



Filipino Science Teachers' Needs, Challenges, and Practices in the New Normal

Homobono Cabrera Tijap , Jerome Esco Malamdag, Princess Margaret Golla Paz,
Alfons Jayson Orbase Pelgone
College of Graduate Studies and Teacher Educational Research, National Center for Teacher Education,
Philippine Normal University, Philippines

Abstract: This survey research involving 464 Filipino Science teachers determined the needs, challenges and practices in teaching and learning in the new normal. The collected data gathered showed that the science teachers needed (a) upskilling and reskilling in content-based knowledge and teaching strategies applicable to several identified challenging science topics in this new normal; (b) continuous training on the use of varied online platforms; (c) capacity building on the use of software and digital science activities applications; (d) a further enhancement in the following teaching related activities such as creating online assessments, online instructional modules, online class management, online teaching strategies, implementing online netiquette, and crafting the individual learning monitoring plan. The study further recommends rolling out this survey further in the Visayas and Mindanao regions and contextualize this survey for other content subject areas.

Keywords: assessment, curriculum, instruction, new normal, science education.

Abstrak: Penelitian survei yang melibatkan 464 guru IPA Filipina ini bertujuan untuk menentukan kebutuhan, tantangan, dan praktik dalam proses belajar mengajar di era new normal. Data yang dikumpulkan menunjukkan bahwa guru sains membutuhkan (a) peningkatan keterampilan dan keterampilan ulang dalam pengetahuan berbasis konten dan strategi pengajaran yang dapat diaplikasikan untuk beberapa topik sains dalam kondisi normal baru ini; (b) pelatihan berkelanjutan tentang penggunaan berbagai platform online; (c) peningkatan kapasitas penggunaan perangkat lunak dan aplikasi-aplikasi aktivitas ilmu digital; (d) peningkatan lebih lanjut dalam kegiatan pengajaran seperti membuat penilaian online, modul instruksional online, manajemen kelas online, strategi pengajaran online, menerapkan netiket online, dan menyusun rencana pemantauan pembelajaran individu. Studi lebih lanjut dibutuhkan untuk survei lebih lanjut di wilayah Visayas dan Mindanao dan mengontekstualisasikan survei ini untuk bidang subjek konten lainnya.

Kata kunci: asesmen, kurikulum, pengajaran, normal baru, Pendidikan IPA.

▪ INTRODUCTION

The global health crisis caused by a novel coronavirus known as COVID-19 has completely changed the landscape of the society. It rapidly spread over the globe and arrived in the Philippines on 21st of January 2020. (Department of Health, 2020) President Rodrigo Roa Duterte approved the class suspension from March 10 to 14, 2020 in Metro Manila area as suggested in the 10th Meeting of the Inter-Agency Task

Force (IATF). (Pascua, 2020) On 11th of March 2020, 114 countries were already affected by COVID-19, prompting Dr. Tedros, Director-General of World Health Organization (WHO) to announce the crisis as pandemic. He also added that the world cannot return to its previous state. The world should brace itself for the "new normal," which should be a safer, healthier, and better place to live. (WHO, 2020) The Department of Education (DepEd) highlighted that March 16 to 20 were the final week for examination for School Year (SY) 2019-2020. Unfortunately, schools that were affected by the stated suspension of classes by national and local authorities on those days will no longer be administered. For the final grade, the affected schools used the grading formula provided by the department. Eventually, on March 16, 2020, a communication released in accordance with Proclamation No. 922 and 929, s. 2020 and Republic Act No. 11332, the entire Luzon is required to implement an Enhanced Community Quarantine (ECQ) (Medialdea, 2020)

The pandemic significantly affects the educational system. In the midst of the challenges, a sudden shift to a new instructional paradigm from in-person classes to distance learning delivery has been implemented to ensure a continuous flow of safe and healthier teaching and learning processes. (San Antonio, 2020) (Dangle & Sumaoang, 2020) The shift from traditional instructional methods to an online and more equitable platform will undoubtedly necessarily involve educators in preparing for a transformative change of the current curriculum. (Capangpangan, 2021) Numerous studies have been developed to look at this transition, such as determining the readiness of Filipino learners from basic education to higher education for remote and blended learning modalities. It shows several factors, challenges, and difficulties that might face by the teachers and learners such as their digital literacy skills and financial capabilities. (Alipio, 2020) (Moralista & Oducado, 2020) (Dayagbil, Palompon, Garcia, & Olvido, 2021)

The Department of Education (DepEd) revisit their educational system and provided different alternative learning delivery methods for SY 2020-2021, apart from online distance learning, which are taught using an internet-based platform; printed or modular which involves individualized instruction such as self-learning modules; television or radio-based learning; and blended distance learning, a combination of synchronous and asynchronous instruction. (San Antonio, 2020) For the SY 2021-2022, DepEd strongly encourages to maximize the utilization of radio, television, PowerPoint, and other available learning modalities for distance learning. (Escobedo, San Antonio, & Pascua, 2021) (Office of Undersecretary of Administration, 2021)

These different distance learning methods have not been new to basic education and have already been implemented before the pandemic. To ensure that this new normal is successfully implemented, collaborative support from all educational stakeholders and educational systems that contribute significantly to making the school safe and conducive is required. (Haris & Ancho, 2020) They should be sensitive to the needs and contexts of students, their families, and communities. (Fontanos, Gonzales, Lucasan, & Ocampo, 2020) The stakeholder should be innovative with the intention of building back better education. (d'Orville, 2020) In lieu, a DepEd collaborative output based on the advice of various education stakeholders known as Basic Education Continuity Plan (BE-LCP). It addresses the critical needs of education in the event of a pandemic, such as health standards, numerous learning competencies and modalities, partnerships, and special activities. (Pitagan, 2021)

As the number of COVID-19 cases declines and the number of people who have been fully vaccinated rises several government agencies have shared responsibility for developing guidelines and plans for safe reopening schools and other educational institutions for face-to-face instruction stated in the DepEd and DOH Joint Memorandum Circular No. 01 and 03, s. 2021 and CHED and DOH Joint Memorandum Circular No. 2021-001 and 002. (Estrellado, 2021) (Luna, 2022) In November 15, 2021, the pilot implementation of limited in-person classes commenced in the several public and private schools in the low-risk areas in the Philippines. This gives insights and experience on implementing the said program with integration of the practicing the minimum health and safety protocol as stated in DepEd Memorandum No. 085, s. 2021. In 2022, the program continuously expanded in other regions with the approval of the Philippine President. (Department of Education, 2022)

Aside from limited face-to-face classes, hybrid learning method or approach adapted by some schools and other educational institutions in the Philippines. It is an educational method in which some of the learners attend the face-to-face classes while others participate synchronously through virtual platforms at home. (Boyarsky, 2020) In light of this, research scholars got interested in the intervening effect on this arising method as viable alternative learning delivering for quality education in this new normal. (Operio, 2021)

Before the pandemic, researchers and experts were already looking for ways to improve and contextualize science teaching and learning experience through needs assessment. Needs assessment is a systematic process for recognizing the school's potentials and shortcomings as well as comprehensively understanding the circumstances and constraints for continuous improvement. (Corbett & Redding, 2017) In 2014, a researchers figuring out the needs of the pre-service teachers in science through analysis of survey questionnaire and journal which lead to development of contextualized enhancement program for practice teachers. (Montebon D. R., 2014) Meanwhile, the University of Eastern Philippines conducts a training needs assessment for teachers in Northern Samar and eventually provides a rationale for the need for an extension program. (Unay, 2019) The Kingdom of Cambodia's Education Ministry published their reports and finding on the Provincial Teacher Training Centre (PTTC) In-Service Training for Teachers (INSET) Needs Assessment. Based on their 302 teaching and 10 non-teaching respondents, 23.2% of the participants teaching a subject different from their specialized area that led to a need for upgrading content knowledge to a new subject. The findings also provide some potential INSET topics like for example Information and Communication Technology, teaching methodology and research to provide an improvement of teachers' practices. For Science Education, this study discovers the need for improvement of individual skill in using technology effectively, lesson integration of 21st Century Skill including creativity, innovation, collaboration and working together to solve problems. Lastly, enhancement of integration of specific Khmer topics in all subjects across area. (MoEYS, 2020)

The Data Quality Campaign recognized the unprecedented school disturbances due to the global pandemic. In response to this scenario, they identified the key themes needed to help to respond and recover like access to the new collected data by parents and teachers for evaluation of students' progress; education bill that supports measure and support for student's experience; data accessibility across all programs and sectors that serve the learners; critically analyze the data to understand learners' understanding

during this new normal; and support from educational stakeholder that help to improve data systems and promote the development of innovation. (DQC, 2020)

Framework of the Study

Curriculum, instruction, and assessment are all part of the education process. In the curriculum, give emphasis on the students should learn, while instruction focuses on the way the students will learn, and assessment shows the student's learning progress. These are intricately connected with each other in order. (Curriculum Instruction Assessment & Grading Handbook, 2017) (Ogena, et al., 2020) The core of the study shows the determination to identify the gap and needs to attain the required performance or desired behavior using the actual performance or behavior. (Manual on Training Needs Assessment, nd) Eventually, this will provide inputs for school-based management of the teacher's capacity building needs and may consider this study in policy making in reflection in this new normal.

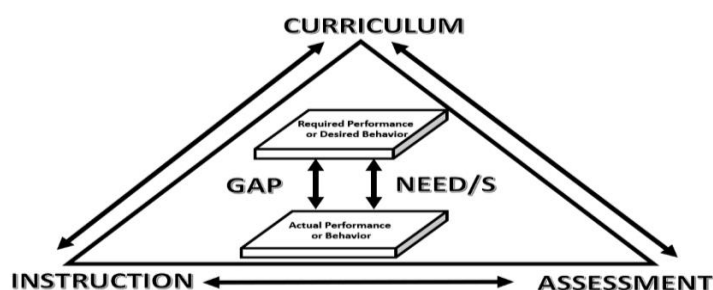


Figure 1. Framework of the study

▪ METHOD

The study employed survey research which involves collection of data from the thought and feedback from the respondents to describe the status of a variable of interest to the researchers. (Gay, Mills, & Airasan, 2012) In this research, gathered 464 (N=464) teacher respondents from Northern Luzon (Area 1), Metro Manila (Area 2), Southern Luzon (Area 3), and Visayas & Mindanao (Area 4). Most of the teachers in the survey composed of 160 (34.48%) were public elementary school teachers while 118 (25.43%) public senior high school teachers, and third most number were public junior high school teachers with 110 teachers or 23.71%. The remaining of the participants are enumerated from Table 1.

Table 1. Type of School the Respondents Employed

School	Total	Area 1	Area 2	Area 3	Area 4
Public-Elementary	160 34.48%	124	3	30	3
Public-Multigrade	4 0.86%	1	2	1	0
Public-JHS	110 23.71%	35	26	45	4
Public-HS with SHS	118 25.43%	54	9	52	3
Public-Stand Alone SHS	10 2.16%	0	4	6	0
Semi-Private	1 0.22%	0	0	1	0

Private-Elementary	3	0.65%	1	1	1	0
Private-JHS	7	1.51%	3	3	0	1
Private-HS with SHS	30	6.47%	10	17	3	0
Others	21	4.53%	10	10	1	0

Regarding the educational attainment of the participant mostly teachers with units of Master’s degree with 226 teachers or 48.71%. While 95 teachers or 20.47% have baccalaureate degree and 91 teacher-participants have a degree in masters. The study gathers 38 teachers or 8.19% with a Master’s degree with units of Doctoral degree and 14 teachers or 3.02% with a Doctorate degree.

Table 2. Educational Attainment of the Respondents

Educational Attainment	Total	Area 1	Area 2	Area 3	Area 4	
B.S. Degree	95	20.47%	48	24	23	0
B.S. with M.A. or M.S. units	226	48.71%	118	34	72	2
Master's Degree	91	19.61%	45	9	34	3
M.A. or M.S. with Doctoral units	38	8.19%	23	7	8	0
Doctoral Degree	14	3.02%	4	1	3	6

In this study 42.03% or 195 teachers with 0 to 5 years in teaching service, next are 20.26% or 94 teachers with 6 to 10 years in teaching service and third are 72 teachers or 15.52% with more than 20 years in service. Meanwhile, 68 teachers of 14.66% with 11 to 15 years in service and 35 teachers or 7.54% with 16 to 20 years in service.

Table 3: Teaching Service

Years in Teaching	Total	Area 1	Area 2	Area 3	Area 4	
0 to 5 years	195	42.03%	87	53	55	0
6 to 10 years	94	20.26%	45	11	36	2
11 to 15 years	68	14.66%	44	3	18	3
16 to 20 years	35	7.54%	20	6	6	3
21 years up	72	15.52%	42	2	25	3

Instrument Used

The research-made survey questionnaire was developed with emphasis on curriculum, instruction, assessment, and capacity building that is possible used in this new normal. The survey was composed of the following: (a) *Introduction* which includes the message of the researchers to the teacher-participant of this study regarding the purpose of the study and its relevance. It also informs them regarding the respect and protection of their privacy and personal information. They are assured that the information gathered by the researchers will be treated confidentially. ; (b) *Background Data* determines the personal information of the teacher-participant. They were asking

for their name (optional), sex, school, region, division, number of years in service, highest educational attainment, and teaching and learning modality implemented in the school; (c) *Curriculum section* focuses on understanding the teacher-participants' concerns about science curriculum amid of the new normal. They were asked for challenging topics to teach in this new normal in Biology, Chemistry, Physics and Earth and Space Science. They also rate the level of their understanding in DepEd Curriculum Guide and MELCs - Most Essential Learning Competencies.; (d) *Instruction & Delivery section* gives emphasis to the teachers' ability in the activities related to the instruction and delivery in this new normal. The teacher-participant rate their level of mastery and expertise in preparing or the following teaching elated activities such as Work Home Learning Plan, creating PowerPoint Presentation, Communication with Students, Inquiry/ Questioning Skills, making Printed Module, Individual Learning Monitoring Plan, Implementing Online Netiquette, Online Teaching Strategies, Online Class Management; and making Online Educational Module. They also rate their proficiency in using Facebook Messenger, YouTube, Google Meet, Zoom, Microsoft Teams, Skype, Moodle, and Schoology. The last part, the teacher-participants provide their suggestion for teaching application or software that they want to know more., (e) *Assessment section* concentrated to the teacher-participant knowledge and skills in creating effective science assessment in this new normal. The respondents rate their level of understanding in the following assessment related activities and concepts such as in making online assessment, new grading system, and making e-class record.; and (f) *Capacity Building section* research-participant list down topics for training that would be helpful for science teachers in this current situation. This also provides an opportunity for the teacher-participants to voice out the necessary upskilling and reskilling programs aside from the previous section discuss.

The researcher-made instrument was validated by the experts in curriculum and science education from the National Center for Teacher Education. Then the instrument was revised and finalized. The study used purposive sampling in which the selection based on the knowledge of the individual being sampled which in this case focus to the science teachers in the basic education. (Gay, Mills, & Airasan, 2012) The survey administered through online using the google form.

Ethical Considerations

The teacher participants in the study participated voluntarily. Appropriate consent form was rolled out before the survey was administered. The researchers value and respect their participants' privacy and have taken reasonable precautions to protect their personal details in compliance with the 2012 Data Privacy Act. The researchers provided an assurance that any information that they supplied in the survey questionnaire would be treated confidentially.

▪ RESULT AND DISCUSSION

Curriculum

The K to12 Curriculum is the most comprehensive attempt to transform the learning curriculum into an enhanced, context-based, spiral progress learning system from kindergarten to 12 years of basic education. (Trance & Trance, 2019) This ensures that graduates have the necessary knowledge, skills, competencies, and values for the twenty-first century. (Aquino, 2013) (Villanueva, Luistro, & Licuanan, 2013)

K to 12 Curriculum Guide

Curriculum Guide (CG) is a set of structured documents that outline the objectives, learning experiences, instructional resources, and assessment which provide guidance for teachers on teaching and learning process inside the classroom. (International Bureau of Education, 2021)

According to (Montebon D. , 2014) students believe that the new science curriculum has a positive impact on how they gain scientific and innovative knowledge, skills, attitudes, and values. It is congruent with the study of (Cabansag, 2014) that science has been viewed as a venue for honing students' talents obtained through innumerable learning activities as one of the focus subject areas in the K to 12 curricula. Moreover, (Walag, Fajardo, Guimary, & Bacarrisas, 2020) stated that the structure (e.g., content standards) should focus on enhancement of deeper learning skills such as creative reasoning, decision making, collaboration, conceptual understanding, and communication.

To the author (Acosta & Acosta, 2016) assessing readiness will serve as a catalyst for improved implementation strategy and the development of alternative interventions. The willingness and readiness of the education sector and stakeholders to embrace change is critical to the long-term success of the government's program efforts. It is connected to the study (Cabansag, 2014) that suggests the need for close monitoring of program implementation, as well as continuous professional trainings for teachers, to clear up areas of misunderstanding, such as the grading system, skills training, and processing of learning performance to meet target competencies and mastery.

Most Essential Learning Competencies (MELCs)

During the pandemic, DepEd revisited the educational scheme with the focus of the curriculum guide which led to the birth of simplified curriculum as MELCs. This were created with supervision of Director Jocelyn D.R. Andaya and with the approval of Dr. Diosdado M. San Antonio. The current K to 12 CG was congested with 14,171 competencies compare to MELCs with 5,689 competencies or 60% reduction. (Arcilla, 2020) DepEd has created MELCs for School Year 2020-2021 in order to assist the teachers in focusing on what is most important to be delivered to students. (Gonzales, 2020) MELCs comprise the fundamental learning competencies that will be utilized as the primary reference in developing and contextualizing self-learning modules and instructional materials in this new normal. (Balderas, 2020) (Go, 2021) In the recent study of (Cahapay, 2020) it must be emphasized in the essential competencies that learners will entail in this new normal. It is challenging on the way to decide whether to integrate or limit the curriculum content.

In support of DepEd's commitment and assurance to ensure a continuous flow of safe and healthier system of education, the researchers determines the challenging topics in biology, chemistry, physics, and earth and space science and understands the teachers' concern about the science curriculum amid of the new normal and eventually recommended to design professional development programs for teachers, much attention should be given to the topics that teachers are least confident in teaching. (Culala & De Leon, 2019)

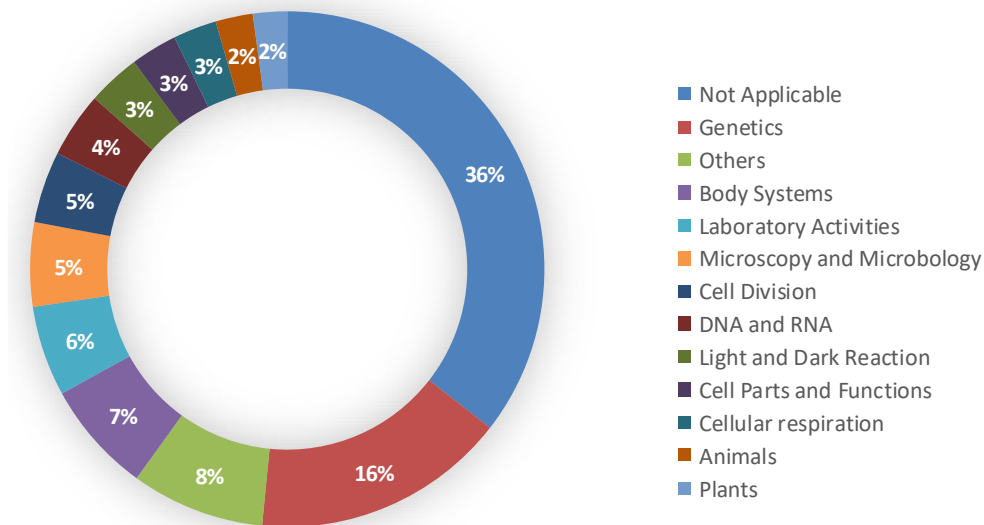


Figure 2. Biology topics that are challenging to teach in this New Normal.

It is seen in Figure 2 that the most challenging Biology topics to teach in this new normal with their percentage are as follows: Genetics were (16%), Body Systems were (7%), Laboratory Activities were (6%), Microscopy/Microbiology were (5%) Cell Division, DNA and RNA, the three of them were (4%) each, Light & Dark Reaction, Cell Parts & Functions, and Cellular Respiration, the three of them were (7%) each, both Animal and Plants were (2%), and Others were (8%). While the majority (36%) of the responses indicate that it is Not Applicable, or some educators found no particular challenging Biology topics in this New Normal.

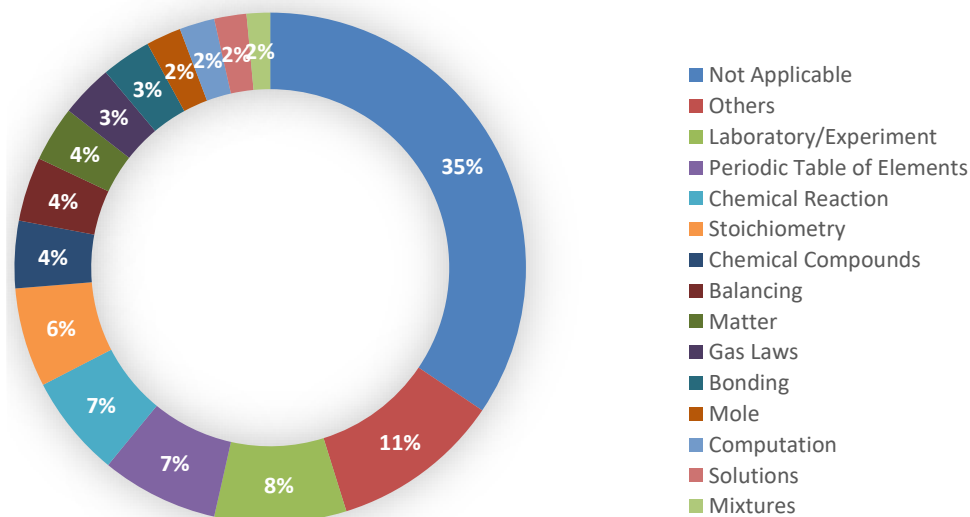


Figure 3. Chemistry topics that are challenging to teach in this New Normal.

The second graph of the curriculum provides data of the most challenging Chemistry topics to teach in this new normal with their percentage are as follows: Laboratory/Experiment were (8%), both Periodic Table of Elements and Chemical Reaction were (7%) each, Stoichiometry were (6%), Chemical Compounds, Balancing, and Matter, the three of them were (4%) each, both Gas Laws and Bonding were (3%), the four remaining topics which are Mole, Computation, Solutions, and Mixtures were (2%) each, and Others were (11%). While the majority (35%) of the responses indicate that it is Not Applicable, or some educators found no particular challenging Chemistry topics in this New Normal.

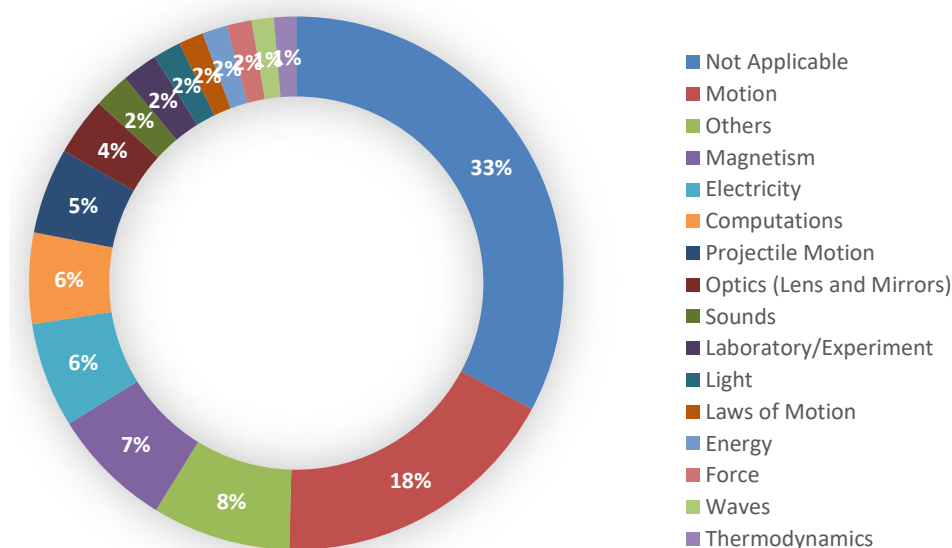


Figure 4. Physics topics that are challenging to teach in this New Normal.

The third section of the curriculum provides data of the most challenging Physics topics to teach in this new normal with their percentage are as follows: Motion were (18%), Magnetism were (7%), both Electricity and Computations were (6%) each, Projectile Motion were (5%), Optics (Lens and Mirrors) were (4%), Sounds, Laboratory/Experiment, Light, Laws of Motion, Energy, and Force, the six of them were (2%) each, both Waves and Thermodynamics were (2%) each, and Others were (8%). While the majority (33%) of the responses indicate that it is Not Applicable, or some educators found no particular challenging Physics topics in this New Normal.

The final part of curriculum provides data of the most challenging Earth and Space topics to teach in this new normal with their percentage are as follows: Astronomy were (11%), Earth was (9%), Tectonic Plate were (8%), Weather, Climate and Season were (4%), both Environmental & Life Science and Rocks & Minerals were (3%) each, Earthquake & Faults, Atmosphere, Volcanoes, and Laboratory/Experiment, the four of them were (2%) each, Typhoon were (1%), and Others were (5%). While the majority (48%) of the responses indicate that it is Not Applicable, or some educators found no particular challenging Earth and Space topics in this New Normal.

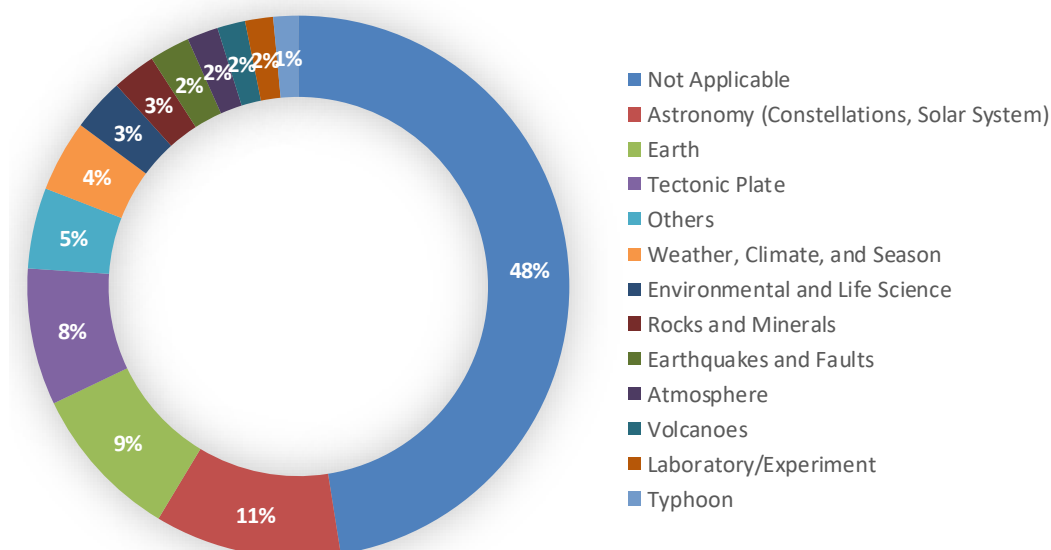


Figure 5. Earth and Space topics that are challenging to teach in this New Normal.

The overall impression of the researchers to the result that the challenging topics to teach provided by the teacher participants in this study were correlated with identified least mastered contents or topics which supported with several recent researches. According to the data collected by the (Cajimat, Errabo, Cascolan, & Prudente, 2020) from the classroom teachers and education program supervisors the least mastered content for the four science areas from grade three to ten were parallel to all topics from this study. In another study which focuses on the development of strategic intervention materials the researchers discovered the chemistry topic of mixture as one of the least learned topics using the pre-test. Mixture is also included as a challenging topic to teach. (Aranda, Diaz, Sombilon, & Gicana, 2019) Another study from Zambales identified the least mastered biology topics from grade seven to ten which includes genetics, body systems, microscopy, and cell division. Meanwhile topic about DNA considered as moving towards to mastery. (Delos Santos, Lim, & Rogayan Jr., 2021)

Instruction

In these new normal, educational leaders urged the institution to emphasize on creating spaces for flexible, accessible, interactive, and hand-on learning that is adaptable to a more rapid pace of change. (APPA, 2020) In the Philippines, researchers before pandemic already investigated on the integration of technology in basic science education curriculum towards national development and Association of South East Asian Nations (ASEAN) competitiveness. The study steered in 2017 focuses on the perception and awareness of 779 students and 75 teachers in technology integration. It reveals that the respondents were lack of awareness on technology use as an aid to understand scientific concepts that lead for urgency for training on modern technology primarily the use personal computer, electronic gadgets, applications, and software. (Limjap, Santos, Lapinid, Roleda, & Anito Jr., 2017) In line with this the researchers want to understand the current needs of science teachers in regards to the application of technology in the delivery of a flexible scientific teaching - learning activities

This study gathered the following data. It shows that work home learning plan (3.24), while creating PowerPoint presentation (3.25), communication with students (3.24), inquiry and questioning skills (3.17), and making printed module (3.13) belong to mastered teaching activities. For the least mastered teaching-related activities and mean scores are Making Online Educational Module (2.66), Online Class Management (2.74), Online Teaching Strategies (2.77), Implementing Online Netiquette (2.96), and Individual Learning Monitoring Plan (3.07). The data shows that the work home learning plan is the most mastered among teaching-related activities while making online educational module is the least mastered teaching activity that needs for capacity building.

Table 4: Self-Evaluation of Teaching-Related Activities

Teaching-Related Activities	Level of Mastery and Expertise						Mean
	1	2	3	4	5	N/A	
Work Home Learning Plan	6	95	151	145	62	5	3.32
Creating Power Point Presentation	21	94	143	108	88	10	3.25
Communication with Students	13	114	138	130	66	3	3.24
Inquiry/ Questioning Skills	14	121	140	137	49	3	3.17
Making Printed Module	18	105	137	124	63	17	3.13
Individual Learning Monitoring Plan	12	119	161	132	33	7	3.07
Implementing Online Netiquette	57	111	122	108	59	7	2.96
Online Teaching Strategies	59	126	131	112	27	9	2.77
Online Class Management	63	130	123	106	31	11	2.74
Making Online Educational Module	65	128	131	95	28	17	2.66

The second section for the instruction determines the proficiency of teacher respondents in using different online platforms. The table below shows the most proficient to the least proficient online platforms. This shows that teachers are knowledgeable in Messenger with a mean score of 3.86, YouTube (3.34), Google Meet (3.21), and Google Classroom and Zoom (3.07). Meanwhile their least knowledge and need for capacity building such as Microsoft Teams (2.72), Skype (2.33), Schoology (2.00), and Moodle (1.98).

Table 5: Teacher Respondent Proficiency in using the Online Platforms

Online Platform	Proficiency						Mean
	1	2	3	4	5	N/A	
Messenger	5	28	147	104	175	5	3.86
YouTube	35	76	131	112	104	6	3.34

Google Meet	36	94	127	132	71	4	3.21
Google Classroom	55	97	115	118	72	7	3.07
Zoom	47	99	129	123	60	6	3.07
Microsoft Team	53	130	134	91	37	19	2.72
Skype	101	127	118	72	17	29	2.33
Schoology	147	129	96	44	12	36	2.00
Moodle	152	144	84	39	14	31	1.98

Various researchers and educators document their teaching and learning experiences, as well as best practices for using these online platforms, to determine their availability efficacy and utility in pandemic education. (Pastores, Dacanay, Mayoya, Nanglihan, & Bautista, 2021) According to a published literature, research scholars tend to identify a digital gap in the use of technology, particularly on these online platforms that were commonly used in the Philippines, based on feedback from teachers and learners. (Capangpangan, 2021). Google Classroom, Moodle, Edmodo, Blackboard LMS, Schoology, Zoom, Google Meet, Collaborate, Facebook, Facebook Messenger, Google Hangouts, Viber, and WhatsApp were among the common learning online platforms and tools mentioned in this study. The researchers discovered that all institutions have a way of communicating students, teachers, and educational stakeholders with various free online platforms. This study recommends that a program be established to train educators on these platforms in order to deepen their understanding and sharpen their technical skills in order to guarantee teaching effectiveness. (Ignacio, 2021) (Pizarro & Bansig, 2021) In the Department of Education, YouTube, Facebook Video, and Messenger were highly utilized to communicate and deliver the content to the learners. The article reveals that teacher-made videos help learners to understand and enjoy the lesson. In addition, intervention using Facebook and messenger provide better understanding of lessons, assigned task, and able to answer the learning task easily. (Olivarez & Insorio, 2021) (Insorio & Macandog, 2022) Other findings revealed that because of the high level of student acceptability, ease of use, quality factor, and user experience in Facebook messenger, it can be an effective engaging tool for assessment. (Osorio, 2021) In terms of online video conferencing, Google Meet was preferred by 60% of teachers and students, while Zoom Application was chosen by 40% due to speed, security, reliability, setup, and pricing. (Mobo, 2021)

The concluding section of the instruction provides the opportunity to voice out their suggestion on science teaching applications or software that they want to know. The table below shows the ten most requested science teaching applications or software for capacity building. It shows that the teacher-respondents want to know more about interactive online simulation activities which may supplement the hands-on experiment. Simulation and PhET requested by 23 teachers while PowerPoint was requested by the 15 teachers. Labster and Canva were selected by 9 teachers and online Laboratories was requested by 6 teachers. Edmodo, Game-based Application or Software and Quipper were requested by 5 teacher-respondents. In this study acknowledge the fact the importance of supporting faculty to adapt to new pedagogy and employ modern technology. (APPA, 2020)

Table 6: Most Requested Science Teaching Application or Software for Training

Rank	Science Teaching Application or Software
1.5	Simulation
1.5	PhET
3	PowerPoint
4.5	About Chemistry
4.5	Labster
6	Canva
7	Online Laboratories
9	Edmodo
9	Game-Based Application or software
9	Quipper

Several researches about this software and application such as the interactive computer simulations and virtual or online laboratory simulations (OLS) were published due to their significance and impact to the learners. It has been increasingly integrated and provided evident improvements in science teaching and learning process. It delivers a safe and risk-free environment for students to solve real world problems. (Faizan, Löffler, Heininger, Utesch, & Krcmar, 2019) It is also used for assessment associated with science learning. (Lamb , 2016) It is a practical approach and option for school with a lack of resources in laboratory equipment and apparatus but still achieving effective learning outcomes as traditional laboratory. (Faulconer & Gruss, 2018) (Kumar, 2019)

Quasi-experimental research focus on effects of simulations in learning science education. The study reveals that simulations enhance traditional science education particularly on instructional support in visualization of lesson and laboratory scenario and scientific information. (Rutten & Van Joolingen, 2012) Another research attests that simulation experience provides the students an avenue to be familiarized to the scientific learning environment and apply accurately the essential skills. (Pasquale, 2015) A year after qualitative study published that focus on the designing and assessing the effectiveness of a simulation-based problem-solving teaching instructional material in developing and improving the students’ scientific attitude and problem-solving skills in physics. This research provides evidence that most of the learners solve problems better and are satisfied in using the designed simulation. (Ceberio, Almudi, & Franco, 2016) In 2017, researchers evaluate student experiences and effectiveness on online laboratory courses used in distance learning. This study confirms its effectiveness and efficiency in teaching and learning instruction through their student respondents as a flexible option to complete their science prerequisite. (Rowe, Koban, Davidoff, & Thompson, 2017) During the COVID-19 pandemic, research highlighted the usage of interactive computer simulations and virtual laboratories as learning tools. It also emphasizes the positive response and satisfaction of this learning tool as an alternative form of education. The finding led to the researchers’ recommendation for more technical training in order to implement online laboratory with high efficiency (Müssig, et al., 2020) (Elkhouly, 2021)

Furthermore, research about Physics Education Technology (PhET) is as well-known and influential computer simulation in science, especially in chemistry and

physics. Comparative research performed in Macedonia regarding PhET to the real scientific experiments. The research shows that the Grade 10 students that use computer simulation give more quality skills and knowledge than students conduct real experiment. This is supported with the pre-test and post-test result. (Ajredini, Izairi, & Zajkov, 2013) In the Philippines, numerous articles give emphasizes on the effectiveness of PhET activities to the students. This reveals that there is a noteworthy enhancement to learners' performance in science based on the result of examinations, informal consultation, and feedback. (Batuyong & Antonio, 2018) (Yunzal & Casinillo, 2020) (Taneo & Moleño, 2021) (Mallari & Lumanog, 2020). PhET also integrated to in collaborative creativity learning model, the scaffolding approach, students' conceptual understanding and students' learning independence in physics, and prove its appropriateness and effectiveness in the curriculum. (Astutik & Prahani, 2018) (Eveline, Jumadi, & Kuswanto, 2019) (Yusuf & Widyaningsih, 2019) (Haryadi & Pujiastuti, 2020) Other Multiple researches positively confirm the benefit of using the PhET to understand better the scientific concept of electricity (Prima, Prima, & Sholihin, 2018) (Yuliati, Riantoni, & Mufti, 2018), gas behavior at a submicroscopic level (Correia, Koehler, Thompson, & Phye, 2019), Hooke's law concept (Mizayanti, Halim, Safitri, & Nurfadilla, 2020), and concept of Greenhouse Gas (Ozcan, Çetin, & Koşur, 2020)

With respect to Labster, several articles report the potential benefit of virtual reality laboratory programs as pre-laboratory activity in biology. Student respondents reported feeling remarkably quite comfortable and at ease operating scientific instruments. Teachers on the other hand observed their students joining the program were more motivated and participative in their class discussion with better learning outcome compared to previous years where the program was not used. (Dyrberg, Treusch, & Wiegand, 2016) (Smith & Coleman, 2017) (Rodriguez, 2018) In the season of pandemic teaching, online laboratory abruptly operated as alternative for traditional in-person experiments. Although the virtual lab cannot completely replicate in-person experiments, they are a creative solution for providing students with a valuable and quality scientific remote learning experience. Student respondents reported feeling significantly more confident and at ease operating laboratory equipment. (Delgado, Bhark, & Donahue, 2020) According to a study, in Maryland Action for Drug Discovery and Pharmaceutical Research (MADDPR) Program, 96% of the student participants in virtual camp involve with Labster inspire to pursuing careers in pharmacy and other health related courses. (Karara, Nan, Golderg, & Shukla, 2021)

In education, PowerPoint is a basic tool that is extensively used for presentation a lesson. Some papers emphasize the effectiveness of the use of the PowerPoint to students' academic performance and enhancement of science content visualization. (León & Martínez, 2021) (Twizeyimana, Bihoyiki, & Maniraho, 2021) A comparative experimental study of the use of PowerPoint presentation to conventional lecture in teaching finds out a positive attitude in the use of PowerPoint with a supported data from the results of survey questionnaire and examination. (Ogeyik, 2016) In 2020, researchers discovered that animated presentations improve physics achievement. It also suggests that school officials provide teacher training on how to create and use animated PowerPoint. (Ugwuanyi, Okeke, Nnamani, Obochi, & Obasi, 2020)

When it comes to chemistry software applications on computers, smart phones, or iPods dramatically growing and adopting to provide support and smooth flow teaching and learning process in chemistry as emerging learning tool. (Libman & Huang, 2013) (Lok & Hamzah, 2021) Several studies conducted to determine the usefulness of

these free chemistry mobile application such as, ARMOlVis, SM2 Chem and 3D Sym Op. The results of this research show that these apps were effective to learners frequently using the chemistry apps than those learners that rarely use it, especially in blended learning for student free play. (Ping, Lok, Yeat, Cherynn, & Tan, 2017) Eventually, these leads for several studies emerge in developing quite easy to use, practical and straightforward chemistry applications. (Nazar, Rusman, Putri, & Puspita, 2020) (Walag, Fajardo, Guimary, & Bacarrisas, 2020)

Moreover, game-based application studies flourished as an alternative educational tool in science. Numerous studies reported that science educators were striving to innovate and enhance their digital technology and pedagogical expertise in order to make their digital native students to experience interactive, enjoyable, and engaging science learning on their own devices. (Al-Azawi, Al-Faliti, & Al-Blushi, 2016) (Csaba, Damsa, & Kristóf, 2017) (Brown, Comunale, Wigdahl, & Hartmann, 2018) Effective technology infused games may successfully serve its purpose if it is carefully planned and executed in the classroom. In order to attain the emerge themes such as usefulness of the application, examination preparation, and enjoyment. Academic institutions should take steps to help teachers develop long-term educational innovative performance. (Ravyse, Lennox, & Jordaan, 2018) (Loganathan, Talib, Thoe, Aliyu, & Zawadski, 2019) (Polo, Serrano, Martin, & Antúnez, 2019) (Frøland, Heldal, Sjøholt, & Ersvær) (Kalogiannakis, Papadakis, & Zourmpakis, 2021)

Another software to consider is Canva. It is a drag-and-drop format graphic design tool website that was created in 2012. It offers free photographs, images, filters, icons, shapes, fonts, designs, and templates such as brochure, business card, infographic, and other documents. (Gehred, 2020) Several studies show Canva as a practical tool in developing Inquiry-Based Activity Science Modules (Walsh, 2017), Digital Storytelling in Science Education (Saritepeci, 2020), making the interactive e-Module for Science (Sintawati & Margunayasa, 2021), and online platform for Virus Awareness (Todd & Whitworth, 2021)

Due to rising expectations of using technology and the need to meet the requirements of the 21st century several studies examine the effectiveness and acceptability of the Edmodo as learning application. According to local research in 2014, it is a good learning tool for enhancement of learners' understanding of the concept through active participation in online discussions and tasks with high level of acceptance to the students even though it is time consuming, difficulty in using the app, plagiarism, and internet access. (Enriquez, 2014) Through Attention, Relevance Confidence, and Satisfaction (ARCS) model the researchers discover that students accept the Edmodo and provide them attention, ease of use, confidence, opportunities of learning equally, satisfaction, and improvement in their performance. (Mustafa, 2015) In 2017, an article presents the effectiveness of this in biology within 6 months. The study shows enhancement in students' academic achievements and motivation in biology which led to the recommendation for all teachers should strive their Information and Communication Technology (ICT) competencies in order to provide an adequate demand of digital native students. (Végh, Nagy, Zsigmond, & Elbert, 2017) More studies attest to its effectiveness as a learning tool in Science Education. (Javier & Dirain, 2018) (Toharudin, Fazriyah, Rahmiati, & Damaiani, 2019) (De La Torre, 2019) (Wibowo & Astriawati, 2020)

Quipper is a user-friendly school application that involves creating a meaningful and engaging teaching and learning experiences. It is considered as a knowledge

platform to distribute wisdom and best education inclusively to everyone since 2010. (Quipper Indonesia, 2018) In 2017, the researchers determined the impact of Quipper as a tool for Open Educational Resources (OER) in physics learning. The study states that Quipper and other OER increased learners' motivation on aspect of confidence, attention, and relevance. Quipper provided learning more affordable for students. This led to the recommendation for the necessity for teachers' mastery in using Quipper and other OER. (Sulisworo, Sulisty, & Akhsan, 2017) Another research conducted using Quipper in Blended Learning Method. It states that the application increased learners' understanding of the concept by 26.13% compare to control class of 15.62% and learning independence of 76.78% which considered as self-supporting category. (Wijanayu, Hardyanto, & Isnaeni, 2018) In a small-scale study shows that Quipper also improves learning management of biology learning with average total of 90.22 % and environmental change materials with average of 76.52%. (Khairani & Suyanto, 2018) It also effectively improved learning difficulties of learners about human physiology and other scientific concepts. (Wardyaningrum & Suyanto, 2019) Quipper also applied in hybrid learning which concluded that the application improved the student's proficiency in concept rather than Edmodo application. (Prabowo, Hufad, Tarsidi, & Aprilia, 2019)

Assessment

In accordance with Enhanced Basic Education Act of 2013, the DepEd has issued policies for classroom assessment which published in 2015. Classroom assessment is recognized as an important part of the curriculum and instruction because it allows teachers to track and measure the progress of diverse students. This assessment guideline is used in public schools all over the country. Educational institutions should take steps to help teachers develop long-term educational innovation capacity. (Ogena, et al., 2020) In June 15, 2015, DepEd provided a template for electronic Class Record. This is an official electronic spreadsheet file designed to ensure sustainability and minimize technical difficulty in making grades. (Luistro, DepEd Memorandum No. 60, s. 2015, 2015)

As the uncertainty due to coronavirus disease, educators implemented numerous practices to assess their learners, like calculating grades, checking of attendance, availability of modalities, and feedback. (Cahapay, 2020) They have limited access to students' performance in online assessments, particularly quizzes. It is difficult for teachers to ensure that learners' honesty and desire to accomplished their assignments. (Butnaru, Nita, & Brînza, 2021) Several issues arise on making an effective online assessment which led to this paper's purpose in determining the teachers' confidence in making assessment for different modes of learning. This paper also invites the teacher respondents to critically reflect on their assessment practices in this new normal. By doing so, educators will be able to continue to provide appropriate opportunities for students to demonstrate their learning while also ensuring students' proficiency and learning through transformational changes. (Hong & Moloney, 2020)

It can be gleaned from the table that 'making e-class record' obtained the highest weighted mean result of 3.25. Moreover, the new grading system obtained a weighted mean of 3.00. Lastly, the category of making online assessments obtained the lowest weighted mean of 2.95. The data shows that teachers understand well the use of e-class records in assessing student performance rather than using an online assessment and new grading system.

This study is congruent to the study of (Dellosa, 2014) which stated that the effectivity and usefulness of Microsoft Excel in developing class records electronically to be used as assessment tools of teachers to their students. Moreover, e-class records may be the basis for student outputs, grades, and performances.

Table 7. Self-Evaluation of Teaching-Assessment Related Activities and Concepts

Assessment Related Activities	Level of Understanding					Mean
	1	2	3	4	5	
Making Online Assessment	37	123	158	117	29	2.95
Making an e-class Record	14	106	154	128	62	3.25
New Grading System	24	134	158	116	32	3.00

The figure below shows the bar graph of the teacher’s responses to their self-evaluation for teaching-assessment-related activities and concepts. The bar that skewed to the left is the least level of understanding while the bar graph that skewed to the right is the highest level of understanding of creating an effective assessment in Science in the New Normal.

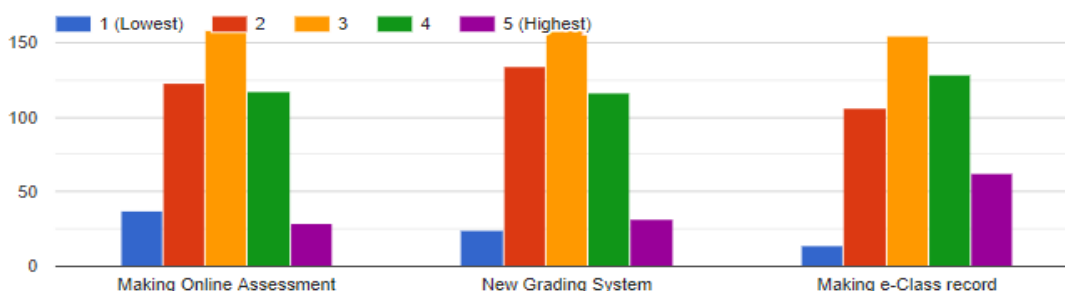


Figure 6. Self-Evaluation of Teaching-Assessment Related Activities and Concepts

In a word, it is crucial for the education stakeholders, especially the teachers to take critical reflection in class assessment practices that will be most meaningful and holistically support learners’ progress. (Briones, DepEd Order No. 031, s. 2020, 2020) According to the National Academy of Education, when assessment is used appropriately, it can assist us in mitigating the impact of the global pandemic for years to come and commence the educational recovery. (Jimenez, 2020) (Bennett, et al., 2021)

Capacity Building

Filipino teachers reported feelings of apprehension, difficulty, and challenges as they transitioned from traditional in-person education to distance learning. (Moralista & Oducado, 2020) To learn to embrace the educational challenges the researchers recognized the importance of teacher capacity building and teacher professional development in order to improve teaching skills in this new normal. It's a way for educators to improve and enhance their pedagogical, technological skills, and abilities, as well as their professional progress, by treating teaching as a lifelong learning process. (Arrieta, Dancel, & Agbisit, 2020) (Lansangan & Gonzales, 2020) (Ancho & Arrieta,

2021) Teaching includes a never-ending pursuit for improvement and knowledge. (Bates & Morgan, 2018) Indeed, during this pandemic educator were exposed to virtual professional learning, video conferencing, and global webinars. (Abdelhafez, 2021) (Caganan & Buenvenida, 2021)

Table 8: Suggested Topics for Capacity Building

Rank	Suggested Topics
1	Learning Delivery -Platform and Software Application
2	Learning Delivery -Teaching Strategies
3	Learning Delivery -Science Laboratory Activities
4	Assessment
5	Content Based
6	Instructional Material and Self-Learning Module Development
7	Coronavirus Disease
8	Stress and Work in the New Normal
9	All Topics
10	Contextualization
12	Most Essential Learning Competencies
12	Research and Science Investigatory Project
12	Teacher Assessment
14.5	Fourth Industrial Revolution and Future Skills
14.5	Learning Delivery -Project Management
17	Curriculum Integration
17	Financial Literacy
17	School Based Management

In this study the following training topics suggested by teacher respondents that they believe would be beneficial to science teachers in this current situation. The data show 82 teachers-respondent (24%) suggest about the online teaching and learning platform and software application, 59 respondents (17.3%) want to be trained about online teaching strategies, and 51 teachers-respondents (14.9%) desires to know about science laboratory activities and experiments for the new normal.

Subsequently, 43 respondents (12.6%) want a training about assessment, 40 teachers (11.7%) suggest training about content-based science topics, and 21 teachers (6.1%) requested a training on the development of instructional material and self-learning module. Then, 12 teachers-respondents (3.5%) desired to know more about coronavirus disease, 7 respondents (2%) suggest a capacity building about coping up with stress in working in the new normal, and 5 respondents (1.5%) like to have all topics that would be beneficial to teachers.

Finally, 4 teachers-respondents (1.2%) suggested about contextualization, 3 respondents (0.9%) on each topic wants to know more about most essential learning competencies (MELCs), research and science investigatory project, and teacher assessment; 2 respondents (0.6%) on each topic suggested about fourth industrial revolution and future skills, and 1 responded (0.3%) on each topic desired to know about curriculum integration, financial literacy, and school-based management.

▪ CONCLUSION

During the global pandemic, the Philippine education system will be recalled as historically challenging and unlike any other school year. (Ogena, et al., 2020) The abrupt transformation from in-person learning to distance modality inspired this study, which intended to identify the gaps and needs of the teachers in science through survey research involving their perceptions in this new normal. The collected data gathered by the researchers from the science teacher respondents provided inputs for policy development and school-based management for science teachers' professional development and capacity-building. Furthermore, this study also significantly provided a list of appropriate technical assistance and development of the capacity-building trainings in response to the diverse school contexts and experiences in the new normal.

Based on the findings of the study, the results showed that the science teachers needed (a) upskilling and reskilling in content-based knowledge and teaching strategies applicable to several identified challenging science topics in this new normal; (b) continuous training on the use of varied online platforms; (c) capacity building on the use of softwares and digital science activities applications; (d) a further enhancement in the following teaching related activities such as creating online assessments, online instructional modules, online class management, online teaching strategies, implementing online netiquette, and crafting the individual learning monitoring plan.

Due to limited teacher respondents in Visayas and Mindanao regions, the researchers highly recommend to rolling out this survey further in to those areas. Moreover, because the focus of this study was on science, this survey should be contextualized for other content subject areas. Finally, the researchers highlight the focus on survey research, the method limitation which did not include interviews of the teachers which could have provided explanations as regards to their choices in the survey.

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