of the LMS.	

PROCESS
Walkthrough of the lesson (how will you deliver the lesson/topic (from engaging the student to ensuring achievement of learning objectives?) *1. How will I ensure interdisciplinarity (Use of STEAM Approach)?* Start from concrete, real-life situations and from here, draw the concepts/principles *2. How will I integrate culture, Language and context in my lesson?* Start from concrete, real-life situations and from here, extract how the formation of typhoon is perceived and/or prevented. *3. How will I encourage my students to communicate what they know and want to know?* Start with the concrete experience they have; either first hand or second hand (from close friends or family members) Students to demonstrate competence *4. What combination of pedagogies will I use to design the Lesson?* Constructivism and social constructivist *5. What lesson flow would capture all these plans? (Present the lesson flow below. Use any applicable model e.g. Experiential model, 7E's)* 7E will enable the presentation of the lesson in a building-up manner.
How will the lesson delivery manifest efficient classroom management? Provide advance reading materials ahead and provide the schedule for the following: ➢ *the flow of the lesson (synchronous and asynchronous activities) including assessment* ➢ *the expected output and its submission*
How will I integrate technology in the lesson delivery? By using the various platform to obtain data (raw or summarized) and process these for effective visualization and interpretation.

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Lesson Exemplar

TEACHER KNOWLEDGE	
Technology Being Used by Students	**Technology Being Used by Teacher**
What technology will my students use in this lesson? Laptop, personal computers, tablet	*What technology will I use in this lesson?* Laptop, personal computers, tablet
What were your reasons for choosing the technology for the students to use? Data acquisition: readily available any time and on any platform/device	*What are the limitations and potential problems in utilizing the technology?*
What are the limitations and potential problems in utilizing the technology? Data or information had been archived.	*What are the limitations and potential problems in utilizing the technology?* Data or information had been archived
Assessment for Learning (Formative Assessment)	**Teacher Competence**
Assessment Strategy Use of PRINT and NON-PRINT materials	*What other skills (language competence, multicultural knowledge system, TPCK) and attitudes do you need in order to implement the lesson?* *PPST* *Domain 1 CONTENT KNOWLEDGE AND PEDAGOGY* *Domain 2 LEARNING ENVIRONMENT* *Domain 3 DIVERSITY OF LEARNERS* *Domain 4:* ASSESSMENT AND REPORTING Attitudes: being aware (thought) and mindful (action) when the topic is being discussed when tragedy or loss are brought into consideration.
Feedback Strategy Use of interactive quiz applications and similar platform (class point, kahoot, etc)	
Technology which will be integrated in the Assessment Applications for interactive quiz and similar platform but not limited to class point, kahoot, coggle.it	
Technology which will be integrated in the Feedback System Applications for interactive quiz and similar platform but not limited to class point, kahoot, coggle.it	

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Lesson Exemplar

Assessment of Learning (Summative Assessment)	Readings/Materials/Tools
1. How do you know students met the learning objectives and targets? Able to design/implement prudent actions based on the data presented.	*What materials, readings, tools do you need to improve your competence and confidence in teaching the topic?* Employ modeling and simulations to create "what-if" scenario.
2. What technology will you use to facilitate assessment of learning? Use of the LMS.	

PROCESS
Walkthrough of the lesson (how will you deliver the lesson/topic (from engaging the student to ensuring achievement of learning objectives?) *1. How will I ensure interdisciplinarity (Use of STEAM Approach)?* Start from concrete, real-life situations and from here, draw the concepts/principles *2. How will I integrate culture, Language and context in my lesson?* Start from concrete, real-life situations and from here, extract how the formation of typhoon is perceived and/or prevented. *3. How will I encourage my students to communicate what they know and want to know?* Start with the concrete experience they have; either first hand or second hand (from close friends or family members) Students to demonstrate competence *4. What combination of pedagogies will I use to design the Lesson?* Constructivism and social constructivist *5. What lesson flow would capture all these plans? (Present the lesson flow below. Use any applicable model e.g. Experiential model, 7E's)* 7E will enable the presentation of the lesson in a building-up manner.
How will the lesson delivery manifest efficient classroom management? Provide advance reading materials ahead and provide the schedule for the following: ➢ *the flow of the lesson (synchronous and asynchronous activities) including assessment* ➢ *the expected output and its submission*
How will I integrate technology in the lesson delivery? By using the various platform to obtain data (raw or summarized) and process these for effective visualization and interpretation.

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Lesson Exemplar

Summary: How will technology, content, and pedagogical knowledge work together in this lesson?

Start from the concrete, real-life situations and from here, execute the flow of the lesson (STEAM).

REFLECTIONS

1. What worked or didn't work in the delivery of the lesson?

Possible scenario: incompatible platform or device limitation (memory, storage space or systems update)
Absence of a member for the presentation
Power interruptions both for students and teacher

2. What difficulties have you encountered (during planning and delivering the lesson)?

The art of making the lesson creative and interesting.

3. What insight have you gained?

Technology had come a long way, enabling to choose which application or platform is suited for the lesson.
The content (principles/concept) is more or less the same for the last 50 years.

4. How do these insights connect or affect your teaching practice, and personal and professional life philosophy?

The demand or expectations are the same for both students and teachers, and only the way of communicating/delivering the content is the same (cognitive and psychomotor).

The environment; society and learning environment; brings a different atmosphere from that 50 years ago, influencing the "what how and why" of teaching a particular topic (affective).

MODIFICATIONS

REFLECTIONS: A. Learning Content and B. Learning Experience

A. Learning Content
A.1 majorship (disciplinal knowledge) - the concepts/principles needed to understand the content
A.2 profession – as teachers, for the advancement of science education
A.3 personal aspect - career growth and leadership
A.4 nation building - benefit to the society, economy and addressing concerns

B. Learning Experience (similar to the ESTA model)
what you realized and moved you to take action(s) on how to become a better person.

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Lesson Exemplar

Educating Science Teachers for All
Philippine Normal University
The National Center for Teacher Education

LESSON EXEMPLAR

COURSE LEARNING OUTCOME(S)		
Course Learning Outcome(s)		
1. Show understanding on the interaction of science and technology with society; 2. Show skill in creating relevant solutions to problems/issues concerning Science, Technology, and Society (STS)		
Objectives	**Content**	**Tasks (What tasks should I give to students to ensure realization of the objectives)**
1.a. Define disinfectants; 1.b. Discuss how disinfectants work; and 1.c. Demonstrate the safe and effective ways of using disinfectants at home as protection from COVID-19.	1. Definition of disinfectants 2. Science/chemistry behind disinfectants 3. Safe and Effective Use of Disinfectants at Home Against COVID-19	1. Filling up the K and W parts in the KWL chart 2. Performing the lab activity 3. Group presentation of results in the lab activity 4. Performing the role play 5. Filling up the L part in the KWL chart
FILIPINO LEARNER		
Diagnosing the Learner		
Based on your survey, describe the target audience for this lesson; what types of learning styles will you need to be mindful of?		
Class/Learner's Demographic Profile *Year Level: First Year* *Ethnicity: Filipino* *Course/Discipline: General Education Curriculum/Science, Technology, and Society (STS)* *Language(s): Filipino, English, other local dialects and languages*		
Heterogeneity in terms of Culture, Language, and Technical Capability *The target audience is considered as a highly heterogenous class in terms of culture and technical capability since the students came from different societal backgrounds. Also, in terms of language, majority can speak both in Filipino, English, other local dialects and languages indicating higher heterogeneity.*		
Misconception/Course Topic Impression *1. All disinfectants can kill bacteria, viruses, fungi, and other microbes.* *2. Disinfectants are harmful chemicals that may be potentially toxic to human (and pet) health.* *3. Disinfectants are all synthetic or man-made (not natural) and are, therefore, toxic.*		
PEDAGOGIES		
What skills will be addressed by this lesson?	***What activities may be integrated in each to help enhance the learning of the content? [CLIL]***	
Cognitive Skills	**Language Function**	
Define, read, write, predict, explain, summarize, tell, relate, discuss, prepare, interpret, analyze, conclude	1. Reading a. Skim the lab activity sheet to get the gist of the material read b. Scan the lab activity sheet to find specific information c. Draw conclusions based on results of experiment d. Draw out information from tables, charts, and graphs 2. Listening a. Take notes from a lecture listened to b. Remember facts and details from a lecture listened to c. Recall steps in a procedure dictated d. Follow oral instructions 3. Writing	
Science Process Skills		
Observing, measuring, predicting, inferring, experimenting, communication		
Future Skills		
Autonomy, self-initiative, self-management, need/ motivation for achievement, creativity, digital literacy, ability to reflect, sense-making, future mindset, cooperation skills, communication competence		
Scientific Attitudes and Filipino Values		
Curiosity, open-mindedness, diligence, resourcefulness, creativity		
Interdisciplinarity: (What specific activities will integrate STEAM?)		
S: The students will perform the lab activity where they are able to use science concepts and practice their science process skills.		

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T: The students will fill up the KWL chart where they will connect the facts/knowledge they have already gained to what they wanted to learn about the topic. They will then connect this to what they have learned after the delivery of the lesson. **E:** In performing the lab activity, the students can use alternative materials and tools to be used if the recommended ones are not available in their homes. **A:** The students will perform a role play where they can exhibit their creativity and express it based on the context provided to them. **M:** The students will practice their knowledge on measuring quantities as they perform the lab activity.	a. Write a paragraph with a clear main point, supporting details, and examples. b. Use appropriate transition words to clarify relationship of ideas and show how they are related 4. Speaking a. Enunciate words clearly when giving a report b. Use appropriate expressions for academic presentation
What are the action words and vocabulary for this lesson? Please provide Mother Tongue translation for each identified vocabulary [MTB-MLE]	***Choose any two or more of these pedagogies in implementing the identified Lesson: (STEAM Approach, CLIL, 7E's, Bagong Kadawyan, Constructivism and Social constructivism Theory, Second Language Acquisition Theory, Experiential Learning Theory) in implementing the lesson.***
Key Language **(What children need to recognize/produce)**	**Strategy/Pedagogy** **(Please describe what pedagogy and how will it be implemented in the lesson)**
Action Words ✓ *Define* ✓ *Observe* ✓ *Measure* ✓ *Describe* ✓ *Relate* ✓ *Predict* ✓ *Interpret* ✓ *Explain* ✓ *Summarize*	**STEAM Approach** In performing the group activities (KWL chart activity, lab activity, and role play) the students will apply or integrate the principles of STEAM approach in terms of Science, Technology, Engineering, Arts, and Mathematics context. **Constructivism** In performing the lab activity, the students will construct their ideas and give their interpretations based on their observations and analyses in performing the lab activity. In role play, however, the students will give suggestions in creating the dialogues and scenes to successfully perform their parts. **Social Constructivism Theory** The students will be assigned to groups to perform the lab activity and role play. During the said activities, the students will have an opportunity to communicate to share their ideas and practice their skills. The group presentation will also enable each group to communicate and give feedback to other groups. Their success in accomplishing the tasks in the activities depends on their cooperation, open-mindedness, and active participation. **Bagong Kadawyan** This is the university's framework for flexible learning. The lesson and student activities will be conducted based on the said framework.
Vocabulary ✓ *Disinfectants* ✓ *Cleaning* ✓ *Disinfection* ✓ *Chlorine* ✓ *Sodium hypochlorite* ✓ *COVID-19* ✓ *Oxidation/oxidizing*	
Language Structure *The language structure can be described as explanatory and descriptive since scientific words used were explained in an organized way.*	
TEACHER KNOWLEDGE	
Technology Being Used by Students	**Technology Being Used by Teacher**
What technology will my students use in this lesson? ✓ *Any word processing software installed in their cellular phones/laptop to accomplish the activity worksheets* ✓ *Any videoconferencing software or app* ✓ *Any electronic equipment available*	*What technology will I use in this lesson?* ✓ *Any word processing software installed in laptop to create the activity worksheets* ✓ *Any videoconferencing software or app* ✓ *Any electronic equipment available*
What were your reasons for choosing the technology for the students to use? ✓ *Accessibility and availability of technology for students to use* ✓ *The choices of platforms must ensure inclusivity.*	*What were my reasons for choosing the technology?* ✓ *The choices of platforms must ensure inclusivity.*

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Lesson Exemplar

What are the limitations and potential problems in utilizing the technology? ✓ *Lack of gadgets* ✓ *Intermittent internet connectivity or lack thereof*	*What are the limitations and potential problems in utilizing the technology?* ✓ *Intermittent internet connectivity or lack thereof*
Assessment for Learning (Formative Assessment)	**Teacher Competence**
Assessment Strategy ✓ *Use of KWL chart, lab activity worksheet and group presentation* ✓ *Assign a role play to perform by students*	*What other skills (language competence, multicultural knowledge system, TPCK) and attitudes do you need in order to implement the lesson?* ✓ *Language competence* ✓ *TPCK* ✓ *Scientific attitudes (e.g., curiosity, honesty in the recording and validation of data, flexibility, persistence, open-mindedness, willingness to tolerate uncertainty)*
Feedback Strategy ✓ *Use of rubric as basis for assessment and giving feedback in group presentation and role play*	
Technology which will be integrated in the Assessment ✓ *Any word processing software installed in their cellular phones/laptop to accomplish the activity worksheets* ✓ *Any videoconferencing software or app* ✓ *Any electronic equipment available*	
Technology which will be integrated in the Feedback System ✓ *Any videoconferencing software or app* ✓ *Any electronic equipment available*	
Assessment of Learning (Summative Assessment)	**Readings/Materials/Tools**
1. *How do you know students met the learning objectives and targets?* ✓ *Accomplishing the lab report and/or creating publication materials to showcase the application of what they learned*	*What materials, readings, tools do you need to improve your competence and confidence in teaching the topic?* ✓ *Animation about how disinfectants work* ✓ *Animation on how oxidation occurs in atomic level* ✓ *Videos related to the topic* ✓ *Research article related to the topic*
2. *What technology will you use to facilitate assessment of learning?* ✓ *Any word processing software* ✓ *Any electronic equipment available* ✓ *Social media platforms*	
PROCESS	
Walkthrough of the lesson *(how will you deliver the lesson/topic (from engaging the student to ensuring achievement of learning objectives?)* 1. *How will I ensure interdisciplinarity (Use of STEAM Approach)?* ✓ *The lesson will be delivered through group activities such as KWL chart, lab activity and role play where students can integrate the STEAM approach.* 2. *How will I integrate culture, Language and context in my lesson?* ✓ *Through the group activities and group presentation* 3. *How will I encourage my students to communicate what they know and want to know?* ✓ *By employing the KWL chart activity* ✓ *By setting expectations before the group activities and discussing the rubric for group presentation* 4. *What combination of pedagogies will I use to design the Lesson?* ✓ *STEAM approach, constructivism and social constructivism* 5. *What lesson flow would capture all these plans? (Present the lesson flow below. Use any applicable model e.g., Experiential model, 7E's)* 1. KWL Chart activity – filling up the K and W parts 2. Lab activity 3. Group Presentation 4. Whole Class Discussion – science/ chemistry behind disinfectants, safe and effective ways of disinfectant use and guidelines on cleaning and disinfection at home 5. Role Play 6. KWL Chart activity – filling up the L part 7. Formative Assessment 8. Summative Assessment	

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Lesson Exemplar

How will the lesson delivery manifest efficient classroom management? ✓ The students will be assigned to a group where each member is expected to participate and contribute. The use of activity worksheet and rubric will facilitate the organized flow of the lesson delivery.
How will I integrate technology in the lesson delivery? ✓ *Use of any word processing software, videoconferencing software, any electronic equipment available and social media platforms to conduct all the planned activities in the lesson delivery*
Summary: How will technology, content, and pedagogical knowledge work together in this lesson? ✓ *My knowledge and use of technology will facilitate the delivery of the lesson specifically the presentation of its contents in a logical and organized manner. My pedagogical knowledge in employing the STEAM approach practicing constructivism and social constructivism with the integration of the abovementioned technology use will facilitate the delivery of the lesson. In essence, the content of the lesson will be delivered through the integration of teacher's technology and pedagogical knowledge.*
REFLECTIONS
1. *What worked or didn't work in the delivery of the lesson?* *The lesson objectives were not fully achieved in one session. The activities in the lesson delivery were not finished.* 2. *What difficulties have you encountered (during planning and delivering the lesson)?* *The limited time may affect the achievement of lesson objectives.* *How will each group perform the role play?* 3. *What insight have you gained?* *Two sessions should be allotted for the lesson.* *The role play can be accomplished using a collection of their individual videos put into one short film since they cannot perform it together in an online class.* 4. *How do these insights connect or affect your teaching practice and personal and professional life philosophy?* *Adjustments to group activities like role play can be done to achieve the lesson objectives since what we usually do in face-to-face (F2F) before may no longer be applicable in an online class setting. In this case, a teacher should always be creative by resorting to other ways or pedagogies to achieve the lesson objectives.* 5. *Did you learn anything different or new when you did this activity? Please relate your experience/s.* *The idea of disinfectants may not be new to them, but some of the misconceptions provided earlier still prevail. It would be a good idea to identify what these are based on their experiences.* 6. *Who would best benefit from the information gained from this activity?* *It would be interesting to get some information from the students who they think would benefit from the information they learned from the activity.*
MODIFICATIONS
1. The lesson will be delivered for two sessions. 2. The activities are subject to change or revision based on actual experience and student feedback. 3. The role play will be in a form of a short film or any graphical representation.

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Reflections

ESTA-PNU-Training/Workshop

Reflection Form/Template

Project Title: Education Science Teachers for All (ESTA)

Participant Profile

- Name of Participant: **CARMELA C. MONTALBO**
- School/Campus/Hub Affiliation: **PNU SOUTH LUZON**
- Science Courses/Subjects taught: **STS and Integrated Science for Elementary 1,2,3, and 4**
- Place of Origin: **Lopez, Quezon** Ethnicity (*if any*): **Filipino**
- Languages Spoken: **Filipino and English**

Training Workshop Details

- Workshop/Training Modality: **ONLINE SYNCHRONOUS/AS SYNCHRONOUS**
- Technology used during the workshop/training: **Laptop, internet source (router)**
- Languages used during the workshop/training: **Filipino and English**
- Indigenous Knowledge (IK) used during the workshop/training:

None

Details of Reflection

(Please narrate your entire experience while attending the training/workshop. Highlight all insights and key points gained from your involvement in the different sessions.

Topic 1: Purpose of Science Education AST 1: Diversity in Class Speaker: Dr. Marie Paz E. Morales	In relation to the purpose of science education, I can still recall the paper entitled, "Good Education in an Age of Measurement: On the Need to Reconnect with the Question of Purpose in Education", where Biesta (2008) proposes that if we are to address the purpose of education, we have to consider the three functions of education which he referred to as "qualification", "socialization" and "subjectification". Qualification relates to providing the people with necessary knowledge, skills and understanding for them to perform a given task. Second, socialization function has something to do with the means on how the people can be a part of a certain group. Lastly, subjectification, which means that through education, the people will establish their identity at the personal level. In essence, for Biesta, these three functions are interrelated. I believe the above principles on the purpose of education are also applicable in addressing the purpose of science education. In the activity provided by Dr. Morales entitled Diversity in Class, I realized how crucial it is for a science educator to have an awareness on the diversity of cultural backgrounds that students have in order to effectively and efficiently design and plan the science instruction and students' activities. I also agree with her that as science educators, we should create a multicultural learning environment, thus ensuring inclusivity and equity among our students.

1

Reflections

Topic 2: Language for Sciences AST 2: Conceptual Change Speaker: Dr. Ruth A. Alido	I learned from the lecture of Dr. Alido how important is learning and understanding the language of science among our students considering that they are coming from diverse cultural backgrounds. Learning and understanding the same language of science serves as a unifying factor for them to also learn and understand science concepts. With the activity entitled Conceptual Change, I realized that as science educators, we should make sure that our students already gained a mastery of the science language before introducing new science concepts, and in the process successfully facilitating conceptual change.
Topic 3: Contextualization • Culture for Sciences • Culture Integration AST 3: Chemistry self-concepts: gender and culture, and the impact of chemistry self-concept on learning behavior Speaker: Dr. Leah Amor S. Cortez Prof. Alfons Jayson O. Pelgone Dr. Zenaida Q. Reyes Dr. Crist John M. Pastor AST 4: Acquisition of Science Capital in Chemistry Speaker: Dr. Arlyne C. Marasigan	In her paper "Facilitating Learning through Contextualization", Perin (2011) presents a literature review about contextualization, its nature and effectiveness in relation to basic skills instruction such as in reading, writing and math. Particularly, contextualization can be implemented through contextualized instruction which is facilitated by instructors of reading, writing and math and integrated instruction by discipline-area instructors such as in academic, career and technical areas. According to Jurmo (2004), both contextualized and integrated instruction deviate from traditional basic skills instruction where the said skills are taught in abstract without reference to real and meaningful applications. Further, both approaches encourage collaboration among teachers and may be applied within learning communities (Jenkins, Zeidenberg, & Kienzl, 2009; Cargill & Kalikoff, 2007). In view of this, putting science education in context by facilitating contextualized instruction will enable science educators to ensure the inclusivity and equity among their multicultural students' backgrounds. Also, designing contextualized science instruction will facilitate effective cultural integration among them.
AST 5: Flipped Classroom AST 6: Technology Integration Topic 4: Orientation to Lesson Exemplar (LE) Development Workshop • Agreements for Part 2: LE Development Workshop • Groupings for Consultation and Mentoring Speaker: Dr. Brando C. Palomar Prof. Ruel A. Avilla	I agree with Dr. Palomar that flipped classroom is an effective approach in contextualizing science education since our diverse students will have the opportunities to work on the learning tasks assigned to them on their homes or places outside their classroom (context). As science educators, we should learn not only the knowledge of technology integration (refers to TPCK) but the skills of technology integration since technology has a crucial role in delivering effective science instruction especially when it's not possible for us to conduct face to face classes, do field work or conduct science activities outside the classroom.
Reflection	
Reflect on the whole process of your professional learning with ESTA by answering the questions below.	
What have I learned from this training/workshop involvement?	I learned that the success of science education lies on our awareness of its purpose. This awareness is our driving factor in achieving quality science instruction. In order to achieve this, a science educator should recognize and address the diversity existing among the students. We should establish a multicultural learning environment which ensures equity and inclusivity. Also, we should facilitate effective conceptual change among our students to enhance student outcomes by gaining mastery on scientific language. Further, contextualizing science education addresses the cultural diversity among the students.One effective approach in putting science in context is flipped classroom. Lastly, developing our knowledge and skills in

Reflections

	technology integration are deemed necessary for science educators to effectively deliver quality science instruction given the fact that we are already in Education 4.0 era.
How could my students and my school benefit from this involvement?	This training could benefit our campus and our students in terms of the knowledge I gained from the different topics covered during the training and putting the said acquired knowledge into practice and sharing them to other science faculty. The said topics revolved on addressing the diversity among students by establishing a multicultural learning environment which ensures equity and inclusivity.
What were the challenges I experienced during the conduct of all activities relative to the training/workshop?	One of the challenges I encountered was the time/schedule of the presentation of some topics wherein I was not able to finish due to some personal concerns such as my pregnancy condition.
What aspects of my involvement in this project would I like to keep?	I would like to keep all the learnings I acquired from the presentations of resource speakers and from the development of our Lesson Exemplar.
What aspect of my teacher knowledge do I need to improve on based on the inputs of the ESTA training?	In terms of teacher knowledge, I believe that I need to improve my TPCK since I am not adept with integrating various technological tools and applications in my science instruction.
What aspect of my instructional practices do I need to improve on based on the inputs of the ESTA training?	In terms of instructional practices, I need to improve on putting my TPCK in practice since I also need to enhance my TPCK. Also, I need to plan the employment of strategies in order to establish a multicultural learning environment for my students which ensures equity and inclusivity.
How will my new understanding of Filipino learners help improve my classroom practice?	Gaining new understanding about the multicultural backgrounds of my students informs me to search for strategies and plan its employment to ensure equity and inclusivity in our classroom.
Comments/Suggestions: I found this training very helpful to me as a science educator because I gained a new understanding about the cultural diversity among my students and how to address this to ensure equity and inclusivity. I am very grateful for all the learnings I acquired from the resource speakers. Thank you so much to all. I hope more trainings will be conducted for science faculty across the PNU system.	

CARMELA C. MONTALBO
Participant
(Signature over printed name)

March 24, 2023
Date

Appendices

Approved Concept Paper

Educating Science Teachers for All
Philippine Normal University
The National Center for Teacher Education

Training Workshop in Inclusive Science Education for Linguistic and Cultural Diversity

PURPOSE:

This intensive training is intended to retool the university science educators of the main campus and the hubs for inclusive science education.

PROPONENT:

ESTA-PHIL-PNU Team

RATIONALE:

Science teachers in the country encounter issues on and struggle against plurality of language, diversity and heterogeneity of learners. The Philippine plurality of language and culture is sourced from the cultural and linguistic profile of the Filipino people with about 110 indigenous groups and more than 170 languages spoken as first languages from a multitude of regional dialects and languages (Philippines, 28 September, 2017). Hence, it may be assumed that science education in the country takes place amidst ethnic divides that translate into linguistic and cultural diversity. Such social conditions in the school or classroom may hamper meaningful learning of science concepts.

Several research claim the vital contribution of teacher quality to student learning and achievement in general (Nilsen & Gustafsson, 2016; Seebruck, 2015). In fact, SDG 4 that promotes quality education, identifies recruitment and training of quality teachers as an important aspect to ensure inclusive quality education. Similarly, with the University's aim to produce quality teachers, there may be a need to promote programs on capacity building and the retooling of university educators to better enact teacher education programs.

Educating Science Teachers for All (ESTA) is a specially designed international project and program that seeks to contribute to the retooling program of the University through disseminating science teaching approaches in linguistically and culturally diverse contexts. Cognizant of these conditions, ESTA-PHIL-PNU team proposes an intensive training workshop to university science teacher educators in all campuses for inclusive science education.

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Educating Science Teachers for All
Philippine Normal University
The National Center for Teacher Education

OBJECTIVES:

The proposed training workshop aims to train university science educators in the aspect of providing an avenue to successfully manage diversity in science classes within the context of the country's language and culture. Specifically, the workshop aims to:

1. Provide inputs to university science educators on the concepts and constructs of science education, language for the sciences, and the contextualization of lessons;
2. Acquaint the university science educators with strategies in managing diverse science classrooms.
3. Orient the university science educators on the Science Education for Linguistic and Cultural Diversity in Philippine Public Higher Education (SELC-PhPHiEd) framework and other ESTA products.
4. Facilitate the development and validation of Lesson Exemplars

PARTICIPANTS:

This intensive Teacher Training on Inclusive Science Education for Linguistics and Cultural Diversity will accommodate **volunteer** science educators from FSTEM and the PNU HUBs.

MATERIALS AND INSTRUMENTS:

This intensive Teacher Training utilize the following materials and instruments in the entire training program:

1. ***Lesson Exemplar (LE) Template.*** This template designed based on the SELC-PhPHiEd framework will serve as guide to participants in the design and development of their respective Lesson Exemplars and all attached documents [e.g., worksheets, assessment].
2. ***Peer Review Form.*** This form is an evaluation tool will be utilized in the first level quality assurance of the developed Lesson Exemplars
3. ***Evaluation Rubric.*** The LE template comes with an evaluation Rubric designed to frame the criteria for exemplars. The same tool will be utilized in the panel critiquing.
4. ***Reflection Template.*** This will be utilized to help our participants document their journey in the training program in case they want to craft their manuscript.
5. ***Evaluation Form.*** This form will be administered to the participants assess the overall management of the training program and the attainment of the aforementioned objectives of the training.

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Educating Science Teachers for All
Philippine Normal University
The National Center for Teacher Education

TRAINING DESIGN:

The training will include two phases: Plenary sessions and Mentoring Sessions. The plenary sessions are designed as synchronous sessions for the team to discuss to the participants the major concepts and principles. The team will share their knowledge on strategies how to: (1) manage diverse and heterogeneous classes, and (2) integrate culture and language in teaching science concepts.

1. *Plenary Session (Synchronous Sessions)*

Date and Time	Activity	Person-In-Charge
January 27, 2022 1:00-4:30 PM	Opening Program Topic 1: Purpose of Science Education AST 1: Diversity in Class	ESTA-PNU Team Dr. Marie Paz E. Morales
January 28, 2022 1:00-4:30 PM	Topic 2: Language for Sciences AST 2: Conceptual Change	Dr. Ruth A. Alido Dr. Leah Amor S. Cortez Prof. Alfons Jayson O. Pelgone
February 3, 2022 1:00-4:30 PM	Topic 3: Contextualization • Culture for Sciences • Culture Integration AST 3: Chemistry self-concepts: gender and culture, and the impact of chemistry self-concept on learning behavior AST 4: Acquisition of Science Capital in Chemistry	 Dr. Zenaida Q. Reyes Dr. Crist John M. Pastor Dr. Arlyne C. Marasigan Dr. Crist John M. Pastor
February 4, 2022 1:00-4:30 PM	AST 5: Flipped Classroom AST 6: Technology Integration Topic 4: Orientation to Lesson Exemplar (LE) Development Workshop • Agreements for Part 2: LE Development Workshop • Groupings for Consultation and Mentoring	Dr. Brando C. Palomar Dr. Ruel A. Avilla Drs. Palomar and Avilla

Part 2 of the training is designed as a Mentoring Program. In this part or phase of the training, the participants will be assigned to one or two of the ESTA-PNU team members of the same specialization. Mentoring and consultation will include Lesson Exemplar Development, Peer Review and Revision of the participants' outputs. For this part of the training, each major activity as aforementioned for the mentoring and consultation is allotted a week of engagement with the participants in small research cells [grouping according to or based on specialization: Biology, Chemistry, Physics].

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2. *Workshop on LE Development*

Date and Time	Activity	Person-In-Charge
Week 1	LE Development [Asynchronous]	ESTA-PNU Team
Week 2 Week 3	LE Peer Review [Asynchronous] LE Revision [Asynchronous]	ESTA-PNU Team
Week 4	Panel Critiquing [8 hours - Synchronous]	

In summary, the training will include 22 hours of synchronous sessions [Plenary and Panel Critiquing] and three weeks of asynchronous session [Mentoring and Consultation].

PROGRAM OUTCOMES:

1. **People Service**: Training of Volunteer Science Teacher Educators of FSTEM and the Hubs
2. **Products**:
    a. ESTA-Phil-PNU Team
        i. Training Design
        ii. Documentation of the Training Program
        iii. Presentations and Activities
        iv. Video Recordings
        v. Mentoring Program
    b. Participants [The expected products as listed will be considered as/will take the place of the MDL of the faculty-participant]
        i. Lesson Exemplars for a Science Course [at least 3]
        ii. Attachments to Lesson Exemplars
            1. Assessment Tools
            2. Worksheets or Activity Sheets
            3. Reading Materials (if applicable)
            4. List of References
        iii. Reflection Notes/Journal
3. **Publication:** One publication on the mentoring program

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Educating Science Teachers for All
Philippine Normal University
The National Center for Teacher Education

113 **ESTA-PNU Team**
114
115 Marie Paz E. Morales, Ph.D.
116 Project Lead
117

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Team Leader

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1. Ruel A. Avilla, M.A.
2. Ruth A. Alido, Ph.D.
3. Marie Paz E. Morales, Ph.D.

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Team Leader

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2. Leah Amor S. Cortez, Ph.D.
3. Alfons Jayson O. Pelgone, M.S.

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References

Nilsen, T., & Gustafsson, J-E. (2016). Teacher Quality, Instructional Quality and Student Outcomes. *Springer, Cham*. https://doi.org/10.1007/978-3-319-41252-8.

Seebruck, R. (2015). Teacher Quality and Student Achievement: A Multilevel Analysis of Teacher Credentialization and Student Test Scores in California High Schools. *McGill Sociological Review*, 5, 1-18.

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Educating Science Teachers for All
Philippine Normal University
The National Center for Teacher Education

Submitted by:

Marie Paz E. Morales, PhD
Project Lead

Approved:

Jennie V. Jocson, PhD
Vice President for Academics

Taft Avenue, Manila, 1000, Philippines

Approved Agreement for MDL

Jennie V. Jocson, Ph.D.
Vice President for Academics

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Philippine Normal University
ANG PAMBANSANG SENTRO SA EDUKASYONG PANGGURO
The National Center for Teacher Education
Maynila
Manila

Reference Memo: OVPA 2022-02

January 4, 2022

MEMORANDUM TO: **Science faculty across the PNU System**

RE : **Training Workshop in Inclusive Science Education for Linguistic and Cultural Diversity on January 27&28 and February 3&4, 2022**

The Education Science Teachers for All (ESTA) project supports the work towards training Science teachers on the challenges and concerns on the plurality of language, diversity and heterogeneity of learners. The ESTA-PHIL-PNU Team, headed by Dr. Marie Paz Morales, is providing this same training to the PNU Science faculty. The training is set for January 27&28 and February 3&4, 2022 synchronous sessions while the rest of February 2022 will be devoted to additional asynchronous activities.

This office directs FSTeM Associate Dean, Campus EDPs and Academic Deans to support the faculty as they attend the training.

All Science faculty are registered and will receive links to the sessions. Materials to be produced during the sessions may be used as the MDL output for this school year. Additional details on this will be discussed during the sessions.

For your strict compliance.

JENNIE V. JOCSON
Vice President for Academics

Cc: EDPs of campuses
CDO
OVPURA

Approved Agreement for MDL

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Manila

Jennie V. Jocson, Ph.D.
Vice President for Academics

Reference No. OVPA 2022-23

February 15, 2022

MEMORANDUM TO: ESTA training Faculty-participants (Science faculty)
PNU-ESTA training team
UCMIMO

RE: MDL for all participating faculty to the ESTA Training

This office recognizes the important work of the PNU-ESTA team with the Science faculty of the PNU system. As part of the works of the faculty, the materials to be developed may be used as the Materials Development Load output for SY 2021-2022.

Any faculty who wishes to change MDL proposal to ESTA output, will submit a new proposal to be attached to the Term 2 ROL. The proposal for MDL could be developed by the ESTA team.

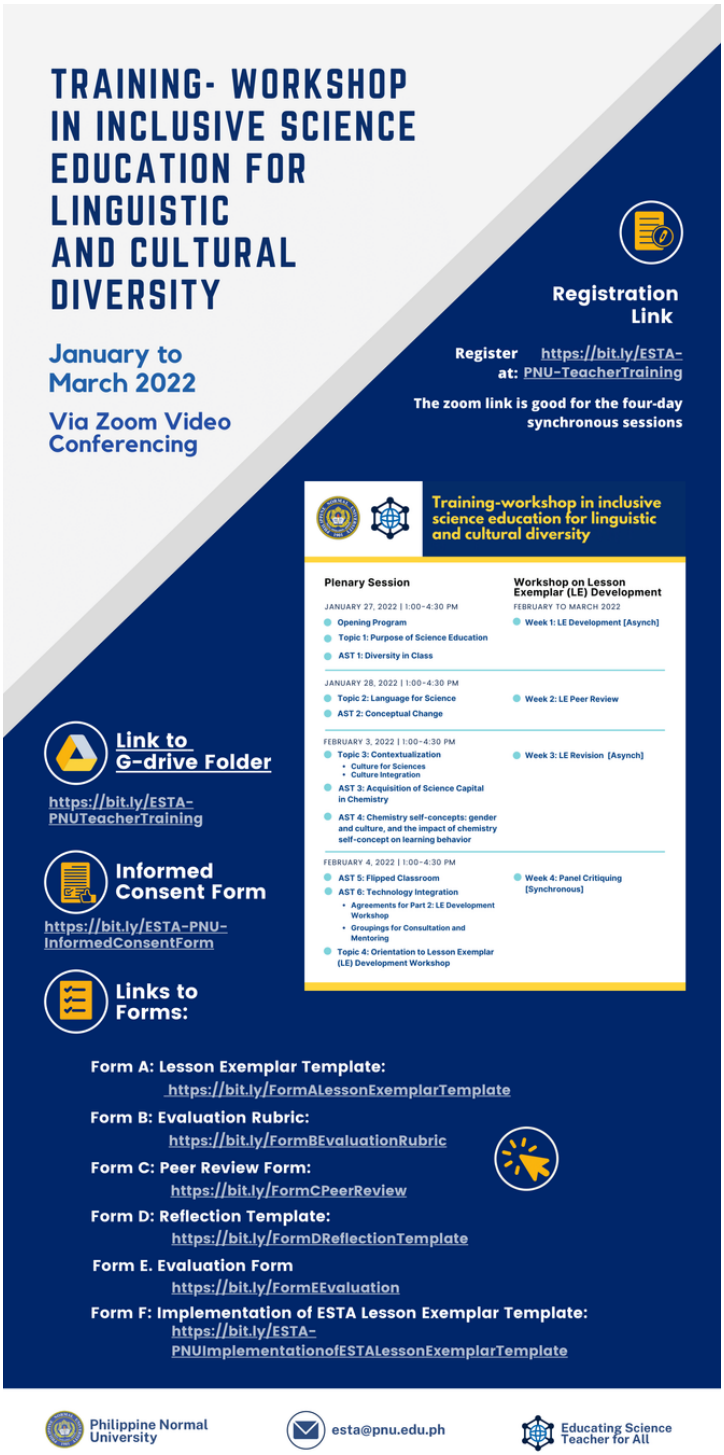
For your guidance

JENNIE V. JOCSON, Ph.D.
Vice President for Academics

cc: CTD-DO
FSTeM
PNU-V
PNU-M
PNU-SL
PNU-NL

ESTA-PNU Framework

Primer


TRAINING- WORKSHOP IN INCLUSIVE SCIENCE EDUCATION FOR LINGUISTIC AND CULTURAL DIVERSITY
January to March 2022
Via Zoom Video Conferencing
Registration Link
Register at: https://bit.ly/ESTA-PNU-TeacherTraining
The zoom link is good for the four-day synchronous sessions
Training-workshop in inclusive science education for linguistic and cultural diversity
Plenary Session
JANUARY 27, 2022 | 1:00-4:30 PM
Opening Program
Topic 1: Purpose of Science Education
AST 1: Diversity in Class
JANUARY 28, 2022 | 1:00-4:30 PM
Topic 2: Language for Science
AST 2: Conceptual Change
FEBRUARY 3, 2022 | 1:00-4:30 PM
Topic 3: Contextualization
Culture for Sciences
Culture Integration
AST 3: Acquisition of Science Capital in Chemistry
AST 4: Chemistry self-concepts: gender and culture, and the impact of chemistry self-concept on learning behavior
FEBRUARY 4, 2022 | 1:00-4:30 PM
AST 5: Flipped Classroom
AST 6: Technology Integration
Agreements for Part 2: LE Development Workshop
Groupings for Consultation and Mentoring
Topic 4: Orientation to Lesson Exemplar (LE) Development Workshop
Workshop on Lesson Exemplar (LE) Development
FEBRUARY TO MARCH 2022
Week 1: LE Development [Asynch]
Week 2: LE Peer Review
Week 3: LE Revision [Asynch]
Week 4: Panel Critiquing [Synchronous]
Link to G-drive Folder
https://bit.ly/ESTA-PNUTeacherTraining
Informed Consent Form
https://bit.ly/ESTA-PNU-InformedConsentForm
Links to Forms:
Form A: Lesson Exemplar Template:
https://bit.ly/FormALessonExemplarTemplate
Form B: Evaluation Rubric:
https://bit.ly/FormBEvaluationRubric
Form C: Peer Review Form:
https://bit.ly/FormCPeerReview
Form D: Reflection Template:
https://bit.ly/FormDReflectionTemplate
Form E. Evaluation Form
https://bit.ly/FormEEvaluation
Form F: Implementation of ESTA Lesson Exemplar Template:
https://bit.ly/ESTA-PNUImplementationofESTALessonExemplarTemplate
Philippine Normal University
esta@pnu.edu.ph
Educating Science Teacher for All

Non-Disclosure Agreement (NDA)

Non-Disclosure Agreement
(NDA)

Title of Project: ***Educating Science Teachers for All [ESTA]***

I agree that any information pertaining to the abovementioned project and all documents of the projects transmitted to me for the purpose of utilization in the course _____ for the program _____ by the ESTA-Philippine-PNU Team through the Science Cluster of the College of Graduate Studies and Teacher Education Research will be considered proprietary and confidential.

Confidential information shall not include information previously known to me, the general public, or previously recognized as standard practice in the field.

Likewise, I agree that I will hold all confidential and proprietary information in confidence and will not use such information except as may be authorized by CGSTER and ESTA=Philippines-PNU, as the proponent of the project and will prevent its unauthorized dissemination. I acknowledge that unauthorized disclosure could cause harm and significant damage to the proponents. I agree that upon request, I will return all written or descriptive matter, including electronic files related to the project and other documents forwarded to me as part of the conduct and implementation project.

Accepted and agreed to by:

SIGNATURE : _____

PRINTED NAME : _____

POSITION / DESIGNATION : _____

AGENCY / INSTITUTION : _____

DATE : _____

TIN : _____

Mobile No. and Address : _____

Informed Consent Form

INFORMED CONSENT FORM

Research Title: **Educating Science Science Teachers for All (ESTA)**

Researcher(s): **ESTA-Philippines-PNU Team**

Participant's Name: _____

What is the study about?

This research is about building a transnational network of university science teacher educators in which evidence for the effectiveness of new approaches to science teaching and learning will be shared and discussed to pre- and in-service teachers in order to implement only the most effective and efficient measures for quality and inclusive science education.

Why are you asking me?

You are being asked to participate in this study because you are a full pledge teacher of the Philippine basic education system managed by the Department of Education or a pre-service teacher at the Philippine Normal University.

What will you ask me to do if I agree to be in the study?

You will be engaged in a course or in courses with several training sessions on how to develop Lesson Exemplars (LE) using templates developed by the ESTA-Philippine-PNU as dictated by the Science Education for Linguistic and Cultural Diversity in Philippine Public Higher Education (SELC-PhPHiEd) framework. You will also be asked to develop your own Lesson Exemplar using ESTA LE templates. Survey and interviews may be done for more data sourcing. The interview is expected to take about one hour or more depending on your response/s.

Is there any audio/video recording?

The interview/s will be audio or video recorded. Because your voice will be potentially identified by anyone who hears the tape, confidentiality of the things you say on the tape cannot be guaranteed although the researchers will try to limit access to the tape. The video recordings will be strictly confidential.

What are the dangers to me?

Your participation in this study entails minimal risk. Your participation WILL NOT AFFECT your work or your standing in the school. Questions, concerns, complaints about this research, benefits or risks associated with being in this study can be addressed to _____ through his/her thru email at _____.

Informed Consent Form

How will you keep my information confidential?

All information obtained in this study is strictly confidential unless disclosure is required by law. All data will be kept in a locked file cabinet and password protected computer. Your name will be replaced by pseudonym when data are disseminated.

Is there any benefit to society as a result of me taking part in this research?

Your participation in this study may help address heterogeneity and diversity Philippine classroom for a more inclusive science education. Furthermore, your participation will mean a voluntary decision on your part to partake and be part of PNU's advocacy for teacher quality, which is believed to translate to better student learning and performance.

Is there any benefit to me for taking part in this research study?

There is no direct monetary benefit to participants in this study. However, participation in this study may help teachers have more ways of looking at their classrooms, preparing more inclusive and meaningful science lessons for the learners. The exercise or activities imbedded in this project implementation.

Will I get paid for being in the study? Will it cost me anything?

There is no cost or payment for participating in this study.

What if I want to leave the study?

You have the right to refuse to participate or to withdraw at any time, without penalty. If you do withdraw, it will not affect you in any way. If you choose to withdraw, you may request that your data be destroyed or deleted unless a de-identifiable state is in place. However, withdrawing from the project does not mean that you are not submitting materials and requirements to your teacher, especially if the teacher with approval of the CGSTER adopted all the templates provided by the project.

What about new information/changes in the study?

If significant new information relating to the study becomes available which may relate to your willingness to continue to participate, this information will be provided to you.

Voluntary Consent by Participant: By signing this consent form, you are agreeing that you read, or it has been read to you and you fully understand the contents of this document. By signing this form, you are agreeing that you are 18 years of age or older and are agreeing to participate in this study.

Signature: _____ Date: _____

Lesson Exemplar

Educating Science Teachers for All
Philippine Normal University
The National Center for Teacher Education

LESSON EXEMPLAR

COURSE LEARNING OUTCOME(S)		
Course Learning Outcome(s)		
1. 2. 3. 4.		
Objectives	**Content**	**Tasks (What tasks should I give to students to ensure realization of the objectives)**
1.a. 1.b. 2.a. 2.b. 3.a. 3.b. 4.a. 4.b.	1.a. 1.b. 2.a. 2.b. 3.a. 3.b. 4.a. 4.b.	1.a. 1.b. 2.a. 2.b. 3.a. 3.b. 4.a. 4.b.
FILIPINO LEARNER		
Diagnosing the Learner		
Based on your survey, describe the target audience for this lesson; what types of learning styles will you need to be mindful of?		
Class/Learner's Demographic Profile *Year Level:* _____ *Ethnicity:* _____ *Course/Discipline:* _____ *Language(s):* _____		
Heterogeneity in terms of Culture, Language and Technical Capability		
Misconception/Course Topic Impression		

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Lesson Exemplar

PEDAGOGIES	
What skills will be addressed by this lesson?	*What activities may be integrated in each to help enhance the learning of the content? [CLIL]*
Cognitive Skills	**Language Function**
	1. *Reading*
Science Process Skills	
	2. *Listening*
Future Skills	
	3. *Writing*
Scientific Attitudes and Filipino Values	
	4. *Speaking*
Interdisciplinarity: **(What specific activities will integrate STEAM?)**	
S:	
T:	
E:	
A:	
M:	
What are the action words and vocabulary for this lesson? Please provide Mother Tongue translation for each identified vocabulary [MTB-MLE]	*Choose any two or more of these pedagogies in implementing the identified Lesson: (STEAM Approach, CLIL, 7E's, Bagong Kadawyan, Constructivism and Social constructivism Theory, Second Language Acquisition Theory, Experiential Learning Theory) in implementing the lesson.*
Key Language **(What children need to recognize/produce)**	**Strategy/Pedagogy (Please describe what pedagogy and how will it be implemented in the lesson)**
Action Words	
Vocabulary	

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Lesson Exemplar

Language Structure	
TEACHER KNOWLEDGE	
Technology Being Used by Students	**Technology Being Used by Teacher**
What technology will my students use in this lesson?	*What technology will I use in this lesson?*
What were your reasons for choosing the technology for the students to use?	*What are the limitations and potential problems in utilizing the technology?*
What are the limitations and potential problems in utilizing the technology?	*What are the limitations and potential problems in utilizing the technology?*
Assessment for Learning (Formative Assessment)	**Teacher Competence**
Assessment Strategy	*What other skills (language competence, multicultural knowledge system, TPCK) and attitudes do you need in order to implement the lesson?*
Feedback Strategy	
Technology which will be integrated in the Assessment	
Technology which will be integrated in the Feedback System	
Assessment of Learning (Summative Assessment)	**Readings/Materials/Tools**
1. How do you know students met the learning objectives and targets?	*What materials, readings, tools do you need to improve your competence and confidence in teaching the topic?*
2. What technology will you use to facilitate assessment of learning?	

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PROCESS
Walkthrough of the lesson (how will you deliver the lesson/topic (from engaging the student to ensuring achievement of learning objectives?) *1. How will I ensure interdisciplinarity (Use of STEAM Approach)?* *2. How will I integrate culture, Language and context in my lesson?* *3. How will I encourage my students to communicate what they know and want to know?* *4. What combination of pedagogies will I use to design the Lesson?* *5. What lesson flow would capture all these plans? (Present the lesson flow below. Use any applicable model e.g. Experiential model, 7E's)*
How will the lesson delivery manifest efficient classroom management?
How will I integrate technology in the lesson delivery?
Summary: How will technology, content, and pedagogical knowledge work together in this lesson?
REFLECTIONS
1. What worked or didn't work in the delivery of the lesson? *2. What difficulties have you encountered (during planning and delivering the lesson)?*

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Lesson Exemplar

3. What insight have you gained? *4. How do these insights connect or affect your teaching practice, and personal and professional life philosophy?*
MODIFICATIONS

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Rubrics for the Lesson Exemplar

Educating Science Teachers for All
Philippine Normal University
The National Center for Teacher Education

RUBRICS FOR THE LESSON EXEMPLAR (LE)

Name:		**Institutional Affiliation:**	
Title of the Lesson:		**Area of Specialization:**	

	1- Beginning	**2- Proficient**	**3- Highly Proficient**	**4-Distinguished**	**Score/ Level**
Course Learning Outcomes/Learning Competencies	Lesson objectives are NOT clear, and DO NOT match the content standards or the course learning outcomes and the identified topics. Furthermore, the tasks are not aligned with the objectives.	The content standards or course learning outcomes and the identified topics partially match the learning objectives. Some lesson objectives are clear and concise. However, not all the identified tasks match the specified learning objectives and content.	The content standards or course learning outcomes and the identified topics match the learning objectives. All the lesson objectives are clear and concise. Identified tasks match each of the specified learning objectives and content.	The set learning objectives are appropriately aligned with the content standards or course learning outcomes. All lesson objectives are clear, concise and measurable. There are provisions of supplemental learning tasks aligned with the set learning objectives and content, for a more	

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Rubrics for the Lesson Exemplar

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				enriched understanding of the lesson.	
About the Learners	The diagnostic processes of class misconception are observed but the details insufficient and **NOT** specific.	The diagnostic processes of class misconception and heterogeneity are in place and **specific** but the details are **insufficient.**	The diagnostic processes of diversity, class heterogeneity, and misconception are in place and are detailed and specific.	**Specific, contextualized** and **detailed** The processes of diagnosis of diversity, class heterogeneity, and misconception are in place. These processes are not only detailed and specific but are also contextualized.	
Pedagogies	The pedagogies identify and address the necessary skills, language functions, assessment, and the management of learners of the lesson objectives but the lesson components have to be aligned and properly sequenced and organized.	The pedagogies are appropriate to the teaching model used in the lesson and these substantially address the skills, language functions, assessment, and management of learners of the lesson objectives. The lessons are well-aligned and are properly sequenced and organized. Adequate synchronous and asynchronous learning opportunities are likewise provided.	The pedagogies are contextualized and culturally anchored. The teaching model is appropriate and the lessons substantially address the skills, language functions, assessment, and management of learners of the lesson objectives. The entire lessons are systematically organized to provide for adequate synchronous and asynchronous learning opportunities.	The pedagogies are interdisciplinary and are contextualized and culturally anchored. The teaching model is appropriate and relevant and the lesson is well-aligned with the set objectives substantially addressing the skills, language functions, assessment, and management of learners. The organization of	

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				lessons is methodical and provides substantial synchronous and asynchronous learning opportunities.	
Connection among content, pedagogical approach and technology	The connection among content, pedagogy, and technology is stated but not clearly evident.	Some of the content, instructional strategies, and technology are connected.	There is a solid connection among the content, instructional strategies, and technology and such connections are described in the lesson plan exemplar	Content, instructional strategies and technology are strongly connected AND the lesson plan includes a description of connections and other interdisciplinary applications.	
Rationale for Instructional strategy/ies	The rationale for selecting the instructional strategies is indicated but insufficient and the instructional activities in the lesson plan are not well-grounded on sound principles.	The rationale for selecting the instructional strategies is sufficiently explained but the instructional activities in the lesson plan need to be aligned.	The rationale for selecting the instructional strategies used is sound and the instructional activities in the lesson plan are well-aligned.	The rationale for selecting the instructional strategies is sound and explicitly anchored to a learning theory; the instructional activities in the lesson plan are equally clearly defined and well-aligned	
Appropriateness of technology for instructor use	The use of technology for instruction is limited for the activities in the lesson plan.	The use of technology for instruction is sound and	The use of technology for instruction is well-chosen and matches with the various	The use of technology is is precise and highlights	

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		appropriate for the planned activities in the lesson.	phases of the . lesson activities.	the relevant instructional strategies.	
Completeness	One or more key elements in the lesson plan are missing or are insufficient.	Lesson plan is complete and contains all of the required elements and attachments such as activities and worksheets.	Lesson plan contains all the required elements and attachments such as activities or worksheets which show clear examples and scaffolding of various parts.	Lesson plan is complete and exemplary . Pedagogy and assessment are relevant for and responsive to the needs of diverse learners in terms of ethnicity, gender, class, and ability including those with special needs	
Language and Mechanics	Lesson plan contains multiple errors in grammar and inappropriate word choice that get in the way of understanding.	Errors in grammar and word choice are minimal and the lesson plan is well-put together.	Lesson plan contains very minimal errors and the writing demonstrates a good understanding of grammar and appropriate word choice.	Lesson plan is error-free and writing demonstrates superior understanding of grammar and appropriate word choice	
Comments/Suggestions:					

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Rubrics for the Lesson Exemplar

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Evaluated by:		
Date:		

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Peer Review Form

Educating Science Teachers for All
Philippine Normal University
The National Center for Teacher Education

PEER-REVIEW FORM

Your Name: _____ **Program:** _____
Subject/Course: _____
Topic: _____
Lesson Title: _____
Level: _____ **Lesson Duration:** _____

ESTA Dimension	Attributes	5 Exceeds standard	4 Meets standard	3 Nearly meets standard	2 Does not meet standard	1 No Evidence	Remarks/Suggestions
Course Learning Outcomes/Learning Competencies	Provides clear lesson objectives	☐	☐	☐	☐	☐	
	Topics/Content match the learning objectives	☐	☐	☐	☐	☐	
	Identified tasks match each of the specified learning objectives and content	☐	☐	☐	☐	☐	

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Filipino Learners	Specific and detailed processes of diagnosis of diversity, class heterogeneity, and misconception are in place.	□ □ □ □ □	
Pedagogies	Skills [cognitive, science process, future] are accurately identified.	□ □ □ □ □	
	Language functions match the provided activities.	□ □ □ □ □	
	Exhibits contextualization/cultural integration		
	Interdisciplinarity is evident and feasible.	□ □ □ □ □	
	Assessments match instructional methods.	□ □ □ □ □	
	Strategies or Theories of Learning and Principles of Teaching are reflected in the LE		
	Lesson appears to help organize and manage student behavior—*Explains sequence of events and procedures for students.*	□ □ □ □ □	
Teacher's Knowledge			
Technology	Lesson plan/exemplar incorporates at least 1 technology.	□ □ □ □ □	
	Discusses possible limitations to technology or potential problems, as well as solutions.	□ □ □ □ □	

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Peer Review Form

	Provides clear rationale for technology choice.	☐	☐	☐	☐	☐	
	Demonstrates understanding of technology as a teacher tool or student tool.	☐	☐	☐	☐	☐	
Pedagogical Content Knowledge	Selects effective teaching strategies appropriate to the subject domain to guide student thinking and learning.	☐	☐	☐	☐	☐	
	Demonstrates awareness of possible student misconceptions.	☐	☐	☐	☐	☐	
	Presents appropriate strategies for developing understanding of the subject content.	☐	☐	☐	☐	☐	
Technological Pedagogical Knowledge	Chooses technologies enhancing approaches (teacher-centered approaches) –*Uses technology to present material.*	☐	☐	☐	☐	☐	
	Chooses technologies enhancing student learning (student-centered approaches) –*Students use technology to explore content and achieve learning goals.*	☐	☐	☐	☐	☐	

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Peer Review Form

	Provides clear rationale for technology choice to deliver instruction.	□ □ □ □ □	
Technological Content Knowledge	Chooses appropriate technologies for subject domain (mathematics, science).	□ □ □ □ □	
	Link between technology and content is obvious or explicit	□ □ □ □ □	
Technological Pedagogical Content Knowledge	Appropriately uses content, pedagogy, and technology strategies.	□ □ □ □ □	
	Technology enhances content objectives and instructional strategies.	□ □ □ □ □	
Completeness	Lesson plan is complete with all its intended attachments [e.g. activities or worksheets etc.] AND includes the following: • addresses higher-order thinking as per Bloom's Taxonomy • integrates with other content areas • provisions for students with special needs.	□ □ □ □ □	
General Comments/Suggestions:			

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Reflection Form/Template

ESTA-PNU-Training/Workshop

Reflection Form/Template

Project Title:
Education Science Teachers for All (ESTA)

Participant Profile

- Name of Participant: _____
- School/Campus/Hub Affiliation: _____
- Science Courses/Subjects taught: _____
- Place of Origin: _____ Ethnicity (*if any*):_____
- Languages Spoken: _____

Training Workshop Details

- Session Title: _____ Date and Time:_____
- Workshop/Training Modality: Online Synchronous
- Technology used during the workshop/training: _____
- Languages used during the workshop/training: _____
- Indigenous Knowledge (IK) used during the workshop/training: _____

Details of Reflection

(Please narrate your entire experience while attending the training/workshop. Highlight all insights and key points gained from your involvement in the different sessions.

Lesson Exemplar Development	
Lesson Exemplar Peer Review	
Lesson Exemplar Revision and Finalization	
Mentoring Program	

1

ESTA-PNU 2021

Reflection Form/Template

Reflection	
Reflect on the whole process of your professional learning with ESTA by answering the questions below.	
What have I learned from this mentoring program involvement?	
How could my students and my school benefit from this involvement?	
What were the challenges I experienced during the conduct of all activities relative to the mentoring program?	
What aspects of my involvement in this project would I like to keep?	
What aspect of my teacher knowledge do I need to improve on based on the inputs of the ESTA mentoring program?	
What aspect of my instructional practices do I need to improve on based on the inputs of the ESTA training?	
How will my new understanding of Filipino learners help improve my classroom practice?	

Summary of Attendance

Day 1 (January 27, 2022)

Ayuste, Thaddeus Owen, D	PNU-Manila
Bailon, James V.	PNU-Manila
Butron, Benilda Ramos	PNU-Manila
Capanzana, Carmela O.	PNU-South Luzon
Danzalan, Jandy S.	PNU-North Luzon
Datukan, Janir T.	PNU-Manila
De Vera, Jayson L.	PNU-Manila
GARCIA, NELSON.	PNU-Manila
Genelita S. Garcia	PNU-Manila
Gonong, Donna Marie DM.	PNU-Manila
Limson, Brian M.	PNU-Manila
Ocampo, Crisanta A.	PNU-Manila
Oliveros, Glenn Arvin V	PNU-Manila
Opeda, Amber Dea Marie P.	PNU-Mindanao
Palomar, Brando C.	PNU-Manila
Roque, Adolfo P.	PNU-Manila
Santiago, Gizel R.	PNU-North Luzon
Sia, Shila Rose D.	PNU-Manila
Villamor, Brenda B.	PNU-South Luzon

Summary of Attendance

Day 2 (January 28, 2022)

Ayuste, Thaddeus Owen D	PNU-Manila
Belmi, Rosario M	PNU-Manila
Butron, Benilda Ramos	PNU-Manila
Camacho, Vic Marie I	PNU-Manila
Capanzana, Carmela O.	PNU-South Luzon
Danzalan, Jandy S.	PNU-North Luzon
Datukan, Janir T.	PNU-Manila
De Vera, Jayson L.	PNU-Manila
Dela Cruz Jr., Jovenal V.	PNU-Mindanao
Espinosa, Allen A	PNU-Manila
Garcia, Genelita S.	PNU-Manila
Gonong, Donna Marie DM.	PNU-Manila
Limson, Brian M.	PNU-Manila
Magbanua, Paul S.	PNU-Visayas
Marasigan, Arlyne C.	PNU-Manila
Opeda, Amber Dea Marie P.	PNU-Mindanao
Oyanib, Ronald A.	PNU-Mindanao
Roque, Adolfo P.	PNU-Manila
Santiago, Gizel R.	PNU-North Luzon
Sia, Shila Rose D.	PNU-Manila
Tampon, Gregie P	PNU-Mindanao
Tondo, Josephine E.	PNU-Manila
Villamor, Brenda B.	PNU-South Luzon

Summary of Attendance

Day 3 (February 3, 2022)

Arquion, Rose D.	PNU-Mindanao
Ayuste, Thaddeus Owen, D	PNU-Manila
Butron, Benilda Ramos	PNU-Manila
Camacho, Vic Marie I.	PNU-Manila
Capanzana, Carmela O.	PNU-South Luzon
Datukan, Janir T.	PNU-Manila
De Vera, Jayson L.	PNU-Manila
Garcia, Genelita S.	PNU-Manila
Gracia. Nelson	PNU-Manila
Gonong, Donna Marie DM.	PNU-Manila
Limson, Brian M.	PNU-Manila
Marasigan, Arlyne C.	PNU-Manila
Ocampo, Crisanta A.	PNU-Manila
Oliveros, Glenn Arvin V	PNU-Manila
Opeda, Amber Dea Marie P.	PNU-Mindanao
Oyanib, Reynald A.	PNU-Mindanao
Roque, Adolfo P.	PNU-Manila
Santiago, Gizel R.	PNU-North Luzon
Sia, Shila Rose D.	PNU-Manila
Villamor, Brenda B.	PNU-South Luzon

Summary of Attendance

Day 4 (February 4, 2022)

Ayuste, Thaddeus Owen, D	PNU-Manila
Butron, Benilda Ramos	PNU-Manila
Capanzana, Carmela O.	PNU-South Luzon
Danzalan, Jandy S.	PNU-North Luzon
Datukan, Janir T.	PNU-Manila
De Vera, Jayson L.	PNU-Manila
Garcia, Nelson	PNU-Manila
Genelita S. Garcia	PNU-Manila
Gonong, Donna Marie DM.	PNU-Manila
Limson, Brian M.	PNU-Manila
Ocampo, Crisanta A.	PNU-Manila
Opeda, Amber Dea Marie P.	PNU-Mindanao
Roque, Adolfo P.	PNU-Manila
Santiago, Gizel R.	PNU-North Luzon
Sia, Shila Rose D.	PNU-Manila
Villamor, Brenda B.	PNU-South Luzon

Reflection Form/Template

Comments/Suggestions

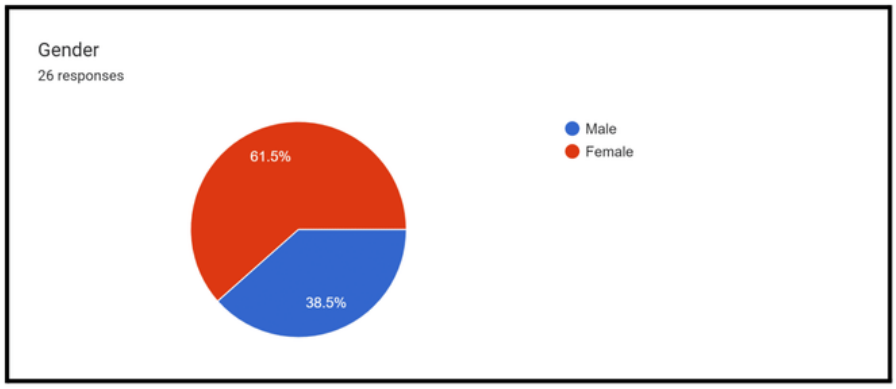
Participant
(Signature over printed name)

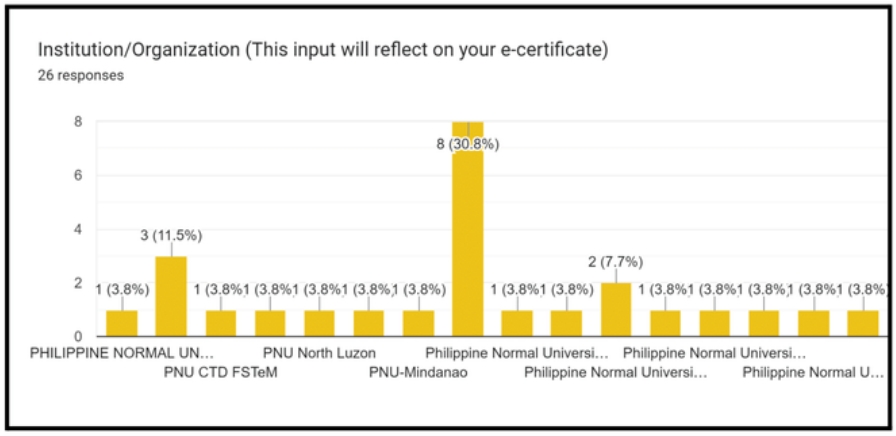
Date

Analysis of Evaluation

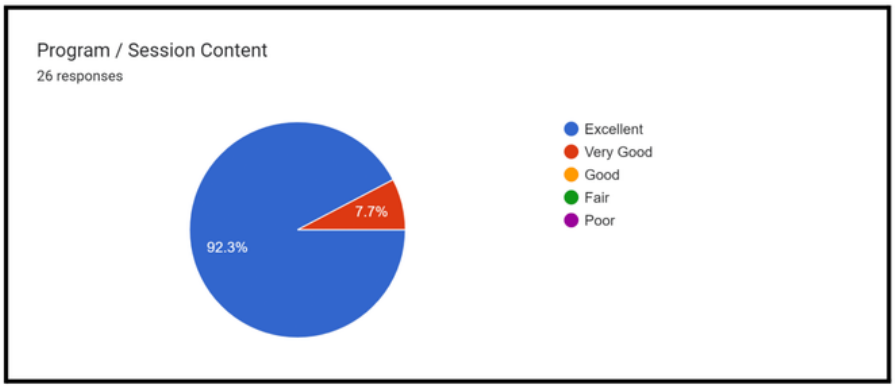
Evaluation for Training Workshop in Inclusive Science Education for Linguistic and Cultural Diversity

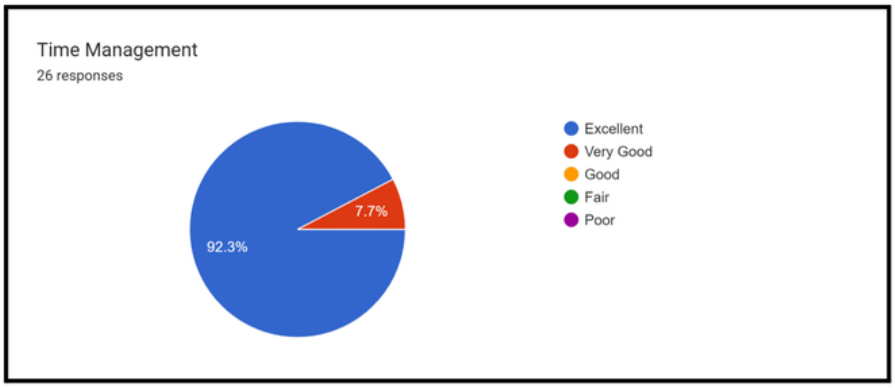
(for University Science Educators)



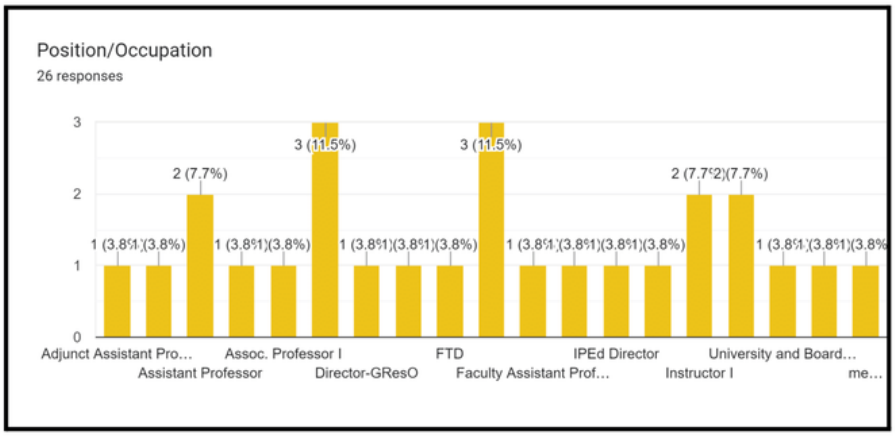


Analysis of Evaluation

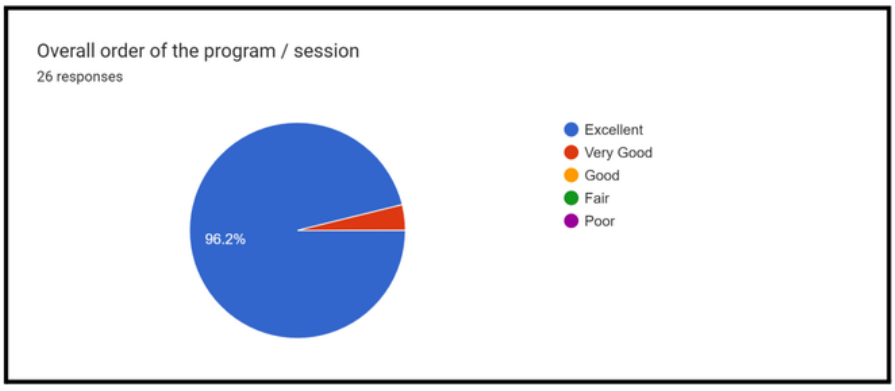




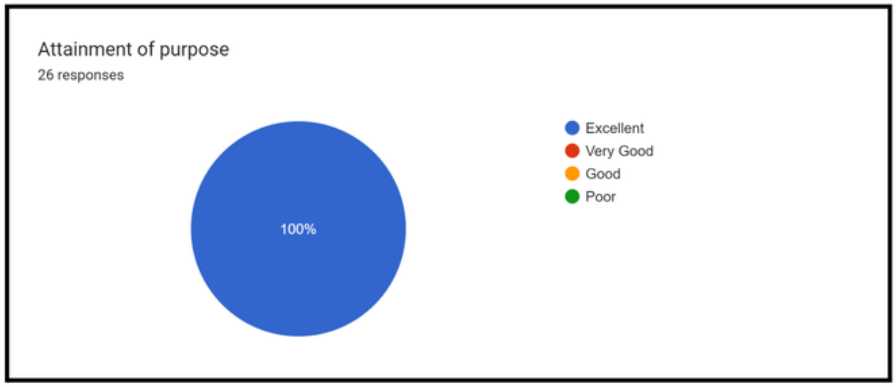
Analysis of Evaluation

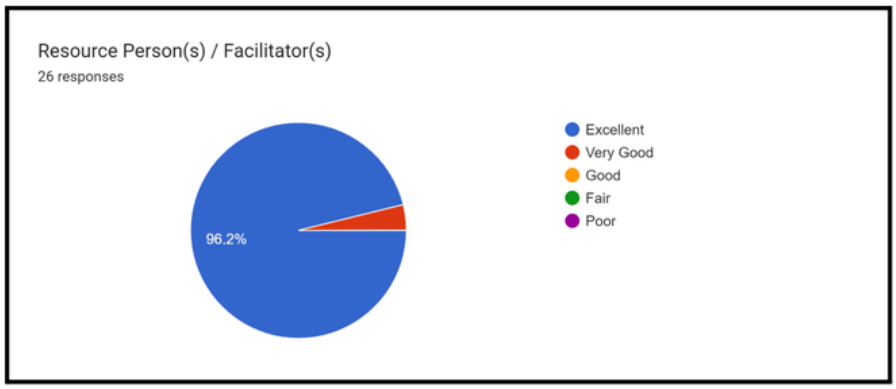


Part 2 (Evaluation)



Analysis of Evaluation





1. What I have learned most from this program/session is

- Incorporation of various factors in teaching science lessons.
- strategies and techniques in creating Lesson Exemplars
- Language is important in teaching.
- The specific details of the lesson exemplar especially how culture, gender and language are considered.
- Mastery orientation and performance skills

Analysis of Evaluation

- How language and culture can serve to bridge the gap between learning and misconception/belief, reinforce the concept and translate into practice the science concepts.
- Gender and languageintegration
- Collaboration works wonders !
- I learned that GAD & language can be a consideration in the diversity of learners not only culture, etc
- I learned to be more inclusive (in all aspects) when preparing Lesson Exemplars.
- how to make lesson exemplar and integrate the other disciplines
- Presentation of lesson exemplars in science
- Interdisciplinary Integration esp. in culture and language
- Possible inputs in each part of the Lesson Exemplar
- The importance of integrating gender themes in the lesson delivery and how language can be appropriately applied
- Respecting, celebrating, and promoting diversity, equality, and inclusion in STEM classrooms
- gender integration in LE
- "The following are my takeaways:
    1. Contextualizing lessons based on learners' diversity, technology and language
    2. Problem based learning is a very good way of promoting critical thinking, collaboration, and community awareness."
- Lesson preparation has to really consider the diversity of learners to make them feel they belong to the class during the actual learning process
- new education app
- Recognizing liguistic and cultural diversity in science classes
- Language is part of Science Teachings.
- STEAM
- How to consciously integrate culture and language in my lessons

Analysis of Evaluation

2. What aspects of the training can I use in my class to address class heterogeneity and diversity?

- Inclusivity
- activities presented
- Respect to cutural difference.
- Proposed activities that takes into consideration most of the learners background.
- socio-culutral context and the framework
- language and culture to be part of the lesson, big task.
- all of it
- Language diversity and Culture diversity in different biological activities .
- I can use dialogical aspect in science instruction
- The principle of heterogeneity based on background, experiences, status, and gender.
- all aspects (e.g. culture, languages,..) can be considered to address heterogeneity and diversity
- differentiation of lesson materials
- Cultural sensitivity by examining cultural backgrounds
- Practical applications in relation to the students inside the class.
- What I have learned from the lecture discussions
- The use of inclusive language etc
- critiquing of lessons
- Differentiation and contextualization of task based on issues, gender and students' culture.
- Provide different learning materials that students feel better and learn better
- LE presentations
- Pedagogies, Languange

Analysis of Evaluation

- The use of lesson exemplar.
- Language
- The topics in the Academic Staff Tours have provided strategies to use to address class diversity and heterogeneity

3. How can I utilize or implement what I have learned about culture and language integration in my field/practice?

- I will be able to utilize these through my Science courses and also utilize the principles learned from this workshop to other non-Science courses.
- share it to my students
- Be sensitive to students' culture
- This is difficult because it has to be a conscious effort on my part as a teacher. But I think knowing the background of my students on the first day of class would help so I can consider them in most of the lessons I will plan for.
- giving scenarios anchored in the Philippines setting
- language and culture to serve as the starting and ending scenario in the presentation of concepts
- Always consider academic writing in any science activity.
- To create activities where students can share their cultural practices and language skills.
- By making use of the various ideas I learned from this training like strategies in contextualizing physics for example
- We chose a topic that was practical whilst incorporating science knowledge and technological innovations. This will be very useful in handling learners of various backgrounds and in the proper use of language that is understandable and able to break misconceptions.
- by incorporating it in the lesson
- be conscious in integrating national heritage and culture in science lessons

Analysis of Evaluation

- Acknowledging beliefs systems and language of one's culture, understand, and identify misconceptions to be address
- through integrating in the class discussion , dig deeper on their practices and be shared.for culture preservation , possibly document it.
- Through contextualization and employment of various pedagogies where culture and language can be integrated
- Through my classroom practice
- lesson implementation
- I must involve my students in the lesson preparations and contextualizing concepts. Feedback is a very good source of information for improvement.
- Writing mechanics should not be the focus in science but the conceptual learning and outputs that speak of their real understanding of the lesson
- highlighting the significance of MTBMLE
- Employing of pedagogies and technological tools
- By integrating both language and culture in the lesson.
- Lesson exemplar
- Specifically of language integration, I need to improve on how I give instructions and guide questions to direct student learning

Please provide comment(s), additional feedback or suggestions:

- The workshop was enlightening and engaging. Thank you very much. More power to the organizers.
- COngrats
- N/A
- Very organized and productive. The time was well spent.
- NA
- LANGUAGE and CULTURE training can be the next sessions.
- Thank you for the expert inputs of the panel
- Excellent Program!!
- Thank you for this activity. Kudos to the ESTA Team.
- I learned a lot from this engagement, which is no surprise. I hope to learn more even though I am not teaching full time anymore. Very helpful!

Analysis of Evaluation

- Congrats ESTA team
- Congratulations
- NONE
- a nice day activity , so fruitful.
- Thank u so much po to ESTA Team for the given opportunity to be a part of this training. Congratulations po!
- n/a
- outstanding
- I hope there's still a second part of the training on how language can be incorporated to a specific lesson.
- Congratulations to the ESTA-PNU team for making me feel the serious roles of science teachers in delivering effective instruction and pushing ST in impacting the world with the needed change in perspectives about nature and life as a whole.
- None... Salamat
- The trainings equipped the Science teachers with knowledge and skills necessary in dealing with cultural diversity in science classrooms
- Very useful training
- Nòne
- maybe give more time for ASTs so that collaborative activities can be more meaningful

Analysis

In summary, the university science educators rated the training as very good to excellent. Specifically, the following constructs were rated by the participants as very good to excellent: overall program, program/session content, time management, attainment of purpose and resource persons/facilitators. These exemplar ratings in each construct were verified and validated through the verbatim responses of the participants in each of the open-ended questions. The succeeding paragraphs present the summarized comments by the participants in each question.

In the aspect of what the University Science Educators have learned the most from the training workshop, their responses may be summarized in two major categories: development of Lesson Exemplars that integrate language, culture and other factors in science teaching, and that language and culture are integral components of an inclusive science education.

Analysis of Evaluation

When asked what aspects of the training can be used/adapted in class to address heterogeneity and diversity, the University Science Educators emphasized three things: inclusivity, and culture and language sensitivity in science education; contextualization, and Lesson Exemplars.

In the aspect of how they can implement what they have learned, the University Science Educators' responses can be clustered into five constructs: contextualization, ESTA principles, culture and language sensitivity, involvement of students in lesson preparation/contextualization, and development of Lesson Exemplars.

Finally, their overall very good to excellent rating are verbalized in the other comments commending the team for a successful training that they can really utilize in achieving inclusive science education.

Philippine Normal University

in collaboration with

Educating Science Teachers for All