



UNIVERSITY OF SOUTHERN MINDANAO
Kabacan, Cotabato
Philippines



EXTENSION SERVICES OFFICE

TRAINING DESIGN

Training Title

Empowering Educators: Crafting Learning Materials and Design Implementing Design-Based Action Research

Rationale

Barangay high schools were established to provide wider access to secondary education, especially for students in remote areas. However, these schools face challenges such as teacher shortages, lack of resources, and low student performance in mathematics. To address these issues, there is a need for effective learning materials that support independent study.

Reports have shown that barangay high schools struggle with instructional quality due to limited qualified teachers and learning resources. The situation worsened during the COVID-19 pandemic, highlighting the need for self-directed learning tools. Research confirms that well-designed self-instructional materials improve student learning, particularly in mathematics. A recent project using representation approach-based learning materials showed positive results, improving student understanding and engagement.

Without proper intervention, students in barangay high schools will continue to struggle with mathematics, limiting their academic and future career opportunities. Teacher shortages and learning gaps may further widen educational inequality, leaving students at a disadvantage compared to their peers in better-equipped schools.

This project aims to implement and validate representation approach-based learning materials to help students learn mathematics independently. By providing structured self-instructional lessons, students can develop essential math skills even in the absence of a teacher. These materials will not only improve learning outcomes but also encourage problem-solving, critical thinking, and self-discipline—key skills for lifelong learning. Additionally, strengthening independent learning resources will enhance the quality of education in barangay high schools, helping to elevate their credibility and provide more equitable opportunities for students in remote communities.

Objectives

Upon completion of this training program, participants will be able to:

1. Strengthen math teachers' capability to develop representation-based self-instructional materials.
2. Engage teachers in collaborative work of developing research lessons and Learning Activity Pages (LAPs).
3. Validate, pilot-test, and refine LAPs to efficiently facilitate independent learning of mathematics concepts and skills.
4. Enhance mathematics performance and numerical literacy among barangay high school students through implementation of LAPs

Participants

USM Extension implementers, graduate students and invited teachers from the target barangay high school

Venue

GSHall, USM

Date of Conduct

May 30 – 31, 2025

Methodology

The training methods will include:

- Lectures and Presentations
Use clear, engaging presentations with real-life examples.
Provide digital and printed handouts
- Hands-on Workshops
Guide participants in creating instructional materials and drafting action research proposals.
- Group Discussions
Encourage sharing of ideas and best practices.

Effectiveness of the training will be evaluated through:

<ul style="list-style-type: none"> Post-Training Survey Participants will complete a survey using the ESO enrolled forms (Resource Person Evaluation, Overall training evaluation). Output Evaluation Assess the quality of instructional materials created during the workshop Review draft action research proposals 			
Training Management Staff			
Resource Speaker 1	Ms. Aurea Puyos	Topic	Lecture 1: Action Research
Resource Speaker 2	Dr. Ian June Garces	Topic	Lecture 2: Writing Good Math Problems
Resource Speaker 3	Dr. Debbie Marie Verzosa	Topic	Lecture 3: Development of Representation Approach – Learning Materials
Resource Speaker 4	1. Dr. Leorence Tandog 2. Dr. Anna Jean Garcia	Topic	Lecture 4: Design – based Research

Estimated Budgetary Requirement		
Particular	Quantity/Unit	Amount
A. Personal Services	N/A	
B. Operation and Maintenance		
Supplies and Materials	Training kits/Printed modules - Ballpens - Papers - Markers	5,000
Meals and Snacks	280x75(70x4 snacks) 140x165 (70x2meals)	21,000 23,100
Total		49,100

Proposed Flow of Activity		
Time	Activity	Person Responsible
May 30, 2025 9:00AM – 10:30AM	Lecture 1: Action Research	Resource Persons Ms. Aurea Puyos
10:30AM – 12:00 PM	Lecture 2: Writing Good Math Problems	Dr. Ian June Garces
1:00PM – 2:30PM	Lecture 3: Development of Representation Approach – Learning Materials	Dr. Debbie Marie Verzosa
2:30PM – 5:00PM	Workshop	Facilitators Leorence Tandog, Philip Lester Benjamin, Sandra Nanding, Anna Jean Garcia, Daryl Mae Mamon, MST/PhD Students
March 31, 2025 8:30AM – 10:00AM	Lecture 4: Design – based Research	Resource Persons Dr. Leorence Tandog and Ms. Anna Jean Garcia
10:00AM – 12:00PM	Workshop	Facilitators Jupiter Pilongo, Daryl Mae Mamon, Lawton Yabes, Roel Valenton, Rowel Madio, Leonard Paleta, MST/PhD Students
1:00PM – 4:00PM	Group presentation and feedbacking	

Additional:

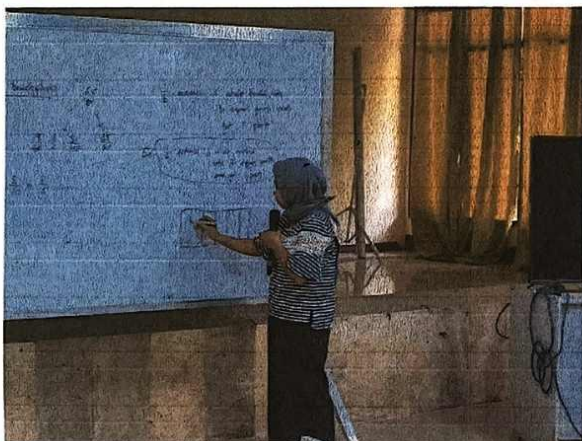
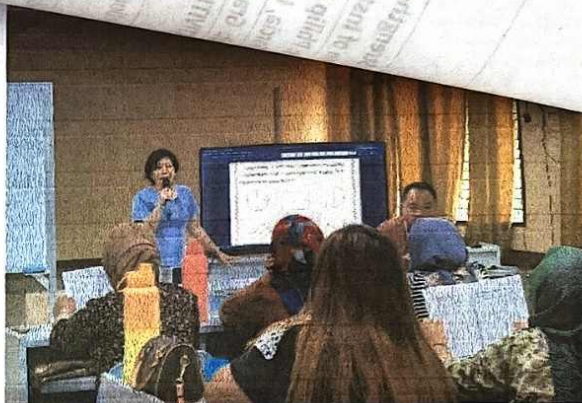
2023 EXTENSION



LECTURE ON IM DEVELOPMENT BY DR. VERZOSA



Attachments



Training session on instructional material (IM) development and simplified fraction explanations led by Dr. Debbie Marie Verzosa, held at the GS Hall, USM. The session focused on equipping educators with effective strategies to create engaging IMs and teach fractions in a straightforward manner.

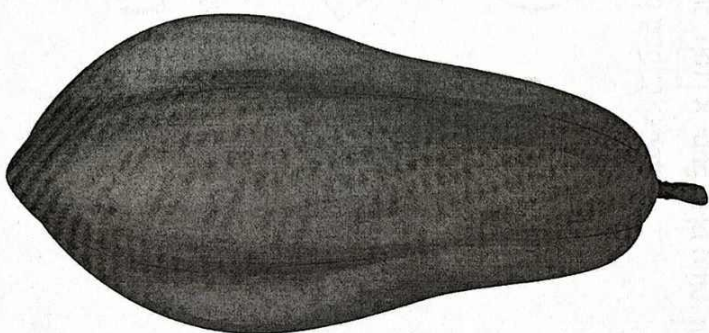
Additionally, the validation process for the IMs developed was overseen by Dr. Leorence Tandog and a team of experts, ensuring alignment with educational standards and effectiveness in facilitating learning.

Name: _____
 Edad: _____
 Birthday: _____
 School: _____
 Grade Level: _____



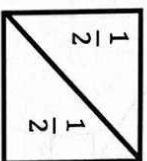
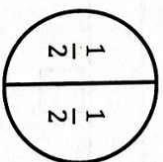
? Gawin Natin 'to

Hatiin sa dalawang pantay na bahagi itong papaya.



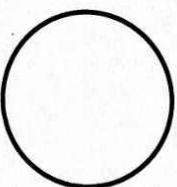
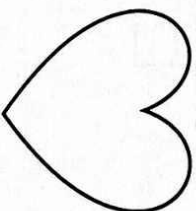
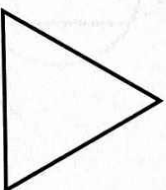
Isang Kalahati o One Half ($\frac{1}{2}$)

Ang isang piraso ng isang buo na hinati sa dalawang magkapantay na bahagi ay tinatawag na $\frac{1}{2}$ (one half).



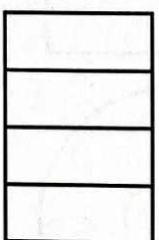
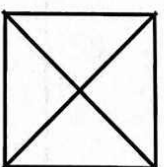
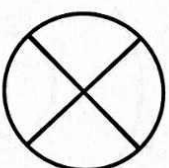
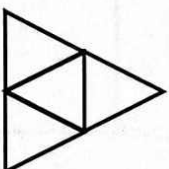
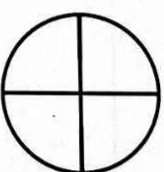
Gawin Natin 'to

Gumuhit ng mga bahaging nagpapakita ng $\frac{1}{2}$.

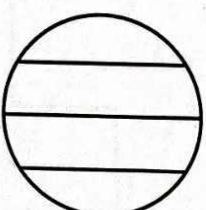
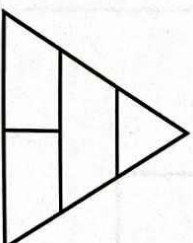
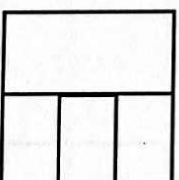


? Suriin Natin 'to

Pantay na Pagkakahati sa Apat



Hindi Pantay na Pagkahati sa Apat





IM DEVELOPED AND REFINED: PILOT TEST



2025 EXTENSION

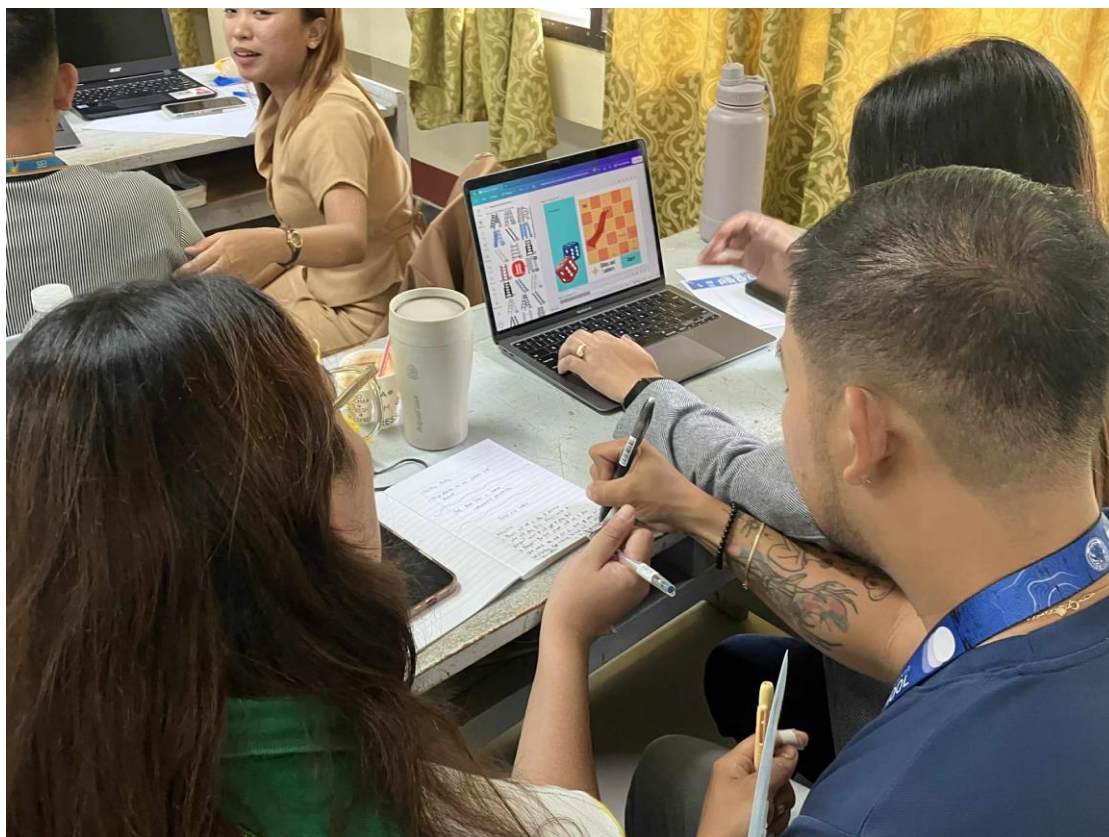
Program of Activities

Schedule of Activities

Time (Day/Time Duration)	Topic/Activity (Title of the Lecture/Discussion)	Speakers/Presentors/Personnel
May 30, 2025 (Friday)		
7:30 - 8:30 AM	Arrival/Settling In/Registration	Secretariat
8:30 - 9:00 AM	Opening Program Welcome Remarks Inspirational Message Overview of the Seminar Workshop	GS Students Dr. Philip Lester P. Benjamin Dr. Jonald L. Pimentel <i>SUC President IV</i> Dr. Leorence C. Tandog
9:00 - 10:15 AM	Lecture 1: Action Research	Speaker: Ms. Aurea Puyos Senior Instructor, Notre Dame of Kidapawan College Moderator: Prof. Roel S. Valenton Associate Professor, USM
10:15 - 10:45 AM	Break	
10:45 - 12:00 PM	Lecture 2: Writing Good Math Problems (Online Mode)	Speaker: Dr. Ian June L. Garces Associate Professor, Ateneo de Manila Moderator: Prof. Rowel P. Madio Associate Professor, USM
12:00 - 1:00 PM	Lunch Break	
1:00 - 2:15 PM	Lecture 3: Development of Representation Approach - Learning Materials	Speaker: Dr. Debbie Marie B. Verzosa Professor, USM Moderator: Dr. Leonard M. Paleta Associate Professor, USM
2:15 - 2:30	Break	
2:30 - 3:40 PM	WORKSHOP	Facilitators: MST and PhD students
3:40 - 4:40 PM	Paper Presentation: ➤ Bridging Ethnomathematical Practices of Obo Manobo Tahiti Farmers and Mathematics Education (Phase 2): Designing Mathematical Problem and Exploring Teachers' Perception ➤ THE APPLICATION OF ENHANCED DAMATH IN LEARNING OPERATIONS ON INTEGERS AND DEVELOPING STRATEGIC THINKING ➤ The Effect of PowToon to the Proficiency Level in General Mathematics of Grade 11 Students in Bacongco National High School	Presentors: Wendell Juntilla Cherrylee Buhay Elaine Grace H. Adto Moderator: Prof. Fitzmee Ann D. Tamalak Instructor, USM

Time (Day/Time Duration)	Topic/Activity (Title of the Lecture/Discussion)	Speakers/Presentors/Personnel
May 31, 2025 (Saturday)		
8:00 - 8:15 AM	Arrival/Settling In	Secretariat Participants
8:15 - 8:30 AM	Recap of the Previous Day Activities	Participants
8:30 - 10:00 AM	Lecture 4: Design-Based Research	Speakers: Dr. Leorence C. Tandog Professor, USM Prof. Anna Jean S. Garcia Associate Professor, USM Moderator: Prof. Sandra A. Nanding Instructor, USM
10:00 - 10:30	Break	
10:30 - 12:00 PM	WORKSHOP	Facilitators: MST and PhD students
12:00 - 1:00 PM	Lunch Break	
1:00 - 2:00 PM	Group Presentation & Feedbacking	Participants
2:00 - 2:15 PM	Break	
2:15 - 3:15 PM	Paper Presentation: ➤ The Role of Manipulatives and Low-Floor High-Ceiling Tasks on the Six Trigonometric ratios ➤ MATHEMATICAL CONCEPTS EMBEDDED IN THE SYMMETRIC PATTERNS OF MAGUINDANAOANS' WOVEN TEXTILES ➤ Automated Formative Feedback for Learning Statistics and Cultivating Growth Mindset among College Students	Presentors: Apple Mae Valencia Jeric Raquel Bernadeth L. Bañados Moderator: Dr. Paul John B. Ongcoy Associate Professor, USM
3:15 - 4:00 PM	Closing Program/Awarding of Certificates Evaluation of Speakers/Conference	Dr. Philip Lester P. Benjamin Secretariat

Lectures and Workshop:





Active Involvement of Recipients during Training/Workshop



Outputs:



EMPOWERING EDUCATORS: CRAFTING LEARNING MATERIALS AND IMPLEMENTING DESIGN-BASED ACTION RESEARCH

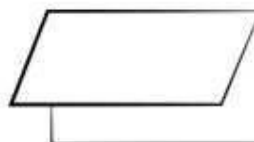
Juntilla, W.C., Adto, E.G.H., Usman, S.E.

EVALUATING^{EXPONENTS}

Solves exponential equations and inequalities (M11GM-Ie-f-1)

SPECIFIC

Students will be asked to fold the paper (depending on their assigned number of folds) and record the number of rectangles formed by the creases on the paper.



NUMBER OF FOLDS	NUMBER OF RECTANGLES FORMED
1 fold	
2 folds	
3 folds	
4 folds	

How about 10 folds?

How about 15 folds?

EXPRESSIVE

What operation/s could be used to solve for the number of rectangles?

Formulate a rule for any number of folds?

Apply the rule you formulated on the following:

$$2^6 =$$

$$5^2 =$$

$$3^4 =$$

$$6^8 =$$



WORD PROBLEM

If you are to choose between Php. 5 000 000.00 given outright or 1 centavo (Php. 0.01) that doubles everyday for 30 days, what would you choose? Why?



RATIO AND PROPORTION

A. Relating Fraction to Ratio.

1.

OBJECTS	FRACTION FORM	FORM IN RATIO
 Hearts to stars	$\frac{2}{5}$	2 : 5
 Green squares to Blue squares	$\frac{3}{6} = \frac{1}{2}$	3:6 = 1 : 2

2. Instruction: Count the objects and write the fraction and ratio in simplest form.

OBJECTS	FRACTION FORM	FORM IN RATIO
 Flowers to Bees		
 Notebooks to Pens		

B. Illustrating Ratio and Proportion

1. For every 2 pieces of lemon, 5 cups of lemonade are made.

Lemons

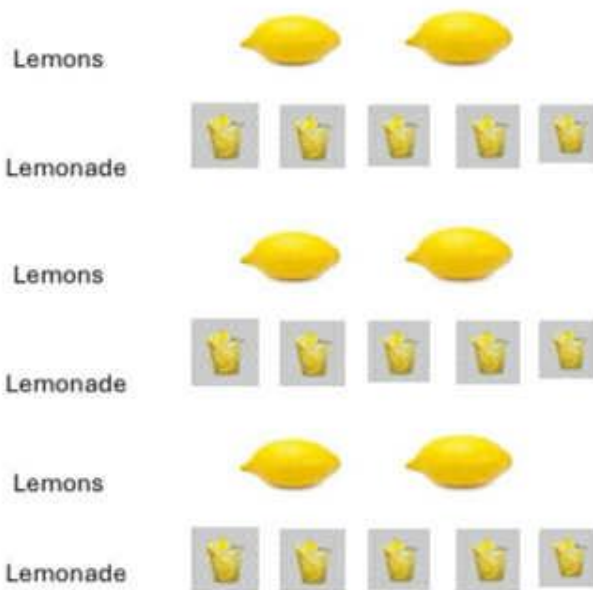


Lemonade



We can also say that the ratio of the number of lemons used to the number of cup of lemonade made is 2 : 5.

Find the number of lemons needed to make 15 lemonades.



The following table shows seller's guide in preparing batches of lemonade.

Number of Lemons	2	4	6
Number of Cups of Lemonade	5	10	15
Lemon: Lemonade	2:5	4:10	6:15
Lemon: Lemonade (simplest Form)	2:5	2:5	2:5

What can you say about the ratios?

The ratios are the same

$$\frac{\text{Number of Lemons}}{\text{Number of Lemonade}} = \frac{2}{5} = \frac{6}{15}$$

$\begin{array}{c} \text{X3} \\ \curvearrowright \\ \text{X3} \end{array}$

Number of Lemons: Number of Lemonade		
X3	2:5	X3
	6:15	

When the 1st quantity triple, the 2nd quantity also triples. The ratios 2:5 and 6:15 are equivalent thus, are proportion.

2. For every 3 slices of Pizza, there are 4 cups of soda served at the party. If there are 18 slices of Pizza served, how many cups of soda are there?

a. What can you say about the ratio?

b. Are the ratios proportion or not?

C. Ratio World Problem

1. A fruit Basket contains apples and oranges in the ratio 4:3. If there are 20 apples, how many oranges are there?

Method 1. Using mental math (in fraction form)

$$\begin{array}{c} \text{X5} \\ \frac{4}{3} = \frac{20}{x} \\ \text{X5} \end{array} = 15$$

Think: The product of 4 and what number is 20?

Because the product of 4 and 5 is 20, multiply the denominator by 5 to find the missing term.

Method 2. Using mental math (in colon form)

Because the product of 4 and 5 is 20, multiply the denominator by 5 to find the missing term.

Number of apples : number of oranges

$$\begin{array}{ccc} \text{X5} & \begin{array}{c} 4 : 3 \\ \curvearrowright \\ 20 : x \end{array} & \text{X5} \end{array}$$

Think: The product of 4 and what number is 20?

The missing term in the proportion is 15.

2. Jino uses his bicycle whenever his mother tells him to do an errand. He can reach a 10-meter distance in 4 seconds. How far did he go if he traveled for 20 seconds?

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