REPUBLIC OF THE PHILIPPINES
UNIVERSITY OF THE SOUTHERN MINDANAO
KABACAN, COTABATO

College of Science and Mathematics

BACHELOR OF SCIENCE IN APPLIED MATHEMATICS

LEVEL I
OCTOBER 26 - 30, 2026



AREA VI
Extension and Community Involvement

SYSTEM-INPUTS AND PROCESSES

S.1. There is an approved and adequate budget for extension.

❖ 2024 – 2025 Budget Allocation

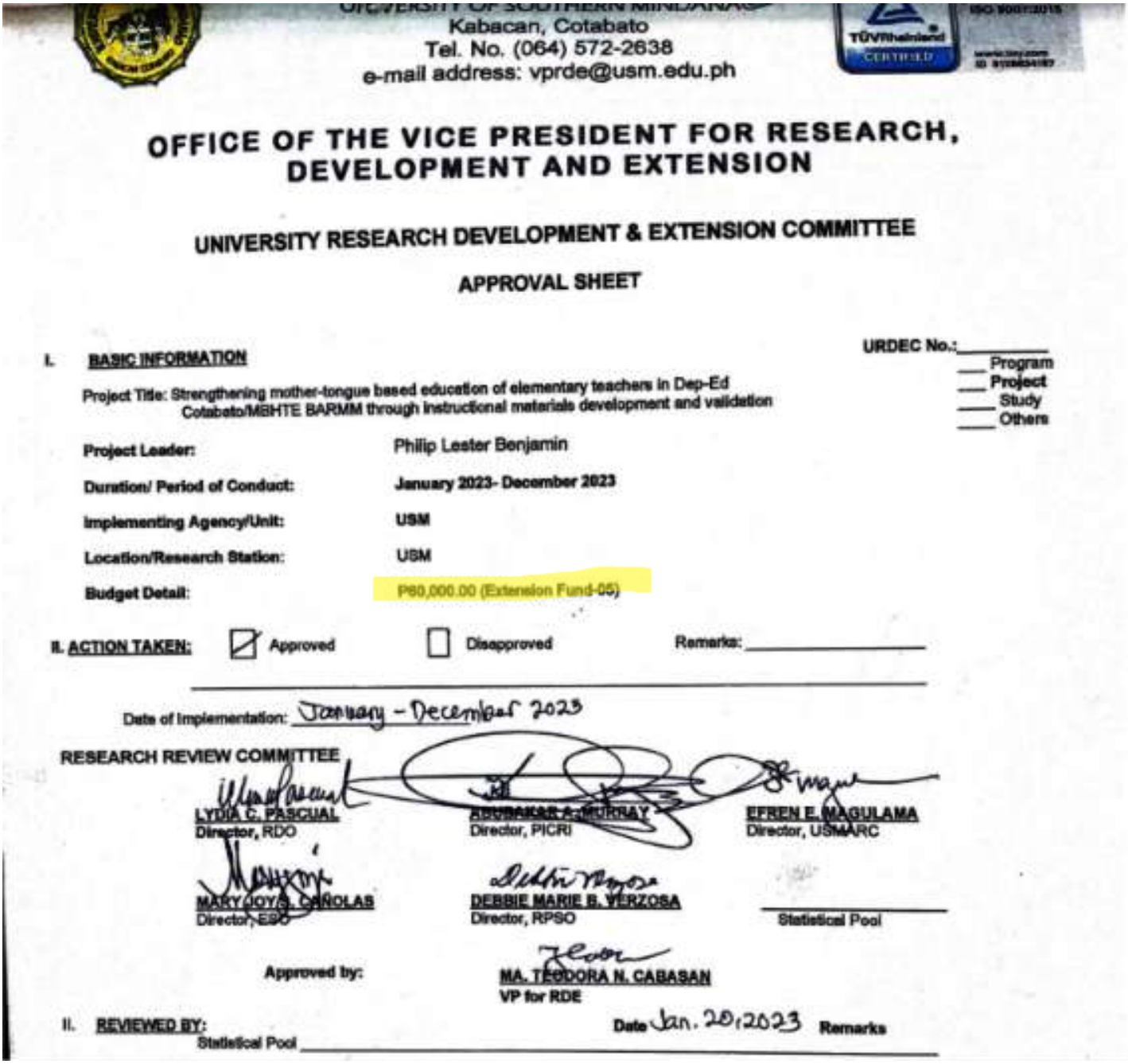
	Uploaded PPMP in https://dr	2024	2025
OVPRDE	Yes	518,189	632,541
RDO	Yes	647,573	790,476
USMARDC (overhead)	Yes	612,849	748,090
RPSO	Yes	392,568	479,198
IPTTBDO	Yes	213,600	260,736
Counterpart to SOX		280,000	320,000
R&D Display Center	Yes	117,770	143,759
Wildlife Center		133,473	162,927
RDE Personnel Devt Asst	Yes	117,770	143,759
In-house Review	Yes	706,622	862,556
Incentives (Publications and IP Assets)	Yes	866,233	1,057,389
USMARDC Support	Yes	1,028,085	1,254,958
Projects (RDO and ESO)		3,662,407	4,470,610
		9,297,139	11,327,000
		GAD	566,350.00

❖ 2026 – 2027 Budget Allocation

	ACTUAL in PPMP (2026)	2027
OVPRDE	590,000.00	500,000.00
RDO	790,000.00	790,000.00
USMARDC (overhead)	748,090.00	594,901.89
RPSO	370,000.00	294,234.36
IPTTBDO	260,736.00	240,000.00
Counterpart to SOX	320,000.00	254,472.96
R&D Display Center	190,784.62	0.00
Wildlife Center	162,927.00	162,927.00
SERDAC	156,000.00	
RDE Personnel Devt Asst	200,743.70	143,193.25
In-house Review	800,000.00	500,000.00
Incentives (Publications and IP Assets)	1,150,000.00	914,512.21
PICRI	1,280,000.00	1,017,891.85
USMARDC Support	1,254,958.00	997,977.83
Projects (RDO, USMARDC, ESO, PICRI)	4,466,760.62	3,720,253.96
	12,741,000	10,132,000
	0.00	10,497,030.17

PARAMETER C: FUNDING AND OTHER RESOURCES

2023 Extension Project



Kabacan, Cotabato
Tel. No. (064) 572-2638
e-mail address: vprde@usm.edu.ph

OFFICE OF THE VICE PRESIDENT FOR RESEARCH, DEVELOPMENT AND EXTENSION

UNIVERSITY RESEARCH DEVELOPMENT & EXTENSION COMMITTEE

APPROVAL SHEET

URDEC No.:_____
___ Program
___ Project
___ Study
___ Others

I. **BASIC INFORMATION**

Project Title: Strengthening mother-tongue based education of elementary teachers in Dep-Ed Cotabato/MBHTE BARMM through instructional materials development and validation

Project Leader: Philip Lester Benjamin

Duration/ Period of Conduct: January 2023- December 2023

Implementing Agency/Unit: USM

Location/Research Station: USM

Budget Detail: P60,000.00 (Extension Fund-05)

II. ACTION TAKEN: ☒ Approved ☐ Disapproved Remarks: _____

Date of Implementation: January - December 2023

RESEARCH REVIEW COMMITTEE

LYDIA C. PASCUAL
Director, RDO

ABDUBAKAR A. MURRAY
Director, PICRI

EFREN E. MAGULAMA
Director, USMARC

MARY JOY S. CAÑOLAS
Director, ESO

DEBBIE MARIE B. VERZOSA
Director, RPSO

Statistical Pool

Approved by:

MA. TEODORA N. CABASAN
VP for RDE

II. REVIEWED BY:
Statistical Pool _____ Date Jan. 20, 2023 Remarks

Strengthening Mother Tounge-Based Education of Elementary Teachers in DepEd Cotabato/MBHTE BARMM through Instruction Materials Development and Validation

Graduate School

Project Leader: Philip Lester P. Benjamin

Component Leader: Sandra A. Nanding

Budget: 60,000

https://www.usm.edu.ph/rde/vp/eso-who-we-are-what-we-do-our-services/#1668860496815-7e13193f-2fd2

PARAMETER C: FUNDING AND OTHER RESOURCES

Budget Summary

University of Southern Mindanao
EXTENSION SERVICES OFFICE
Kabacan, North Cotabato

BUDGET SUMMARY

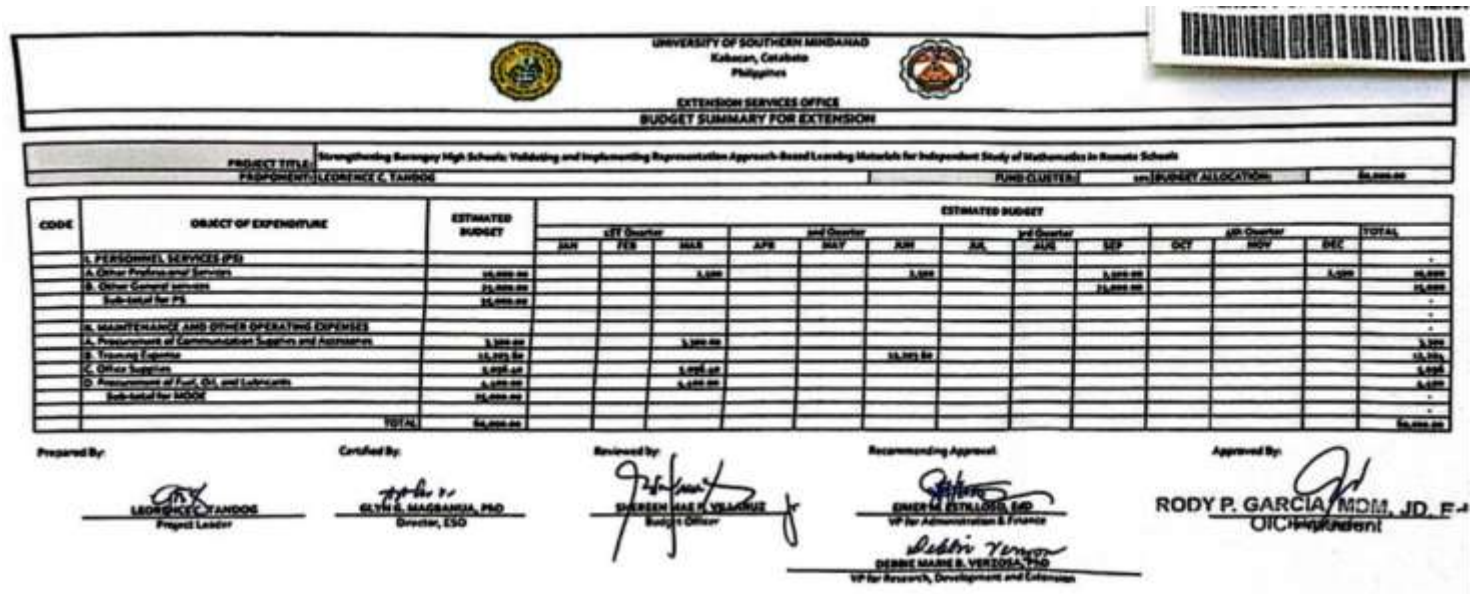
Project Title: Strengthening mother-tongue based education of elementary teachers in Deped Cotabato/MBHTE BARMM through instructional materials development and validation.

Proponents: Philip Lester P. Benjamin

Source of Fund: Extension Fund 05 | Total Budget: Php60,000 | Implementing College/Unit: CSM

ITEM	Year 1				Total
	Q1	Q2	Q3	Q4	
I. Other Supplies and Materials Expenses-Common					
A. Consumables: Epson inks			958.76	479.38	1,438.14
Sub-total			958.76	479.38	**1,438.14**
II. Food Supplies					
A. Meals			18,750.00		18,750.00
Sub-total			18,750.00		**18,750.00**
III. Fuel Expenses					
A. Gasoline			6,750.00		6,750.00
Sub-total			6,750.00		**6,750.00**
III. Communication					
A. Cell Cards (Smart)	1000	1000	1000		3,000.00
Sub-total	1000	1000	1000		**3,000.00**
IV. Other Professional Services					
Instructional materials illustrator		20,000			20,000.00
Honorarium	2,500	2,500	2,500	2,500	10,000.00
Sub-total	2,500	22,500	2,500	2,500	**30,000.00**
TOTAL	3500	23,500	29,958.76	2,978.38	**P59,938.14**
	35	235	299.5876	29.7838	399.3814

XT-F03-Rev.3.2021.01.26



UNIVERSITY OF SOUTHERN MINDANAO
Kabacan, Cotabato
Philippines

EXTENSION SERVICES OFFICE
BUDGET SUMMARY FOR EXTENSION

PROJECT TITLE: Strengthening Barangay High Schools: Validating and Implementing Representation Approach-Based Learning Materials for Independent Study of Mathematics in Remote Schools
PROPONENT: LEORENCE C. TANDOG | FUND CLUSTER: | SOURCE/BUDGET ALLOCATION:

CODE	OBJECT OF EXPENDITURE	ESTIMATED BUDGET	ESTIMATED BUDGET												TOTAL
			1st Quarter			2nd Quarter			3rd Quarter			4th Quarter			
			JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
	I. PERSONNEL SERVICES (PS)														-
	A. Other Professional Services	10,000.00			3,500			3,500			3,000.00			3,000	10,000
	B. Other General services	25,000.00									25,000.00				25,000
	Sub-total for PS	35,000.00													-
															-
	II. MAINTENANCE AND OTHER OPERATING EXPENSES														-
	A. Procurement of Communication Supplies and Accessories	3,500.00			3,500.00										3,500
	B. Training Expense	16,500.00						16,500.00							16,500
	C. Office Supplies	5,000.00			5,000.00										5,000
	D. Procurement of Fuel, Oil, and Lubricants	5,000.00			5,000.00										5,000
	Sub-total for MOOE	25,000.00													-
															-
	TOTAL	60,000.00													60,000.00

Prepared By: LEORENCE C. TANDOG, Project Leader

Certified By: GLYN G. MAGBANUA, PhD, Director, ESO

Reviewed By: SHEREEN MAE P. VILLAMOR, Budget Officer

Recommending Approval: EMERITA ESTRADA, EdD, VP for Administration & Finance; DEBBIE MARIE B. VERZOSA, PhD, VP for Research, Development and Extension

Approved By: RODY P. GARCIA, MDM, JD, F-, OIC-President

2025 Extension Project

Strengthening Barangay High Schools: Validating and Implementing Representation Approach-Based Learning Materials for Independent Study of Mathematics in Remote Schools

Project Leader: Leorence C. Tandog

Budget: 60,000

https://www.usm.edu.ph/rde/vp/eso-who-we-are-what-we-do-our-services/#1668860496815-7e13193f-2fd2

PARAMETER C: FUNDING AND OTHER RESOURCES

Republic of the Philippines
UNIVERSITY OF SOUTHERN MINDANAO
Kabacan, Cotabato
Tel. No. (064) 572-2638
e-mail address: vprde@usm.edu.ph

Management System ISO 9001:2015

OFFICE OF THE VICE PRESIDENT FOR RESEARCH, DEVELOPMENT AND EXTENSION

UNIVERSITY RESEARCH DEVELOPMENT & EXTENSION COMMITTEE

APPROVAL SHEET

I. BASIC INFORMATION

URDEC No.: _____

Title: Strengthening Barangay High Schools: Validating and Implementing Representation Approach-Based Learning Materials for Independent Study of Mathematics in Remote Schools

___ Program
_X_ Project
___ Study
___ Others

Author(s): Leorence C. Tandog

Duration/ Period of Conduct: January 2025 – December 2025

Implementing Agency/Unit: USM

Location/Research Station: USM

Budget Detail: Php 70,000.00

II. ACTION TAKEN: ☑ Approved ☐ Disapproved Remarks: _____

Date of Implementation: _____

RESEARCH REVIEW COMMITTEE

LYDIA C. PASCUAL
RDO Director

JALALODEN B. MAROHOM
IPTTBDO Director

JURHAMID C. IMLAN
USMARC Director

GLYN G. MAGBANUA
Extension Director

MA. TEODORA N. CABASAN
Publication Director

Statistical Pool

Budget Summary

REPUBLIC OF THE PHILIPPINES
UNIVERSITY OF SOUTHERN MINDAN

UNIVERSITY OF SOUTHERN MINDANAO
Kabacan, Cotabato
Philippines

EXTENSION SERVICES OFFICE

BUDGET SUMMARY FOR EXTENSION

PROJECT TITLE:	Strengthening Barangay High Schools: Validating and Implementing Representation Approach-Based Learning Materials for Independent Study of Mathematics in Remote Schools				
PROPONENT:	LEORENCE C. TANDOG	FUND CLUSTER:	101	BUDGET ALLOCATION:	60,000.00

CODE	OBJECT OF EXPENDITURE	ESTIMATED BUDGET	ESTIMATED BUDGET												
			1ST Quarter			2nd Quarter			3rd Quarter			4th Quarter			TOTAL
			JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
	I. PERSONNEL SERVICES (PS)														-
	A. Other Professional Services	10,000.00			2,500			2,500			2,500.00			2,500	10,000
	B. Other General services	25,000.00									25,000.00				15,000
	Sub-total for PS	35,000.00													-
															-
	II. MAINTENANCE AND OTHER OPERATING EXPENSES														-
	A. Procurement of Communication Supplies and Accessories	3,300.00			3,300.00										3,300
	B. Training Expense	12,203.60						12,203.60							12,204
	C. Office Supplies	5,096.40			5,096.40										5,096
	D. Procurement of Fuel, Oil, and Lubricants	4,400.00			4,400.00										4,400
	Sub-total for MOOE	25,000.00													-
															-
	TOTAL	60,000.00													60,400.00

Prepared By:
LEORENCE C. TANDOG
Project Leader

Certified By:
GLYN G. MAGBANUA, PhD
Director, ESO

Reviewed by:
SHEREEN MAE P. VILLARUZ
Budget Officer

Recommending Approval:
EIMER M. ESTILLOSO, EdD
VP for Administration & Finance
DEBBIE MARIE B. VERZOSA, PhD
VP for Research, Development and Extension

Approved By:
RODY P. GARCIA, MDM, JD, FAIM
OIC-President

S.2. There is a provision of:

S.2.1. facilities and equipment such as internet and other ICT resources;



The Information, Communication and Technology Center manages the university's internet connection

PARAMETER C: FUNDING AND OTHER RESOURCES



The server room, located inside the ICTC building

PARAMETER C: FUNDING AND OTHER RESOURCES





ICT resources are likewise installed in various units

PARAMETER C: FUNDING AND OTHER RESOURCES



DXVL, the university's FM radio station, transmits relevant content and information to its listeners, extension beneficiaries included

S.2.2. extension staff;

Table of Organization



Glyn B. Gabano-Magbanua, Phd
ESO Director



Ritchel O. Torres
Training Specialist II



Laurence Arjay T. Mamburam
CBDEM Extension Coordinator



AP Warren A. Adamat
CVM Extension Coordinator



Joan P. Sadoral
CA Extension Coordinator



Cherie C. Mangaoang
CSM-Extension Coordinator



Ellen Joy M. Farala
CED Extension Coordinator



Rezeille May C. Amilbahar
CASS Extension Coordinator

PARAMETER C: FUNDING AND OTHER RESOURCES



Glyn G. Magbanua
Graduate School Extension Coordinator



Marjurie V. Catuguran
CTI Extension Coordinator



Agripino N. Agulo Jr
CHS Extension Coordinator



Josephine C. Martinez-Buison
COM Extension Coordinator



Avegale S. Roy
CHEFS Extension Coordinator



Jassen Fe C. Calaoagan
CEIT Extension Coordinator



Ma. Karysa F. Garcia
KCC Extension Coordinator



Ali A. Ayob
IMEAS Extension Coordinator



Basser L. Wagia
PPALMA Extension Coordinator



Vinus P. Java
CHK Extension Coordinator

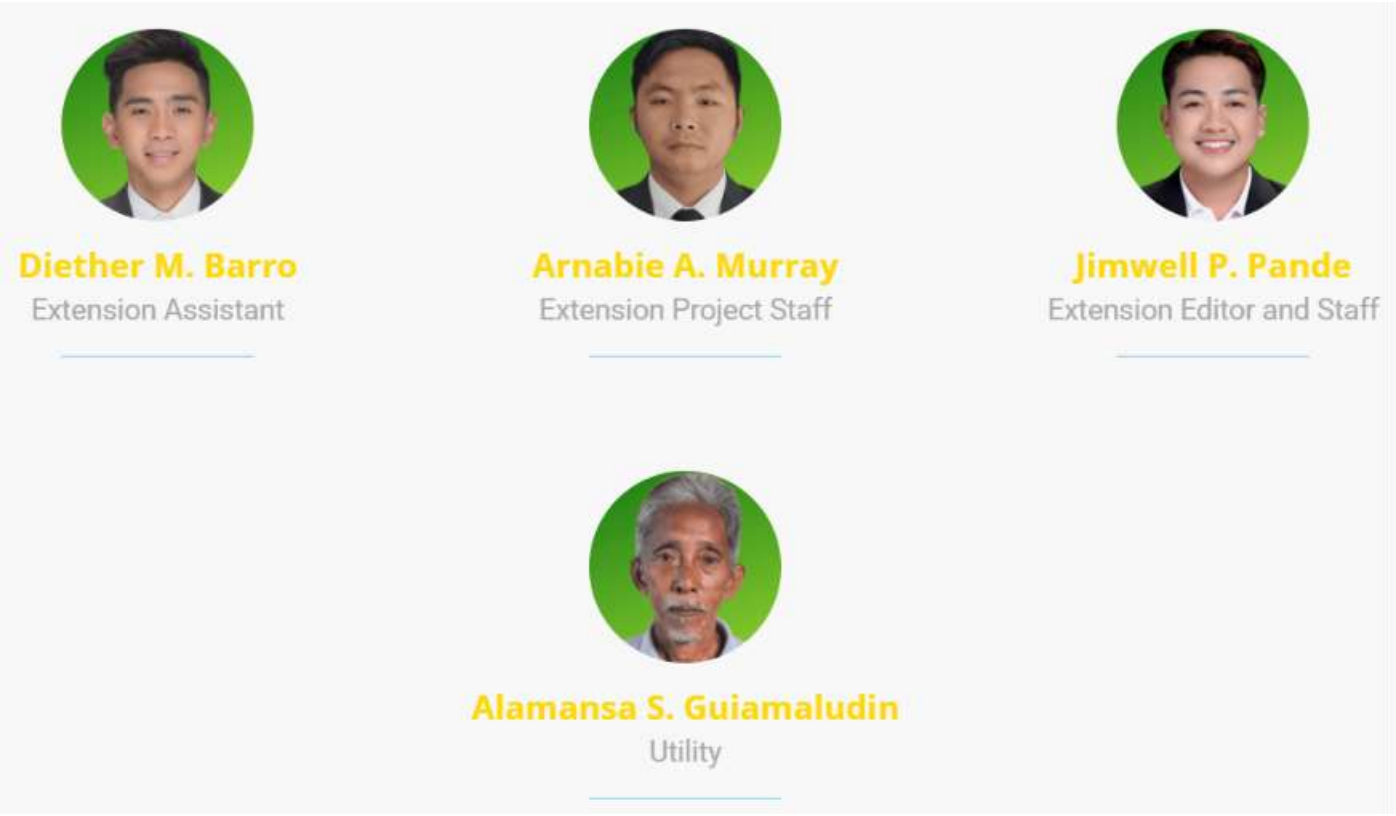


Bonifacio C. Solsoloy
NSTP Director



Rahima A. Cabunto
Education Program Specialist I

PARAMETER C: FUNDING AND OTHER RESOURCES



S.2.3. supplies and materials; and



a desktop computer and a printer for use of the Extension Coordinator



DLP for capability building activities



Office supplies for printing and reproduction of documents

S.2.4. workplace.



ESO CONFERENCE ROOM



FOR CONFERENCE AND SEMINAR



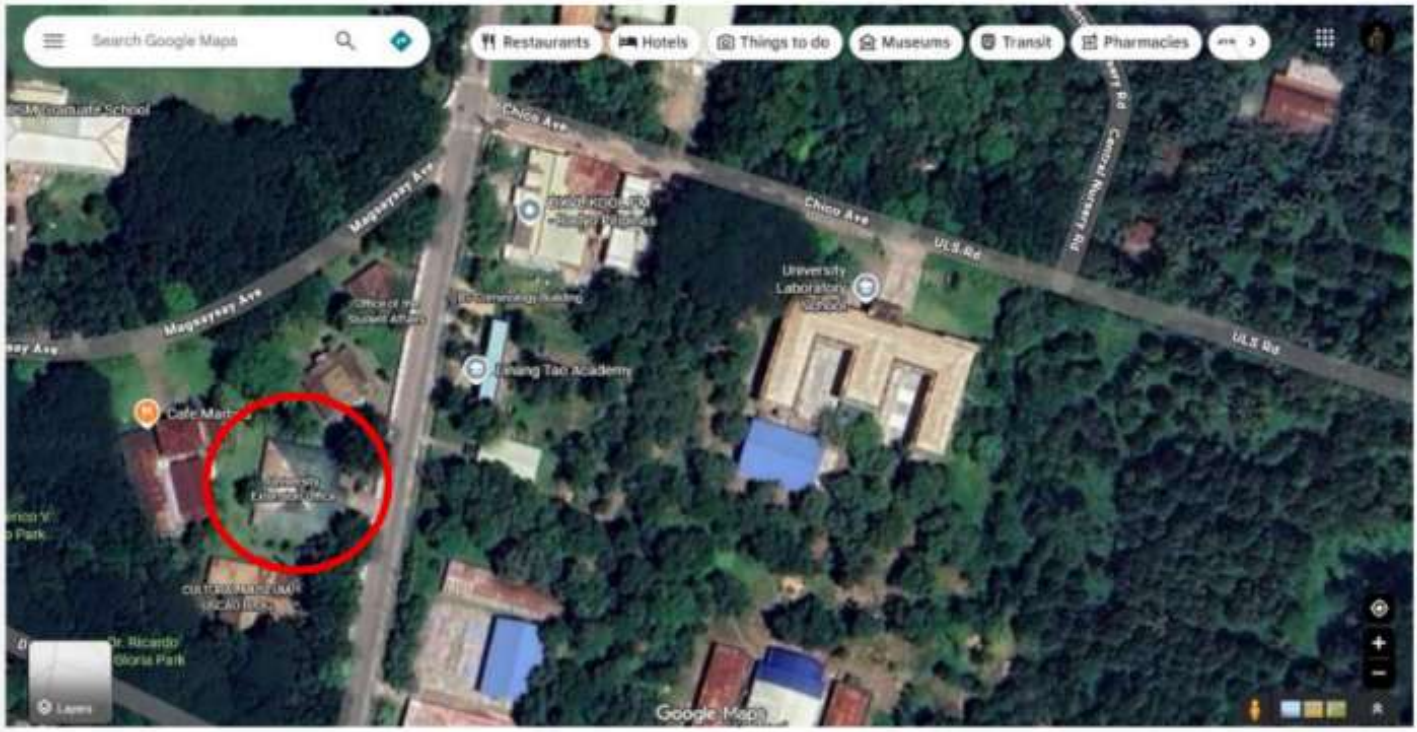
FOR MOTHLY MEETINGS



ESO Director's Office

PARAMETER C: FUNDING AND OTHER RESOURCES

UNIVERSITY EXTENSION OFFICE



EXTENSION SERVICES OFFICE – TC ROOM







The Extension Services Office (ESO) Director, Glyn B. Gabano-Magbanua, PhD, convened a meeting on April 30, 2026, at the ESO TC Room to welcome two new unit heads and strategize the implementation of continuing projects for 2026.

Prof. Anamarie B. Uyangurin (Monitoring and Impact Assessment) and Prof. Florence Roy P. Salvaña (Extension) were appointed as unit heads as the office transitions under the Revised Organizational Structure for Staffing and Standards (ROSSS) II.

Central to the discussion were the unit breakdowns for ROSSS II, execution strategies for ongoing projects, and budget allocations—all of which are essential for aligning extension initiatives with the university's long-term strategic vision.

"Our goal is to involve all our colleges in community engagements," said Director Magbanua as she concluded the meeting.

As ESO expands its structure in the coming years, it remains dedicated to integrating these organizational shifts into a streamlined framework that ensures the delivery of sustainable and transformative impacts across its partner communities.



IMPLEMENTATION

I.1. The budget for the extension program is utilized as planned.

2023 Extension Project

II. **Financial Report**

Budget Utilization

Component	Allocation	Utilized	% Utilized
Component 1: Development of high-quality mother-tongue based instructional materials in elementary mathematics that effectively engage and educate students.	1st Quarter	3,500	100%
	2nd Quarter	23,500	100%

USM-EXT-F15-Rev.3.2021.01.26

SERVICES OFFICE
Kabacan, North Cotabato

TERMINAL REPORT

Component 2: Validation of mother-tongue based instructional materials developed for elementary mathematics through feedback from teachers, students, and parents.	3rd Quarter	29,958.38	100%
	4th Quarter	2,978.38	100%

PARAMETER C: FUNDING AND OTHER RESOURCES

2025 Extension Project

UNIVERSITY OF SOUTHERN MINDANAO
Kabacan, Cotabato
Philippines

EXTENSION SERVICES OFFICE

QUARTERLY MONITORING AND EVALUATION REPORT FOR EXTENSION

Project Title:	**Strengthening Barangay High Schools: Validation and Implementation of Representation-Based Learning Materials for Independent Study of Mathematics in Remote Schools**	**Period Covered**	☒ 1st Quarter ☐ 3rd Quarter ☐ 2nd Quarter ☐ 4th Quarter
Proponent(s):	Leorence C. Tandog, Debbie Marie B. Verzosa, Jonald L. Pimentel, Philip Lester P. Benjamin, Leonard M. Paleta, Anna Jean S. Garcia, Jupiter G. Pilongo, Daryl Mae C. Mamon, Rowel P. Madio, Roel S. Valenton, Sandra A. Nanding, Lawton John A. Yabes	**Fund Source**	☒ Local ___Fund 101___ ☐ External _____

Activities *Based on the Work Plan Schedule*	**Outputs**	**Accomplishments** Target (%) *Based on the Milestone in the Workplan*	Actual (%)	**(%) Completion (Cumulative)**	**Problems Encountered** *(if any)*	**Action Taken**	Fund Utilization (%)	**Remarks by Evaluator**
% Completion (Cumulative) from the previous quarter: 0%								
1. Building Capacity of Teachers in Instructional Material Development (one day)	Training design, workshop schedule and venue, committee in charge, processed COPD application	10%	0%	0%	Conflict of schedule, DepEd teachers and faculty were busy at the time, near semester end.	Training will be conducted together with the next capacity-building activity to allow more preparation time.	0%	
2. Development of Representation Approach-Based Learning Materials for Independent Learning of Mathematics	Diagnostic test result, some baseline information, PhD students identified topics for IM development and lesson study.	40%	0%	0%	Cannot proceed because the training on capacity must come first.	Activity postponed until capacity-building training is completed.	0%	

Prepared by:	Noted by:	Evaluated by:	Concurred by:
LEORENCE C. TANDOG, PhD	**CHERIE C. MANGAOANG, PhD**	**GLYN G. MAGBANUA, PhD**	**DEBBIE MARIE B. VERZOSA, PhD**
Project Leader	College Extension Coordinator	Director, Extension Services Office	Vice President for Research, Development and Extension

UNIVERSITY OF SOUTHERN MINDANAO
Kabacan, Cotabato
Philippines

EXTENSION SERVICES OFFICE

QUARTERLY MONITORING AND EVALUATION REPORT FOR EXTENSION

Project Title:	**Strengthening Barangay High Schools: Validation and Implementation of Representation-Based Learning Materials for Independent Study of Mathematics in Remote Schools**	**Period Covered**	☒ 1st Quarter ☐ 3rd Quarter ☒ 2nd Quarter ☐ 4th Quarter
Proponent(s):	Leorence C. Tandog, Debbie Marie B. Verzosa, Jonald L. Pimentel, Philip Lester P. Benjamin, Leonard M. Paleta, Anna Jean S. Garcia, Jupiter G. Pilongo, Daryl Mae C. Mamon, Rowel P. Madio, Roel S. Valenton, Sandra A. Nanding, Lawton John A. Yabes	**Fund Source**	☒ Local ___Fund 101___ ☐ External _____

Activities *Based on the Work Plan Schedule*	**Outputs**	**Accomplishments** Target (%) *Based on the Milestone in the Workplan*	Actual (%)	**(%) Completion (Cumulative)**	**Problems Encountered** *(if any)*	**Action Taken**	Fund Utilization (%)	**Remarks by Evaluator**
% Completion (Cumulative) from the previous quarter: 0 %								
1. Building Capacity of Teachers in Instructional Material Development (one day)	Training design, workshop schedule and venue, committee in charge, processed COPD application	10%	100%	10%	None	None		
2. Development of Representation Approach-Based Learning Materials for Independent Learning of Mathematics (two months)	Diagnostic test result, some baseline information, PhD students identified topics for IM development and lesson study.	40%	100%	50%	None	None	25.84%	
3. Validation and Packaging of Representation Approach-Based Learning Materials for Independent Learning of Mathematics (two months)	validated and packaged LMAPS	20%	100	70%	None	None		

PARAMETER C: FUNDING AND OTHER RESOURCES

UNIVERSITY OF SOUTHERN MINDANAO
Kabacan, Cotabato
Philippines

EXTENSION SERVICES OFFICE

QUARTERLY MONITORING AND EVALUATION REPORT FOR EXTENSION

4. Building Capacity of Teachers on Action Research (one day)	Training design, workshop schedule and venue, committee in charge, processed COPD application	10%	100%	80%	None	None		

Prepared by:
LEORENCE C. TANDOG, PhD
Project Leader

Noted by:
CHERIE C. MANGAOANG, PhD
College Extension Coordinator

Evaluated by:
GLYN G. MAGBANUA, PhD
Director, Extension Services Office

Concurred by:
DEBBIE MARIE B. VERZOSA, PhD
Vice President for Research, Development and Extension

UNIVERSITY OF SOUTHERN MINDANAO
Kabacan, Cotabato
Philippines

EXTENSION SERVICES OFFICE

QUARTERLY MONITORING AND EVALUATION REPORT FOR EXTENSION

Project Title:	**Strengthening Barangay High Schools: Validation and Implementation of Representation-Based Learning Materials for Independent Study of Mathematics in Remote Schools**	**Period Covered**	☒ 1st Quarter ☒ 3rd Quarter ☒ 2nd Quarter ☐ 4th Quarter
Proponent(s):	Leorence C. Tandog, Debbie Marie B. Verzosa, Jonald L. Pimentel, Philip Lester P. Benjamin, Leonard M. Paleta, Anna Jean S. Garcia, Jupiter G. Pilongo, Daryl Mae C. Mamon, Rowel P. Madio, Roel S. Valenton, Sandra A. Nanding, Lawton John A. Yabes	**Fund Source**	☒ Local Fund 101 ☐ External

Activities *Based on the Work Plan Schedule*	Outputs	Accomplishments: Target (%) *Based on the Milestone in the Workplan*	Accomplishments: Actual (%)	(%) Completion (Cumulative)	Problems Encountered *(if any)*	Action Taken	Fund Utilization (%)	Remarks by Evaluator
% Completion (Cumulative) from the previous quarter: 80%								
5. Implementation of Representation Approach-Based Learning Materials for Improved Learning of General Mathematics (two months)	Deployment & use of LMAPS by target beneficiaries	20%	75%	95%	None	None	40%	

Prepared by:
LEORENCE C. TANDOG, PhD
Project Leader

Noted by:
CHERIE C. MANGAOANG, PhD
College Extension Coordinator

Evaluated by:
GLYN G. MAGBANUA, PhD
Director, Extension Services Office

Concurred by:
DEBBIE MARIE B. VERZOSA, PhD
Vice President for Research, Development and Extension

UNIVERSITY OF SOUTHERN MINDANAO
Kabacan, Cotabato
Philippines

EXTENSION SERVICES OFFICE

QUARTERLY MONITORING AND EVALUATION REPORT FOR EXTENSION

Project Title:	**Strengthening Barangay High Schools: Validation and Implementation of Representation-Based Learning Materials for Independent Study of Mathematics in Remote Schools**	**Period Covered**	☒ 1st Quarter ☒ 3rd Quarter ☒ 2nd Quarter ☒ 4th Quarter
Proponent(s):	Leorence C. Tandog, Debbie Marie B. Verzosa, Jonald L. Pimentel, Philip Lester P. Benjamin, Leonard M. Paleta, Anna Jean S. Garcia, Jupiter G. Pilongo, Daryl Mae C. Mamon, Rowel P. Madio, Roel S. Valenton, Sandra A. Nanding, Lawton John A. Yabes	**Fund Source**	☒ Local Fund 101 ☐ External

Activities *Based on the Work Plan Schedule*	Outputs	Accomplishments: Target (%) *Based on the Milestone in the Workplan*	Accomplishments: Actual (%)	(%) Completion (Cumulative)	Problems Encountered *(if any)*	Action Taken	Fund Utilization (%)	Remarks by Evaluator
% Completion (Cumulative) from the previous quarter: 95%								
5. Implementation of Representation Approach-Based Learning Materials for Improved Learning of General Mathematics (two months)	Deployment & use of LMAPS by target beneficiaries	20%	100%	100%	None	None	67%	

Prepared by:
LEORENCE C. TANDOG, PhD
Project Leader

Noted by:
CHERIE C. MANGAOANG, PhD
College Extension Coordinator

Evaluated by:
GLYN G. MAGBANUA, PhD
Director, Extension Services Office

Concurred by:
DEBBIE MARIE B. VERZOSA, PhD
Vice President for Research, Development and Extension

PARAMETER C: FUNDING AND OTHER RESOURCES

I.2. Honoraria and other incentives (deloading, credit unit equivalent, etc.) to faculty involved in extension work are granted.

University of Southern Mindanao
EXTENSION SERVICES OFFICE
Kabacan, North Cotabato

BUDGET SUMMARY

Project Title: Strengthening mother-tongue based education of elementary teachers in Deped Cotabato/MBHTE BARMM through instructional materials development and validation.

Proponents: Philip Lester P. Benjamin

Source of Fund: Extension Fund 05 | Total Budget: Php60,000 | Implementing College/Unit: CSM

ITEM	Year 1				Total
	Q1	Q2	Q3	Q4	
I. Other Supplies and Materials Expenses-Common					
A. Consumables: Epson inks			958.76	479.38	1,438.14
Sub-total			958.76	479.38	**1,438.14**
II. Food Supplies					
A. Meals			18,750.00		18,750.00
Sub-total			18,750.00		**18,750.00**
III. Fuel Expenses					
A. Gasoline			6,750.00		6,750.00
Sub-total			6,750.00		**6,750.00**
III. Communication					
A. Cell Cards (Smart)	1000	1000	1000		3,000.00
Sub-total	1000	1000	1000		**3,000.00**
IV. Other Professional Services					
Instructional materials illustrator		20,000			20,000.00
Honorarium	2,500	2,500	2,500	2,500	10,000.00
Sub-total	2,500	22,500	2,500	2,500	**30,000.00**
TOTAL	3500	23,500	29,958.76	2,978.38	**P59,938.14**
	35	235	299.5876	29.7838	599.3814

XT-F03-Rev.3.2021.01.26

PARAMETER C: FUNDING AND OTHER RESOURCES

UNIVERSITY OF SOUTHERN MINDANAO
Kabacan, Cotabato
Philippines

Management System ISO 9001:2015

NOTICE TO PROCEED

NTP #: 2025-____
Date: November 26, 2024

PROF. LEORENCE C. TANDOG
PROF. LEONARD M. PALETA
PROF. DEBBIE MARIE B. VERZOSA
PROF. PHILIP LESTER BENJAMIN
PROF. JUPITER G. PILONGO
University of Southern Mindanao
Kabacan, Cotabato

Dear Mesdames and Sirs:

Your extension proposal has been approved by the URDEC for 2025 funding in the amount of **Php 60,000.00** charged to Fund 101. Notice is hereby given that the conduct of the study entitled "**Strengthening Barangay High Schools: Validating and Implementing Representation Approach-Based Learning Materials for Independent Study of Mathematics in Remote Schools**" may commence not later than 7 days after the receipt of this notice up to December 2025.

This Study has the following components leaders and incentive:

Project Leader: ***Prof. Leorence C. Tandog,*** with honorarium

Component 1. **Building Capacity of Teachers in Instructional Development'**
Component Leader: ***Prof. Leonard Paleta*** with honorarium;

Component 2. **Building Capacity of Teachers in the Conduct of Action Research**
Component Leader: ***Prof. Debbie Marie B. Verzosa*** with honorarium;

Component 3. **Development and Validation of Representation Approach-Based Learning Materials for Independent Learning of Mathematics**
Component Leader: ***Prof. Leorence C. Tandog,*** with honorarium and;

Component 4. **Implementation of Representation Approach- Based Learning Materials for Improved Learning of Mathematics**
Component Leader: ***Prof. Philip Lester Benjamin; Prof. Jupiter Pilongo,*** with honorarium

You shall be responsible for ensuring the completion of the extension project in accordance with the approved work and financial plan. Furthermore, you have to submit a quarterly progress report and make an oral presentation during the Midyear and Year-End University Research Development and Extension In-House Review. Upon completion of the study, you have to submit the terminal report and your outputs (IEC/s in both hard and e-copy) of extension results before you can claim your incentive as program/project/component leader.

In the event that you discontinue the project without justifiable reasons, you have to refund/return to the management the total amount you have actually spent; prior to the time you discontinue the project. In addition, you are required to submit the necessary output during the period you conducted the project.

Please acknowledge receipt and acceptance of this NOTICE by signing both copies in the space provided below.

Very truly yours,

GLYN G. MAGBANUA, PhD
Director, ESO

Recommending approval:

DEBBIE MARIE B. VERZOSA, PhD
Vice Pres. for Res., Dev't. & Ext'n.

Approved by:

FRANCISCO GIL N. GARCIA, RPAE, PhD
SUC President IV, USM

USM-RES-Fo8-Rev.1.2020.02.18

I.3. The College/Academic Unit of Mathematics/ Applied Mathematics sources out the following from other agencies:

I.3.1. additional funding; and

NOT APPLICABLE – Extension projects were 100% funded through the institutional extension budget.

I.3.2. technical assistance and service inputs.

UNIVERSITY OF SOUTHERN MINDANAO
Kabacan, Philippines

INVITATION LETTER

April 22, 2025

DR. IAN JUNE L. GARCES
Associate Professor, Department of Mathematics
Ateneo De Manila University
Loyola Heights, Metro Manila

Dear Dr. Ian June L. Garces,

Greetings!

On behalf of University of Southern Mindanao, we are pleased to extend our warm invitation to you as one of the speakers for our upcoming seminar-workshop titled: **"Empowering Educators: Crafting Learning Materials and Implementing Design-Based Action Research"**

The event will be held on May 30–31, 2025 at Graduate School, University of Southern Mindanao, Kabacan, Cotabato.

This event aims to bring together educators and researchers to strengthen their capabilities in developing instructional materials and conducting action research in real classroom settings.

This two-day seminar is designed to:

1. Equip participants with the skills to create instructional materials using multiple representations for better student engagement and learning outcomes;
2. Guide them in formulating meaningful and challenging mathematics problems that foster critical thinking; and
3. Assist them in identifying and refining relevant research questions for classroom-based inquiry.

We believe your expertise in Writing Good Math Problems would greatly inspire and benefit our participants. Your insights would be invaluable in enriching discussions and helping educators gain practical tools for enhancing their teaching practices. Should you accept this invitation, we would be happy to coordinate the details of your talk at your convenience. We can also provide any necessary support in terms of logistics or presentation needs.

Thank you for considering this invitation. We hope to have the privilege of welcoming you as one of our esteemed speakers.

Warm regards,

PHILIP LESTER P. BENJAMIN, PhD
Conference Chair
Email: plbenj@usm.edu.ph
Contact number: 09338245352

PARAMETER C: FUNDING AND OTHER RESOURCES

PROGRAM

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

Venue: Graduate School, University of Southern Mindanao, Kabacan, Cotabato

Date: May 30-31, 2025

This serves as an invitation

Schedule of Activities

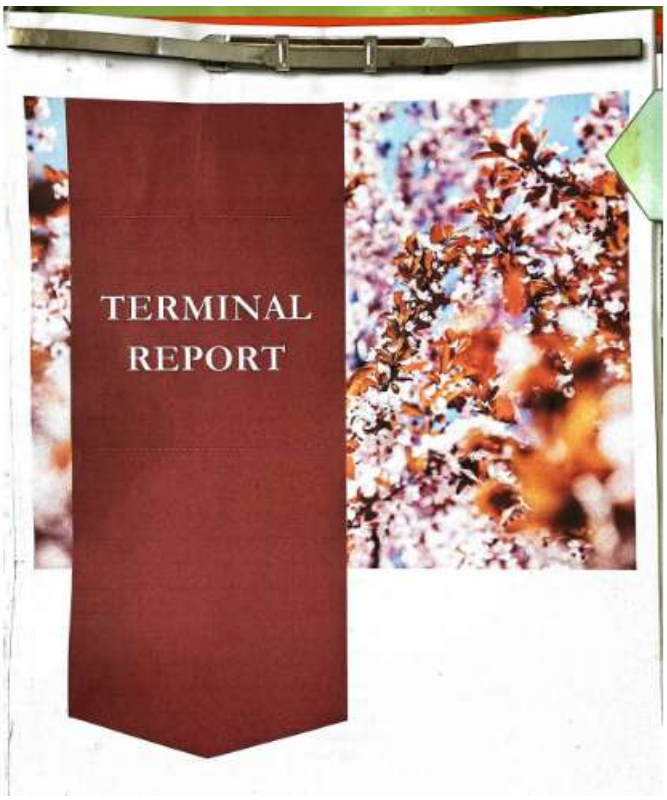
May 30, 2025 (Friday)		
6:30AM – 7:15AM	**Registration**	
7:15AM – 7:45 AM	**Opening Program** Master of Ceremony: **Hannah Faith Jane A. Palmos and Roel S. Valenton**	
	Invocation and National Anthem	**AVP**
	Welcome Remarks	**Dr. Philip Lester P. Benjamin** Dean, College of Science and Mathematics
	Overview and Rationale	**Dr. Leorence C. Tandog** Vice President for Academic Affairs
7:45AM – 9:45 AM	**Plenary Talk 1**	
	Introduction of the Plenary Speaker	**Roel S. Valenton** Moderator
	Plenary Talk 1: *Action Research*	**Ms. Aurea Puyos** Senior Instructor, Notre Dame of Kidapawan College
9:45AM – 10:00 AM	Break	
10:00AM – 12:00 PM	**Plenary Talk 2**	
	Introduction of the Plenary Speaker	**Rowel P. Madio** Moderator
	Plenary Talk 2: *Writing Good Math Problems*	**Dr. Ian June L. Garces** Associate Professor, Ateneo de Manila
12:00PM – 1:00PM	Lunch	
1:00PM – 2:00PM	**Plenary Talk 3**	
	Introduction of the Plenary Speaker	**Leonard M. Paleta** Moderator
	Plenary Talk 3: *Development of Representation Approach - Learning Materials*	**Dr. Debbie Marie B. Verzosa** Professor, University of Southern Mindanao
2:00PM – 2:15PM	Break	
2:15PM – 4:15PM	Workshop 1: *Development of Learning Mateirals*	**Sandra A. Nanding, Watarie E. Manto, and Leif Cullin A. Matandog** Facilitator
4:15PM – 4:40PM	**Paper Presentation**	
	Fitzmee Ann D. Tamulak Moderator	
	Bridging Ethnomathematical Practices of Obo Manobo Tahiti Farmers and Mathematics Education (Phase 2): Designing Mathematical Problem and Exploring Teachers' Perception	**Wrendell Juntilla** Speaker
4:40PM – 5:05PM	The Application of Enhanced Damath in Learning Operations on Integers and Developing Strategic Thinking	**Cherrylee Buhay** Speaker
5:05PM – 5:30PM	The Effect of PowToon to the Proficiency Level in General Mathematics of Grade 11 Students in Bacongco National High School	**Elaine Grace H. Adto** Speaker

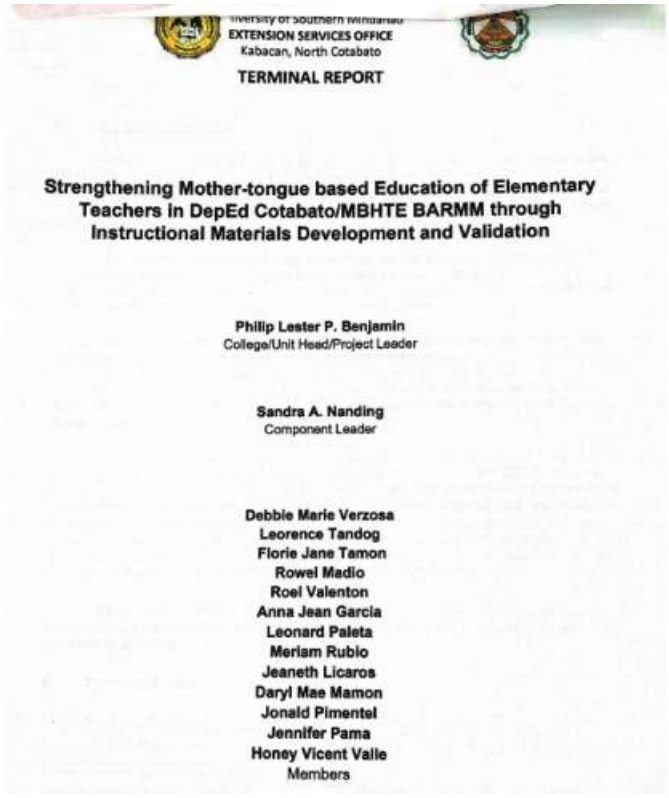


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OUTCOME/S

O.1. The Extension Program is adequately funded.





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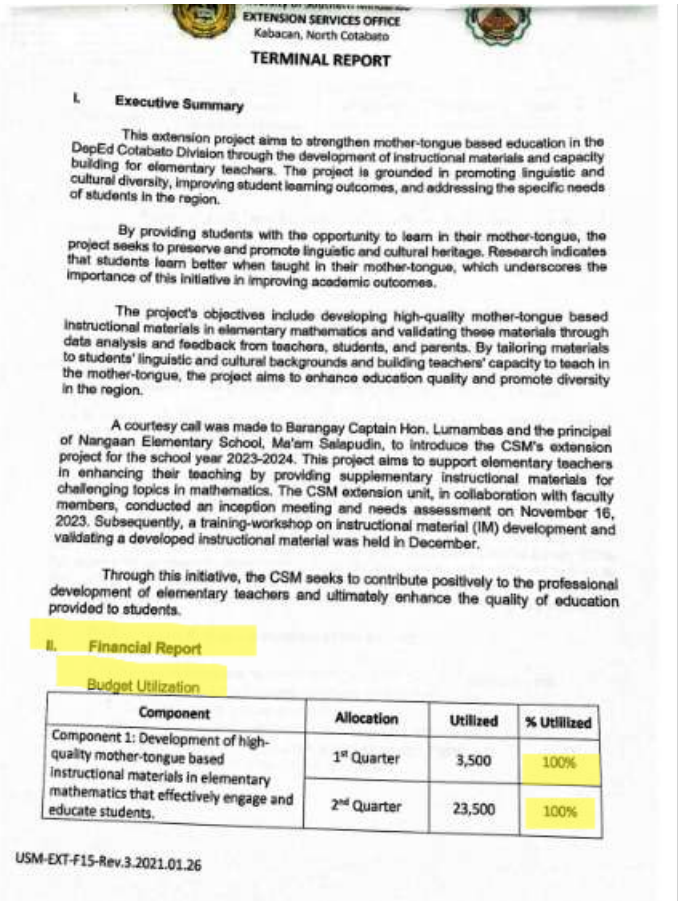
TERMINAL REPORT

Strengthening Mother-tongue based Education of Elementary Teachers in DepEd Cotabato/MBHTE BARMM through Instructional Materials Development and Validation

Philip Lester P. Benjamin
College/Unit Head/Project Leader

Sandra A. Nanding
Component Leader

Debbie Marie Verzosa
Leorence Tandog
Florie Jane Tamon
Rowel Madio
Roel Valenton
Anna Jean Garcia
Leonard Paleta
Meriam Rubio
Jeaneth Licaros
Daryl Mae Mamon
Jonald Pimentel
Jennifer Pama
Honey Vicent Valle
Members



EXTENSION SERVICES OFFICE
Kabacan, North Cotabato

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I. Executive Summary

This extension project aims to strengthen mother-tongue based education in the DepEd Cotabato Division through the development of instructional materials and capacity building for elementary teachers. The project is grounded in promoting linguistic and cultural diversity, improving student learning outcomes, and addressing the specific needs of students in the region.

By providing students with the opportunity to learn in their mother-tongue, the project seeks to preserve and promote linguistic and cultural heritage. Research indicates that students learn better when taught in their mother-tongue, which underscores the importance of this initiative in improving academic outcomes.

The project's objectives include developing high-quality mother-tongue based instructional materials in elementary mathematics and validating these materials through data analysis and feedback from teachers, students, and parents. By tailoring materials to students' linguistic and cultural backgrounds and building teachers' capacity to teach in the mother-tongue, the project aims to enhance education quality and promote diversity in the region.

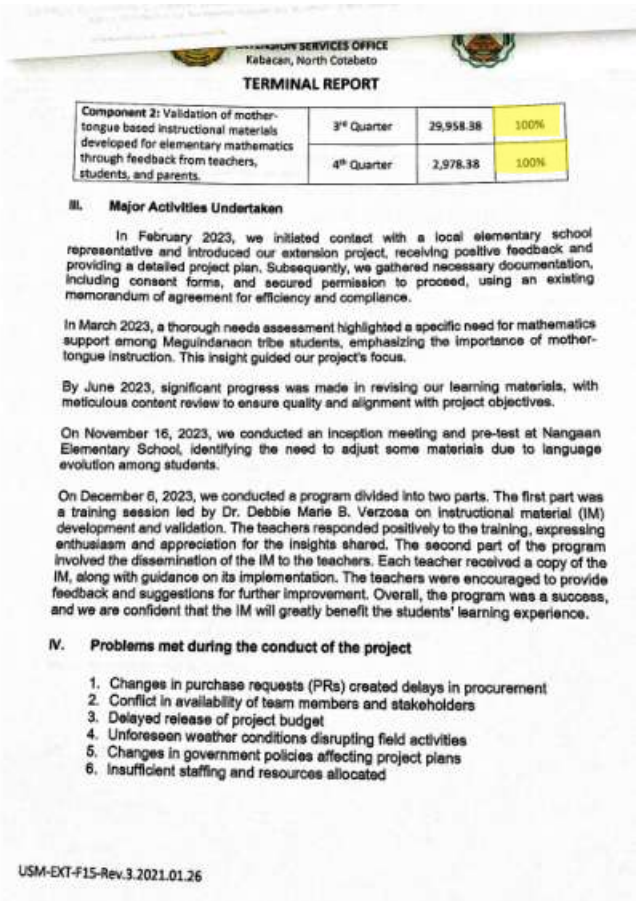
A courtesy call was made to Barangay Captain Hon. Lumambas and the principal of Nangaan Elementary School, Ma'am Salapudin, to introduce the CSM's extension project for the school year 2023-2024. This project aims to support elementary teachers in enhancing their teaching by providing supplementary instructional materials for challenging topics in mathematics. The CSM extension unit, in collaboration with faculty members, conducted an inception meeting and needs assessment on November 16, 2023. Subsequently, a training-workshop on instructional material (IM) development and validating a developed instructional material was held in December.

Through this initiative, the CSM seeks to contribute positively to the professional development of elementary teachers and ultimately enhance the quality of education provided to students.

II. Financial Report

Budget Utilization

Component	Allocation	Utilized	% Utilized
Component 1: Development of high-quality mother-tongue based instructional materials in elementary mathematics that effectively engage and educate students.	1st Quarter	3,500	100%
	2nd Quarter	23,500	100%



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Kabacan, North Cotabato

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Component 2: Validation of mother-tongue based instructional materials developed for elementary mathematics through feedback from teachers, students, and parents.	3rd Quarter	29,958.38	100%
	4th Quarter	2,978.38	100%

III. Major Activities Undertaken

In February 2023, we initiated contact with a local elementary school representative and introduced our extension project, receiving positive feedback and providing a detailed project plan. Subsequently, we gathered necessary documentation, including consent forms, and secured permission to proceed, using an existing memorandum of agreement for efficiency and compliance.

In March 2023, a thorough needs assessment highlighted a specific need for mathematics support among Meguindanaon tribe students, emphasizing the importance of mother-tongue instruction. This insight guided our project's focus.

By June 2023, significant progress was made in revising our learning materials, with meticulous content review to ensure quality and alignment with project objectives.

On November 16, 2023, we conducted an inception meeting and pre-test at Nangaan Elementary School, identifying the need to adjust some materials due to language evolution among students.

On December 6, 2023, we conducted a program divided into two parts. The first part was a training session led by Dr. Debbie Marie B. Verzosa on instructional material (IM) development and validation. The teachers responded positively to the training, expressing enthusiasm and appreciation for the insights shared. The second part of the program involved the dissemination of the IM to the teachers. Each teacher received a copy of the IM, along with guidance on its implementation. The teachers were encouraged to provide feedback and suggestions for further improvement. Overall, the program was a success, and we are confident that the IM will greatly benefit the students' learning experience.

IV. Problems met during the conduct of the project

1. Changes in purchase requests (PRs) created delays in procurement
2. Conflict in availability of team members and stakeholders
3. Delayed release of project budget
4. Unforeseen weather conditions disrupting field activities
5. Changes in government policies affecting project plans
6. Insufficient staffing and resources allocated

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V. Recommendations

1. Establish a clear and streamlined process for PR creation and approval to minimize changes and delays.
2. Coordinate schedules in advance to ensure availability of all parties involved in project activities.
3. Advocate for timely release of project budgets and maintain regular communication with the funding agency.
4. Develop contingency plans for weather-related disruptions, such as rescheduling activities or implementing remote work arrangements.
5. Stay updated on government policies and regulations, and adapt project plans accordingly.
6. Allocate additional resources or personnel to address workload challenges and ensure timely project delivery.

VI. Project Impact/Output

The project is expected to at least generate the following:

Outputs:
- Developed and validated mathematics instructional materials tailored for mother-tongue based education.
- Improved mathematics academic performance and learning outcomes for students through the use of these materials.

Impact:
- Increased cultural pride and self-esteem among students as they see their language and culture represented in their education.
- Strengthened linguistic and cultural identity among students, fostering a sense of belonging and connection to their heritage.
- Enhanced quality of education in the area by providing effective and culturally relevant teaching materials, ultimately improving student engagement and understanding in mathematics.

VII. Supplemental Activities

VIII. Other Accomplishment

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IX. Pictorials



Inception Meeting with Teachers of Nangaan Elementary School



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Conduct of needs assessment and Pre-test



Visit at Nangaan Elementary School

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Training on IM Development and Validation of IM with the resource person Dr. Verzosa.



USM-EXT-F15-Rev.3.2021.01.26

PARAMETER C: FUNDING AND OTHER RESOURCES

Strengthening Barangay High Schools: Validation and Implementation of Representation-Based Learning Materials for Independent Study of Mathematics in Remote Schools

Leorence C. Tandog, Ph.D.
Project Team Leader

Funded by

USM Fund 101

Terminal Report
March 2026

UNIVERSITY OF SOUTHERN MINDANAO
Kabacan, Cotabato

ABSTRACT

Strengthening Barangay High Schools: Validation and Implementation of Representation-Based Learning Materials for Independent Study of Mathematics in Remote Schools

Project members: *Leorence Tandog, Shandra Nanding, Philip Lester Benjamin, Jupiter Pilongo, Rowel Madio, Lawton Yabes, Dominic Carajay, Lidey Sultan, Debbie Marie Verzosa, Jonald Pimentel, Leonard Paleta, Anna Jean Sebastian, Daryl Mae Catubig, Jeanette Licaros, Roel Valenton, Jennifer Pama, Arnel Toledo, DOST-SEI Project Strand-N Scholars, MST and PhD Ed Math Students*

This extension project aimed to improve mathematics learning in barangay high schools, with Salvacion High School in Cotabato serving as the primary beneficiary, through the development and implementation of representation-based, self-instructional learning materials. The project responded to persistent challenges faced by barangay high schools in the Philippines, including the shortage of qualified teachers, limited instructional resources, and consistently low performance in national achievement assessments. It built on a research initiative launched in 2021 that introduced representation-based instructional materials, which demonstrated positive effects on students' understanding of mathematics and science.

The project engaged faculty members and graduate students from the PhD in Education and MST in Mathematics programs in collaborative lesson study, materials development, and action research. A systematic implementation process was followed, which included baseline data collection, teacher training, material development, validation and refinement, and classroom implementation. As a result, the project produced Learning Activity Pages (LAPs) designed to support independent learning and address identified learning gaps in mathematics in a remote area.

The implementation was conducted at Salvacion High School with the active support of the teachers and the school heads. The effectiveness of the intervention was assessed using pre- and post-tests on mathematical achievement and numeracy, student feedback, and teacher observations. Findings indicated a significant improvement in the numeracy skills of the student respondents, particularly in the various mathematical thinking skills. Moreover, the school beneficiary demonstrated enhanced overall performance, as reflected in their better rankings in district-wide competitions and increase in the number of senior high school students who qualified to enroll at USM based on USMCEE score.

The results of the project provided empirical evidence to support further refinement and possible scaling of the developed materials for use in other low-resource educational settings. Overall, the project contributed to the advancement of inclusive, equitable, and quality education by empowering students and teachers through accessible, research-based, and context-responsive learning resources.

Keywords: *Representation-Based Learning, Self-Instructional Materials, Learning Activity Sheets, Mathematics Education, Barangay High Schools*

UNIVERSITY OF SOUTHERN MINDANAO
Kabacan, Philippines

A. BASIC INFORMATION		
1. Title	Strengthening Barangay High Schools: Validation and Implementation of Representation-Based Learning Materials for Independent Study of Mathematics in Remote Schools	
2. Status	☐ Ongoing ☐ Completed	
3. Project Leader Study Leader	**Dr. Leorence C. Tandog** College of Science and Mathematics	
Email Address	lctandog@usm.edu.ph	
Contact Number	09466115568	
4. Lead Unit/College	College of Science and Mathematics	
Collaborating Unit/College	DepEd Cotabato Division	
5. Category	☐ Program ☑ Project ☐ Study	
6. Classification	☐ Research	☐ Development ☑ Extension
	☐ Basic ☐ Applied	☐ Pilot Testing ☐ Prototype Development ☐ Tech. Promotion/Commercialization
7. Thematic Area	☑ Quality Learning, Skills Development, and Literacy ☐ Social Development, and Strong Institutions ☐ Preservation of Culture ☐ Environmental Protection, Conservation, and Risk Reduction ☐ Food Security and Poverty Reduction ☐ Good Health and Well-being ☐ Innovations in Science, Engineering, and Technology ☐ Sustainable Entrepreneurship and Management	
8. Sustainable and Development Goals	☐ No Poverty ☐ Zero Hunger ☐ Good Health & Well-Being ☑ Quality Education ☐ Gender Equality ☐ Clean Water & Sanitation ☐ Affordable and Clean Energy ☐ Decent Work & Economic Growth ☐ Industry Innovation & Infrastructure	☐ Reduced Inequalities ☐ Sustainable Cities & Communities ☐ Responsible Consumption & Production ☐ Climate Action ☐ Life Below Water ☐ Life on Land ☐ Peace, Justice and Strong Institutions ☐ Partnership for the Goals
9. Project Duration	One year	
10. Project Location	Matalam, Cotabato	
11. Total Budget	PhP 60,000	

TERMINAL REPORT

B. TECHNICAL DESCRIPTION

1. Rationale / Significance

Rationale

The performance of Philippine barangay high schools has long been perceived as inferior due to persistent challenges—foremost among them is the lack of qualified teachers. Teacher shortage is a critical issue in many rural areas globally but is particularly acute in barangay schools. These institutions often serve as entry points for novice teachers who are frequently assigned to teach out-of-field subjects due to staffing limitations and the small number of class sections typically offered in remote locations. Serving predominantly underprivileged and marginalized communities, barangay schools are often overlooked in favor of larger, better-resourced institutions.

In 2021, our team initiated a multi-dimensional response to the urgent educational disruptions brought about by the COVID-19 pandemic. This involved the development of instructional materials and technological tools designed to support student learning under constrained conditions. We introduced teaching innovations that featured interactive elements, visual aids, and manipulable representations. These efforts resulted in notable improvements in students' understanding of mathematics and science concepts.

Building on the success of that initiative, faculty members and graduate students from the PhD in Education and MST major in Mathematics programs engaged in a collaborative lesson study. This led to the development of research-based lessons and Learning Activity Pages (LAPs) that employ multiple representational approaches. These materials are designed to enable students to grasp essential concepts and skills even with minimal teacher supervision—or in the absence of a teacher altogether.

With these resources now prepared for validation, this extension project seeks to address the unique educational challenges faced by barangay schools through their strategic deployment and use.

Significance

This extension project was significant in addressing the persistent teacher shortage in barangay schools through the development of learning materials (LMs) that support independent learning. These materials were contextualized to reflect the realities of local school settings and the mathematical deficiencies of target learners, making them more relevant and responsive to the needs of barangay students. The initiative contributed to the long-term improvement of barangay high schools by enhancing instruction through the use of high-quality, research-based resources.

In addition to promoting content mastery, the materials foster lifelong learning by integrating soft skills such as number sense, critical thinking, problem-solving, and self-efficacy. These competencies continue to prepare students for real-world challenges and academic success. The project also aimed to enhance students' chances of admission to

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tertiary education, a critical pathway to socio-economic advancement and improved quality of life, particularly for learners in remote areas.

Grounded in lesson study and collaborative educational research conducted by faculty members of the Mathematics Department and graduate students, the project supported professional development and strengthened academic–community partnerships.

Furthermore, this initiative aligned with the broader goal of achieving inclusive and equitable quality education. The approach and materials can be adapted for use in other low-resource schools across the country, positioning the project as a potential model for broader implementation. By supporting barangay high schools, this project helps ensure that Filipino learners have access to meaningful and quality learning experiences, regardless of their geographic location.

Objectives

This project aimed to enhance the mathematics education received by students in barangay high schools in DepEd Cotabato with the use of carefully designed and validated self-instructional LMs.

The specific objectives of the extension project were to:

1. **strengthen** mathematics teachers' capacity to develop representation-based, self-instructional materials and to conduct action research or design-based research using these materials;
2. **engage** teachers in the collaborative development of research lessons and the design of self-instructional learning materials (LMs) in the form of Learning Activity Pages (LAPs);
3. **validate, pilot-test, and refine** activity sheets to effectively facilitate independent learning of mathematics concepts and skills;
4. **enhance** mathematics performance and numerical literacy among barangay high school students through the implementation of action research using the developed instructional materials; and
5. **improve** the overall performance of the target school and increase the chances of its senior high school (SHS) students being admitted to the University of Southern Mindanao (USM).

2. Review of Related Literature

Barangay high schools, formerly known as barrio high schools, were established in 1964 to provide wider access to secondary education (Orata, 1979). Since then, additional barangay high schools have opened with the passage of RA 6054 or the "Barrio High School Charter" in 1969. The establishment of barangay high schools is considered as equalizing opportunity for all Filipino children to access education regardless of their place of residence or economic condition.

The performance of Philippine barangay schools has always been viewed to be inferior. In 1987 the Department of Education (DepEd) temporarily halted the opening of barangay high schools with acknowledgement that the quality of instruction in most of the barangay high schools suffered as evidenced by poor results in national achievement tests (DepEd DO 69, s. 1987).

Self-regulated and independent study is vital in cases where teachers are not available to facilitate learning. Effective LMs significantly support independent learning since resources that can be learned without needing the assistance of a teacher can empower students to take control of their studies, learn at their own pace, and develop self-discipline and independent thinking. Research shows that supplemental printed materials significantly facilitate successful learning of math concepts (Brown and Gilmer, 2009) and self-instructional worked examples are effective in the development of both conceptual and procedural knowledge (Sheldon, 2013).

In 2021, we initiated a multi-dimensional approach to respond to the challenges that emerged from the urgent educational adaptations driven by the pandemic through material and technology tools development (Tandog & Verzosa, 2021). Our project introduced teaching innovations that utilized interactive elements, visual features, storytelling, and manipulable representations. Various studies have shown that these features and tools enhance learning (De las Peñas & Bautista, 2008), facilitate visualization (Taka, Taka, & Budinski, 2010), and develop creativity (Shelomovskiy & Nosulya, 2012). Representation is an important element in the study of mathematics and is considered at the heart of cognitions associated with mathematical activity (Kaput, 1987).

3. Methodology

A. Development Phase

1. Baseline Data Collection / Needs Assessment

Surveys were conducted on school performance and admission SHS graduates to college to profile Salvacion High School. Ocular visits and interviews with teachers and school heads assessed existing learning resources, identified students' learning gaps, and considered contextual factors for project implementation. A diagnostic pretest was also administered to determine specific student needs to guide material development.

2. Planning and Training

An orientation introduced project goals, and the learning needs to be addressed. Training was conducted on the representation approach, scaffolding techniques, action research, and design-based research to support teachers in material development. Plans of activities for developing, reviewing, validating, and pilot-testing instructional materials were prepared.

3. Development, Validation, Pilot Testing, and Refinement

Instructional materials were developed collaboratively by MST and PhD students with faculty of the Mathematics and Statistics Department as subject experts. Faculty and students validated the content, and pilot testing involved selected high school students to assess engagement and learning outcomes. Materials were refined using feedback from needs assessment, validation, and pilot testing to suit students' capabilities and curriculum requirements.

4. Packaging and Reproduction of LAPs

Final layouts considered cost-efficiency, readability, and usability. LAPs were reproduced for target beneficiaries, and implementation feedback informed refinement for potential future use, patenting, and wider dissemination.

C. Implementation Phase

The project was implemented at Salvacion High School, an annex of Kibia High School. Support was provided to teachers and the TIC during student engagement, outputs were evaluated to guide ongoing support, and action research assessed improvements in learning outcomes.

D. Evaluation Phase

Project effectiveness was measured through comparison of pretest and posttest scores, student outputs, and teacher observations. Student feedback was gathered through interviews and focus groups. Impact on school operations was assessed via principal and teachers' narratives on how the materials addressed teacher scarcity and improved school performance.

4. Results and Discussion

Baseline data

An ocular site visit and interviews conducted with the teachers and the former Principal of Salvacion High School at the start of the extension project revealed critical gaps in instructional support for mathematics education. One of the most pressing issues identified was the lack of learning resources, particularly in mathematics, as the Department of Education (DepEd) has been unable to provide textbooks for the subject. Additionally, it was found that none of the teachers in junior high school specialized in mathematics. Instead, mathematics classes are handled by teachers with academic backgrounds in Science and Filipino, underscoring the urgent need for subject-specific instructional support.



Figure 1. MST Math students and Salvacion HS teachers during initial site visit

Secondary data on the results of the Rapid Mathematics Assessment (RMA) for Grades 7–10 at Salvacion High School revealed that none of the students in the partner school demonstrated proficiency in the cognitive domain at their current grade level. This finding aligns with the recently released EDCOM 2 report, which indicated that only 0.40% of Grade 12 students in the Philippines attained the minimum level of competency (Second Congressional Commission on Education [EDCOM II], 2026). The RMA further revealed that most of the target students, despite being in high school, possess mathematics competencies equivalent to Grade 2 level, with the highest observed competency reaching only up to Grade 4 level.


RAPID MATHEMATICS ASSESSMENT(RMA)
Grades 7 to 10

Figure 2. Rapid Mathematics Assessment Result for Grades 7-10.

A diagnostic test was administered to Grades 7-10 students to assess their number sense across three key categories: Numbers; Operations and Computational Estimation, and Data Sense Making.



Figure 3. Salvacion HS junior high school students taking the diagnostic test

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Figure 8. Orientation meeting with Salvacion HS teachers.

Capacity Building of Teachers

This project started with the enhancement of teachers' capacity in instructional material development and the conduct of action research as essential inputs to the implementation of the extension program. To achieve this objective, two seminar-workshops were conducted, with participants including graduate students engaged in curriculum development, teachers from the extension site, and other interested educators.

The first was a two-day seminar-workshop designed to strengthen three key areas of professional growth: instructional material development using representation-based approaches, the conduct of action research, and an understanding of design-based research. The seminar was carefully structured to enable participants to develop effective curriculum materials while simultaneously engaging in action research to improve instructional practice. Design-based research was introduced to equip participants—particularly the graduate students—with the research skills necessary for the continuous refinement of the developed materials for wide-scale distribution.



Figure 9. Seminar-workshop publication material and attendees

The seminar provided a space for participants to collaborate, share ideas, and create instructional tools they can apply in their own classrooms, and possible action research while implementing the innovations. The seminar workshop was attended by 72 teachers who highly rated the various aspects of the seminar with an overall rating of 4.71 (excellent). It also contributed to professional growth of teachers, including those from the beneficiary school with the PRC approved 8 CPD points for the seminar.



Figure 10. Seminar participants presenting their developed LM and collaborating for possible action research

The second workshop seminar was conducted as result of some challenges in the initial implementation of the LMs developed. Some students have difficulty reading texts and understanding activity instructions. There also seemed to be other preferences for learning. This seminar explored alternative pathways to numeracy and literacy. Still grounded in the principles of the representation-based approach, it emphasized how zines—small, self-published booklets—can serve as powerful tools to enhance both numeracy and literacy development. Training participants explored how to design and integrate zines into their teaching practices through hands-on activities such as creating sample zines, collaborating with peers, and developing classroom applications that align with curriculum goals. The one-day seminar workshop was awarded 4 CPD points by PRC.



Figure 11. Seminar publication material and certificate awarded

By the end of the one-workshop, teacher participants were equipped with both theoretical grounding and practical tools to implement zine-making as a pedagogical strategy that bridges literacy and numeracy learning in innovative and meaningful ways. The seminar workshop ended with presentation and critiquing of the zines developed by the participants.



Figure 8. Orientation meeting with Salvacion HS teachers.

Capacity Building of Teachers

This project started with the enhancement of teachers' capacity in instructional material development and the conduct of action research as essential inputs to the implementation of the extension program. To achieve this objective, two seminar-workshops were conducted, with participants including graduate students engaged in curriculum development, teachers from the extension site, and other interested educators.

The first was a two-day seminar-workshop designed to strengthen three key areas of professional growth: instructional material development using representation-based approaches, the conduct of action research, and an understanding of design-based research. The seminar was carefully structured to enable participants to develop effective curriculum materials while simultaneously engaging in action research to improve instructional practice. Design-based research was introduced to equip participants—particularly the graduate students—with the research skills necessary for the continuous refinement of the developed materials for wide-scale distribution.



Figure 9. Seminar-workshop publication material and attendees

The seminar provided a space for participants to collaborate, share ideas, and create instructional tools they can apply in their own classrooms, and possible action research while implementing the innovations. The seminar workshop was attended by 72 teachers who highly rated the various aspects of the seminar with an overall rating of 4.71 (excellent). It also contributed to professional growth of teachers, including those from the beneficiary school with the PRC approved 8 CPD points for the seminar.



Figure 10. Seminar participants presenting their developed LM and collaborating for possible action research

The second workshop seminar was conducted as result of some challenges in the initial implementation of the LMs developed. Some students have difficulty reading texts and understanding activity instructions. There also seemed to be other preferences for learning. This seminar explored alternative pathways to numeracy and literacy. Still grounded in the principles of the representation-based approach, it emphasized how zines—small, self-published booklets—can serve as powerful tools to enhance both numeracy and literacy development. Training participants explored how to design and integrate zines into their teaching practices through hands-on activities such as creating sample zines, collaborating with peers, and developing classroom applications that align with curriculum goals. The one-day seminar workshop was awarded 4 CPD points by PRC.



Figure 11. Seminar publication material and certificate awarded

By the end of the one-workshop, teacher participants were equipped with both theoretical grounding and practical tools to implement zine-making as a pedagogical strategy that bridges literacy and numeracy learning in innovative and meaningful ways. The seminar workshop ended with presentation and critiquing of the zines developed by the participants.

PARAMETER C: FUNDING AND OTHER RESOURCES



Figure 12. Sample of zines produced by seminar participants

The seminar workshop was attended by 102 teachers, who rated the event very highly, giving it an overall score of 4.88 (excellent), reflecting strong satisfaction with the content, organization, and practical applicability of the activities. The comments extracted from the Overall Training Evaluation Sheets has three themes:

1. Positive and Enriching Training Experience. Participants described the training as enriching, insightful, and valuable, indicating that the session provided meaningful learning experiences. Many reported gaining new knowledge and insights. The creativity introduced with zines generated interest among participants in adopting creative approaches as instructional tools.

2. Contribution to Professional Practice. Participants acknowledged that the seminar enhanced their knowledge and skills, enabling them to improve and adapt their professional practice. They noted that the session provided practical ideas and tools to support their teaching, particularly in numeracy and literacy instruction.

3: Desire for Continuous Professional Development. Participants expressed strong interest in attending additional seminars and training programs, particularly those focused on strengthening pedagogy and instructional skills. They also suggested incorporating digital or software-based demonstrations, such as Canva and other applications, to better support teachers who prefer computer-based activities over handmade outputs.



Figure 13. Participants of the seminar-workshop with MST and PhD Ed Math Students

Design, Development, Validation, and Development of LMs

The extension project initially intended to involve the mathematics teacher at the beneficiary school; however, this did not materialize due to the absence of a designated mathematics teacher. The design and development of the instructional materials were therefore undertaken collaboratively by PhD and MST students, together with faculty members from the Department of Mathematics and Statistics serving as subject matter experts.

The development was anchored on the positive outcomes of a previous research initiative (Tandog & Verzosa, 2021), as well as on the initially developed LMs and the Professional Learning Community (PLC) structure for lesson study and pedagogical sharing established during the previous extension project (Tandog et al., 2022). The LMs prioritized the development of mathematical thinking and skills, with curriculum content serving primarily as a vehicle for cultivating the identified competencies. This approach seeks to address gaps in basic education, where instruction often tends to emphasize content coverage over the development of mathematical thinking and conceptual understanding.

The developed materials emerged from research lesson study conducted by the assigned groups and were guided by representation-based frameworks deemed appropriate by each group, including the Multiple Representation Approach (MRA), Concrete–Representational–Abstract (CRA), Representation Construction Approach (RCA), Concept Attainment (CA), and other related approaches, as shown in the following table.

Table 1. Mathematical thinking skills and content coverage of developed LMs.

Mathematical Thinking Skill	Content	Topics	Framework	Validation
Number Sense and Estimation	Numbers and Number Sense	-Number	- McKintosh/MRA	Complete
		-Operations (Multiplication)	-Array Models	(on-going)
		-Fractions	-RCA	Complete
Proportional Reasoning		-Percents	-Proportional Thinking	Complete
Relational Thinking	Sets	-Sets and Set Operations	-RCA -CA	Complete
Data Sense Making/ Quanti-tative Reasoning	-Descriptive Statistics	-Data Presentation -Average & spread	Microlearning	Complete
Predicting/Induct ive Reasoning	Patterns and Sequences	-Number Sequence	Inductive Learning Model	Complete
		-Arithmetic/ Geometric Seq		(On-going)
Spatial Reasoning	Geometry	-Polygons	-CA -Van Heile -CRA	Complete
		-Areas and Perimeter		(On-going)
Logical Reasoning	Mathematical Logic	- Conditional Statements	-CRA -Van Heile	Complete
Probabilistic Thinking	Combinatoric s	-Counting Techniques	-CRA	Complete
		-Combination -Permutation	-CA -CRA	(On-going)
	Probability	-Simple Probability		(On-going)
Symbolic Thinking	Algebra	-Alg. Expressions		(On-going)
Problem Solving		-Linear Equation		(On-going)
Measuring	Measurement		-	(On-going)

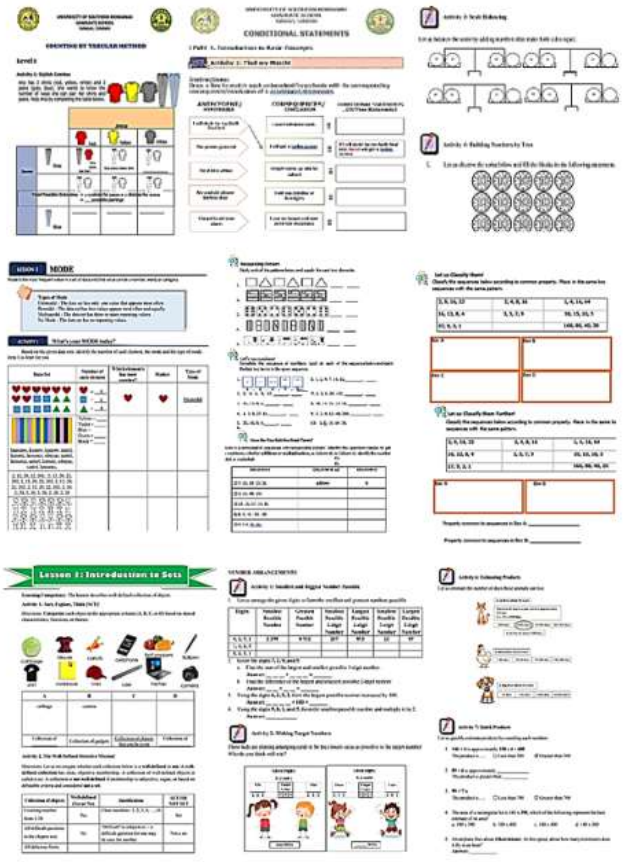


Figure 14. Samples of developed LMs

PARAMETER C: FUNDING AND OTHER RESOURCES

The initial review of the developed materials was conducted online, with PhD Mathematics Education students serving not only as reviewers but also as critics who provided suggestions for improvement. The validation process was conducted primarily face-to-face with faculty members from the Department of Mathematics and Statistics, who served as subject matter experts.

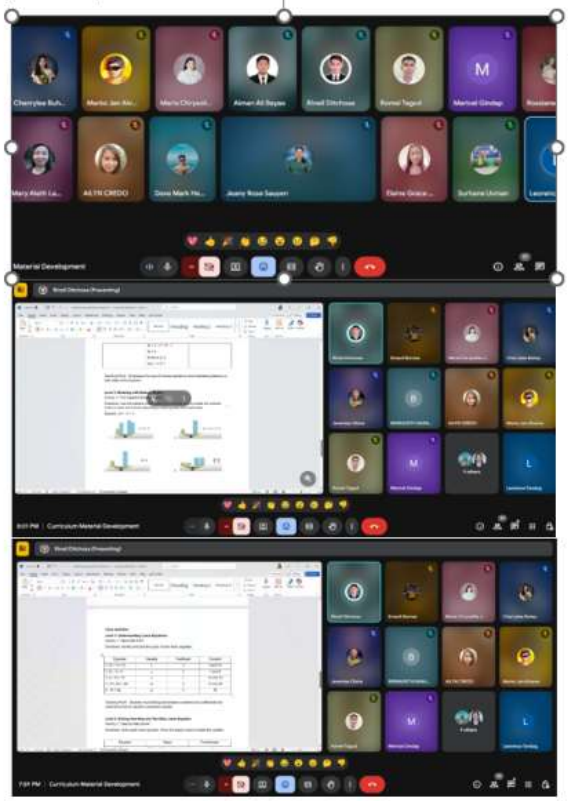


Figure 15. Online meetings and presentations of developed LMs

The pilot testing of the developed LMs varied across groups. Some groups conducted pilot tests with students in their respective schools. Others selected a small number of students who shared similar characteristics with the target users to implement the materials and determine whether, after using them, the students were able to answer the intended pretest items. Revisions were made based on the results of these pilot tests.

For several groups, the initial implementation of the validated materials in the beneficiary school functioned as pilot testing, with revisions undertaken topic by topic. Adjustments were made including in the pacing of instruction and the number of activities assigned, based on how students interacted with the materials in the preceding lessons.

Implementation of LMs

After the preliminary arrangements and school visits, implementation commenced in mid-September 2026, with MST and PhD students taking the lead in deploying the (LMs) they had developed, under the guidance of faculty members from the Department of Mathematics and Statistics. The extension project team was allocated every Friday by the partner school for the implementation of the LMs.





Figure 15. PhD Ed and MST math students during deployment and implementation of LMs

At the start of deployment, several student difficulties in using the materials were observed.

- Numbered instructions were interpreted as test items to be answered.
- Lettered examples were perceived as multiple-choice options to be encircled.
- Black-and-white printing rendered color-highlighted important texts unnoticeable.

These observations indicated underlying issues in reading comprehension and test-taking habits. The LM writers suggested color printing to make important texts more noticeable. Adjustments in numbering and formatting were also considered. However, upon reflection, the original numbering and example formats were retained to address students' tendency to treat lettered items as multiple-choice options and to encircle answers mechanically without fully comprehending the instructions or content. Table 2 shows the schedule of implementation of different LMs.

Table 2. Schedule of LM deployment and implementation

Mathematical Thinking Skill	Content	Topics	Dates Implemented	Grade Level
Number Sense and Estimation	Numbers and Number Sense	-Number	September, October	Grades 7-12
		-Operations (Multiplication)	For Implementation	
		-Fractions	For Implementation	
Proportional Reasoning		-Percents	For Implementation	
Relational Thinking	Sets	-Sets and Set Operations	October, November	Grade 8,10
Data Sense Making/ Quantita-tive Reasoning	-Descriptive Statistics	-Data Presentation -Average & spread	October, November	Grade 9
Predicting/Inductive Reasoning	Patterns and Sequences	-Number Sequence	October, November	Grades 11-12
		-Arithmetic/ Geometric Seq	For Implementation	
Spatial Reasoning	Geometry	-Polygons	For Implementation	
		-Areas and Perimeter		
Logical Reasoning	Mathematical Logic	- Conditional Statements	For Implementation	
Probabilistic Thinking	Combinatorics	-Counting Techniques	For Implementation	
		-Combination -Permutation	For Implementation	
	Probability	-Simple Probability	For Implementation	
Symbolic Thinking	Algebra	-Alg. Expressions	For Implementation	
Problem Solving		-Linear Equation	For Implementation	
Measuring	Measurement		For Implementation	

Of the 11 targeted mathematical thinking skills, only four were fully implemented. The start of implementation was delayed by one month due to the extended validation and revision of the LMs and pretests, which took longer than anticipated. Additional factors also contributed to the partial implementation of the developed LMs, including class suspension due to school district's scheduled activities, cancellation of classes following an earthquake, and shortened class periods due to armed conflict in a neighboring area.

PARAMETER C: FUNDING AND OTHER RESOURCES



Figure 16. Extensionists Ensuring Student Safety During the October 10 Earthquake

The deployment of the learning materials was halted in November due to a land conflict in a nearby barangay and a killing incident on December 2, 2025, along the road leading to Salvacion. This decision was made to ensure that the safety of the graduate students and faculty members actively participating in the extension program was not compromised. As such many of the developed materials are still for implementation as shown in Table 2.



Figure 17. Newsclips of incidents that affected project implementation

Aside from the deployment of learning materials (LMs), a review in preparation for college admission examinations was conducted for senior high school students. The Department of Mathematics and Statistics provided review sessions on mathematics and quantitative reasoning, aiming to improve students' problem-solving skills and test-taking strategies. Other test components, such as English and Science, were delegated to the school as it has available teachers to handle these subjects. This collaborative effort provided a comprehensive review experience and helped enhance students' readiness and confidence for college admission examinations.



Figure 17. USM conducting a review for college admission tests

The school also requested assistance from the Mathematics and Statistics faculty extensionists in training selected students for the Damath competitions, further strengthening the collaboration between the university and the partner school while providing students with opportunities to develop their mathematical and strategic skills. This support helped enhance students' computational skills, and strategic decision-making, which are essential in mathematical problem-solving and competitive events.



Figure 17. USM coaching student contestants for DAMATH competition

Outcomes of the Project

The targeted major outcome of this project is the enhancement of numerical literacy and mathematics performance and among barangay high school students through the implementation of the developed LMs

1. **Improved** overall performance of the target school and increase the chances of its senior high school (SHS) students being admitted to the University of Southern Mindanao (USM).
   - Improved numeracy

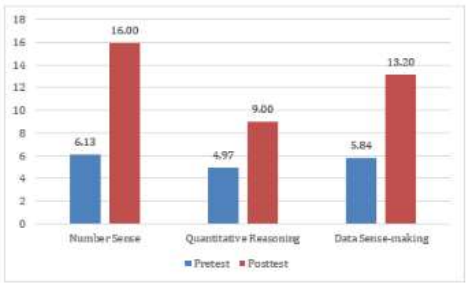


Figure 18. Pretest and Posttest performance of students

2. **Improved** ranking in mathematics competitions





3. Enhanced potential for college admission

Data	SY 2024-25		SY 2025-26	
	f	%	f	%
Grade 12 Grad	23		19	
Took the Exam	5	21.7	6	31.6
Passed USM CEE	2	40	6	100.0
Admitted to BS Program	2			
Admitted to Associate Program	1			

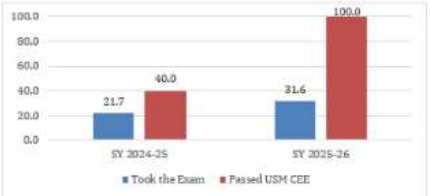


Figure 19. Comparative performance of Senior HS students in USMCEE

PARAMETER C: FUNDING AND OTHER RESOURCES

Extension Project Outputs

This project has produced the following outputs:

1. Developed and validated learning materials on at least ten topics
2. Three completed action research
3. One research article ready for journal publication submission



Figure 20. Research article from extension project for journal publication

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EXTENSION SERVICES OFFICE

QUARTERLY MONITORING AND EVALUATION REPORT FOR EXTENSION

Project Title:	**Strengthening Barangay High Schools: Validation and Implementation of Representation-Based Learning Materials for Independent Study of Mathematics in Remote Schools**	**Period Covered**	☒ 1st Quarter ☒ 3rd Quarter ☒ 2nd Quarter ☒ 4th Quarter
Proponent(s):	Leorence C. Tandog, Debbie Marie B. Verzosa, Jonald L. Pimentel, Philip Lester P. Benjamin, Leonard M. Paleta, Anna Jean S. Garcia, Jupiter G. Pilongo, Daryl Mae C. Mamon, Rowel P. Madio, Roel S. Valenton, Sandra A. Nanding, Lawton John A. Yabes	**Fund Source**	☒ Local ____ Fund 101 ☐ External _____

Activities *Based on the Work Plan Schedule*	Outputs	Accomplishments: Target (%) *Based on the Milestone in the Workplan*	Accomplishments: Actual (%)	(%) Completion (Cumulative)	Problems Encountered *(if any)*	Action Taken	Fund Utilization (%)	Remarks by Evaluator
% Completion (Cumulative) from the previous quarter: 95%								
5. Implementation of Representation Approach-Based Learning Materials for Improved Learning of General Mathematics (two months)	Deployment & use of LMAPS by target beneficiaries	20%	100%	100%	None	None	67%	

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