Republic of the Philippines
Department of Education
NEGROS ISLAND REGION

REGIONAL MEMORANDUM
No. 008, s. 2026

JAN 0 6 2026

CONDUCT OF SURVEY FOR THE STUDY "DEVELOPMENT AND VALIDATION OF SCALE FOR ASSESSING EFFECTIVE MATHEMATICS INSTRUCTIONAL PRACTICES IN THE PHILIPPINE BASIC EDUCATION"

To: All Schools Division Superintendents

1. Attached is the Memorandum on the conduct of the survey for the study "Development and Validation of Scale for Assessing Effective Mathematics Instructional Practices in the Philippine Basic Education."

2. For details, coordinate with the PPS-PRDD through email address ps.prd@deped.gov.ph or at telephone number (02) 8635-3976. For coordination, contact the researcher, Mr. Randy P. Acoba at randy.p.acoba@isu.edu.ph.

3. Immediate dissemination of this Memorandum is desired.

RAMIR B. UYTICO EdD, CESO III
Regional Director

Encl: As stated
Reference: As stated

To be indicated in the Perpetual Index
under the following subjects:

RESEARCH

PPRD/JIS/Memo_Conduct of Survey of Reseach Instrument Validation.docx

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Republic of the Philippines
Department of Education
POLICY AND PLANNING SERVICE

MEMORANDUM
2025-PPS-OD-11-019

FOR : **REGIONAL DIRECTORS**

mcligunas-roque

FROM : **MARIA CLARISSE T. LIGUNAS-ROQUE**
Director IV, Policy and Planning Service

SUBJECT : **Endorsement of the Survey for the Study "Development and Validation of Scale for Assessing Effective Mathematics Instructional Practices in Philippine Basic Education"**

DATE : 12 November 2025

This refers to the request of Mr. **Randy P. Acoba, faculty researcher, Isabela State University**, conducting a study on the development of an assessment tool to evaluate the mathematics teaching practices of mathematics teachers in the Basic Education across the country. The study aims to gather critical insights into the teaching strategies and instructional approaches commonly employed by Mathematics teachers in actual classroom settings from Elementary Level to Senior High School Level.

To establish the tool's construct validity and reliability, the researcher seeks the participation of Mathematics teachers nationwide in an online survey. A large sample will be targeted to ensure robust parameter estimates and enhance the generalizability of the scale. As such, the study aims to include as many respondents as possible. The findings are expected to inform policy development, curriculum design, and teacher professional development programs toward improving the quality of mathematics education in the Philippines.

In this regard, this Office respectfully **endorses the deployment of the survey to all Mathematics teachers at the Elementary, Junior High School, and Senior High School levels** in consideration of existing DepEd Orders, such as DO 9, s. 2005 (*Instituting Measures to Increase Engaged Time-on-Task and Ensuring Compliance Therewith*), to minimize class disruptions and maximize time-on-task for learners and teachers. Likewise, participation is voluntary, and the rights and privacy of all respondents will be fully protected in accordance with ethical research standards.

Attached is the Survey questionnaire, along with the brief description of the study. The survey questionnaire can also be accessed through the link or the QR code provided below:

Google Form Link: bit.ly/4ld1CTO

For further inquiries, you may contact PPS-PRDD through email address ps.prd@deped.gov.ph or at telephone number (02) 8635-3976. For lateral coordination, please contact the researcher, Mr. **Randy P. Acoba,** at **randy.p.acoba@isu.edu.ph**.

For favorable consideration. Thank you.

Development and Validation of Scale for Assessing Effective Mathematics Instructional Practices in the Philippine Basic Education

Randy P. Acoba
Isabela State University

Rationale:

Mathematics plays a critical role in the development of logical reasoning, problem solving, and analytical skills. In fact, the MATATAG Agenda of the Department of Education (DepEd) in the Philippines emphasized strengthening foundational skills, including mathematics, to prepare students for higher learning and real-life challenges. This implies that the learners are expected to acquire the foundational skills in mathematics concepts and use them effectively in academic, professional, and real-life contexts. In a broader perspective, the Philippine mathematics curriculum prepares the learners to become capable, independent, and globally competitive individuals.

To teach mathematics effectively, it is essential to understand what the learners already know, and identify what they need to learn, and provide challenges and support to help them master it successfully. Furthermore, the National Council of Teachers of Mathematics (NCTM) (2000) asserts that effective mathematics instruction requires knowing and understanding mathematics, students as learners, and pedagogical strategies. Also, the MATATAG curriculum of DepEd provided a mathematics curriculum framework for mathematically rich lessons. However, in the Philippines, students' performance in mathematics remains low as revealed in the different large-scale assessments such as the Programme for International Student Assessment (PISA) and the Trends in International Mathematics and Science Study (TIMSS). The 2018 and 2022 PISA result ranked the Philippines among the lowest-performing countries, with Filipino learners scoring significantly below the global average in mathematics (DepEd, 2019; OECD, 2023). Similarly, the country ranked the lowest among the 58 participating countries in the 2019 TIMSS (TIMSS, 2019).These dismal results raise pressing questions about the effectiveness of current instructional practices and the systemic issues that may hinder the development of students' mathematical skills.

One critical challenge in mathematics education is the negative perception of mathematics as a difficult and intimidating subject which leads to students disliking the subject. Studies (Casinillo, 2019; Kunwar, 2021) have shown that negative learning attitudes toward mathematics is one among the common factors of failure rate in mathematics. In addition, Bacong et al (2023) found that students who dislike mathematics tend to give up easily in learning the subject. Their study also showed the crucial role of an engaging mathematics classroom for the students to put effort in learning the subject. Moreover, Aguilar (2021) found that one reason for students' reluctancy towards mathematics is their lack of understanding and self-perception of low content knowledge. Another cause of low performance in mathematics includes poor study habits, a lack of interest from the students, and a lack of confidence in learning mathematics (Tran et al., 2024; Casinillo, 2019). They also found that students do not know how to use existing knowledge in solving mathematics learning tasks. While these studies emphasized student-factors in low rate in mathematics, Jameel and Ali (2016) corroborated that strictness of the teacher when teaching mathematics causes low achievement in the subject. Other studies (Goldhaber & Cowan, 2016; Darling-Hammond, 2015; Kearney & Garfield 2019; Blazar, 2015; Fung et al., 2017; Toropova et al., 2019) have documented teacher-factors that affect mathematics achievement such as teaching effectiveness, teacher quality, teaching practices, teaching experience, and teaching characteristics. These factors underscore the importance of identifying and assessing effective

instructional practices in mathematics which address both the student- and teacher-related factors to create a learning environment where mathematics learning thrive effectively.

Meanwhile, the NCTM (2014) published an article highlighting eight (8) effective mathematics instructional practices. These include establishing mathematics goals to focus learning; implementing tasks that promote reasoning and problem solving; using and connecting mathematics representations; facilitating meaningful mathematics discourse; posing purposeful questions; building procedural fluency from conceptual understanding; supporting productive struggle in learning mathematics; and eliciting and using evidence of student thinking. These practices provide framework for evaluating and enhancing mathematics instruction to ensure it supports mathematics learning effectively. For instance, focusing on clear learning goals and meaningful mathematical discourse may guide teachers in structuring lessons that resonate with students' real-life experiences.

In this context, developing and validating a scale to assess effective mathematics instructional practices become crucial. Hence, this study aims to develop a validated scale in the Philippine context to assess an effective mathematics instructional practices incorporating the NCTM's eight effective mathematics instructional practices. This tool not only provides educators with insights on the strengths and areas for improvement in teaching but also serves as a guide for implementing evidence-based strategies.

Research Objective:

The current study aims to develop Likert scale that can be used to assess the effective instructional practices of Basic Education teachers in mathematics. Specifically, the study aims to establish the construct validity and internal reliability of the scale.

Research Design

This study will use quantitative research design, utilizing a descriptive survey approach. More specifically, the study will employ Confirmatory Factor Analysis (CFA) to validate the proposed structure of the scale for assessing effective mathematics instructional practices. CFA is a technique used to analyze the efficacy of measurement models where the number of factors or constructs and their direct relationship is specified (Price, 2023). In the present study, CFA will be used to establish the construct validity of the developed instrument.

Respondents

Mathematics teachers from the Department of Education in the Philippines (both public and private) will serve as the respondents of the study, specifically elementary teachers, as well as mathematics teachers from the Junior High School and Senior High School levels. While the adequacy of sample size is critical in CFA, a large sample size will be targeted to ensure the robustness of the parameters estimates, as well as the generalizability of the scale. As such, the study aims to include as many respondents as possible.

Scale Preparation and Pilot Testing

a. Scale Development

The Eight Effective Mathematical Teaching Practices by Hattie (2017) published by the National Council of Teachers of Mathematics (NCTM) were considered as constructs in the development of the scale. Literature reviews were also conducted to determine the items tailored to these variables. 15 items in each category were constructed in the form of Likert Scales ranging from 1 (Never) to 5 (Always).

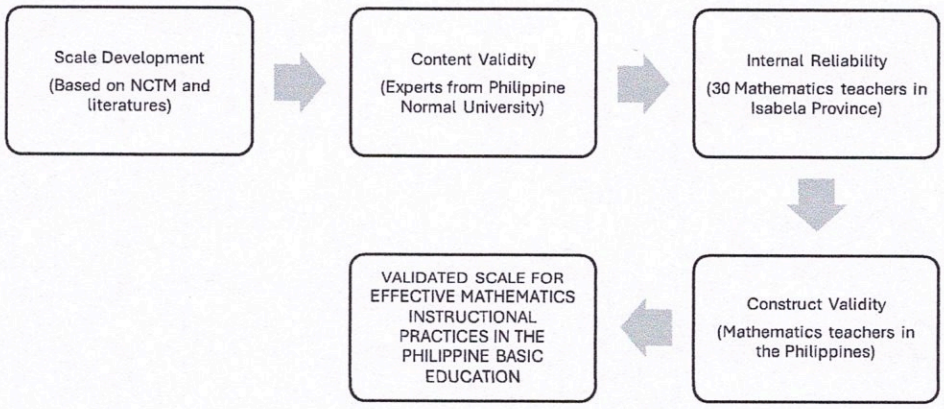
b. Content Validity and Reliability Testing

The content validity of the scale was assessed by experts from the Philippine Normal University Manila in which few items were revised based on the comments of these experts. After establishing the scale's content validity, it was pilot tested to thirty (30) mathematics teachers in Isabela province to establish its internal reliability. A Cronbach's alpha of 0.88 indicated that the scale is highly reliable and internally consistent.

c. Construct Validity Testing

The next phase in the scale development process is the establishment of its construct validity through the administration of the instrument to a wider population. In this study, the scale will be administered to mathematics teachers across elementary, junior high school, and senior high school levels, encompassing both public and private schools in the Philippines.

Below is the schematic diagram illustrating the process involved in developing and validating the Scale for Effective Mathematics Instructional Practices in the Philippine Basic Education.



Data Analysis

Confirmatory Factor Analysis (CFA) will be performed using JAMOVI, an open source statistical software. In the CFA, Correlation Matrix, Bartlett's Tests, and Kaiser-Meyer-Olkin (KMO) Measures of sampling adequacy will be utilized to assess the suitability of the data for factor analysis. The model fit will be evaluated using Chi-Square Goodness of Fit, Comparative Fit Index, Root Mean Square Error of Approximation, and Standard Root Mean Square Residual. The factor loadings for each item will be inspected to evaluate their contribution to the corresponding latent constructs. Hair et al. (1998) suggested that items with factor loadings below 0.50 were considered for removal.

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Effective Mathematics Instructional Practices in the Philippine Basic Education

Development and Validation of Scale for Assessing Effective Mathematics Instructional Practices in the Philippine Basic Education

Items	Not relevant	Somewhat Relevant	Quite Relevant	Highly relevant
A. Establish mathematics goals to focus learning.				
1. Previous lessons are recalled before introducing the next topic in mathematics.				
2. Prerequisite lessons are discussed briefly to connect to the next topic in mathematics.				
3. The learning objectives are clearly presented before discussing the lesson.				
4. The students are encouraged to use mathematics learning targets to summarize concepts they have learned.				
5. The students are given chance to use mathematics learning targets to connect concepts they have learned.				
6. Students are provided with opportunities to defend their solutions or answers.				
7. Students are given chance of explaining the importance of the mathematical tasks they are doing.				
B. Implement tasks that promote reasoning and problem solving.				
1. The teacher provides mathematical tasks that are adequately challenging.				
2. The teacher provides mathematical tasks that encourage meaningful discussions.				
3. The teacher allows the students to come up with their own solutions, different from the ones already presented.				
4. Students are motivated to treat mathematical tasks as opportunities for exploration rather than simply a series of exercises.				
5. Mathematical tasks are introduced in a way that sparks students' interest and enthusiasm for solving them.				
6. The teacher poses questions that encourage deeper thought rather than directly guiding students to the solution.				

7. The teacher provides conceptual and procedural scaffolding during the lesson but refrains from directly giving the answer.				
8. Students are given enough chances to solve problems independently without too much help from the teacher.				
C. Use and connect mathematical representations.				
1. The teacher gives opportunities for the students to relate their prior knowledge of mathematics to the current lesson.				
2. The teacher gives chances for the students to relate their skills in mathematics to the current lesson.				
3. The teacher provides opportunities for the students to relate their prior understanding of mathematics to the current lesson.				
4. Mathematical models are presented for the students to investigate.				
5. Figures, charts, number lines, diagrams, graphs, and other representations are provided to the students to reinforce teaching-and-learning.				
6. The teacher engages with mathematical concepts through numerals, variables, equations, tables, and other symbols.				
7. The teacher applies mathematical concepts in various real-life situations.				
8. The teacher employs tangible objects to demonstrate, explore, or manipulate mathematical concepts.				
D. Facilitate meaningful mathematical discourse.				
1. The teacher intentionally encourages students to evaluate and critique one another's solutions.				
2. Students are encouraged to ask clarifying questions during mathematics discussion.				
3. The teacher encourages the students to show and explain their solutions on the board.				
4. The teacher provides opportunities for students to share their ideas about the topic being discussed.				

5. The teacher uses student's approaches and solution strategies for whole-class analysis and discussion.				
6. The teacher assigns a question or problem for students to discuss in groups.				
7. During group activities, the teacher roams around to observe, gather insights, and provide support when necessary.				
8. The teacher uses supportive tone when correcting student's incorrect solutions.				
E. Pose purposeful questions.				
1. The teacher asks questions that require students to explain and justify their reasoning.				
2. The teacher poses questions that encourage students to explore mathematical patterns and connect different mathematical ideas.				
3. The teacher provides adequate time for students to develop thoughtful explanations and justifications.				
4. The students are expected to justify their answers, not just provide the solution.				
5. The teacher asks questions that make mathematical concepts clearer and more accessible for students to analyze and discuss.				
F. Build procedural fluency from conceptual understanding.				
1. The teacher encourages students to apply their own reasoning strategies and methods when solving problems.				
2. The teacher asks students to explain why the procedure they are using are effective for solving a given problem. (e.g., using boxes to add fractions rather than using numerical methods)				
3. The teacher connects student-generated strategies and methods to more efficient methods when appropriate.				
4. The teacher uses visual models to enhance students' understanding of general procedures.				
5. The teacher provides opportunities for students to consistently practice solving to ensure retention and mastery.				

G. Support productive struggle in learning mathematics.				
1. The teacher asks questions to pinpoint the challenges students are facing.				
2. The teacher encourages students to explore alternative approaches to solving the problem.				
3. The teacher encourages students to reflect on their works to understand their strengths and weaknesses.				
4. The teacher encourages students to focus on the process rather than just the correct answer.				
5. The teacher gives students time to manage their challenges in mathematics.				
6. The teacher avoids intervening too quickly to allow students to learn from their struggles.				
7. Teachers recognizes that struggle in learning mathematics is an essential part of learning and engaging.				
8. The teacher groups the students heterogeneously to provide support for those who are struggling.				
9. The teacher sets high mathematical expectations among the students.				
10. The teacher emphasizes that success in mathematics requires efforts.				
11. Time is provided for group reflection during problem-solving activities to help students identify ineffective strategies.				
12. The teacher establishes class norms where making mistakes is viewed as a valuable learning opportunity.				
H. Elicit and use evidence of student thinking.				
1. The teacher provides interesting mathematical tasks to assess students' learning progress.				
2. The teacher quickly decides how to respond to students, using questions and prompts to guide or deepen their understanding.				
3. The teacher reflects on student learning evidence to plan the next instructional steps.				
4. Students are encouraged to argue the correctness of a mathematical				

statement or solution by reasoning and justifying.				
5. Students are asked not only how to solve a problem but also why the solution or formula works.				
6. The teacher promotes a classroom culture where mistakes are viewed as valuable opportunities for reasoning and discussion.				

Evaluated by:

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