



Philippine Council of Mathematics
Teacher Educators (MATHTED), Inc.

MATHTED 2021

AN INTERNATIONAL CONFERENCE ON MATHEMATICS EDUCATION

13th Biennial and 1st Virtual Conference

in celebration of MATHTED's



*Tracing Roots, Treading New Ground in
Mathematics Teacher Education*

CONFERENCE PROGRAM

October 21-23, 2021 | #MATHTED2021 | #MATHTED25years

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Message from the MATHTED President



It is with sincere joy that I welcome you to the 13th Biennial and 1st Virtual MATHTED Conference with the theme, “Tracing Roots, Treading New Ground in Mathematics Teacher Education.” We chose this theme to look back and recognize the efforts of MATHTED’s founding members and past board members. We also seek the opportunity to develop new directions in research and pedagogy driven by the sudden shift in learning modalities.

MATHTED is committed to pursue the advancement of mathematics education in the Philippines. Through this conference, we aim to provide a venue for colleagues to share challenges faced and insights learned during these uncertain times. We will launch the 2021 issue of MATHTED’s official journal, *Intersection*, and we will announce MATHTED’s new logo. We shall also seek more participation from members through projects that can eventually inform educational policy. And of course, we shall also celebrate 25 years of fulfilling our vision to provide leadership and promote research and collaboration to improve mathematics education in the country.

Through all of these activities, we anticipate this Virtual International Conference to inspire MATHTED members to seek new avenues for excellence in research and education. We also hope to bring together friends and colleagues who have been with MATHTED during the past 25 years. On behalf of the MATHTED National Board and the Conference Organizers, I wish you all a fruitful and meaningful experience during this conference.

Sincerely,

A handwritten signature in black ink that reads "Debbie Verzosa".

DEBBIE MARIE B. VERZOSA

President, MATHTED



Message from the Conference Chair



MATHTED's Biennial Conferences have always been crowd-drawers, not only for their choices of venue but, more importantly, for their rich academic content. This 13th Biennial Conference and 1st Virtual International Conference is no exception. Even as we struggle during this CoVid-19 pandemic, MATHTED 2021 promises to be an unforgettable experience. We may not be meeting at a touristy place but we are together once more, two years since we last met in person, and are virtually connected to each other.

This year marks MATHTED's 25th anniversary since its incorporation. The conference theme, "Tracing Roots, Treading New Ground in Mathematics Teacher Education" is an expression of MATHTED's willingness to confront and overcome the unprecedented challenges it faces in mathematics education and mathematics teacher education while learning valuable lessons from the past. I, therefore, enjoin all of us in MATHTED to renew our commitment to: (1) provide leadership in improving the quality of mathematics teacher education; (2) promote research in mathematics education; (3) facilitate the exchange of best practices in mathematics teacher education and research; (4) foster collaboration with members of other recognized mathematical, scientific, and educational institutions, and; (5) actively organize mathematics education symposia, meetings, conferences and other professional activities.

For MATHTED 2021, we are fortunate to have four outstanding mathematics educators from the Philippines, Australia, USA and Singapore as plenary speakers. I take this opportunity to thank them for their willingness and time to be with us. I am also grateful to all MATHTED members who will be presenting their research and teaching practices through oral presentations and posters as well as to those who will be conducting workshops. I look forward to these enlightening sessions. Despite the limitations, I am proud to say that our scientific program is full -- 39 oral presentations, nine workshops and 14 posters.

On behalf of the National Board, I thank all of you for being loyal members of MATHTED. It was for this reason that we have decided to make this conference exclusive to MATHTED members of good standing. It is our way of showing our deepest gratitude as we all come together in this journey towards a new era.

Mabuhay tayong lahat!

With my best wishes,

Catherine P. Vistro-Yu, EdD
Chair, MATHTED 2021

Message from the Ateneo Teacher Center (ATC) Director



8 October 2021



On behalf of the Ateneo Teacher Center, I would like to congratulate the MATHTED on its 13th Annual Biennial Conference and its first ever virtual conference.

The MATHTED has played a valuable role in elevating the quality of Math education in the country through its various training programs, conferences, and presence as a professional learning community of Mathematics educators discussing current issues in Math education and sharing research and best practices.

The theme of this year's Conference, "Tracing Roots, Treading New Ground in Mathematics Teacher Education" is of particular significance as we share lessons learned from the sudden shift to remote learning which forced educators everywhere to seriously reflect on what mattered most in their teaching and how to teach this given the severe constraints that we all faced. I look forward to MATHTED continuing its leadership role in defining quality Math education that is responsive to students' needs in an uncertain future. I wish you a very successful and productive Conference as your association starts to reimagine Math education in the country in this "next normal."

Sincerely,

A handwritten signature in black ink, appearing to read 'Rita Atienza'.

Rita Atienza

Director,

Ateneo Teacher Center



Message from the Keynote Speaker



MESSAGE

Warmest greetings to the organizers, speakers, and participants of *MATHTED's 13th Biennial Conference and 1st Virtual Conference*.

Our team at the Department of Science and Technology-Science Education Institute (DOST-SEI) supports the Philippine Council of Mathematics Teacher Educators (MATHTED) in this effort to promote research and collaboration among mathematics educators. We hope our country's best scientific minds will take on more active roles as we continue to battle the effects of the pandemic. Let your talent in mathematics shine brighter and be valuable in understanding the surge of information and initiatives related to this pandemic and in reinvigorating various sectors and fields such as agriculture and environmental science.

The theme "Tracing Roots, Treading New Ground in Mathematics Teacher Education" captures the goal to look back and explore, which is very fitting as MATHTED marks its 25th year at a time the education landscape goes through drastic changes. May the ingenuity, brilliance, and perseverance of our mathematics educators in the early years of MATHTED inspire you, and may this spark of inspiration reach your colleagues and students.

I deeply appreciate and commend your efforts to improve skills and initiate collaborations despite the challenges. I encourage you to widen your perspective and soak in the knowledge to be offered by the presenters. The DOST-SEI, as the S&T human resources development agency of the government, continues to hope for a strengthened research and development landscape in the country as well as an improved environment for practicing scientists and engineers and science and mathematics educators.

I congratulate all of you and look forward to the success of this event.

DR. JOSETTE T. BIYO
Director, DOST-SEI

Philippine Council of Mathematics Teacher Educators (MATHTED), Inc.

MATHTED pursues the advancement of mathematics education in the Philippines.

VISION

Provide leadership in improving the quality of mathematics teacher education;
Promote research that will address relevant issues in mathematics education;
Promote research that will address relevant issues in mathematics education;
Encourage and foster collaboration with members of other recognized
mathematical, scientific, and educational institutions.

<http://mathted.weebly.com>
<http://www.facebook.com/mathted>

MEMBERSHIP

You can start being a member, or you may renew your membership through the following steps:

1) Pay the amount of P500 as a membership fee valid for up to 2 years.

Payments can be through any branch of the Bank of the Philippine Islands (BPI) nearest you or by bank transfer, deposit the amount to :

Account Name: Philippine Council of Mathematics Teacher Educators (MATHTED), Inc.

Account Number: 3080-0048-25 (Checking account)

2) Send a copy of the deposit/payment slip (with your name, date, and time of successful transaction) by email to:

Membership and Secretariat Committee

MATHTED, Inc.

Email: mathted1996@gmail.com

Subject: **Membership Registration Fee**

3) Create or update your membership profile by completing the profile sheet through the link

<http://mathted.weebly.com/membership.html>



INTERSECTION

The Official Journal of MATHTED

Intersection welcomes articles detailing qualitative and/or quantitative research on mathematics education, expositions on applications of mathematics education to various fields of endeavor, review of educational resources (print, multimedia, etc), and reflections on teaching and learning Mathematics.

Contributions should be addressed to Intersection (c/o MATHTED), Ateneo de Manila University Mathematics Department, Loyola Heights, Quezon City 1128, Philippines. Papers should be double-spaced, with wide margins. Inquiries may be sent through electronic mail: mathted.intersection@gmail.com

Submission of a paper assumes that it contains nothing libelous nor infringes copyright. All material is peer-reviewed. Authors will normally receive a decision regarding their paper within six months of receipt. When a material is accepted for publication, it is agreed that the copyright belongs to the publisher.

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PHILIPPINES

Volume 14 Issue 1-2 of Intersection is available [online](#).

Articles in this issue

Learning Probability through Video Lecturers: What can we learn from YouTube Analytics

Jerryco M. Jaurigue

DOBRA: Gamifying My Algebra Online Class

Leopoldo B. Laset Jr. &
Pol Niño E. Laset

Blended Learning Models in Schoology: Effects on Students' Mathematics Achievements and Perception

Mark Joseph L. Mendoza & Minie Rose C. Lapinid

Exploring Emergent Tasks in Sustaining Mathematics Interests in the Classroom: Reflections on the 10th Young European Society for Research

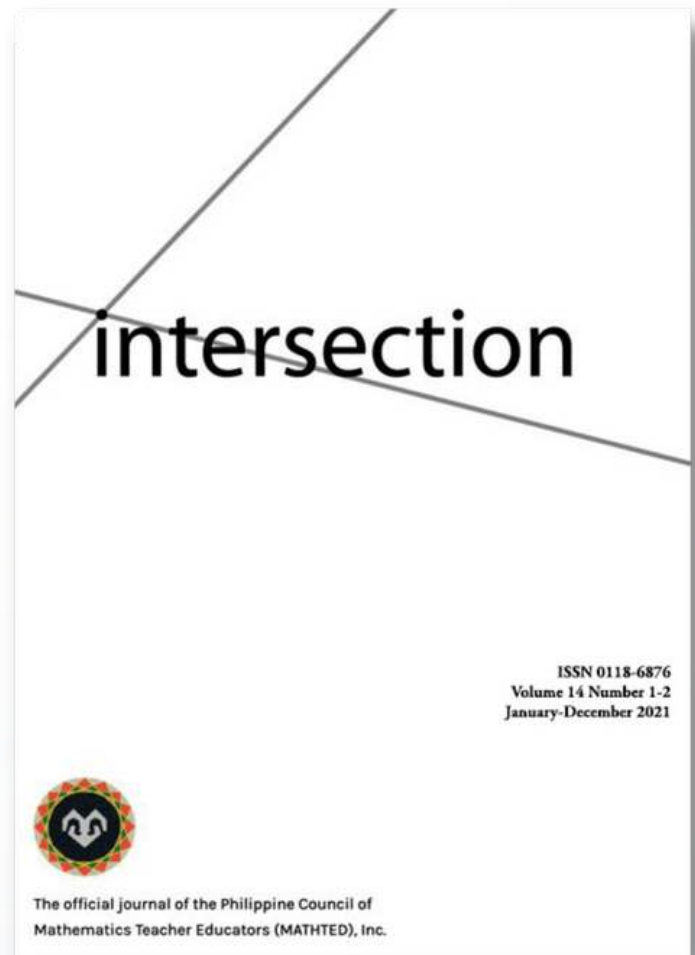
Gily M. Aguilos & Vitus Paul L. de Jesus

Linguistic Relativity, Cognitive Restructuring, and the Mathematical Thinking of Chinese Filipinos

Lester C. Hao & Romina Ann S. Yap

Influence of Professional Beliefs to Cognitive Ability of Philippine-and US-Based Filipino Mathematics Teachers

Virginia R. Arceo & Ma. Nympha B. Joaquin





About MATHTED 2021

In the pursuit of its mission for the advancement of mathematics education in the Philippines, MATHTED holds this conference that features plenary talks, workshops, and presentations of educators who have been doing research in mathematics teaching and learning in the country.

The conference is designed to:

1. apprise participants of distance learning trends in mathematics,
2. serve as a venue for sharing knowledge, effective practices, and experiences in teaching mathematics to students and teachers at this time of the pandemic,
3. provide novel ideas and tools in mathematics education research, and
4. strengthen the MATHTED members' commitment to contribute to the development of mathematics teacher education and mathematics education in the Philippines.

The 13th Biennial and 1st Virtual International Conference of MATHTED will grant Continuing Professional Development (CPD) Credit Units upon approval

through the



Ateneo de Manila University
ATENEO TEACHER CENTER (ATC)
Accredited CPD Provider | Accreditation No.: PTR-2021-315

Conference Schedule

Philippine Standard Time	October 21, 2021	October 22, 2021	October 23, 2021
8:30-9:00			
9:00-9:30	Opening Ceremony Master of Ceremony Dr. Lovella Divinagracia	Plenary 2 Dr. Sven Trenholm University of South Australia Moderator Prof. Jose Maribbay	Plenary 3 Dr. Ferdie Rivera San Jose State University Moderator Dr. Celina Sarmiento
9:30-10:00		BREAK	BREAK
10:00-10:30	Introduction Dr. Evangeline Golla Keynote Dr. Josette Biyo DOST-SEI	Workshops (WS01 to WS 09)	Plenary 4 Dr. Berinderjeet Kaur National Institute of Education Moderator Dr. Debbie Marie Verzosa
10:30-11:00	BREAK		
11:00-12:00	Plenary 1 Dr. Auxencia Limjap De La Salle University and Jose Rizal University Moderator Dr. Lovella Divinagracia		Highlights/Reports from Discussion Groups Moderator Dr. Catherine Vistro-Yu
12:00-1:30	BREAK		
1:30-3:30	Discussion Groups (DG01 to DG12)	MATHTED Business Meeting	25th Anniversary Celebration/ Closing Ceremony Master of Ceremonies Dr. Gladys Nivera
On your own time	Pre-recorded Paper/ Poster Presentations	Pre-recorded Paper/ Poster Presentations	Pre-recorded Paper/ Poster Presentations

MATHTED 2021 features both synchronous and asynchronous online activities.

The synchronous sessions, comprising of the Opening and Closing Ceremonies, Keynote Address, Plenary Lectures, Discussion Groups, and Workshops, will utilize Zoom as the videoconferencing platform. The Zoom links to these sessions are compiled on [Pages 17-19](#).

Meanwhile, the pre-recorded video presentations of accepted papers and posters comprise the asynchronous aspect of the conference. These are uploaded in MyOpenMath and may be viewed by the participants during their preferred time. Interaction with presenters can be conducted through the comments section of each video presentation. More information on MyOpenMath is presented on [Page 20](#).



Conference Guidelines and Reminders

All registered participants must open an account with MyOpenMath and register in the course MATHTED 2021 to get the full benefits of the conference.

Synchronous Sessions

1. To enter the Zoom virtual room, ensure that your username matches your registered name in MATHTED 2021.
2. Enter the virtual room 5 minutes before the session starts. As soon as you are connected, mute your microphone and, if your bandwidth allows, keep your video cameras on. Leave the room as soon as the session ends.
3. Test your microphone and speaker before every session to avoid delays when you wish to speak.
4. Keep your microphones turned off unless you have been acknowledged by the moderator to speak. The chatbox will stay open for comments and questions throughout the session. Refrain from writing content that is irrelevant to the session. Do not overuse the chatbox. If you want to speak, click on the 'raise hand' button. Click on the 'lower hand' button when finished.
5. Be mindful of the language you use in the chatbox and during the Open Forum. MATHTED will not tolerate any language or expression that disrespects or maligns other participants' opinions.
6. Observe proper decorum. Be as polite as you are in person. Respect other participants' privacy.
7. Should you have any connection problems, send a message to the helplines:

Mobile numbers: 09173121366 / 09228842656 / 09565147137

Attention to: MATHTED 2021 Conference Secretariat

Message: (Kindly indicate the complete name of the participant, concern, and session code)

Discussion Groups

1. All registered participants have been pre-assigned to a discussion group. See [Pages 27-29](#) for your discussion group assignment.
2. Use the link assigned to your group.
3. Should you have any problems joining the discussion group assigned to you, send a message to the helplines.

Workshops

1. Registration for workshops is on a first-come, first-serve basis as there are limited slots per workshop.
2. The registration period is on October 21, 2021, from 12 PM until 6 PM only.
3. The registration form is found in MyOpenMath's Workshops section.
4. After you sign up, the zoom link will be sent to your email before 8 AM on October 22. Make sure to check your spam folder, in case you don't receive the link.
5. Make sure to attend the workshop you signed up for.

Asynchronous Sessions

1. Your LMS account is yours alone. Do not lend it to others.
2. Participate actively in the asynchronous sessions by sharing your insights in any video and/or poster presentation that you view.
3. Respect the authors and creators of the presentations. Refrain from recording or reproducing any of their materials without permission.

Certificates and CPD Requirements

1. All registered participants will receive the Certificate of Participation.
2. All registered participants who were assigned official tasks before, during, or after the conference will receive a Certificate of Active Participation.
3. All presenters and workshop facilitators will receive a Certificate of Presentation.
4. All participants who satisfy the attendance and participation requirements for CPD points will receive a Certificate of Completion and will be granted CPD points upon approval by ATC. The requirements are as follows:
 - a. Attend or join the following:
 - i. Opening Ceremony
 - ii. All 4 Plenary Talks
 - iii. One Discussion Group
 - iv. One Workshop
 - v. MATHTED Business Meeting
 - vi. Highlights/Reports from Discussion Groups
 - vii. MATHTED Anniversary Celebration
 - b. View 6 Paper Presentation Videos and complete the feedback forms
 - c. View 3 Posters and complete the feedback form



Synchronous Sessions: Zoom

Zoom is a communications platform founded in 2011 and is headquartered in San Jose, California. A publicly traded company (NASDAQ:ZM), Zoom offers a wide range of communication features that have video as their foundation. It is one of the choice online conferencing applications for institutions and individuals alike. For more information about Zoom and its features, you may visit their [Frequently Asked Questions](#) page.

Adapted from <https://explore.zoom.us/en/about/>

Zoom Links

Opening Ceremony and Keynote Address (October 21, 2021; 9:00AM to 10:30AM)

Plenary Lecture 1 (October 21, 2021; 11:00AM to 12:00PM)

Plenary Lecture 2 (October 22, 2021; 8:30AM to 9:30AM)

Plenary Lecture 3 (October 23, 2021; 8:30AM to 9:30AM)

Plenary Lecture 4 (October 23, 2021; 10AM to 11:00AM)

Highlights from Discussion Groups (October 23, 2021; 11:00AM to 12:00PM)

Closing Ceremony (October 23, 2021; 1:30PM to 3:30PM)

<https://us02web.zoom.us/join/join?meetingid=84121631687&passcode=MATHTED25>

(Link to actual Zoom session will be sent via email after successful registration through the given link above.)

Meeting ID: 841 2163 1687 | Passcode: MATHTED25

Discussion Groups (October 21, 2021; 1:30PM to 3:30PM)

DG01: Kindergarten to Grade 3

<https://up-edu.zoom.us/j/87651681535>

Meeting ID: 876 5168 1535 | Passcode: 14724550

DG02: Grades 4 to 6

<https://pnu-edu-ph.zoom.us/j/97803286072?pwd=V2FiSEpWd0pmS3VQMXptSUplYU1DUT09>

Meeting ID: 978 0328 6072 | Passcode: 540690

DG03: Grades 7 to 10 (A)

<https://pnu-edu-ph.zoom.us/j/95635540081?pwd=MjY0UlhxZlZwYVhaOEJhUTRVZXJPUT09>

Meeting ID: 956 3554 0081 | Passcode: 462155

DG04: Grades 7 to 10 (B)

<https://us02web.zoom.us/j/87220749926?pwd=N3RMaENoTDVLYTNTdG5pUUc0azhFUT09>

Meeting ID: 872 2074 9926 | Passcode: MATH_DG04

DG05: Grades 7 to 10 (C)

<https://pnu-edu-ph.zoom.us/j/95635540081?pwd=MjY0UlhxZlZwYVhaOEJhUTRVZXJPUT09>

Meeting ID: 956 3554 0081 | Passcode: 462155

Conference Helplines

09173121366

09228842656

09565147137

Discussion Groups (October 21, 2021; 1:30PM to 3:30PM)

DG06: Grades II and 12 (A)

<https://pnu-edu-ph.zoom.us/j/98327736594?pwd=WHdZcXE4NGlNaDhPRkVoYjRpSWlFdz09>

Meeting ID: 983 2773 6594 | Passcode: MATHTED_DG

DG07: Grades II and 12 (B)

<https://us04web.zoom.us/j/72719092837?pwd=Q0t6UU5nMVIeFenRaNlB4NmMvMkJFZz09>

Meeting ID: 727 1909 2837 | Passcode: MATH_DG07

DG08: Tertiary (A)

<https://us02web.zoom.us/j/84749351682?pwd=UUJhUDRBMm1lVktxWUJhbTR3WkYJYdz09>

Meeting ID: 847 4935 1682 | Passcode: 648565

DG09: Tertiary (B)

<https://us02web.zoom.us/j/85961344210?pwd=ait2QUVINDA0TmNEdkFuVlVUQWpWQT09>

Meeting ID: 859 6134 4210 | Passcode: 626407

DG10: Tertiary (C)

<https://up-edu.zoom.us/j/84019345087>

Meeting ID: 840 1934 5087 | Passcode: DG10Math

DG11: Tertiary (D)

<https://ateneo-edu.zoom.us/j/81933507120?pwd=bXIzcUxSZnd2N1hVRldlQzYvcEI3QT09>

Meeting ID: 819 3350 7120 | Passcode: 171840

DG12: Graduate School

<https://ateneo-edu.zoom.us/j/89346713941?pwd=LlIjQmVhVGV5dkNoTnlERjllYVFWZz09>

Meeting ID: 893 4671 3941 | Passcode: 977654

Workshops (October 22, 2021; 10:00AM to 12:00PM)

WS01: Addressing Difficulty in Calculus Limits using Dynamic Geometry Software (DGS)

<https://ateneo-edu.zoom.us/j/84461984188?pwd=QzVrK2ZSbWR6UzJvNUVONkkraS9odz09>

Meeting ID: 844 6198 4188 | Passcode: 476822

***WS02: Argumentative Discourse-Centered Classroom
to Hone Students' Mathematical Comprehension and Confidence***

<https://ateneo-edu.zoom.us/j/84240690662?pwd%3DaERaYTRWS2RxY3FQSTd4dGFNandsZz09>

Meeting ID: 842 4069 0662 | Passcode: E9Ce5mCD

***WS03: Development and Validation of Gamified Mobile Courseware
for Senior High School Statistics and Probability***

<https://us02web.zoom.us/j/87535909864?pwd=bk9jaGwwb0RtNkhsbjAyeFlhWVRVUT09>

Meeting ID: 875 3590 9864 | Passcode: 830213

Conference Helplines

09173121366

09228842656

09565147137



Zoom Links

Workshops (October 22, 2021; 10:00AM to 12:00PM)

WS04: Dobra: Gamifying my Algebra Online Class

<https://pnu-edu-ph.zoom.us/j/3249525171?pwd=V3VsYmc4RFBqT25iSG9JQ2M4bXhHdz09>

Meeting ID: 324 952 5171 | Passcode: MATHTED_WS

WS05: Implementing A Theory-Based Metacognitive Alternative Assessment in Grade 8 Mathematics during the Covid-19 Pandemic

<https://up-edu.zoom.us/j/87651681535>

Meeting ID: 876 5168 1535 | Passcode: 14724550

WS06: Learning Probability Through Video Lectures: What can we learn from Youtube Analytics?

<https://ateneo-edu.zoom.us/j/81933507120?pwd=bXIzcUxSZnd2N1hVRldlQzYvcEI3QT09>

Meeting ID: 819 3350 7120 | Passcode: 171840

WS07: Tangram Proficiency Leading to Numeracy Skills Enhancement

<https://us02web.zoom.us/j/84749351682?pwd=UUJhUDRBMm11VktxWUJhbTR3WkJKYdz09>

Meeting ID: 847 4935 1682 | Passcode: 648565

WS08: Tarsia Formulator: A Gamification Tool in the New Normal

<https://us02web.zoom.us/j/86135235509?pwd=a2VyZkVRUForWmtKZVIwVktjWklyZz09>

Meeting ID: 861 3523 5509 | Passcode: MATH_WS08

WS09: Calculator Emulator and Casio Education

<https://pnu-edu-ph.zoom.us/j/96086312823?pwd=WThJVElWVFZRRURDOFQvRnRKSskZjZz09>

Meeting ID: 960 8631 2823 | Passcode: 964302

Asynchronous Sessions: MyOpenMath

MyOpenMath is an online course management and assessment system for mathematics and other quantitative fields. MyOpenMath’s focus is providing rich algorithmically generated assessment to support the use of free and open textbooks. This powerful tool is likewise a platform with a collaborative community of users. It provides managed hosting of the open source IMathAS online assessment software. There are questions and pre-built courses, which are all created by faculty in the user community and shared with others in the spirit of openness. Additionally, experienced users provide peer-to-peer support through discussion forums.

MyOpenMath.com is operated by the non-profit organization MyOpenMath, and is supported in part by financial and in-kind contributions from corporate sponsors, Lumen Learning and XYZ Homework.

Adapted from <https://www.myopenmath.com/info/aboutus.php>

Instructions for Participants

1. Go to <https://www.myopenmath.com/>
2. Click "Register as a new student". (Figure A)
3. Enter your information (Figure B). You can choose your own username (as long as it is available).
For Course ID, type **115807**; for Enrollment key, type **mathted2021conference**.
4. Log in to MyOpenMath using the username and password you created. (Figure C)
5. Click "MATHTED 2021" to access the conference. (Figure D)

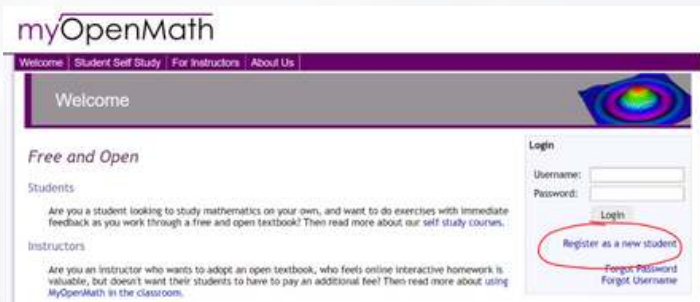


Figure A

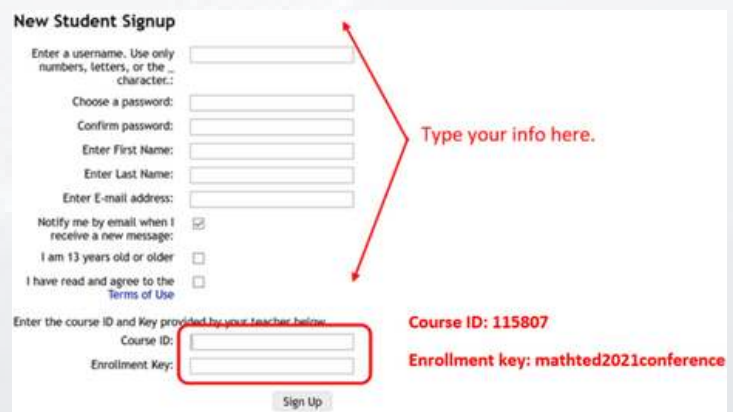


Figure B

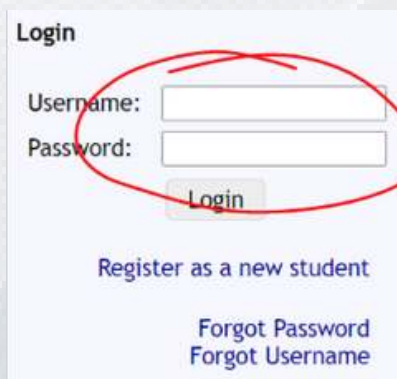


Figure C



Figure D



Plenary Lectures

Plenary Lecture 1

October 21, 2021 | 11:00AM - 12:00PM

[https://us02web.zoom.us/meeting/register/tZAsdeiurTosEtMMxyEZNHudmPIBxQ-dP8ko](https://us02web.zoom.us/join/https://us02web.zoom.us/meeting/register/tZAsdeiurTosEtMMxyEZNHudmPIBxQ-dP8ko)

Meeting ID: 841 2163 1687

Password: MATHTED25

A HISTORICAL PERSPECTIVE ON MATHTED'S TEACHER PROFESSIONAL DEVELOPMENT INITIATIVES THAT SHAPE FUTURE ENDEAVORS



Dr. Auxencia Limjap

Jose Rizal University and De La Salle University

The Philippine Council of Mathematics Teacher Educators, MATHTED, Inc., was founded in 1996 by a group of esteemed mathematics educators. Among the prime movers are Dr. Catherine Vistro-Yu, Prof. Josefina Fonacier, Dr. Evangeline Golla, and Dr. Flordeliza Francisco. With the primary goal of promoting teacher professional development in the field of mathematics education, it launched national conferences and seminars that provide a venue for mathematics teachers in the basic education and tertiary levels to share their best practices, and their pedagogical insights on trends, issues, and innovations that can contribute to the improvement of mathematics education in our country and abroad. As a former president of MATHTED in 2001-2003, I was tasked to trace the roots of the organization on its 25th year that will enlighten all members on what future direction it can take.

As a professional community of mathematics educators, MATHTED has kept a collegial relationship among the founders, past officers and board members, and regular members. It values the wisdom of the past leaders and members and welcomes fresh ideas of the current officers and new members. I thought it best to get the insights and perspectives of the prime movers and past leaders regarding how they envisioned the organization in the past and what role the organization can play in the Teacher Professional Development programs of the future, in a volatile, uncertain, complex and ambiguous world. As we anticipate issues and shape the conditions in the new normal and beyond, try to understand the consequences of the issues and actions we intend to take, while finding coherence and clarity in aligning our expectations to our understanding, we need to prepare, interpret, and address new opportunities (Mansipang, 2021; Skidmore, 2020; Hadar et al., 2020). We need to listen to the voice of influence of those who assumed the most crucial leadership roles when they served the MATHTED organization.

I will present video clips on the interviews and refer to secondary sources to draw inferences that can shape the future Teacher Professional Development Program for Mathematics Educators that MATHTED can envision to undertake in the next 25 years.

Plenary Lecture 2

October 22, 2021 | 8:30AM - 9:30AM

<https://us02web.zoom.us/join/ztAsdeiurTosEtMMxyEZNHudmPIBxQ-dP8ko>

Meeting ID: 841 2163 1687

Password: MATHTED25

**FULLY ONLINE TEACHING AND LEARNING OF MATHEMATICS:
A VIEW OF CURRENT RESEARCH AND DEVELOPMENT EFFORTS****Dr. Sven Trenholm**

University of South Australia

There is little doubt the creation of the internet has transformed the way education is being delivered in the modern era. With regards to fully online teaching and learning, the online medium presents both opportunities and challenges for mathematics educators.

In this talk, I summarise my own related research work, conducted over the last two decades, with an eye to disentangling the hype from the reality and providing one view of the future of fully online teaching and learning of mathematics.



Plenary Lecture 3

October 23, 2021 | 8:30AM - 9:30AM

<https://us02web.zoom.us/join/84121631687>

Meeting ID: 841 2163 1687

Password: MATHTED25

DEEPENING STUDENTS' UNDERSTANDING OF, AND PURPOSE FOR LEARNING, SCHOOL MATHEMATICS: EXPLORING STANDARDS FOR MATHEMATICAL PRACTICE AND CULTURALLY RELEVANT MATHEMATICS INSTRUCTION FOR LONG-TERM IMPACT



Dr. Ferdie Rivera

San Jose State University, USA

When the Philippine educational system transitioned to the K-12 Basic Education Curriculum, new guides and instructional, curriculum, and pedagogical frameworks were also developed to support successful and effective implementation at scale. As a way of providing conceptual support for all these changes that are currently taking place, this plenary presentation will provide Filipino math teachers and educators with an opportunity to learn about the US Common Core State Standards for mathematical practice, which is slowly changing the way US teachers teach mathematics, from covering content objectives and goals to implementing content-practice lessons that support deep understanding of mathematics. The development and institutionalization of the US Common Core State State Standards in Mathematics in all schools across the country exemplifies how subject matter curriculum that is built around learning progressions and the articulation of subject-specific practices go hand in hand in deepening roots and fostering new grounds for teaching and learning school mathematics. In this presentation, Filipino math teachers and educators will also learn what it means to develop and implement math lessons that are culturally relevant as a way of increasing relevance and supporting social justice-minded learners. This plenary session closes with some implications in learning, assessment, and research for lasting change and long-term impact.

Plenary Lecture 4

October 23, 2021 | 10:00AM - 11:00AM

<https://us02web.zoom.us/join/9101474315>

Meeting ID: 841 2163 1687

Password: MATHTED25

**CLASSROOM STUDIES – INSIGHTS FROM THE LESSONS OF
SECONDARY SCHOOL MATHEMATICS TEACHERS IN SINGAPORE****Dr. Berinderjeet Kaur**

National Institute of Education, Singapore

In this lecture I will draw on a recently completed research project and share with participants distinct features of classroom practice of mathematics teachers in Singapore secondary schools. This will dispel myths that in Asian mathematics classrooms "instruction is very much teacher dominated and student involvement minimal. ... [Students are] required to engage in ample practice of mathematical skills, mostly without thorough understanding." The DNA of mathematics lessons will be presented and teachers' conceptions of "mastery learning" illuminated.



Discussion Groups

The Discussion Groups will provide a venue for the participants of the conference to share their experiences on the teaching and learning of Mathematics in the midst of the COVID-19 pandemic. Participants have been pre-assigned to their respective groups; kindly see the list from Pages 27 to 29.

Synchronous Parallel Sessions

October 21, 2021 | 1:30PM - 3:30PM

Reserve Facilitators: Dr. Rosemarievic Villena-Diaz and Dr. Erminda Fortes

DISCUSSION GROUP 1 (DG01): KINDERGARTEN TO GRADE 3

Facilitator: Dr. Lovella Divinagracia

Documenter: Mr. Anthony P. Gran, Jr.

<https://up-edu.zoom.us/j/87651681535>

Meeting ID: 876 5168 1535 | Passcode: 14724550

DISCUSSION GROUP 2 (DG02): GRADES 4 TO 6

Facilitator: Dr. Gladys Nivera

Documenter: Ms. Jenny Lou Bermejo

<https://pnu-edu-ph.zoom.us/j/97803286072?pwd=V2FiSEpWd0pmS3VQMXptSUplYU1DUT09>

Meeting ID: 978 0328 6072 | Passcode: 540690

DISCUSSION GROUP 3 (DG03): GRADES 7 TO 10 (A)

Facilitator: Dr. Mary Jane Castilla

Documenter: Mr. Mark Lester Garcia

<https://pnu-edu-ph.zoom.us/j/95635540081?pwd=MjY0UlhxZlZwYVhaOEJhUTRVZXJPUT09>

Meeting ID: 956 3554 0081 | Passcode: 462155

DISCUSSION GROUP 4 (DG04): GRADES 7 TO 10 (B)

Facilitator: Prof. Osbert Bryan Villasis

Documenter: Mr. Dennis Lee Jarvis Ybañez

<https://us02web.zoom.us/j/87220749926?pwd=N3RMaENoTDVLYTNTdG5pUUc0azhFUT09>

Meeting ID: 872 2074 9926 | Passcode: MATH_DG04

DISCUSSION GROUP 5 (DG05): GRADES 7 TO 10 (C)

Facilitator: Prof. Jose Maribbay

Documenter: Ms. Angelica Ortega

<https://pnu-edu-ph.zoom.us/j/95635540081?pwd=MjY0UlhxZlZwYVhaOEJhUTRVZXJPUT09>

Meeting ID: 956 3554 0081 | Passcode: 462155

Conference Helplines

09173121366

09228842656

09565147137

DISCUSSION GROUP 6 (DG06): GRADES 11 AND 12 (A)

Facilitator: Dr. Rosemarievic Diaz

Documenter: Ms. Celine Grace Gerilla

<https://pnu-edu-ph.zoom.us/j/98327736594?pwd=WHdZcXE4NGlNaDhPRkVoYjRpSWlFdz09>

Meeting ID: 983 2773 6594 | Passcode: MATHTED_DG

DISCUSSION GROUP 7 (DG07): GRADES 11 AND 12 (B)

Facilitator: Dr. Evangeline Golla / Dr. Joseph Simon Madriñan

Documenter: Mr. Mark Benedick Chavez

<https://us04web.zoom.us/j/72719092837?pwd=Q0t6UU5nMVlFenRaNlB4NmMvMkJFZz09>

Meeting ID: 727 1909 2837 | Passcode: MATH_DG07

DISCUSSION GROUP 8 (DG08): TERTIARY (A)

Facilitator: Dr. Flordeliza Francisco

Documenter: Ms. Guinever Vera

<https://us02web.zoom.us/j/84749351682?pwd=UUJhUDRBMm1lVktxWUJhbTR3WkJYdz09>

Meeting ID: 847 4935 1682 | Passcode: 648565

DISCUSSION GROUP 9 (DG09): TERTIARY (B)

Facilitator: Dr. Debbie Marie Verzosa

Documenter: Mr. Adam Julian Che

<https://us02web.zoom.us/j/85961344210?pwd=ait2QUVINDA0TmNEdkFuVlVUQWpWQT09>

Meeting ID: 859 6134 4210 | Passcode: 626407

DISCUSSION GROUP 10 (DG10): TERTIARY (C)

Facilitator: Dr. Nympha Joaquin

Documenter: Ms. Ruth Joy Magno

<https://up-edu.zoom.us/j/84019345087>

Meeting ID: 840 1934 5087 | Passcode: DG10Math

DISCUSSION GROUP 11 (DG11): TERTIARY (D)

Facilitator: Dr. Maria Alva Aberin

Documenter: Mr. Vitus Paul de Jesus

<https://ateneo-edu.zoom.us/j/81933507120?pwd=bXlZcUxSZnd2N1hVRLdIQzYvcEI3QT09>

Meeting ID: 819 3350 7120 | Passcode: 171840

DISCUSSION GROUP 12 (DG12): GRADUATE SCHOOL

Facilitator: Dr. Catherine Vistro-Yu

Documenter: Ms. Gily Aguilos

<https://ateneo-edu.zoom.us/j/89346713941?pwd=LlIjQmVlVGV5dkNoTnlERjllYVFWZz09>

Meeting ID: 893 4671 3941 | Passcode: 977654



Discussion Groups 1-4 Assignments

DG01

Baltazar, J. I.
Doño, H. L.
Laset Jr., L.
Santos, M. D. C.
Tan, R. G.

DG02

Alagos, D. K. B.
Arroyo, G. M. G.
Asis, R. C.
Bacabac, M. A. A.
Casipong, A. M.
Delos Santos, M. S. M.
Falcatan, A. R. F.
Garces, I. J. L.
Liangco, M. M.
Magat Jr., R. B.
Marquez, R. S.
Sayson, M. C.

DG03

Aguilar, M. O. O.
Aguilor, A. M. T.
Alegre, H. C.
Arceo, V. R.
Berou, M. L.
Bueno, M.
Carandang, E. S. P.
Clemente, W. B. E.
Corral, M. C. J. D.
Cruz, M. L. A.
De Jesus, V. P. L.
Dela Cruz, D. J. T.
Despacio, J. F. V.
Espartero, V. D.
Idosora, E. N.
Italia, M. J. N.
Jaurigue, J. M.
Lasac-Chen, L.
Laset, P. N. E.
Ledesma, J. P.
Lucas, M. I. T.
Mangabat, M. C. Q.
Matias, M. J. E.
Melchor, P. J. M.
Miranda, C. N.
Ongcoy, P. J. B.
Pasiliao, A. R.
Refugio, E. M.
Rellon, L. R. S.
Romero, V. M. C.
Rosales, R. J.
Santiago, Z. E.
Veluya, R. P.
Victorio, C. N.

DG04

Andrada, G. D.
Balog, H. A.
Basco, L. V.
Cabus, C. E.
Che, A. J. L.
Dacanay, D. C.
Dahon, M. D. P.
Florece, S. B.
Flores, E. E.
Fortes, E. C.
Guita, G. B.
Hao, L. C.
Herera, I. P.
Joson, M. C. M.
Leyson, G. D.
Macam, M.
Mallari, K. G.
Mancera, N. C.
Pante, T. O.
Piamonte, R. J. C.
Placino, R. S.
Quevedo, C. O. G.
Reamosio, H. P. A.
Reyes, F. A.
Salansang, M. V. G.
Tabing, T. K. S.
Talusán, M. P.
Tolang, J. E.
Travero, A. S.
Valladolid, L. M.
Villavicencio, A. D.
Yn, G. U.

Discussion Groups 5-8 Assignments

DG05

Abarete, R. A.
 Balbio, M. V. C.
 Balubar, O. T.
 Cabello, L. P.
 Castilla, M. J. A.
 Corona, H. P.
 Cunanan, C. P. M.
 Denso, J. H. F.
 Dimasuay, L. B.
 Gacis, R. J. M.
 Garingan Jr, P. J. T.
 Gozun, C. M.
 Gran Jr., A. P.
 Ignacio, R. L.
 Layague Jr., R. H.
 Macalintal, C. C.
 Macapagal, L. S.
 Maniulit, J. J.
 Marasigan, N. V.
 Oabina, C. D.
 Ochia, M. A. P.
 Oledan, A. M. B.
 Pia, P. G. M.
 Quito, R. D.
 Reyes, M. C. D.
 Santos, E. J. C.
 Sedigo, A. I.
 Sia, A-L. D.
 Sicut, M. C. A.
 Ticar, M. A. J.
 Valenzuela, K. J. O.
 Vidad, D. C.

DG06

Adamos, J. L.
 Agawin, M. P.
 Bacosa, D. P.
 Cannaoay, A. B.
 Cano, J. C.
 Dela Cruz, N. N.
 Dulce, C. R.
 Espiritu Jr., M. L.
 Gaylo, D. N.
 Gerilla, C. G. M.
 Hortelano, J. T.
 Lapinid, M. R. C.
 Lomibao, L. S.
 Macapagal, N. R.
 Manalang, R. F.
 Medina, J. B.
 Ortega, A. M.
 Ortega, I. G.
 Pascual, E. A.
 Petancio, J. A. M.
 Ramos, R. A.
 Roble, D. B.
 San Miguel, N. V.
 Santos, J. V. L.
 Seña, J. R. E.
 Sumagui, J. R. O.
 Unay, O. D. G.

DG07

Arabe Jr., R. B.
 Arigo, J. P. R.
 Ayaay, M. J. V.
 Bagnol, J. R. V.
 Balantes, C. M. B.
 Bayudan, K. J.
 Bravo-Panen, V.
 Catalan, G. T.
 Chavez, M. B. B.
 Cunanan, J. G. S.
 Dacoco, J. L. N.
 Equias, R. W. V.
 Ferrer, F. B.
 Girao, J. A.
 Latican, A. T.
 Lepasana, M. J.
 Mallari, I. L. C.
 Manalaysay, E. G.
 Mandia, R. C.
 Nicolas, M. J. M. A.
 Perez, M. T.
 Plan, E. L. C. M.
 Saulo, J. V.
 Tanjeco, K. A.
 Tidula, T. J. T.
 Villasis, O. B. T.
 Yumul, R. S.

DG08

Asuncion, V. J.
 Bayron, D. M. S.
 Bermejo, J. L. A.
 Cabanalan, J. F. A.
 Calpa, M. J. B.
 Cruz, V. D.
 Dalisay, T. T.
 Dinglasa, F. A. O.
 Estrella, B. M.
 Gagaza, M. A.
 Lumayod, H.
 Madrinan, J. S. V.
 Magat, M. E. R.
 Matias, C. J. O.
 Nadal, A. F.
 Ocampo, R. P.
 Pelayo, E. O.
 Plantado, J. C.
 Reblando, K. M.
 Remata, H. R.
 Rodriguez, J. S. U.
 Sanchez, J.
 Tabi, G. D.
 Tagra, G. G. C.
 Valencia, H. B.
 Vargas, E. A. I.
 Villanueva, A. C.
 Wariza Jr., R. E.
 Zantua, J. A. V.



Discussion Groups 9-12 Assignments

DG09

Acuña, I. E.
 Alejan, R. O.
 Ambid, A.
 Amorio, S. M. G.
 Arañez, E. M. B.
 Bacatan, R. J. P.
 Batrina, J. C.
 Belila-Miyas, A.
 Cerrado, P. M. Y.
 Curaraton, E. P.
 Dela Cruz, C-A.
 Gabrinao, J. C.
 Gonowon, R. R.
 Hortelano, J. C. C.
 Lanuza, M. H.
 Lao, D. B. C.
 Leyco Jr., P. P.
 Luib, J. R. T.
 Malana, J.
 Montajes, M. P.
 Nillas, L. A.
 Orig, M. J.
 Osorio, A. B.
 Rivera, J. K. M.
 Sadol, G. B.
 Sudara, P. A. S.
 Vargas, M. A.

DG10

Aala-Capuno, M. L.
 Abayata, A. M.
 Almojera, R. P.
 Antig, L. M.
 Bagnate, M. B.
 Balut, J. A. B.
 Bansil, A. G.
 Brillante, M. P.
 Bumanglag Jr., O. M.
 Caguioa, F. J. A.
 Clemente, E. A.
 Diaz, R. V.
 Ingreso, J. R. C.
 Mabilangan, R. A.
 Merlin, H.
 Molina, M. G.
 Mutuc, M. Y. C.
 Nocon, I. M. B.
 Padlan, G. M.
 Santos, A. D. C.
 Sebial, S. C. L.
 Solomon, M. C. W. C.
 Sumbilon, R. M. B.
 Taborda, P. P.
 Tuazon, R. G.
 Vera, G. G.
 Vistro-Yu, C. P.

DG11

Aberin, M. A.
 Baroro, M. L. M.
 Bucalin, M. E. M.
 Buscano, J.
 Bustoba, A. M.
 Castro, K. J. M.
 Cruz, M. K. R.
 Del Mundo, M. M.
 Divinagracia, L. S.
 Elin, C. J. P.
 Francisco, F. F.
 Gardose, A. D.
 Golla, E. F.
 Guzon, A. F. H.
 Lasco, M. T.
 Peña, B. M.
 Regala, A. V.
 Repizo, C. R.
 Rivera, M. D.
 Rivera, R-A. B.
 Robles, R. L.
 Sarmiento, C.
 Tatlonghari, L. B.
 Tuazon, E. L. C.
 Ulep, S. A.
 Villareal, M. J. A.

DG12

Alcantara, Z. C.
 Bullecer, B. D. C.
 Camson, J. A.
 Daguasi, I. M.
 De Joya, E.
 De Vera, J. P.
 Dejoras, A. W. A.
 Garcia, C. V.
 Garcia, M. T. T.
 Gulim, C. I. B.
 Jimenez, J. R.
 Joven, R. O.
 Licup, J. H.
 Lim, R. D. A.
 Marticio, L. M.
 Martin-ao, R. S.
 Oroza, F. G. I.
 Tactay, R. G.
 Taguinod, M. B.
 Umpacan, J. L.
 Vargas II, G. T.
 Velez, M. B.
 Ybañez, D. L. J. B.
 Zoleta, M.

Workshops

Synchronous Parallel Sessions

October 22, 2021 | 10:00AM - 12:00PM

Register through MyOpenMath on October 21, 2021, 12PM-6PM

WS01: ADDRESSING DIFFICULTY IN CALCULUS LIMITS USING DYNAMIC GEOMETRY SOFTWARE (DGS)

Facilitator: Dr. Starr Clyde L. Sebial

Moderator: Dr. Catherine Vistro-Yu

<https://ateneo-edu.zoom.us/j/84461984188?pwd=QzVrK2ZSbWR6UzJvNUVONkkraS9odz09>

Meeting ID: 844 6198 4188 | Passcode: 476822

In this workshop, I will be sharing our journey on how we integrated a computer-assisted simulation in illustrating limits in Calculus class using a Dynamic Geometry Software (DGS). Usually, students can quickly master the procedural steps on solving limits of a function for these involve only a simple substitution process with some rules to follow. However, students find it difficult to locate those limits when illustrative graphs of those functions are presented. Hence, bridging the algebraic understanding into a graphical knowledge level prevails to be a big challenge for Calculus teachers. In this session, we will be discussing how we formulate these simulations using dynamic texts and graphing features of the DGS to provide students real-time feedback illustrating the specific location of the limit when an x approaches a particular location. Through these simulations, students would see how limits behave graphically given specific conditions of various types of functions. One-sided limits, limits on jump discontinuity, and limits at infinity will be incorporated in the simulations.

WS02: ARGUMENTATIVE DISCOURSE-CENTERED CLASSROOM TO HONE STUDENTS' MATHEMATICAL COMPREHENSION AND CONFIDENCE

Facilitator: Mae Antonette J. Ticar

Moderator: Dr. Angela Fatima Guzon

<https://ateneo-edu.zoom.us/j/84240690662?pwd%3DaERaYTRWS2RXY3FQSTd4dGFNandsZz09>

Meeting ID: 842 4069 0662 | Passcode: E9Ce5mCD

This video presentation aims to demonstrate how to implement the Argumentative Discourse-centered Classroom Model as a teaching strategy in the classroom. This instructional model was tested as a dissertation research study and has revealed a positive result in honing students' comprehension and confidence in Mathematics. This model used a modified oxford-oregon debate model wherein students debate on the topic given by the teacher, exchange their ideas and argue, and then identify their own misconceptions and correct them after a series of reasoning and proofs. In this workshop, I, as the presenter, will demonstrate the step-by-step procedure on how it can be conducted in the classroom. After the presentation and demonstration, the audience is given the opportunity to ask questions for clarifications and give feedback to assess the process. They will also be given an opportunity to share their suggestions to improve this strategy. There will also be an actual debate to be participated by the audience for them to experience this model. The goal of this workshop is to introduce a new teaching model to all teachers, particularly to all mathematics teachers, to enhance the students' mathematical ability in order to achieve the Standards for Mathematical Practice set by the National Council of Teachers of Mathematics (NCTM).

Conference Helplines

09173121366

09228842656

09565147137



WS03: DEVELOPMENT AND VALIDATION OF GAMIFIED MOBILE COURSEWARE FOR SENIOR HIGH SCHOOL STATISTICS AND PROBABILITY

Facilitator: Rolando B. Magat, Jr.

Moderator: Dr. Debbie Marie Verzosa

<https://us02web.zoom.us/j/87535909864?pwd=bk9jaGwwb0RtNkhsbjAyeFliWVRVUT09>

Meeting ID: 875 3590 9864 | Passcode: 830213

The teaching-learning process lies with the teacher's ability to select, develop, and use instructional material to suit the learners' academic needs. In that regard, I developed a gamified mobile courseware in Statistics and Probability for senior high school students. The gamified mobile courseware in Statistics and Probability is an online-offline mobile application software that runs with android smartphones. It can be used by both the teacher and the students. The app allows the teacher to keep track of their student's progress and interact with them. The gamified mobile courseware contents have been developed based on DepEd's Curriculum Guide in Statistics and Probability (2013) and followed the 5E Instructional Model by the Bybee & Landes (1990). The Pre-test and Learning Preparation were for the engagement, Chapter Overview for the exploration, Learning Contents for the explanation, Learning Links and Learning Assessments for the elaboration, and Chapter Tests and Post-test for the evaluation. It was anchored to the Self-Paced Curriculum Learning Model, Mastery-Based Learning Theory, Game-Based Learning Theory, and Mobile Learning Theory. The game elements were information, aesthetics, conflict, and a scoring/reward system.

WS04: DOBRA: GAMIFYING MY ALGEBRA ONLINE CLASS

Facilitator: Pol Niño E. Laset

Moderator: Dr. Rosemarievic Diaz

<https://pnu-edu-ph.zoom.us/j/3249525171?pwd=V3VsYmc4RFBqT25iSG9JQ2M4bXhHdz09>

Meeting ID: 324 952 5171 | Passcode: MATHTED_WS

This workshop introduces mathematics teachers to the world of gamification. We present a sample gamified system that can be easily implemented in any math class of any grade level at any grading period in a remote learning set-up. The system was advised for adoption this school year. Participants receive the manual in PDF format describing the objectives, mechanics, and benefits of the sample gamified system. The workshop proceeds in three parts in which we present the mechanics, simulate one level of the system, and critique in small groups. As an incentive for attending the workshop, a **free** echo seminar-workshop shall be conducted in the schools of the workshop participants on a first-come-first-served basis.

WS05: IMPLEMENTING A THEORY-BASED METACOGNITIVE ALTERNATIVE ASSESSMENT IN GRADE 8 MATHEMATICS DURING THE COVID-19 PANDEMIC**Facilitator: David Bryan C. Lao****Moderator: Dr. Lovella Divinagracia**<https://up-edu.zoom.us/j/87651681535>

Meeting ID: 876 5168 1535 | Passcode: 14724550

The COVID-19 pandemic has disrupted the usual class routines and has brought about the online implementation of teaching and learning; with this, came the demand for more effective teaching and learning strategies. Studies have shown that metacognition and metacognitive strategies may serve as a potential answer to this growing need. In this workshop, we will demonstrate a strategy for the creation of a theory-based metacognitive alternative assessment aptly called the learning companion. We will present the strategy in a series of sessions starting from a short symposium on the theoretical framework leading to a discussion of the assessment design process and culminating in the production and presentation of the learning companion by the participants. This will allow them to be acquainted with metacognition and metacognitive strategies and equip them with the mathematical knowledge and thinking skills which will serve the main purpose of the metacognitive instructional materials.

**WS06: LEARNING PROBABILITY THROUGH VIDEO LECTURES:
WHAT CAN WE LEARN FROM YOUTUBE ANALYTICS?****Facilitator: Jerryco M. Jaurigue****Moderator: Dr. Alva Aberin**<https://ateneo-edu.zoom.us/j/81933507120?pwd=bXIzcUxSZnd2N1hVRldlQzYvcEI3QT09>

Meeting ID: 819 3350 7120 | Passcode: 171840

Content creators in video-sharing sites such as YouTube utilize video analytics provided by the platform to analyze and improve the performances of their channels. YouTube analytics gives different statistics that measure engagement and retention among the videos uploaded on the platform. In this workshop, we will discover the benefits of using analytics for video lectures uploaded to YouTube. Participants of this workshop will be engaged in the key metrics provided by the analytics and their potential to uncover students' viewing and learning patterns.



WS07: TANGRAM PROFICIENCY LEADING TO NUMERACY SKILLS ENHANCEMENT

Facilitator: Elymar A. Pascual

Moderator: Dr. Flordeliza Francisco

<https://us02web.zoom.us/j/84749351682?pwd=UUJhUDRBMm11VktxWUJhbTR3WkYJYdz09>

Meeting ID: 847 4935 1682 | Passcode: 648565

Enhancement in any discipline takes on many ways like practice, advanced exploration, various exercises, repetitive process and many other interventions. This workshop highlights the assistance of playing tangram to develop the numeracy skills enhancement of the learners through the process of thinking and imagination during tangram activity. This workshop was designed to share how tangram playing can be executed in an online platform, which may be a motivation or priming activity in daily activities in a virtual classroom. Participants of this workshop must print out the attached tangram and get ready for a short tournament and have a mobile phone apart from the gadget used for joining the workshop. Participants gain points whenever they send the picture of the accomplished pattern ahead of the others through group chat. Participants need to send direct message to the facilitator (Elymar Pascual, with black Spiderman profile pic), at least three days before the scheduled workshop, to inform their interest to join the workshop, which in turn will include them in the workshop group chat. Winners in the short tournament will receive cell phone load from the facilitator. In between rounds of tangram tournament, the facilitator will share nuggets of findings coming from the accomplished study, insights on how the facilitator used tangram years ago when the pandemic has not yet hit the country, and other interesting anecdotes.

WS08: TARSIA FORMULATOR: A GAMIFICATION TOOL IN THE NEW NORMAL

Facilitator: Alfred Mark Aguilor

Moderator: Mr. Osbert Bryan Villasis

<https://us02web.zoom.us/j/86135235509?pwd=a2VyZkVRUForWmtKZVIwVktjWklyZz09>

Meeting ID: 861 3523 5509 | Passcode: MATH_WS08

Gamification is the process of using the elements of a game to improve instruction and learning by enhancing students' participation and motivation to accomplish a task. However, how do we effectively use gamification in the new normal despite the absence of face-to-face instruction? In this workshop, the participants will explore one tool that teachers can use to gamify their lessons which is the Tarsia Formulator, a free offline software package which can create learning materials, particularly, jigsaw puzzles. The main objective of the workshop is to explore the features of the software, and enable teacher-participants to craft learning materials, aligned with the learning competencies in Mathematics, using the software.

WS09: CALCULATOR EMULATOR AND CASIO EDUCATION

Facilitator: Dr. Celina P. Sarmiento

Moderator: Dr. Joseph Simon Madriñan

<https://pnu-edu-ph.zoom.us/j/96086312823?pwd=WThJVElWVFZRRURDOFQvRnRKSskZjZz09>

Meeting ID: 960 8631 2823 | Passcode: 964302

This workshop will guide participants in using a scientific calculator emulator, specifically the Casio 991EX model. The use of an emulator can help teachers hone students' skills in using the calculator in a remote teaching and learning environment. Additionally, the session will provide tips and suggestions to maximize the use of the calculator emulator and will introduce the Casio Education learning repository.

Conference Helplines

09173121366

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Paper Presentations

Theme 1: Student Learning in Elementary Mathematics

PA-TI-01: MATHEMATICS IN NATURE: A PEDAGOGICAL APPROACH

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Most knowledge that we can acquire through discovery and investigation has been already known by the nature around us. It has the secrets long before we discover patterns, rhythm and calculations. This book intended to explore the unique way of teaching Mathematics through nature. Five individuals from different disciplines of study accepted the seven-day challenge of teaching pre-school learners on a one-on-one basis while observing Philippine Enhanced Community Quarantine in the fight against COVID-19. The lessons are nursery number sense which includes Counting 1-10, Days of the Week, Months of the Year, Ordinal Numbers, Counting 11-20, and The Time and Clock. Pre- and post-assessment of numeracy skills were recorded using observable competency tallied with literal descriptions – A for mastered, B for developing, and C for beginning. Alongside teaching, online conferencing was conducted for a qualitative interview with the teacher-participants. Questions revolved around teaching mathematics using nature as a springboard. Responses were put into transcription, coded, thematically analyzed and discussed in light of sound principles in teaching and learning. After the seven-day challenge, it was found out that teaching using naturalist approach led to the increase in numeracy skills of pre-school learners. Six themes were developed based on the common experience of the teacher-participants. Teaching Mathematics through nature was capsuled in the concepts of familiarity, practicality and affectivity. Nature's aid in understanding Mathematics is due to interaction, imagination and concrete notion. Learners' response to nature discussion was characterized into expressiveness, attentiveness and inquisitiveness. The features of nature that make it a feasible springboard are calming, universal fitting and awe-inspiring. Nature's similarities to Mathematics are complex sense, obedience and cadence, while the Mathematics of protecting nature can be observed in valuing, balancing and growing aspects. Recommendations to school heads, community and curriculum developers were laid down near the end of the study.

PA-TI-02: ORTON-GILLINGHAM APPROACH AS AN INTERVENTION FOR LEARNERS DIAGNOSED WITH ATTENTION DEFICIT HYPERACTIVITY DISORDER (ADHD)-SPECIFIC LEARNING DISORDER (SLD) IN MATHEMATICS: A DESCRIPTIVE-EXPLORATORY CASE STUDY

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The purpose of this qualitative case study was to explore whether the use of Orton-Gillingham Math as an intervention in teaching a child diagnosed with Attention Deficit Hyperactivity Disorder (ADHD) and Specific Learning Disorder (SLD) with impairment in mathematics would lead to an improvement in addition skills and to explore the child's response towards an online OG-Math intervention in terms of working behavior. This study had a single participant chosen purposively based on the criteria, namely diagnosis, arithmetic calculation level, and unfamiliarity with OG-Math intervention. The participant was taught using the Orton-Gillingham Math approach which has two main features, multisensory approach and concrete-representational-abstract progression, via an online platform twice a week over a period of four weeks. The pre and post evaluation of the participant's Developmental and Behavioral Pediatrician and the pre and post paper-and-pencil test which was composed of 75-item addition problems administered by the teacher were used to determine the participant's basic operation addition fact knowledge before and after the implementation of OG-Math online intervention. The data were analyzed using trustworthy thematic analysis and pattern matching. The analysis revealed that the participant can already solve addition problems involving 3-digit addends with and without regrouping after the math intervention from only being able to solve single-digit addition problems. Also, the participant showed symptoms of inattention, hyperactivity, impulsivity, management of emotion, and sleepiness during online classes. Hence, it is recommended to mathematics teachers to use the Orton-Gillingham Math approach as an intervention for children with ADHD and SLD with impairment in math to improve their addition skills and to consider the duration of an online class given their short attention span.



PA-TI-03: TANGRAM PROFICIENCY LEADING TO NUMERACY SKILLS ENHANCEMENT

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This study focused on determining the ways in which numeracy skills are enhanced through tangram. An exploration on ways of solving patterns in tangram, power of imagination, enhancement of logical, analytical and critical thinking, and desirable characteristics being formed in playing tangram formed part of this study. The community quarantine in the Philippines due to COVID-19 caused the design of this study to gather data through an online tangram tournament. Seven learners accepted the seven-day challenge. They solved 55 tangram puzzles and answered 6 qualitative questions. After a week of tangram challenge, the following findings were established. In solving tangram puzzles and players can consider (1) looking into the details, (2) trial-and-error, or (3) planning. The best ways to solve tangram puzzles are (1) focusing on the whole portion, (2) focusing on the bigger portions, or (3) focusing on the smaller portions. Imagination plays an important role because (1) it makes things clear and the solution easier to obtain, (2) it put things into proper perspective, and (3) it reduces useless effort. Logical, analytical and critical thinking are enhanced because (1) proper flow of thought in the process of making decisions or conclusion is exercised, (b) deep thinking in considering different ways and solutions is given importance, and (c) correct reasoning based from facts or evidence is practiced. Numeracy skills are enhanced due to the following reasons: (1) tangram can train the mind in dealing with abstracts and apply them in concrete things, (2) tangram can assist in molding right attitude towards achieving goals and success, thereby improving skills like numeracy, (3) tangram can aid learners in looking at the big picture without taking for granted the small details, and (4) tangram can enhance skill in solving word problems. Desirable characteristics were discovered as by-products of playing tangram.

PA-TI-04: TARSIA FORMULATOR: A GAMIFICATION TOOL IN THE NEW NORMAL

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Gamification is the use of game-like elements in the teaching-learning process. One of the challenges in the new normal is to incorporate and effectively use gamification to improve students' achievement and learning outcomes despite the absence of face-to-face instruction. In this study, the researcher used gamification to improve some least mastered competencies in grade 8 Mathematics under the topics on linear equations in two variables. In particular, the researcher used formulator tarsia, an offline software that can craft different puzzles called Tarsia puzzles. Mixed method research was utilized to measure the effectiveness of the intervention. Twenty (20) respondents were selected through purposive sampling by getting the lowest-performing students in a grade 8 class in a researcher-made pretest. The interventions, namely Tarsia Puzzles, were given to all the 20 respondents. The Tarsia Puzzles were crafted to align with the following competencies: (1) illustrating linear equations in two variables, (2) writing a linear equation in the form $Ax+By=C$ into $y=mx+b$ and vice versa, and (3) evaluating linear equations in two variables. The respondents' pretest and post-test scores ($\alpha=0.74$) were recorded and analyzed. It was found out that there is a significant increase in the post-test result which implies that the interventions were indeed effective. Remarkably, the respondents' mastery level in evaluating linear equations in two variables has significantly increased by 27%. The researcher employed the triangulation method through virtual focus group discussion and interviews with the respondents. A four-point Likert scale ($\alpha=0.84$) was administered. Results show that the respondents Strongly Agree that they enjoyed playing the Tarsia Puzzles, and it improved their collaboration and critical thinking skills.

Theme 2: Student Learning in Secondary School Mathematics

PA-T2-01: 4S LEARNING CYCLE ON STUDENTS' MATHEMATICS COMPREHENSION

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Mathematics is one of the oldest scientific disciplines yet its applications are still very relevant for it is one of the basic foundations in understanding almost all phenomena in everyday life. However, it is not easy to comprehend mathematics. The latest Program for International Student Assessment (PISA) results exhibited an alarming reality about Filipino students' performance. Filipino students' average scores in mathematics, science, and reading ranked 76th out of 77 participating countries, particularly 76th in mathematics and 77th in both science and reading (OECD, 2013). This study was a quasi-experimental research conducted to investigate the effect of 4S (Sense-Making, Showing Representation, Solving with Explanation, and Synthesizing) Learning Cycle Model on students' mathematics comprehension. The participants of the study were the two intact classes of freshmen education students in College and Advanced Algebra course enrolled during the 1st semester SY 2019-2020 at the University of Science and Technology of Southern Philippines. One section was assigned as control group who was exposed to Polya Method of Problem Solving while the other one was experimental group who was exposed to 4S Learning Cycle Model. The performance of the students was measured using their test scores. To determine if the 4S Learning Cycle Model significantly affected the students' mathematics comprehension, the Analysis of Covariance Model (ANCOVA) was utilized at 0.05 level of significance. Results revealed that the 4S Learning Cycle Model helped in the development of students' mathematics comprehension. On this basis, teachers may adapt this teaching strategy to improve the mathematics comprehension skills of their students.

PA-T2-02: ARGUMENTATIVE DISCOURSE-CENTERED CLASSROOM TO HONE STUDENTS' MATHEMATICAL COMPREHENSION AND CONFIDENCE

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The study determined the effect of the Argumentative Discourse-centered Classroom model on the participants' mathematical comprehension and self-confidence. It used a pretest-posttest quasi-experimental control group design. The experimental group was exposed to the Argumentative Discourse-centered Classroom model while the control group was exposed to the DepEd 4A's model. There were two research instruments used: concept mapping to assess mathematics comprehension and self-test for confidence. The data were analyzed using mean, standard deviation, and ANCOVA Equal n's. The analysis revealed that the scores of those exposed to the Argumentative Discourse-centered Classroom model are comparable to those exposed to DepEd 4A's model in terms of mathematical comprehension and confidence. Both models have enhanced the participants' comprehension skills, communication skills, speaking skills, and confidence level through the tasks assigned to them individually and in a group activity. They also have developed good study habits and increased their motivation to focus on their learning in mathematics. These models have also enriched the participants' verbal fluency and have helped them solve word problem-solving tasks in a logical, sequential, and coherent manner. The Argumentative Discourse-centered Classroom Model had engaged more students when given appropriate mathematical tasks that forced them to reason out mathematically, communicate their thinking to others, and participate in reciprocal critiquing of mathematical ideas. The process had also developed participants' oral verbal communication. The researchers recommend that mathematics teachers may use the Argumentative Discourse-centered Classroom model not only in Mathematics but also in other Mathematics-related subjects to enable the students to experience how to express their ideas with their classmates to exhibit their conceptual understanding and enhance oral communication skills.



PA-T2-03: DEVELOPMENT AND VALIDATION OF GAMIFIED MOBILE COURSEWARE FOR SENIOR HIGH SCHOOL STATISTICS AND PROBABILITY

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The teaching-learning process lies with the teacher's ability to select, develop, and use instructional material to suit the learners' academic needs. In that regard, the study aimed to develop and validate gamified mobile courseware in Statistics and Probability for senior high school students. The study used the descriptive-evaluative method to attain its objectives. The Mobile App Rating Scale and the Gamified Mobile Courseware Evaluation Tool were used to collect the necessary data. Expert purposive sampling was used in the selection of the respondents. Five I.T. professionals, 12 math teachers, and five math experts participated voluntarily in the study. Results showed that the gamified mobile courseware has been developed to a moderate extent in terms of engagement, functionality, aesthetics, and information as assessed by the I.T. professionals. The result also suggested that the content quality, learning objectives, content presentation, learning assessments, and usability of the gamified mobile courseware was developed to a great extent according to the math teachers and experts. Suggestions were also provided by the evaluators for the improvement of the said app.

PA-T2-04: DOBRA: GAMIFYING MY ALGEBRA ONLINE CLASS

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Filipino educators should find ways to make learning Mathematics easier and more welcoming to students, especially in a remote learning set-up. In the Philippines, limited research has investigated the effects of gamification on student academic performance and attitude towards math in an online learning environment. Based on literature, gameful design, as compared to playful design, employs meaningful choices among its players that could influence their behavior, improve their motivation, and increase their engagement. This research aimed to determine the effects of the prototype gamification setup, i.e. DOBRA, in online algebra classes of the UP Rural High School during the first quarter of AY 2020 - 2021. The treatment involved a set of BINGO-inspired games with subject-related and non-subject-related tasks. An attitude survey was also conducted to determine students' motivation after playing the first level of the game. An independent sample t-test was conducted on students' first quarter grades. Upon analyzing the mean grade from students in the treatment group ($M = 90.95$, $SD = 5.57$) and from the control group ($M = 84.74$, $SD = 7.23$) with $t(76) = 4.271$, the results indicated that the students who participated in the gamified system compared to the students in the control group demonstrated significantly better first quarter grade in Algebra ($p < 0.001$). The gamified set-up statistically gives students a better chance of performing well in the subject. The findings from the attitude analysis revealed that the gamified set-up created a more positive attitude towards learning algebra concepts in an online learning environment. Also, the students in the treatment group testified of finding DOBRA fun and easy to use. The prototype enhanced student proficiency in and attitude towards Algebra. The results will be of benefit to Math educators, school administrators, and other researchers for future planning.

PA-T2-05: EFFECTS OF DIFFERENTIATED SCAFFOLDING STRATEGIES ON TRIANGLE CONGRUENCE: THEIR EFFECTS ON THE ACADEMIC PERFORMANCE AND CONFIDENCE OF MATHEMATICS LEARNERS

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This study investigated the effects of differentiated scaffolding strategies on improving academic performance and confidence of Mathematics learners. It was conducted at Bukidnon State University Secondary School, Malaybalay City during the second semester of school year 2018-2019. It was participated by sixty (60) Grade 8 learners, 30 belonging to the control group and 30 to the experimental group. Pretest-posttest quasi-experimental research design was utilized in the study. Developed lessons on triangle congruence concepts like ASA, SAS, SSS, and AAS, as well as the research-made academic performance test and confidence scale were evaluated by panel of experts. Comments and suggestions from the panel of experts were taken into consideration in the enhancement of the developed lessons, test and scale. The instruments were pilot tested and those instruments came out reliable with a Cronbach alpha coefficient of 0.807 for the academic performance test and 0.810 for the confidence scale in Mathematics. Moreover, the gathered data were treated with the mean, standard deviation, One-way Analysis of Covariance (ANCOVA) and Pearson Product Moment Correlation. The results revealed that the learners' academic performance when taught using differentiated scaffolding strategies was Fairly Satisfactory while those learners taught with conventional teaching strategies had Did Not Meet Expectations level. There was a significant difference on the performance results of both groups. However, there was no significant difference in confidence in Mathematics of both groups. Furthermore, there was significant relationship between the academic performance and Mathematics confidence of learner taught with differentiated scaffolding strategies.

PA-T2-06: ENHANCING REQUISITE KNOWLEDGE AND SKILLS IN DIFFERENTIAL CALCULUS THROUGH ADAPTIVE LEARNING

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With the full implementation of the K-12 program, most of the general education mathematics courses have been integrated in the senior high school curriculum, raising concerns about students' readiness, particularly in the engineering programs, for mathematics-intensive courses in the collegiate level. A diagnostic assessment in pre-calculus topics among 1870 freshman engineering students at Mapua University revealed that students have low proficiency in trigonometry and analytic geometry, and average proficiency in algebra and geometry. As an intervention initiative, students were enrolled in an adaptive learning system – the Assessment and Learning in Knowledge Spaces (ALEKS), to reinforce the requisite knowledge and skills for a college-level calculus course. The topics covered were Algebra, Geometry, Equations and Inequalities, Graphs and Functions, Polynomials and Rational Functions, Exponential and Logarithmic Functions, Trigonometric Functions, Trigonometric Identities, and Conics – topics that are not within the course coverage of Calculus I (Differential Calculus) which they were enrolled in. Students had to design their own schedule of doing the activities in ALEKS, with the close supervision of their assigned professor, so that they can still accomplish the usual learning and assessment tasks in Calculus I. Data showed that students were able to significantly improve their knowledge and skills in the pre-calculus topics, which in turn, was seen to be associated to higher performance in Differential Calculus. In particular, logistic regression analysis showed that students who obtained 90% or higher in the ALEKS assessments can double their chances of passing Differential Calculus. Moreover, results also showed that students who spent longer time in ALEKS increased their chance of passing the course, and that low-performing students have higher chances of passing if they accomplish the ALEKS mediation activities and assessments.



PA-T2-07: ROTATION BLENDED LEARNING IN GENERAL MATHEMATICS: ITS EFFECTS ON THE CONCEPTUAL UNDERSTANDING OF SENIOR HIGH SCHOOL LEARNERS

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The study investigated the effects of rotation blended learning on the conceptual understanding of senior high school learners in General Mathematics. It was conducted at Laguindingan National High School, Division of Misamis Oriental during the school year 2019-2020. Sixty Grade 11 learners were the participants of the study. Pretest posttest quasi-experimental research design was utilized in the study. The five developed lessons in General Mathematics included were simple interest, compound interest, annuities, stock and bonds, and consumer loans. A panel of experts assessed and evaluated the developed lesson plans as well as the 30-item researcher-made conceptual understanding test. The results of their final evaluation were taken into consideration in the final revision of the developed lessons and test. The researcher-made test was tested for its reliability and came out dependable. The necessary protocols and ethical considerations were followed by the researcher before, during and after the conduct of the study. The appropriate statistical techniques such as frequency, percentage, mean, standard deviation, analysis of co-variance (ANCOVA) were used to treat the data. Results revealed that the conceptual understanding of senior high school learners in General Mathematics when taught using rotation blended learning fall under *mathematically correct understanding*; while, students taught with conventional learning fall under *partially correct understanding*. Further, there is a significant difference in conceptual understanding of senior high school learners in General Mathematics when taught using rotation blended learning as compared with conventional learning.

PA-T2-08: THE EFFECT OF REALISTIC MATHEMATICS EDUCATION TO THE STUDENTS' PERFORMANCE AND INTEREST IN MATHEMATICS

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The dilemma of the Philippine Education today is the deterioration of the learner's performance in the field of Mathematics. To improve the performance of the students in the said subject is the major goal of every Mathematics educator. This quasi-experimental study was conducted to unveil the effect of Realistic Mathematics Education (RME) to the perception of the students. Likewise, the resulting data from the teaching and learning Mathematics showed the experience while learning the activities. This study adapted the concept of RME believing that students could enjoy appreciating Mathematics if it is relevant and in "real-talk" about their daily lives (Cobb et al., 2008). This study used quasi-experimental design in seventy (70) Senior High School students particularly in the Technical Vocational Education (TVE) Strand of Parañaque National High School-Main. There are two groups of respondents: the control group (n=35) who executed the traditional approach, and the experimental group who received the RME approach. This study was conducted in three (3) weeks' span and two method instruments were used: the Mathematics Performance Test and the Interest Questionnaires. Collected data had been analyzed using t-test of dependent and independent variables, and very significant result for the study emerged after the test execution. The study concluded that the RME approach enhanced and improved the interest and performance of the students. Henceforth, RME approach is an effective and enjoyable way to improve students' interest and performance in the study of Mathematics.

Theme 3: Online Mathematics Learning

PA-T3-01: DEVELOPMENT, ACCEPTABILITY AND EFFECTIVENESS OF RECORDED LECTURE VIDEO ON BASIC OPERATIONS IN COMPLEX NUMBERS

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The challenge for teachers in the new normal education is to hold an online class discussion; therefore, they make adjustments to supplement the learning of the students through recorded lecture video (RLV). This research aims to identify the level of acceptability and effectiveness of the RLV on basic operations in complex numbers on the mathematics performance of the students. Forty Bachelor of Secondary Education first year mathematics major students were selected as respondents using the fish bowl method. The study utilized a self-structured questionnaire to rate the level of acceptability on RLV and a self-made test for the assessment in complex numbers; both gained a reliable score on the reliability test. A quasi-experimental single group pretest-posttest design was used to test the effectiveness of the RLV and a correlational design was used to determine how the level of acceptability of the RLV and level of performance of the respondents were related to each other. Data gathered were treated statistically using descriptive and inferential statistics such as Pearson's Product Moment Correlation and t-test analysis. Results revealed that there is no significant relationship between the level of acceptability of the recorded lecture video in terms of content, structure, instructional design, and technical design and the level of performance of the students. Also, there is no significant difference between the mean results on the pretest and posttest of the students. Moreover, the level of acceptability of the recorded lecture video is not a factor for mathematics performance. The student's performance in complex numbers have increased after the intervention of the recorded lecture video. Thus, it is recommended that teachers should explore and come up with the different strategies to improve students learning in mathematics during the new normal.

PA-T3-02: INQUIRY-BASED APPROACH IN TEACHING THEORETICAL AND EXPERIMENTAL PROBABILITY VIA FULL ONLINE LEARNING MODALITY: A LESSON STUDY

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This study investigated the implementation of inquiry-based instruction in theoretical and experimental probability on incoming Grade 10 students through a fully online learning mode. The researchers utilized Lesson Study and carefully carried out each step of its cycle. Theoretical and experimental probability was chosen as the topic for the research lesson as it is usually taught in a short amount of time and is believed to contribute to students' poor understanding of the basics of probability. An Understanding by Design (UbD) lesson plan was prepared that highlights inquiry-based learning, which promotes a more experiential, meaningful, and participative form of learning even in this time of the pandemic. A research lesson was then conducted on six incoming Grade 10 students where they learned via full-online mode for the first time. The teacher tasked the students to obtain the theoretical probability of tossing a coin and its experimental probability after 10, 20, and 50 tosses. They also did the same activity, but this time, with tossing a die. From these results, they analyzed the relationship between the two types of probabilities. They went back to the main online class to share their findings and to synthesize their learning with the guide of their teacher. Throughout the class, the students showed eagerness to learn despite dealing with online technologies, which mostly were new to them, and connectivity issues. They also responded well to argumentation and had shown critical thinking during the activity and synthesis. Some of them even had presented interesting and significant analyses. With these insights and few recommendations, employing inquiry-based instruction on this topic in the new normal setting can still provide critical thinking and meaningful learning opportunities to the students.



PA-T3-03: LEARNING PROBABILITY THROUGH VIDEO LECTURES: WHAT CAN WE LEARN FROM YOUTUBE ANALYTICS?

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YouTube analytics provide performance statistics that can measure engagement and retention among the videos uploaded on the platform. Fifteen video lectures covering basic topics in probability were created and used by 123 Grade 10 students as the primary resource in their course over 4 weeks. Key metrics from the YouTube channel of the researcher such as the number of views, average percentage viewed, percentage of audience watching the first 30 seconds, average audience retention, and key moments on the audience retention graph (spikes and dips) were gathered and analyzed. The students were surveyed about their viewing habits using Google Forms. The results indicated that students watch the videos multiple times and mostly during the day before the assessment. Longer lecture videos received more views which may indicate unclear delivery of the lesson. The percentage of viewers watching the first 30 seconds is significantly related to the average audience retention. Spikes and dips on the audience retention graph appeared mostly during the discussion of concepts and solutions to sample problems. These findings, together with the perception of the students regarding the qualities of a good video lecture, were used to enumerate design implications and suggestions to enhance future video lectures.

PA-T3-04: MACHINE LEARNING APPROACHES FOR ASSESSING DIGITAL FATIGUE AMONG STUDENTS OF ONLINE MATH COURSES

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This study focused on assessing the extent of digital fatigue experienced by students during online learning in mathematics. A sample of 642 college students who were enrolled in at least one mathematics course during the first and second quarters of SY2020-2021 in Mapua University were selected as samples using simple random sampling process. The instrument used for quantifying digital fatigue was adapted from the Multidimensional Fatigue Inventory (MFI) and the Fatigue Severity Scale (FSS) with some items adjusted and contextualized in online engagement. Factors considered include gender, age, academic load (number of units), units of math courses enrolled, mathematics course enrolled, schedule of math course, time spent for studying, time spent for studying mathematics, duration of sleep, sleeping hours, internet provider, and home school quality. Noteworthy from the gathered data is the fact that students (47%) have less than 8 hours of sleep and that they usually sleep after 12 midnight (42%). Respondents (63%) also claim that their home study set-up is not conducive to learning due to a variety of disruptions during online class. MFI results also revealed that online fatigue is high at the dimensions of mental (mean=10.21), reduced motivation (9.78) and reduced activity (9.41). For the severity of fatigue, 38% of the students scored 4 or higher, indicating significant level of fatigue. Using logistic regression, it was found out that academic load, duration of sleep and home school quality are significant factors of online fatigue. Decision tree and k-nearest neighbor (kNN) were also implemented to classify the respondents into the five levels (reduced) of fatigue severity. It was the latter which yielded a better accuracy and precision.

PA-T3-05: MATHEMATICS TEACHING MODALITIES IN THE NEW NORMAL OF PUBLIC SECONDARY SCHOOLS

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Education seems much the same as it has been for many years; however, this is no longer the case due to COVID-19. As a result, teachers were compelled to adapt new teaching methods in order to meet their students' demands. Hence, this study described the teachers' adaptability in the new Mathematics teaching modality in terms of material and non-material resources, figured out how much expertise the teachers have about modular and online distance learning, correlated the extent of teachers' expertise with their adaptation in the new Mathematics teaching mode, ascertained the challenges in the learning delivery modalities of teachers, and prepared Mathematics teaching strategies in the new modalities of teaching. A descriptive-correlational design was employed for the study. A sample of 67 high school Mathematics teachers from the Division of Tanauan was surveyed using a researcher-made questionnaire. The findings demonstrated that the level of the respondents' knowledge had a strong association with their adaptability to the new Mathematics teaching modalities. However, it was found to be very challenging on the part of the teachers to adhere to the implementation of the new Mathematics teaching modalities with problems concerning teachers' availability most of the time as well as the students' engagement in the process. This study suggests that the School City Division office may host trainings, seminars, and workshops that begin with an examination of teachers' professional development needs; the mathematics teaching strategies made by the researcher may be used and evaluated; teachers may allot time to answer all their students' queries regarding the lesson taught; the principal may organize trainings, seminars, and workshops on the use of internet applications in Mathematics instruction, and future researchers may conduct similar studies to further identify other Mathematics teaching strategies appropriate in the teaching modalities.

PA-T3-06: STUDENTS' SELF-REGULATION SKILLS AND ONLINE COMMUNICATION PLATFORM UTILIZATION IN LEARNING MATHEMATICS

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Online distance learning (ODL) environments demand learners to take greater responsibility for their learning; thus, self-regulation skills are crucial for success in these more autonomous learning contexts. As there is no face-to-face interaction, this necessitates the use of online communication platforms, which will replace face-to-face interaction between teachers and students. Hence, this study ascertained the students' self-regulation skills in Mathematics online distance learning, determined the extent of utilization of online communication platform, correlated the level of students' self-regulation skills and extent of utilization of online communication platforms, identified the problems encountered in Mathematics ODL, and developed a platform support process flow in Mathematics ODL. A descriptive-correlational design was employed for the study. The researcher-made questionnaire was used to gather data from a sample of 208 Junior High School students at First Asia Institute of Technology and Humanities (FAITH) during SY 2020-2021. The findings demonstrated that the students in Mathematics ODL have a high degree of self-regulation skills and also utilized online communication platforms. It also revealed that the students' utilization of online communication platforms is highly connected to their degree of self-regulation skills. However, it was found that students encountered difficulties with online distance learning due to problems involving network connection and technical know-how even with the available gadgets ready for utilization which can result to difficulties in submission of activities and reports. This study suggests that FAITH Catholic School create a platform committee to assist the students with their difficulties and needs in Mathematics ODL; the researcher's platform support process flow can be evaluated, implemented, and monitored to determine its effectiveness in assisting students with their difficulties, and researchers in the future may do similar studies to uncover other self-regulation skills and technology usage abilities in Mathematics ODL.



Theme 4: Assessment

PA-T4-01: A COMPARATIVE STUDY OF FILIPINO AND TAIWANESE STUDENTS' MATHEMATICAL COMMUNICATION SKILLS BASED ON ILL-STRUCTURED TASKS

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This study analyzed and compared Filipino and Taiwanese students' mathematical communication skills (written, oral, and representational) based on ill-structured tasks. This was a qualitative case study that involved seven grade 10 top performing students in mathematics from Chinese Filipino, Filipino Special Science, and Taiwanese classes. The students' written and representational mathematical communication skills were assessed using Mathematical Communication Test. The students' answers and solutions in the test were numerically scored using the Quantitative Holistic Scoring Guide and were categorized using Qualitative Analytic Scoring Guide. Moreover, the students' oral mathematical communication skills were assessed through a series of interviews and classroom observations and with the use of scoring guide. Findings indicate that of the seven students, three had superior, two had above average, and two had average written mathematical communication skills. Additionally, students exhibited different solution strategies, justification soundness, and mathematical understanding. Chinese Filipino students had high while both Taiwanese students and Special Science students had average oral mathematical communication skills. The findings likewise indicate that the students used multi-modal representations. It was concluded that Chinese Filipino, Special Science, Taiwanese students are able to express and convey mathematical ideas accurately in a clear and logical manner. Chinese Filipino students have better written and oral mathematical communication skills than both Taiwanese and Special Science students. Moreover, Chinese Filipino students use more representation modes than both Special Science and Taiwanese students. In light of the findings, policy makers should issue a clear set of guidelines on the mathematics topics for Special Science class. Future researchers may investigate the use of ill-structured tasks as an intervention for a quasi-experimental study. Recommendations are likewise given to students, parents, teachers, textbook writers, and curriculum developers with the end in view of developing students' mathematical communication skills.

PA-T4-02: A PILOT IMPLEMENTATION OF A THEORY-BASED METACOGNITIVE ALTERNATIVE ASSESSMENT IN GRADE 8 MATHEMATICS DURING THE COVID-19 PANDEMIC

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The COVID-19 pandemic has disrupted the usual class routines and has brought about the online implementation of teaching and learning, and with this, the demand for more effective teaching and learning strategies. Studies have shown that metacognition and metacognitive strategies may serve as a potential answer to this growing need. In this work, we developed and implemented an alternative assessment based on a metacognitive theory to a group of Grade 8 learners in a science high school in Western Visayas, Philippines (with $n=23$). A one-group pretest-posttest quasi-experimental design was utilized with $\alpha=0.05$. The results showed that the alternative assessment has improved the metacognitive awareness level of the learners as a whole (with a p-value of 0.01064) and in particular, their regulation of cognition (with a p-value of 0.006417). Meanwhile, considering only the knowledge of cognition results to a p-value of 0.05183 which is not deemed statistically significant. In all these cases, however, Cohen's d (effect size) values fall within the small to medium range suggesting a non-negligible effect. Pearson correlation also revealed significant moderate correlation between the learners' alternative assessment and subsequent summative assessment scores – as a whole (with $r=0.4728124$ and $p=0.0227$) and when considering higher order thinking skills (HOTS) items only (with $r=0.4413483$ and $p=0.03501$). On the other hand, when considering only the lower order thinking skills (LOTS) items, the r value obtained is 0.3935082 with a p-value of 0.06321 – a correlation coefficient that is deemed not statistically significant and suggests a weak correlation. Overall, the alternative assessment has been shown to be a viable prototype for future metacognitive instructional materials.

PA-T4-03: INCORPORATING OPEN-ENDED MATHEMATICAL TASKS ON RESEARCH LESSONS IN ENHANCING STUDENTS' CREATIVITY

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The role of teachers has changed as we reached a different era in education. Student-centered activities are well-known to maximize students' learning. Aside from content skills that students should learn, they should also know how to adapt to the changing world. Being flexible to changes requires an individual to be creative in finding solutions and answers. Thus, schools should foster students' creativity as well. Creativity is identified as one of the 21st-century skills and can be enhanced if an individual is exposed to thinking in a divergent manner. Thinking of strategies and activities is not an easy task for teachers, especially in the new normal mode of teaching - flexible learning. Thus, this research work invited seven secondary mathematics teachers from private and public institutions who are teaching different grade levels to collaboratively plan lessons and whose goal was to incorporate open-ended mathematical tasks that intend to develop students' divergent thinking and creativity. This qualitative study narrates teachers' interaction and discussion on planning lessons to foster students' creativity. Through thematic analysis, challenges encountered by the teacher participants are as follows: not used to drafting open-ended mathematical tasks, being open-minded to other ideas, adaptive to other teaching practices, time management, and achieving the goal to teach for creativity. Despite the challenges encountered, the teachers developed four research lessons that incorporate open-ended mathematical tasks. Addressing issues in the new normal mode of teaching and sharing ideas to maximize students' learning and foster their creativity was achieved through the collaboration of teachers in planning lessons. This study also investigated the creativity of teachers in designing their lessons.



Theme 5: Mathematics and Culture

PA-T5-01: TEKS: A CULTURE-BASED CONTEXTUAL APPROACH IN TEACHING PROBABILITY

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According to Samo et al. (2018), the term contextual learning means that learning activities must be experienced as part of life to make meaningful connections. This study introduces “teks” (one of the traditional Filipino games played by most of the students) to six Grade 11 students enrolled in different academic strands in one of the Senior High Schools in Metro Manila (two students from STEM and HUMSS and one student from ABM and GAS). When students tend to ask this question: “Is the outcome Head-Tail the same as Tail-Head?” and the researcher tells them that HT and TH are two different outcomes, they get confused and then generalize and write the outcome HH as H1H2 and H2H1 as two different outcomes. They do the same thing with the outcome TT. However, when teks was introduced to students, they were able to recognize that both teks and coins have the same context and instead of doing the aforementioned problem, they named the position of each teks using the name of each player playing teks. For instance, this is one of the statements from the HUMSS students: “...I assigned a random name on each player, Far and Diego: (1) both Far and Diego can win or lose at the same time (FF, BB); or (2) Far wins and Diego lose (FB); or (3) Far lose and Diego wins (BF). Nothing else, hence, there are only 4 outcomes...” For this study, we realized that teks can offer a more meaningful learning among the students across the academic strands, perhaps more powerful than using coins.

*Theme 6: Learning Materials***PA-T6-01: AN ANALYSIS OF THE SIGNIFICANCE OF VISUALIZATION IN GRADES 8 AND 10 MATHEMATICS TEXTBOOKS: THE CASE FOR PROBABILITY**

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Visualization in mathematics education is both a process and a product of illustrating meaningful mathematical concepts to potentially improve the teaching-learning process. Furthermore, according to the conceptual framework of the Philippine mathematics curriculum (DepEd, 2016), one of the skills and processes that need to be developed by students is Visualizing. Hence, the inscriptions (pictures, graphs, diagrams) found in mathematics textbooks are assumed to provide the learners an opportunity to understand concepts better and improve their visual reasoning skills. To explain how visualization can possibly contribute to students' conceptions of Probability, the study focused on determining the significance given to visualization in the Probability chapters of the Philippine Grades 8 and 10 mathematics textbooks. Textbook analysis was employed as the research design of the study, and the inscriptions in the textbooks were examined through the lens of the implied reader from the Reader-Oriented Theory (Weinberg & Wiesner, 2011). Results showed that there were 29 inscriptions in the Probability chapter of the Grade 8 textbook, while there were 41 in the Grade 10 textbook. Moreover, 8.44% and 5.06% of the text space were allotted to visualization in the Probability chapters of the Grades 8 and 10 mathematics textbooks, respectively. This meant that Philippine mathematics textbooks prioritize describing Probability concepts and procedures primarily in words instead of with inscriptions, based on the page space allotted to text compared to inscriptions. The research hopes to contribute to the development of Mathematics textbooks which will eventually enhance student's understanding of Probability.

PA-T6-02: DESIGN, DEVELOPMENT, AND EVALUATION OF TRIANGLE CONGRUENCE MODULE FOR OPEN HIGH SCHOOL PROGRAM

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This presentation is part of the dissertation project where the ADDIE instructional model was used. ADDIE is an abbreviation for Analyze, Design, Develop, Implement and Evaluate. This study aimed to design, develop, and evaluate a mathematics module intended to Open High School Program (OHSP). However, only the evaluation of the developed module as perceived by mathematics teachers as content and pedagogy experts is presented. The implementation part is yet to be done to see to it that the module perfectly meets the standards before it will be implemented to the students. This study employed the concurrent validating quantitative data triangulation design. The researchers gathered quantitative and qualitative data at the same time, within one survey instrument. Thirty-one (31) mathematics teachers examined and evaluated the modules based on the three indicators, which include: (1) content; (2) layout and design; (3) language. Quantitative data were analyzed using mean and weighted mean while the qualitative data was analyzed thematically using a directed content analysis approach. Results revealed that on the first evaluation, the evaluators observed minor errors in spelling, grammar, and formatting. They also found one major error which violates the persons with disabilities (PWDs) act. After revision, the evaluators gave a perfect rating. Hence, the researchers recommended that instructional developers should endeavor to obtain faultless instructional material no matter how many revisions are needed.



PA-T6-03: DEVELOPMENT OF INSTRUCTIONAL MODULES IN MATHEMATICS IN THE MODERN WORLD AT TAGUIG CITY UNIVERSITY

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The study aimed to develop modules in Mathematics in the Modern World for freshmen of Taguig City University. The necessity on the instructional medium in this specific subject invigorates the researchers to formulate these modules in accordance to the implemented Revised General Education Curriculum of the Commission on Higher Education. For this reason, the researchers developed a set of modules which covered ten (10) major topics, established a scheme anchored on Bruner's Constructivist Theory in developing instructional modules which primarily focuses on the active involvement of students in knowledge construction rather than passive learners, and garnered the extent of acceptability in terms of objective, contents, instructional design, exercises, language, and usefulness as perceived by the two groups of respondents – students, and teachers. A total of 69 students and 9 teachers during academic year 2019 – 2020 were selected as respondents of the study. It employed descriptive research design with emphasis on the survey method using an adopted research instrument. The frequencies, means, and t-test were the statistical measures utilized. Results revealed that the two groups of respondents accepted the proposed instructional modules in Mathematics in the Modern World. In addition, the extent of acceptability under 'contents' got the highest mean, while 'instructional design' got the lowest mean. Further, the results divulged that components under 'objectives' are not statistically significant based on the perception of the two groups of respondents. On the other hand, the perceptions on the components under content, instructional design, exercise, language, and usefulness are significantly affected. It is suggested that the school should produce the developed instructional module in Mathematics in the Modern World to be used by mathematics instructors and students. In addition, mathematics instructors must attend seminars and training for comprehensive module writing.

PA-T6-04: INTENDED LEARNING OPPORTUNITIES IN THE GRADE EIGHT MATHEMATICS MODULES AND THEIR LEVELS OF COGNITIVE DEMAND: A CONTENT ANALYSIS

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The COVID-19 pandemic has caused a large disruption in the education sector worldwide. In the Philippines, the Department of Education (DepEd) has recommended different learning modalities for the delivery of learning, one of which is distance learning modality. Under the distance learning modality is Modular Distance Learning, wherein learners are provided with Self-Learning Modules (SLMs) in print or in digital format. This research study aimed to analyze the cognitive demand levels of the mathematical tasks contained in the SLMs. It hopes to provide guidance to DepEd in its efforts to continuously improve existing learning materials for Filipino students. The method of content analysis was used. Ninety-one (91) mathematical activities from the three sections, What's More, What Can I Do, and Additional Activities, in the SLMs for Grade 8 Mathematics for First Quarter of School Year 2020-2021 were coded and categorized using coding systems adapted from the Smith and Stein's (1998) Task Analysis Guide to determine the cognitive demand level of the activities. Findings reveal that 80% of the SLM activities were found to be categorized as Procedures With No Connection, while 10% of the activities as Memorization. Furthermore, 8% of the activities are categorized as Procedures With Connections and 2% of the activities as Doing Mathematics. Analyses indicate that the intended learning opportunities through the mathematical activities in the SLMs potentially engage the students more in activities of lower-level cognitive demand than higher-level cognitive demand.

PA-T6-05: REPRESENTATIONS OF EXERCISES IN SELECTED GRADE 8 MATHEMATICS TEXTBOOKS FROM THE PHILIPPINES AND SINGAPORE: A COMPARATIVE STUDY

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The curricula of the Philippines and Singapore use a spiral curriculum approach and they have centralized decision making for curriculum syllabi, textbooks and examinations. Also, both curricula aim to enable students in acquiring and applying necessary mathematical concepts, skills, and attitudes for learning mathematics and they appear to have a common goal which is to develop students' problem solving skills. Yet, despite these similarities, the two countries performed differently in the Trends in International Mathematics and Science Study (TIMSS) and in Program for International Student Assessment (PISA). From the TIMSS and PISA frameworks, a four-dimensional framework was formed and used to classify 3,336 algebra exercises in selected grade 8 mathematics textbooks from the two countries. All exercises were classified using these four dimensions: cognitive domain, mathematical process, contextual feature, and response form. The percentages, based on the frequencies of the algebra exercises in each element of the dimensions, were used in the three statistical tests: t-test, Levene's test, and ANOVA, to see if there are significant differences on how these countries represent algebra exercises. It was found that there are more algebra exercises that are in knowledge-level, intra-mathematical, closed-constructed, and require no process present in Philippine textbooks than in Singaporean textbooks. Results show that the differences in cognitive domain, mathematical process, contextual feature, and response form of the algebra exercises from the two countries were not significant. These results will hopefully help DepEd and textbook's authors in modifying exercises in mathematics textbooks to improve students' learning and performance in TIMSS and PISA.



Theme 7: Teachers and Teacher Education

PA-T7-01: A PROPOSED COMPETENCY MODEL FOR SECONDARY MATHEMATICS TEACHERS

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The goal of providing a clear and coherent message about the mathematics content and processes that students need to know and be able to do is of utmost importance. Hence, this study determined the competencies offered to pre-service mathematics teachers based on the mathematics education program of the Teacher Education Institutions (TEIs), revealed the alignment of these competencies to the demand of the Junior High School Mathematics Program, disclosed the performance of pre-service mathematics teachers in the Mathematics Achievement Test, identified the competencies needed by a competent mathematics teacher, and proposed a competency model based on the findings. Results showed that the competencies provided to pre-service mathematics teachers were formulated based on CHED Memorandum Order (CMO) 30 series 2004 and CMO 75 series 2017. The competencies acquired from TEIs were aligned to the demand of the Junior High School Mathematics Program, and the pre-service mathematics teachers manifested a good performance in the Mathematics Achievement Test. The competencies needed by a competent mathematics teacher include professional knowledge, professional beliefs and disposition, and classroom management skills. The model harmonizes the three major competencies needed by pre-service mathematics teachers from the institution to the local setting making these would-be teachers globally competitive. Based on the findings, this study recommends that while the students are still in the pre-service programs, they may be encouraged to take part in varieties of discipline-specific competency-enhancement opportunities such as workshops, research collaborations, best practices expositions and the like to intensify their mathematics content knowledge, may consider the three major competencies which include professional knowledge, professional beliefs and disposition, and classroom management skills in preparing the pre-service mathematics teachers, and may look at the possibility of classroom observations as data gathering scheme to monitor the pedagogical practices of secondary mathematics teachers.

PA-T7-02: BECOMING THE TEACHER ONE NEEDS: AN EMERGENT THEORY ON PEDAGOGIC EMPATHY

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A prospective mathematics teacher, or any other teacher for that matter, should know the learners to be able to teach them in a way that they will learn. This entails the teacher to be able to put himself/herself in the shoes of the learner. For teaching interns who teach for the first time in the laboratory and partner schools, teaching mathematics is beset with challenges. This study aimed to explore the Bachelor of Secondary Education (BSEd) teaching interns' notions of empathy as they taught mathematics throughout their Internship phase to generate an emergent theory of teaching interns' notions of Mathematics pedagogic empathy. Adhering to the Glaserian tenets of Grounded Theory, the researcher explored the qualitative data obtained through interviews for theory generation through the utilization of theoretical sampling, the constant comparative method of data analysis, and discovering the core category of becoming the teacher one needs. To be this kind of teacher that every student would need, these are the five related categories: acknowledging learners' levels of mathematical ability, keeping the learners interested, sensing and responding to learners' emotions, connecting mathematics to real life, and teaching for learning. This implies the need for teacher training institutions to provide strong academic support, up-to-date integrated laboratory classrooms, and opportunities for the teaching interns to be reflective of their practices. The findings revealed how the BSEd Mathematics teaching interns consider themselves to be "students" who are still always learning about the learners and the Mathematics subject itself, and how to effectively teach it for genuine learning. Furthermore, the teaching interns perceive empathy as being manifested all throughout the mathematics teaching-learning process.

PA-T7-03: STATUS OF MATHEMATICS EDUCATION RESEARCH IN THE PHILIPPINES, AS REFLECTED BY ACCEPTED ABSTRACTS IN MATHTED, INC. CONFERENCES

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This study determined the status of mathematics education research in the Philippines as reflected by the 227 abstracts of all parallel sessions in MATHTED, Inc. conferences from 2015 to 2019. The MATHTED conferences conducted within this time frame were held in Cebu (2015), National Capital Region (2016), Cavite (2017), and Palawan (2019). This study is a descriptive meta-analysis research and the instrument used was the Revised Paper Classification Form (Sozbilir, Kutu & Yasar, 2012). The data were encoded in MS Excel and categorized across several dimensions. Results showed that most of the abstracts were presented by researchers from Luzon excluding NCR. The majority of these researchers were affiliated with public institutions and tertiary-level institutions. Most of the 227 studies were conceptualized by a single author only per study and very few of these studies evidenced concentration on elementary mathematics while others mostly evidenced concentration on teaching, learning, attitude/perception, and/or assessment. The use of the quasi-experimental design among studies showed dominance while very few used the qualitative methods or mixed methods designs. Students were the most commonly utilized samples among the studies and the sample size were usually ranging from 31 to 100. Many of these studies used the purposive sampling technique and used the measures of central tendency as a statistical tool. The predominant data collection tools were achievement tests and the majority of the studies evidenced implementation at the school level only. The researcher also found out that mathematics education research in the Philippines is currently experiencing the “experimental incremental decay” and the “qualitative or mixed incremental growth”.

PA-T7-04: TEACHERS’ WORK FULFILLMENT FOR SCHOOL ADEQUACY RELATIVE TO STUDENTS’ SCHOLASTIC EXECUTION

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The study aimed to investigate the teachers’ work fulfillment for school adequacy relative to students’ scholastic execution of mathematics teachers in public schools. Mainly, it focused on determining the profile of the teacher-respondents, the level of teachers’ work fulfillment, the GWA of the student-respondents, and the relationship of the level of teachers’ work fulfillment with the scholastic execution of the student-respondents. A quantitative descriptive method of research design was conducted on a research sample of thirty-three (33) mathematics teachers and two hundred eighty-one (281) students. For the secondary data on the student’s scholastic execution, General Weighted Average (GWA) for 1st and 2nd Quarter of Tago II District were utilized. After the analysis and interpretation of the data, findings revealed on the profile of the respondents that majority were female, married, have earned their master’s degree, less than a decade of experience in service as teachers, with less number of siblings, has least number of trainings and seminars attended, and the highly designated were Teacher-I. Most of the teacher-respondents were in the middle age and enrolled in graduate school. However, in terms of the level of teachers’ work fulfillment, it was found through a standardized questionnaire that most of the respondents were “moderately satisfied” due to teachers’ personal opinions and concerns in dealing with their day-to-day work-related challenges. Meanwhile, the General Weighted Average (GWA) revealed that students’ scholastic execution belongs to the grading scale 80-84 with a satisfactory descriptor. Among the level of work fulfillment, responsibility and professional advancement has a relationship with the academic track of the students. The researcher suggests the conduct of an intervention plan entitled “Annual Training on Sustainability of Teachers’ Fulfillment to Developed Students’ Scholastic Execution in Public Schools.” It may boost teachers’ fulfillment and foster academic endeavor in public schools.



Theme 8: Mathematics Students

PA-T8-01: ADDRESSING DIFFICULTY IN CALCULUS LIMITS USING DYNAMIC GEOMETRY SOFTWARE (DGS)

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Given basic and piece-wise functions, students can solve various limits through algebraic procedures and rules but mostly failed to locate them from the graphs of these functions. A pre-experimental one-group design was employed to address the problem in a form of remedial sessions for sixty-two (62) grade 10 students in the Science & Technology Engineering Program (STEP) curriculum during the first quarter of S.Y. 2019-2020. An attempt to bridge the gap between procedural steps in solving limits and finding its location from the graph were done through a series of simulations using the interactive graphing environment of a Dynamic Geometry Software (DGS) together with its dynamic tools and sliders. The flexible and interactive simulations, comprising graphs of basic and piece-wise functions linked with dynamic texts of algebraic process of solving limits, were designed to provide opportunities for students to explore the underlying geometrical relations with real-time response. The system would provide immediate feedback whenever the learners move the arbitrary location of the point thus confirming and diagnosing their responses, visualizing the actual location of limits, provided they exist. The results revealed a statistically significant improvement on the students' achievement as reflected from their pretest ($M=6.02$, $SD=2.68$) and post-test ($M=13.39$, $SD=1.35$), $t(62) = -19.99$, $p < .001$, $d=2.54$. The remedial sessions with the integration of the DGS simulations were found to be effective in addressing the difficulties of the students in dealing with limits. The overall results of this study provide evidences and valuable details for Mathematics teachers, school administrators, and policy makers to enhance curriculum designs and teaching pedagogies regarding Mathematics teaching and learning.

PA-T8-02: A STRUCTURAL EQUATION MODEL ON PRO-SOCIAL SKILLS AND EXPECTANCY-VALUE OF STEM STUDENTS

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The study was conceptualized to develop a structural model on how mathematics performance depends on students' self-regulated learning skills, grit, and expectancy-value towards Science, Technology, Engineering and Mathematics (STEM). A quantitative research design using causal research approach was implemented to investigate the interrelationships of these constructs. A Covariance-Based Structural Equation Modeling (CB-SEM) was done on the survey data collected from 664 senior high school students from 17 STEM high schools in the province of Zamboanga del Sur. The SEM analysis presents the Respecified Self-Regulated Learning Skill – Expectancy-Value towards STEM – Grit – Mathematics Performance (Respecified SRL-EV-GR-MP) model as the most parsimonious fit indicating as the best empirical support for the theoretical model of this study, $\chi^2(36) = 50.308$, $p > .05$, $RMSEA = .02$, $SRMR = .02$, $NFI = .99$, $CFI = .99$, $GFI = .99$, $TLI = .99$. The mathematics performance of senior high school students of STEM curriculum is attributable to their high expectancies for success and perceived values of the STEM tasks, high grit, and high self-regulated learning skills. The model showed that the expectancy-value of STEM together with their grit have explained large proportions of variances of STEM learners' mathematics performance. Students' grit and expectancy-value of STEM positively and significantly affect their scholastic achievements. Results suggested that when students have high self-regulation in doing and completing STEM-related tasks, they tend to achieve high life-long perseverance, expectancies, and values of STEM, which consequently increase their mathematics performances. Also, evidence of mediating and moderating grit effects was observed in the concurrent effects of expectancy-values towards STEM and the self-regulated learning skills towards students' mathematics performance. Other implications of the study and directions for future research were also provided.

PA-T8-03: EXTENT OF EXPERIENCE ON THE USE OF METACOGNITIVE PROBLEM-SOLVING STRATEGIES OF THE TECHNICAL EDUCATION AND SKILLS DEVELOPMENT (TESDA) STUDENTS

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Learning requires using processes such as planning, application, regulation, and reflection which are considered as metacognition. Studies have shown that metacognition is associated with problem solving skills. Studying metacognition opens the emergence of possible problem-solving strategies in Mathematics instruction. This descriptive research primarily aims to verify the presence of the theory-based metacognitive problem-solving strategies (MPSS) in students when they solve problems in math. Specifically, it intends to determine the 1) extent of their experience on the use of MPSS when classified according to their performance in the problem-solving test, and as a whole; 2) the most experienced MPSS when ranked; and 3) the relationship between the MPSS and students' performance in the test. The researcher-made questionnaire and a set of problem-solving items in Mathematics were used to collect data on the MPSS and students' performance in problem-solving test, respectively. Descriptive statistics using the mean and standard deviation was used to analyze the data. All four MPSS were at a moderate to high experience. The findings show that the Metacognitive Knowledge of the Nature of the Problem was the most experienced metacognitive strategy in problem solving. Students' performance in their problem-solving test is significantly related to the Metacognitive Knowledge of the Nature of the Problem and the Metacognitive Knowledge of the Problem Typology. This finding supports the theory on metacognition used in this study that accurate mathematical knowledge together with the richness of experiences on various kinds of problem-solving play a crucial role in the success of the Mathematical Knowledge and Thinking as the core phenomenon of the successful problem-solving solution outcomes. Hence, the result of this study sees the importance of the integration of these metacognitive problem-solving strategies in designing instructions and so with mathematics teacher education.

PA-T8-04: LITERACY AND NUMERACY SKILLS ON WORD PROBLEM IN MATHEMATICS OF SENIOR HIGH SCHOOL STUDENTS

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In Mathematics, problem solving is the basis of learning. The students must be skillful in solving a word problem. However, only some of the students can solve problems and others are experiencing difficulties. Hence, this qualitative-descriptive study is conducted to examine students' errors and learning attitudes when solving Mathematical word problems. The sample consists of thirty-three (33) Grade II students of FAITH Fidelis Senior High, Tanauan City, Batangas. Making use of Newman's Error Analysis consisting of decoding, comprehension, transformation, process skill, and encoding stages, the researcher was able to determine the stages where students usually commit errors. It is also the objective of the researcher to examine the students' learning attitude in solving word problems as to three components, namely: affective, behavioral, and cognitive. It also determined the different strategies used by teachers in correcting the errors of students in solving word problems. The results showed that students only have a developing level of proficiency in the transformation (78.79%), process (79.80%), and encoding (80.81%) stages of solving word problems. These are the stages where students' most common errors were made. In the encoding stage, students are on the beginning level of proficiency (13.13%) and on the proficient level (23.23%) on the comprehension stage of solving word problems. This study also revealed that students possess a positive attitude in the affective and cognitive component of solving word problems but acquire a negative attitude in learning in the behavioral component. Lastly, the study proposed a Mathematical learning strategy derived from the different strategies used by teacher in correcting error in solving word problems in Mathematics. These strategies can help students with the proper way of conceptualizing word problems.



PA-T8-05: MATHEMATICS ANXIETY OF FEMALE AT-RISK HIGH SCHOOL LEARNERS: A PHENOMENOLOGICAL STUDY

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This study aimed to understand and describe the lived experiences of female at-risk high school learners in mathematics, particularly on their mathematics anxiety, from the eyes of those who experienced the phenomenon. Specifically, this study aimed to describe how the female at-risk high school learners struggled with their mathematics anxiety. While there is a plethora of quantitative research on mathematics anxiety of female learners, there is a dearth of literature on the lived experiences of female at-risk high school learners that can narrate their emotional experiences. A phenomenological method is required to capture, investigate, and describe a lived experience of a phenomenon. Thus, the descriptive phenomenological method was employed. Purposive sampling was utilized as the female high school participants must have belonged to the at-risk category in mathematics. As defined in this study, the at-risk learners failed in succession grades nine and ten and had to pass a remedial course to proceed to the next level. Eight female at-risk high school learners from an exclusive school in Quezon City were interviewed. Three themes emerged under mathematics anxiety: aversion to mathematics, comprehension as the gatekeeper for positive emotional experiences, and stress and anxiety. The meaning units for the theme “aversion to mathematics” include hatred towards mathematics, fear of mathematics, and hopelessness. The theme “comprehension is the gatekeeper for positive emotional experiences” highlights the two positive emotions experienced when the learners demonstrated comprehension of the lesson: happiness and redemption. The last theme, “stress and anxiety,” has three meaning units: stress in testing and learning mathematics, physical and emotional toll of stress, and mind block. Understanding the lived experiences on mathematics anxiety of these at-risk learners can provide a clue on how to provide an environment that can provide support for them.

PA-T8-06: MATHEMATICAL READINESS OF SENIOR AND NON-SENIOR HIGH SCHOOL GRADUATES: A BASIS FOR MATHEMATICS BRIDGING PROGRAM

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This study utilized a descriptive-inferential approach of research which aimed to examine the college mathematical readiness of the senior and non-senior high school graduates and to determine if the graduates’ mathematical readiness statistically differ. The participants of the study were 154 senior high school graduates, 160 non-senior high school graduates, and five subject matter specialists. The participants’ mathematical readiness was examined using the college general education Mathematics competency test of Salvador (2019). The instrument was a 60-item test composed of 17 items in Number and Number Sense; 14 items in Patterns, Functions and Algebra; 14 items in Measurements and Geometry, and 15 items in Statistics and Probability. The results were item analyzed and interpreted according to the specific objectives of the study. The results showed that senior high graduates were viewed more ready than the non-senior high school graduates. Statistics showed that senior high school graduates performed statistically better and significantly more prepared for college Mathematics coursework. A Mathematics bridging program was strongly recommended based on the pursuit of the study to reinforce and prepare the non-senior high school graduates. Also, in response to CHED Memorandum Order (CMO) no. 10 s. 2017, Policy on Students Affected by the Implementation of the K to 12 Program and the New General Curriculum, a proposed course syllabus for General Mathematics was formulated which may be used as a teaching guide in the implementation of the program. Along with the syllabus, activity and performance task sheets were appended. The proposed course syllabus, activity sheets, performance tasks were examined and validated by the five subject matter subject specialists.

PA-T8-07: MENTAL ACTIONS IN THE TRANSITION FROM PART-WHOLE CONSTRUCT TO MEASURE CONSTRUCT

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Fraction magnitude knowledge is the capacity of using the concepts of fraction as a measure and the interlinking of related concepts and relationships. It is only in recent years that researchers have further investigated its role in the understanding of fractions. In relation, Behr (1993) identified several constructs that constituted fraction knowledge; of which, the measure construct has been intensively studied for its implications on mathematical performance in higher levels. In terms of teaching fractions, many countries teach fractions heavily from part-whole construct and less on the measure construct, even though these constructs can linearly progress. Difficulties happen when a learner cannot move forward from one construct of fractions to another. Thus, this study aimed to identify possible difficulties and hindrances in the progression from part-whole construct to measure construct of fractions using the Learning Progression Model of Wilkins and Norton (2018). The participants were 36 Grade 4 pupils in a public school. A test consisting of 12 modified TIMSS released items on the concepts of fractions was administered. Student solutions were analyzed using the Learning Progression Model. One-third of the participants were interviewed. It was observed that the mental actions 'partitioning' and 'iterating' were inadequate among the students. The lack of these two basic mental actions hindered the transition of fraction learning from the part-whole construct to the measure construct. The deficiency in mental actions impedes the production of new mental actions required in developing fraction magnitude knowledge. Since requisite mental actions are crucial as can be seen from the results of this study, further research on developing fraction knowledge is recommended to improve the teaching and learning of fractions.

PA-T8-08: USING LINGUISTIC RELATIVITY AND COGNITIVE RESTRUCTURING TO UNDERSTAND THE LINGUISTIC PREFERENCES OF CHINESE-FILIPINO STUDENTS DURING MATHEMATICAL THINKING

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Linguistic relativity is the principle that language influences its speakers' thoughts. On the other hand, cognitive restructuring is a form of adaptation that occurs in one's mind when acquiring a second language. In this regard, Pavlenko (2014) identified several predictors of cognitive restructuring that may be indicative of linguistic relativity in multilinguals. This study used linguistic relativity and the predictors of cognitive restructuring as lenses to understand the linguistic preferences during mathematical thinking of Chinese-Filipino students who learned mathematics in both the English and Chinese languages-of-instruction from Kindergarten to Junior High School. In particular, the participants of this study were ten Chinese-Filipino university freshmen who completed their K-10 studies in a bilingual English-Chinese mathematics program. Survey questionnaires were administered and interviews were conducted that included tasks with a think-aloud protocol in place. The Language Profile Questionnaire gathered information pertinent to the students' language background, usage, motivation, and exposure. On the other hand, the Mathematical Situations Survey posed mathematical ideas whose conceptualizations or terminologies differ in English and Chinese. A mixed methods analysis of the data suggested that the students had a stronger preference for English overall in thinking about mathematics, performing mathematics tasks, and communicating mathematical ideas. Likewise, the role of other languages (i.e., Mandarin, Hokkien, and Filipino) in mathematical thinking can also be attributed to the predictors of cognitive restructuring. Hence, this presentation demonstrates the viability of using the predictors of cognitive restructuring as based on the principle of linguistic relativity to analyze linguistic preferences in the mathematical thinking of multilinguals.



Poster Presentations

Theme 1: Student Learning in Secondary Mathematics

PO-TI-01: AN ONLINE CONSTRUCTIVIST APPROACH IN TEACHING FACTORING QUADRATIC TRINOMIALS WHERE $a > 1$: A LESSON STUDY

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This study aims to share new grounds in teaching mathematics in an online setup while adhering to the principles of constructivism as a shift from traditional teaching. Moreover, this poster presents a lesson study in Grade eight (8) algebra specifically on factoring quadratic trinomials where $a > 1$ that was held through Google Meet. Authors shared the same interest towards improving the teaching delivery of the said topic in an online setup by integrating questioning techniques, collaborative works, and real-life scenarios by which factoring is best represented. The Slide-Divide-Bottoms-Up and trial-and-error techniques were used as strategies for factoring quadratic trinomials ($a > 1$). Thirty (30) Grade 8 students participated in the study, wherein online platforms such as Google Meet, breakout rooms for group work activities, Jamboard for demonstrative activities, and Padlet for students' evaluation were used. Through the lesson study cycle, three (3) different sessions were executed, namely: (i) Planning Day, (ii) Implementation Day, and (iii) Reflection through teacher collaboration and post-conference. With the application of the constructivist approach in an online teaching and learning, the following points were identified as the result of the study: a) effective questioning can develop the fullest possible knowledge of the students about the topic; b.) students learn well when they can relate their previous knowledge and experiences to the topic; c.) collaborative works improve their understanding about the lesson; d.) relevant activities raise enthusiasm for learning, and e.) constructive feedbacks help students learn the topic and its application in real life even more. Furthermore, students were able to express their ideas, participated in the discussion, and received good results on the assessment given to them. It is the authors' realization that using breakout rooms, Jamboard, and Padlet can improve teacher-student interaction in an online class and is recommended to be used in the new normal education.

PO-TI-02: REVIEW CLASSES IN MATHEMATICS AT LEONARDO AMIGO MEMORIAL HIGH SCHOOL, MAKIWALO MONDRAGON N. SAMAR

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Mathematics education and mathematics achievement have always been on the agenda of the Philippine national education system. Mathematics is perceived as one of the difficult subjects by most of the students especially during their secondary years. The Mathematics department of the College of Science is mandated to serve communities. Hence, review classes in Leonardo Amigo High School were conducted to help address shortages of inputs through classroom review classes. Through these math review classes, the faculty of the department aimed to help improve the learning competencies of these students and the school to which the extension program was conducted. Extension classes, particularly review classes, are a great way to learn more about different topics, learn new skills, or further improve their mathematical ability from a new set of teachers.

**PO-TI-03: TEACHING PROPOSITIONAL LOGIC IN THE NEW NORMAL
USING FLIPPED CLASSROOM DESIGN**

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Logic is considered the foundation of mathematics as it embodies the reasoning skills for understanding mathematical concepts. Despite this fact, students have difficulty grasping the concepts of propositional logic due to the different symbols used that may entail more problematic mathematical reasoning. The new normal has posed another challenge to this problem as the transition to a new way of learning requires adjustments on the part of the teacher and the students. As such, this lesson study focused on how useful flipped classroom design is in teaching propositional logic to Grade 11 in the new normal. It followed the five-stage lesson study design: (1) planning, (2) implementation, (3) post-lesson discussion, (4) reflection, and (5) application. Results showed that using flipped is efficient in delivering instructions in the new normal. This platform can promote interactive discussions where the teacher can facilitate effectively and efficiently. It was also found out that the English grammatical structure of simple and compound sentences confused students' understanding of simple and compound propositions. This can be addressed by teachers by emphasizing the similarities and differences between these two concepts. Difficulty in converting conditional propositions from symbols to statements and vice versa was traced to the students' fixed knowledge that conditionals only have the if-then form. It is important to give emphasis on the two parts of a conditional statement and how it could be written interchangeably in their position. Thus, providing an ample number of examples for practice must be considered.



Theme 2: Student Learning in Tertiary Mathematics

PO-T2-01: COMPARATIVE ANALYSIS OF MOBILE APPLICATIONS FOR ITS INTEGRATION IN COLLEGE MATHEMATICS SUBJECTS

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The purpose of this study is to investigate potential mobile applications that can be utilized to help college students learn mathematical ideas and principles. The considered mobile applications include those that have an equation solver feature and are named as follows: MalMath, Solve4x, MyScript Calculator, Photomath, iMathematics, Microsoft Math Solver, Mathway, Socratic, WolframAlpha, and Cymath. These mobile applications will be evaluated subjectively and statistically to identify which is/are the most suitable for utilization in a flexible learning environment, while also considering their benefits and drawbacks in the teaching-learning process. This study will take into account various app features such as subject coverage, interface, accessibility, and so on, which will serve as the common criteria for evaluation. Each criterion will be rated and ranked accordingly. The Friedman Test, a nonparametric statistical test, will be used to evaluate the rank-ordered data set of numerous mobile applications premised on a common criteria. In the case that there is a significant tendency for a math solving application/s to rank systematically higher or lower based on the results of Friedman Test, Post-Hoc tests will be conducted. Following that, a comparative analysis will be performed to get findings and recommendations for the prospective integration of mobile apps. Furthermore, this research will help with information distribution and raise awareness regarding the utilization of mobile applications in the teaching-learning process. The advantages and disadvantages of adopting mobile applications will help educators successfully facilitate the teaching-learning process. Meanwhile, students will be encouraged to use the mobile application/s to enhance their mathematics literacy and problem-solving skills.

PO-T2-02: CONSTRUCTION OF DIFFERENCE SETS FROM UNIONS OF CYCLOTOMIC CLASSES OF ORDER $N=14$

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A (v, k, λ) -difference set D in a group G with order v is a non-empty proper k -subset of G such that every non-identity element of G can be written as a product $d_1 d_2^{-1}$ of elements of D in exactly λ ways. If a finite group G is written additively, the defining condition is that every nonzero element of the group can be expressed as a difference $d_1 - d_2$ of elements of D in exactly λ ways.

A classical method for constructing difference sets in the additive groups of finite fields is by cyclotomic construction which uses cyclotomic classes. This paper aimed to investigate which unions of cyclotomic classes of order $N = 14$ produce difference sets in the group $(GF(q), +)$, where q is a prime of the form $q = nN + 1$ for two positive integers $n > 1$ and $N > 1$. Moreover, the obtained difference sets will be classified if they are of Paley type, Hall type, quartic or octic cyclotomic difference sets, or equivalent to the complement of these known cyclotomic difference sets. In addition, this study also considered adding the residue zero to the unions of cyclotomic classes.

This research adopted and modified the algorithm created by Estrella and Balmaceda (2019) using exhaustive computer search. The construction was discussed in detail including the computer programs or codes derived from the definitions and known theorems on difference sets using the open-source programming language Python. The results revealed that only the union of seven cyclotomic classes such as $C_0^{(14,q)} \cup C_2^{(14,q)} \cup C_4^{(14,q)} \cup C_6^{(14,q)} \cup C_8^{(14,q)} \cup C_{10}^{(14,q)} \cup C_{12}^{(14,q)}$ forms Paley type difference sets. Similarly, this union together with the residue zero also forms a difference set equivalent to the modified Paley type.

PO-T2-03: ON THE MULTIDIMENSIONALITY OF TEACHERS' QUALITIES, PERSONAL ACHIEVEMENT AND THEIR ROLE ON STUDENTS' ACHIEVEMENT IN GENERAL MATHEMATICS

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The study was conducted to develop a valid and reliable tool which can be used to measure teachers' qualities and develop a robust ordinal logistic regression model that predicts students' achievement in General Mathematics based on teachers' qualities and achievements (measured by professional rank, years of experience, highest educational attainment, and participation in professional development activities) as independent variables. The statistical tools used were Reliability Test, Exploratory Factor Analysis, and Ordinal Regression Analysis. The researcher interviewed 10 experienced mathematics teachers and 10 senior high school students who recently finished General Mathematics. Their responses were then converted to measurable variables to construct an initial questionnaire. The initial questionnaire was pilot tested to 300 student-respondents for reliability and was found reliable. Based on the results under Exploratory Factor Analysis, there are five latent variables/dimensions of teachers' qualities. These dimensions are Instructional Competencies, Personal Qualities, Procedural Fairness on Tests, Handling Learners' Response, and Compassionate Discipline. The developed questionnaire was administered to 70 randomly selected students of 14 senior high school mathematics teachers from the eight (8) schools in Dipolog City offering senior high school curriculum. The result of ordinal regression analysis explained only five explanatory predictors that have significantly improved the Logistic Ordinal Regression Model. These five explanatory predictors were Teacher's Years of Experience, Teacher's Highest Educational Attainment, Personal Qualities, Procedural Fairness on Tests, and Handling Learners' Response. The result rejected Teacher's Professional Rank, Teacher's Participation in Professional Development Activities, Instructional Competencies, and Compassionate Discipline as predictors of students' achievement in General Mathematics. Moreover, with the highest Wald value of 5.842, Teacher Personal Qualities had the greatest influence on the level of student's achievement in General Mathematics. Hence, teachers' attitudes in dealing with students should be seriously considered when aiming to increase the level of students' achievement in mathematics.



Theme 3: Teachers and Teacher Education

PO-T3-01: CASE STUDIES OF OUTSTANDING MATHEMATICS TEACHERS: TOWARDS A FRAMEWORK FOR HIGH-QUALITY TEACHING

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Emanated from the lived-experiences of seven (7) Mathematics Teachers who were recipients of Teaching Excellence Award, a descriptive case study was employed in describing and analysing their teaching practices as well as their characteristics through the lens of their students and colleagues. The participants of the study were selected through purposive and snowball sampling. Selection was made through their recognition as outstanding teacher in mathematics in their respective district, province, or region. The criteria used in their selection were limited to the standards set by the institution or awarding body. Questionnaires and guide questions served as the data collection instruments from which the lived experiences of the participants were drawn. Thematic analysis was employed following the 6 phases proposed by Clarke and Brawn (2006) for the qualitative data: familiarization of data, generating initial codes, searching for themes, reviewing themes, defining and naming the themes, and producing the report. Anchored to their subjective interpretations of their lived experiences as effective Mathematics Teachers, this study figured out the following themes which served as factors that contributed to the proposed framework for High Quality Teaching: Deliberate instructional design; Enhanced engagement; Adaptive instruction; Respectful learning environment, and Lifelong learning. Data analysis revealed seven (7) emerging themes on the characteristics of Outstanding Mathematics teacher. These emerging themes are (1) being hardworking, (2) being a supportive teacher, (3) accomplishing things to be described as being a teacher-achiever, (4) exhibiting passion in their profession, (5) being an intellectual person, (6) having care for their colleagues and students, and (7) being a role model for others. The end product is a framework woven towards high quality teaching: The Manifestation of Lifelong Learning through Teaching Practices and Teachers' Characteristics.

PA-T5-02: EXPLORING THE TEACHER'S DEVELOPMENT OF CULTURALLY SENSITIVE LESSON IN MATHEMATICS THROUGH MODULAR APPROACH: TOWARDS A PROFESSIONAL LEARNING COMMUNITY MODEL FOR MULTICULTURAL INSTRUCTION

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The challenges faced during the development of culture-sensitive lessons (CSLs) in mathematics for multicultural classes establish the importance of organizing a school's Professional Learning Community (PLC). The cultural diversity of the students in a multicultural class necessitates cultural sensitivity in teaching. However, current Mathematics teaching practices and culture-sensitive learning materials are insufficient. An exploratory case study has been applied to three cases to explore a PLC composed of Mathematics teachers, school heads, and ethnic leaders developing the CSLs. Semi-structured interviews, focus group discussion, and lesson planning have been conducted with the key informants. Thematic analysis has been applied using NVIVO software for the qualitative data gathered. Results have shown the importance of the PLC in addressing the challenges of multicultural instructions in the cases studied. The challenges the teachers encountered are the communication platform amidst pandemic, less understanding of the students' cultures, and the transition of teaching to modular approach with a multicultural class. A Professional Learning Community, i.e. prescriptive process model for Multicultural Instruction (PLC-MI), has been generated based on the study participants' qualitative data and cross-case analysis. There is a need to change and enhance the community of practice and develop learning materials for the students. Professional development must also be focused through PLC towards developing a culture of practice in school and the community towards improved student learning.

PO-T3-03: EXPLORING THE UTILIZATION OF 2C-2I-1R APPROACHES OF THE PUBLIC SECONDARY SCHOOL MATHEMATICS TEACHERS

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This study described the utilization of 2C-2I-1R approaches of Mathematics Teachers at the Division of Tanauan City during the school year 2020-2021. The study was conducted using a quantitative-qualitative research design, employing the utilization of questionnaires with 56 secondary mathematics teachers of Tanauan City and conducting interviews with 28 Grade 7 and 8 teachers. The statistical tools used in the analysis of data were mean and standard deviation. Specifically, the study described the respondents' discourse of the pedagogical approaches and the extent of their utilization of the given approaches in accordance with the New Learning Competencies used in the new normal. More so, the problems encountered in utilizing approaches were identified. Lastly, the study proposed a teaching approach matrix that can serve as a guide for teachers using the new competencies. The findings revealed that the respondents highly utilized Collaborative, Constructivist, Inquiry-based, Integrative and Reflective approaches in executing different tasks. This study also asserts that the integrative approach is the most commonly used in the set of new competencies, while the problems mostly encountered by teachers are related to the behavior of the students to the said subject. Furthermore, researchers may perform similar studies in the future to learn more about the utilization of the different educational approaches and strategies. The Schools City Division Office of Tanauan City may also design a program that can help the teachers to be highly proficient in utilizing the pedagogical approaches through the use of the Teaching Matrix Guide developed by the researcher.

PO-T3-04: MATHEMATICS NEEDS ASSESSMENT IN LEONARDO AMIGO HIGH SCHOOL: BASIS FOR EXTENSION PROGRAM OF THE DEPARTMENT OF MATHEMATICS, COLLEGE OF SCIENCE, UNIVERSITY OF EASTERN PHILIPPINESOlga D. Unay*, Fel B. Muncada Jr., Christine V. Mollejon, Mary Jane B. Calpa, Ida E. Esquierdo,
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The aim of the study was to identify the needs of the students about mathematics in terms of its standards-aligned instructional materials, instructional time, instructional leadership, teacher qualifications and professional development, student achievement monitoring system, instructional assistance and teacher support, classroom instruction and management practices, differentiated instruction, teacher collaboration, instructional groupings and scheduling, and fiscal support. This study was conducted at Leonardo Amigo High School where the respondents are the 3 mathematics teachers and 50 students. Data were collected through a survey questionnaire taken from Santa Clara County Office of Education (SCCOE) organization with a few revisions to fit the respondents' characteristics. To analyze the data, descriptive statistics and descriptive analysis method were used. Based on the result, the lowest score which needs the most priority in beginning the mathematics extension were the fiscal support, classroom instruction and management practices. This mathematics needs assessment gives justification for the Department of Mathematics College of Science's extension program in the Leonardo Amigo High School.



PO-T3-05: PREFERENCES OF FACULTY MEMBERS OF THE UNIVERSITY OF EASTERN PHILIPPINES ON HOW TO PROCEED LEARNING AMIDST COVID-19 PANDEMIC

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This study was conducted to determine the preferences of faculty members on how to proceed with learning amidst the Covid-19 pandemic in terms of age, gender, academic rank, and the college where the faculty belongs. It also attempted to determine the preferred alternative mode of teaching of the faculty members of the University of Eastern Philippines in the first semester of academic year 2020–2021. The researchers provided an online survey questionnaire in Google Forms to gather the data. The data collected were tabulated and interpreted using frequency counts and percentages. Results showed that 38% of the respondents were 31-40 years old, 71% were female, and majority of these respondents were instructors. Results also showed that 51% of respondents preferred to end the semester and evaluate the student's performance as of March 16, 2020 based on their accumulated grades from the first day of classes. However, in terms of resuming the class for the second semester and for the incoming first semester academic year 2020–2021, a majority of the respondents preferred to have a modular instruction as an alternative mode of teaching considering the internet connectivity issue in the province. The study concluded and suggested to conduct training-workshop on the preparation of learning modules with the faculty members and to determine the most efficient and prompt way of delivering the learning modules to students especially to those in far-flung places.

Theme 4: Mathematics Students

PO-T4-01: ESTIMATING STUDENT'S MATHEMATICS PERFORMANCE USING MULTIPLE LINEAR REGRESSION: A NORMAL ESTIMATION EQUATION APPROACH

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This study intended to formulate a mathematical model in estimating mathematics performance of the Grade 10 students in Taguig City using normal estimation equation. A total of twenty-nine (29) Grade 10 public junior high school mathematics teachers during school year 2018–2019 were selected as respondents of the study. It employed regression analysis with emphasis on survey method using two instruments: 1) BarOn EQ:i-S to determine the emotional quotient, and 2) a researchers-made instrument to describe the 21st century skills of the respondents. Mathematics performance is considered as dependent variable while there are fifteen independent variables which were categorized into two – emotional quotient and 21st century skills. Out of fifteen independent variables, ten are from 21st century skills and these are creativity and innovation, critical thinking, metacognition, communication, collaboration, information literacy, ICT literacy, citizenship, life and career, and personal and social responsibility. The remaining five independent variables are from emotional quotient which are intrapersonal scale, interpersonal scale, stress management, adaptability, and general mood. When matrix theory was applied for mathematical computations and manipulations, the researchers came up with the mathematical model with predicting power of 70 percent. Applying multiple regression, only the variables under emotional quotient are found to be significant predictors of mathematics performance. It can be implied that the emotional intelligence of the teachers has a significant role in estimating the performance of the students. Further, there is no significant difference between the actual mathematics performance and predicted values according to the result of independent sample t-test. It means that the predicted values obtained using the mathematical model was 70 percent close to the actual ones. It is recommended to conduct a similar study in a national level in order to come up with a stronger model which predicts the mathematics performance of the students.

PO-T4-02: RELATIONSHIP OF FRIENDSHIP ON ACADEMIC PERFORMANCE, MATH ANXIETY, ATTITUDE TOWARDS MATH AND SMALL GROUP LEARNINGS

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The study aims to determine the relationship of friendship towards academic performance, attitude towards Mathematics, small group learning, and mathematics anxiety. Descriptive correlation design was utilized to address the objectives of the study. Multi-stage sampling in selecting the respondents was used. A total of 200 Grade 7 pupils were selected from the private and public schools in the City of Dasmariñas. The instrument used are as follows: McGill Friendship Questionnaire "Friendship Functions", The Student's Attitude towards Group Environment questionnaire, Modified Fenema-Sherman Attitude Scale, and Mathematics Anxiety Rating Scale. Descriptive statistics such as mean and standard deviation, frequency distribution, and Pearson's r correlation were used in this study. The results show that the respondents prefer a friend who does things together that arouse enjoyment, amusement, and excitement; a friend who can be counted on for continuing availability and loyalty; and a friend who provides guidance, assistance, information, advice, and other forms of tangible aid necessary to meet needs or goals. In addition, using the frequency distribution, most students were proficient in Math with a grade between 85% - 89% using the DepEd grading and showed a positive attitude towards Math and small group learning. Moreover, the respondents have low level of Math anxiety. In conclusion, the level of friendship has high significant relationship on academic performance, attitude towards Mathematics, and small group learning with p -values all equal to 0.00 but has no significant relationship on level of Math anxiety with a p -value of 0.239. This study implies that students who find help from their friends tend to improve their performance in math and have a positive attitude in Math and small group learning.



PO-T4-03: THE EFFECT OF DIGITAL LITERACY AND INTERNET SPEED ON COLLEGE STUDENTS' MATHEMATICS PERFORMANCE

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Due to the existing pandemic and the shift to e-learning, this study was purposefully conducted to explore the relationship of digital literacy with the academic performance of the students enrolled in the course Mathematics in the Modern World (GE 4) at the University of Mindanao First Semester of SY 2020-2021. It utilized descriptive correlational research design and data were examined from the online survey responses of the 318 students that were randomly selected from a population of 1,558. Responses were descriptively analyzed using frequency for the demographics and mean to determine the levels of students' digital literacy and mathematics performance. Pearson r was used to determine the relationship between these variables. Regression analysis was also used to determine the effect of digital literacy skills and internet speed to students' mathematics performance. Majority of the students who participated in the study used their cellphones as primary tool to attend online classes with an average internet speed of 9.55 Mbps (SD=8.055 Mbps). The level of students' digital literacy was good with a mean of 3.602 (SD=0.539), while the level of students' mathematics performance was very good with an average grade of 87.34 (SD=6.258). It was also found that digital literacy was significantly correlated to mathematics performance with p -value of 0.016 at $\alpha = 0.05$. This also had a positive effect in predicting the students' mathematics performance with a digital literacy coefficient of 1.665 and unstandardized coefficient (B) of 82.139. This means that for every unit increased on digital literacy, there is an increase of 1.665 on students' mathematics performance.

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