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Creating Assessment Instruments for Mathematics Teachers Teaching in Small School

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***Abstract*—** This study explored the development of assessment tools among Junior High School Mathematics teachers in a small school in the province of Aklan, Philippines. It aimed to understand the challenges encountered and the considerations made by teachers in aligning assessment tools with the Most Essential Learning Competencies (MELCs). The study revealed four major themes: (1) Difficulties in Constructing Assessment Tools, (2) Considerations in Assessment Design, (3) Level of Alignment to the Curriculum, and (4) Bases of Assessment Construction. Teachers reported significant difficulties, including misalignment with MELCs due to numerous school activities, students' low mathematical comprehension, challenges in creating a Table of Specifications (TOS), and uncertainty in selecting appropriate types of assessment. These factors hinder the creation of valid and effective assessments. Teachers also emphasized key considerations such as the level of student understanding, the scope of topics covered, and the type of assessment tools used. Despite aiming for 100% alignment to MELCs, alignment decreased progressively from the second to the fourth quarter due to time constraints and additional responsibilities. The study underscores the importance of providing support to teachers in instructional planning and assessment development, especially in schools with limited resources and heavy workloads. Literature from scholars such as Biggs & Tang (2009), Mazana et al. (2019), and Garavalia (2008) supports these findings, emphasizing the need for constructive alignment, consideration of learner diversity, and context-sensitive assessment practices. The results call for targeted professional development and institutional reforms to enhance the capacity of teachers to construct meaningful and aligned assessment tools.

***Keywords*—** Assessment, Creating, Instrument, Mathematics Teachers, Small School.

I. INTRODUCTION

To effectively implement a 21st-century educational framework, it is imperative to ensure coherence and alignment among core academic components, namely, the curriculum, instruction, and assessment, within the secondary education setting, as highlighted by Aquino (2024).

Mathematics learning, in particular, continues to pose a significant challenge (Brezavšče, 2020; Bringula, 2021), the need for sustained efforts and strategic interventions by educators, policymakers, and researchers are highly encouraged. Strengthening foundational competencies, enhancing instructional methodologies, creating positive learning environment toward the subject, and addressing persistent learning difficulties are crucial steps in empowering students to have confidence and competence in mathematics.

In the Philippine context, students frequently struggle with comprehension, strategy selection, and solving accuracy, often committing errors due to carelessness (Mangulabnan, 2016). These challenges are echoed in Preclaro (2019) findings, which revealed difficulties in retrieving mathematical facts, using mathematics-specific language, and solving word problems. Similarly, Velez (2023) identified recurring issues such as misinterpretation of problems, ineffective strategy application, and careless problem-solving habits, which hinder students' learning processes in mathematics.

Teachers play a vital role in helping students combat these challenges by creating targeted support, particularly to learners experiencing significant difficulty in grasping mathematical concepts. Such support is essential for bridging understanding gaps and enabling students to overcome barriers to learning (Cesaria & Herman, 2019).

Classroom assessment, when effectively aligned with the curriculum, has the potential to significantly enhance students' mathematical achievement. This process requires careful consideration of how evidence of learning is gathered, interpreted, and utilized to inform both instruction and student progress. Despite growing recognition of its importance, further inquiry is needed into how assessment design can directly inform and shape instructional strategies in mathematics

classrooms. Demosthenous, Christou, and Pitta-Pantazi (2021) propose a framework that emphasizes the interplay between assessment task design and student response analysis, drawing on established models within mathematics education.

Alignment among curriculum, instruction, and assessment aims to create a cohesive educational experience. Typically, educators begin with the curriculum to define instructional goals, develop appropriate learning activities, and design assessments that measure students' progress toward these objectives (Baliber & Sañosa, 2022). To maximize student achievement of targeted learning outcomes, it is essential that instructional planning incorporates relevant learning activities and that assessment tools are crafted to provide valid and reliable evidence of the extent to which those outcomes have been attained.

The primary purpose of this study is to investigate the alignment of assessment tools utilized by mathematics teacher to the Most Essential Learning Competencies (MELC) provided by the Department of Education (Deped). Furthermore, this study would look into the dominant assessment utilized by mathematics teachers teaching in a small secondary school in the Province of Aklan and to unlock their experiences in crafting effective assessment tools for students.

The purpose of this study was to uncover challenges and experiences of mathematics teacher's in crafting and utilizing assessment tools for the learners. Specifically, it seeks answer to the following problems:

1. What are the difficulties encountered by junior high school mathematics teachers in constructing assessment tools?
2. What are the considerations made by junior high school mathematics teachers in constructing assessment tools?
3. What is the level of alignment of the assessment tool to the prescribed Most Essential Learning Competencies (MELC) by the Deped?
4. What are the bases of mathematics teachers in creating assessment tools?

II. METHODOLOGY

The participants in this study were the four (4) Junior High School Mathematics Teachers teaching in an identified secondary small school in the Division of Aklan. They were selected based on the following criteria:

a. they were teaching mathematics in the Junior High School in one of the DepEd identified small school in the Division of Aklan. Small school is defined by the DepEd as a school whose enrollment is below 300 learners;
b. they were willing to participate in the conduct of the study.

A questionnaire was developed to gather information regarding the challenges and experiences these junior high school mathematics teachers encountered in developing appropriate assessment tools for learners. To ensure the validity of the instrument, the questionnaire underwent a validation process by a panel consisting of the school's mathematics coordinator, mathematics teachers, and an English language expert. This step was essential to guarantee the validity of the instrument.

This study employed a qualitative research design, specifically a qualitative case study approach. Creswell (2013) described the qualitative case study approach as an exploration of a bounded system or case over time through detailed, in-depth data collection involving multiple sources of information, each with its sampling, data collection, and analysis strategies. The outcome is a case description comprised of case-based themes. Researchers have characterized the QCS approach as a contextually based tradition; difficulty exists in separating the case. The use of qualitative case study research has increased during the past decade.

The reason for selecting this method was that it allows an in-depth exploration of the participants' experiences which are best captured through written or verbal expressions. By using a qualitative approach, the study aimed to explore and describe the challenges and experiences newly hired DOST mathematics teachers are facing.

To collect data, the researcher conducted interviews with the participants. This method allowed for flexible, open-ended responses, encouraging teachers to elaborate on their experiences and provide detailed insights into the specific encounters they face while teaching mathematics. The interview data was transcribed and analyzed using thematic analysis.

In identifying and analyzing themes and patterns within the data in a qualitative research, thematic analysis was used. This method allowed the researcher to explore systematically the responses of the participants, categorize most occurring themes, and create meaningful insights about participants' experiences in

teaching mathematics Vaismoradi, Turunen, & Bondas (2013). The findings were presented as key themes that reflect the participants' shared experiences, as well as any differences in the challenges faced by individual teachers. The results were presented as themes that represents participants' challenges faced in teaching mathematics, as well as their shared significant experiences in teaching, in general.

This methodology provided a comprehensive understanding of the obstacles that teachers face in creating assessment tools, thus contributing to potential improvements in teaching practices and curriculum design.

III. RESULTS AND DISCUSSION

The development of assessment tool among Junior High School Teachers teaching in one of the small school in the Division of Aklan was divided into four (4) parts: (1) Difficulties of Mathematics Teachers in Constructing Assessment Tools (2) Considerations Made by Mathematics Teachers in Constructing Assessment Tools, (3) Level of Alignment of Assessment Tool to the Curriculum, and (4) Bases of Mathematics Teachers in Constructing Assessment.

Difficulties of Mathematics Teachers in Constructing Assessment Tools

Mathematics Teachers expressed the challenges and difficulties they encountered in constructing assessment tools. Their responses were grouped into four (4) sub-themes. (1) Misalignment of the Assessment to the Most Essential Learning

Competencies (MELCS), (2) Low Level of Mathematical Understanding among Students, (3) Constructing a Table of Specifications, (4) Difficulty in Selecting What Type of Assessment Should be Used.

Misalignment of the Assessment to the Most Essential Learning Competencies (MELCS)

Alignment of the assessment to the Most Essential Learning Competencies (MELCS) had been a problem to Junior High School Mathematics Teachers teaching in an identified small school by the Department of Education in the Division of Aklan.

Teacher A expressed: "Assessment is hard to align to the MELCs because of the many school activities." Also, Teacher B mentioned: "Bukon it align sa MELC" as translated, not aligned to MELC. Meanwhile, Teacher D added: "Aligning assessment to MELC is impossible because of students' low level of comprehension in Mathematics, I cannot proceed right away to the next topics".

This reveals a significant challenge among Junior High School Mathematics teachers in aligning assessment tasks with the Most Essential Learning Competencies (MELCs), particularly within the context of a small school setting identified by the Department of Education. Teachers reported various obstacles contributing to this misalignment, including the pressure of numerous school-related activities and the limited instructional time they afford. Additionally, students' low levels of mathematical comprehension were cited as a barrier to progressing through the curriculum at the expected pace, thereby hindering effective alignment with the prescribed learning outcomes.

This result conforms the paper of Urbano (2020) which states that curriculum of today is covered with so many competencies, including the educational system. Moreover, although curriculum, instruction, and assessment are aligned, the rapid instructional changes hinder students' ability to effectively grasp the material, ultimately contributing to limited content mastery, thus it means failure in assessment for teachers, according to (Aquino, 2024).

Constructive alignment refers to the extent to which assessment tasks are coherently aligned with the intended learning outcomes and the corresponding teaching and learning activities (Biggs & Tang, 2009; Dorman & Knightley, 2006).

As Gichuhi (2014) explains, it represents a clear and purposeful connection between what students are expected to learn, the educational experiences provided, and the methods used to assess their learning.

Low Level of Mathematical Understanding among Students

Mathematics teachers also mentioned that a low level of mathematical understanding among students hinders their ability to construct an effective assessment tool. In addition, Teacher C asserted: "When considering the level of understanding of students, it is hard to decide which type of assessment should be used." Moreover, Teacher A stated: "I can't jump right away to the next lesson because students have a very poor understanding of mathematical concepts and that gives me problem in constructing assessment tool." Also, Teacher D mentioned: "The low level of mastery in mathematics among learners is a factor in constructing assessment tool because they cant even answer easy type of exam".

This result highlights a critical issue faced by mathematics teachers: the difficulty in designing effective assessment tools due to students' limited understanding of mathematical concepts. Teachers emphasized that the low level of mastery among learners significantly hinder their ability to select appropriate forms of assessment and to advance through the curriculum. These challenges point to a broader concern regarding curriculum pacing and assessment validity, suggesting the need for differentiated instructional strategies and remedial support to bridge learning gaps before effective assessment design can be achieved.

According to Bangalan and Hipona (2020), students often perceive mathematics as a difficult subject, which negatively impacts both their comprehension and overall attitude toward it. They identified several challenges commonly faced by learners, including a lack of understanding of mathematical concepts, struggles with problem-solving, and a large number of topics covered in the curriculum.

Velez (2023) stated that the results of this study indicate that students experience a significant level of difficulty in grasping mathematical concepts. Among the most frequently reported challenges are interpreting problems, comprehending underlying principles, selecting appropriate methods of solution, formulating equations, and simplifying expressions which are all part of the mathematics curriculum.

Langoban (2020) identified three primary factors that contribute to students' difficulties in learning mathematics: the effectiveness of instructional delivery and curriculum implementation, the learners' individual capabilities and prior experiences, and the quality of the school environment and available learning resources.

According to Mazana et al. (2019), various factors influence students' mathematical learning and achievement, including their attitudes toward the subject, the instructional approaches employed by teachers, and the overall quality of the school learning environment.

Constructing a Table of Specifications

Teachers added that constructing a table of specifications has been a problem for them. It limits their span in constructing an effective and efficient assessment tool.

Teacher C expressed: "Constructing a table of specification is one of my problems".

Teacher D said: Due to many school activities, I have limited time sometimes meeting my students. The topics I discussed are only few. It is a challenge for me then to create table of specifications".

This reveals that constructing a Table of Specification (TOS) creates a significant challenge for mathematics teachers, particularly in schools where instructional time is hampered by numerous institutional activities. Teachers reported that limited classroom contact and the reduced number of topics covered due to time constraints hinder their ability to create a comprehensive and accurate TOS. As a result, aligning assessment content with instructional coverage becomes difficult, potentially affecting the validity and fairness of student evaluations.

Alade and Igbinosa (2014) emphasized that a frequent mismatch exists between the instructional content delivered during lessons and the material included in unit assessments. This lack of alignment often results in evaluations that do not yield reliable evidence for teachers to make accurate judgments about students' academic performance.

Notar et al. (2004) supported this view by highlighting that poorly constructed tables of specification can create problems across content areas and contribute to issues concerning content validity.

According to Downing (2006), assessment plays a critical role within the educational curriculum, serving as a means to track learners' progress about the intended learning outcomes.

Difficulty in Selecting What Type of Assessment Should be Used

Difficulty in selecting the type of assessment to use has been a struggle for mathematics teachers.

Teacher B mentioned: "Difficulty in choosing the type of assessment to be used, and I am using the easiest type to answer, like multiple choice and matching type." Teacher D expressed: "The low level of mastery in mathematics among learners is a factor in constructing assessment tool because they can't even answer easy type of exam".

The finding provides that mathematics teachers face considerable difficulty in determining the most appropriate types of assessment to use in their classrooms. This challenge is largely influenced by students' low levels of mathematical proficiency, which

allows teachers to rely on simpler formats such as multiple-choice and matching-type items. While these formats may be easier for students to engage with, they often fall short in effectively measuring deeper understanding and higher-order thinking skills. The limited mastery of basic concepts among learners not only restricts the complexity of assessments that can be administered but also impacts the validity of evaluating true learning outcomes.

Garavalia (2008) emphasized that several factors must be taken into account when designing effective assessments, including students' characteristics, limited resources such as time and class size, and the availability of assessment expertise to support faculty. Choosing the most appropriate assessment type, be it formative, summative, diagnostic, or performance-based, poses a significant challenge. Given the diversity of student learning needs, educators often face uncertainty regarding which assessment method best aligns with the intended learning outcomes. This challenge is further intensified by time constraints and limited institutional support, adding complexity to the assessment design process.

Mager (1984) asserted that assessment tasks must be aligned with both the instructional content and the behavioral expectations outlined in the learning objectives. This alignment is essential and should be given significant emphasis in the assessment process.

Considerations Made by Mathematics Teachers in Constructing Assessment Tools

Mathematics teachers takes many considerations in creating an assessment tool. Their responses is divided into three (3) sub-themes. (1) Level of Understanding of Learners, (2) Topics Covered, (3) Types of Assessment Tools to be Used.

The level of students' understanding is one of the considerations of teachers in designing assessment tools.

Teacher A said: "I consider students' level of understanding. I consider this because it helps me decide what type of assessment should I use."

Teacher C added: "students understanding on lesson presented helps me decide on what assessment tool to use".

Teacher D: "How students perform in mathematics is one of my considerations in doing the assessment tool".

Mathematics teachers also mentioned that the topics covered and taught were considered by mathematics teachers in creating the assessment tool.

Teacher A said: "Topics covered. For example, in the first quarter, all competencies required in MELCs are met, but during the second to fourth quarter, some topics can not be touched anymore".

Teacher B expressed: "Some topics cannot be discussed due to time constraints and this affect me in constructing an assessment tool."

Teacher C mentioned: "Topics covered. In making examinations for example, you will align it to the topics you have covered and taught."

Mathematics teachers also mentioned that they consider types of assessment tools to be used.

Teacher A said: "Types of assessment to be used (Multiple Choice, Matching Type, Problem Solving, etc)".

Teacher B expressed: "I always consider the type of assessment. I make sure that the type of assessment measures the multiple intelligences of the learners".

Teacher D: "I consider the type of assessment that I will be using. Not considering proper assessment can limit the skills and potential of learners."

Students' level of understanding plays a crucial role in how mathematics teachers design their assessment tools. Teachers consistently reported that learners' performance and acquiring of mathematical concepts directly influence the selection of assessment types. By considering students' cognitive readiness and classroom performance, educators aim to ensure that assessment tasks are appropriate, fair, and aligned with learners' current capabilities. Moreover, the scope of topics actually taught in class significantly influences how mathematics teachers construct their assessment tools. Teachers emphasized that while alignment with the Most Essential Learning Competencies (MELCs) is ideal, time limitations and instructional constraints often prevent full coverage of the prescribed content. As a result, assessments are frequently based only on the topics that were addressed during instruction. In addition, mathematics teachers give careful consideration to the type of assessment tools they employ, recognizing their impact on accurately measuring student learning and potential. Teachers

reported that selecting appropriate assessment formats, such as multiple choice, matching type, or problem-solving tasks, is essential to addressing the diverse learning styles and multiple intelligences of their students.

Heuvel (1994) emphasized that assessment tasks should offer meaningful and valuable learning experiences that are accessible to all students.

According to Thompson and Kaur (2011), such tasks should guide instructional practices and influence the design of classroom activities.

Burkhart and Swan (2013) further noted that tasks designed to reveal students' cognitive processes are typically more complex and time-consuming than standard formats, such as multiple-choice questions, due to their demand for deeper cognitive engagement. Consequently, varying types of assessment tasks yield different forms of evidence about students' conceptual understanding.

Level of Alignment of Assessment to the Curriculum

Mathematics teachers were asked on the level of alignment to the Most Essential Learning Competencies.

Teacher A mentioned: "Teacher A: First Quarter, 100% alignment to the MELC. 2nd quarter to 4th quarter, from moderate alignment to very low alignment, because of the many school activities."

Teacher B expressed: " During 1st quarter, 100% but in the 2nd to 4th quarter cannot be aligned properly to the MELC because of my ancillary functions like ICT Coordinator, School Planning Corrdinator and School Research Coordinator."

Teacher D: "100% for 1st quarter. 2nd quarter, 60%. 3rd quarter 40% and 4th quarter 20%."

Table I. *Alignment to MELC of Grade 7 Summative Assessments*

Quarter	Percentage of Alignment
1	100
2	70
3	50
4	30
Overall Alignment	62.5

Table II. *Alignment to MELCs of Grade 8 Summative Assessments*

Quarter	Percentage of Alignment
1	100
2	60
3	40
4	30
Overall Alignment	57.5

Table III. *Alignment to MELCs of Grade 9 Summative Assessments*

Quarter		Percentage of Alignment
1	1	100
2	2	75
3	3	50
4	4	40
Overall Alignment		66.25

Table IV. *Alignment to MELCs of Grade 10 Summative Assessments*

Quarter	Percentage of Alignment
1	100
2	80
3	50
4	20
Overall Alignment	62.5

This study reveals a declining trend in the alignment of assessment tools with the Most Essential Learning Competencies (MELCs) across the academic quarters. Teachers reported achieving full alignment during the first quarter; however, subsequent quarters showed a significant decrease in alignment levels. This decline was primarily attributed to competing demands on teachers' time, including numerous school-related responsibilities and ancillary functions such as coordinating ICT, research, and school planning. These competing duties limited instructional time and hindered the thorough implementation of the curriculum.

About curriculum implementation, Nizeyimana and Muthukrishna (2003) found that educators often adopt ineffective and unsound instructional practices, which may hinder the achievement of intended educational goals.

As noted by Fan and Zhu (2007) and Lazakidou et al. (2007), it is essential for mathematics educators to focus on enhancing students' higher-order thinking skills, promoting self-reflection and self-regulation, and utilizing diverse instructional and assessment strategies that support the development of problem-solving competencies. It can by aligning the developed assessment tools to the implemented curriculum.

Bases of Mathematics Teachers in Constructing Assessment

Mathematics Teachers responded when asked on their basis of constructing assessments. Their responses were grouped into three (3) sub-themes. (1) Table of Specification, (2) Level of Understanding of Students, and (3) Topics Discussed. Table of specifications is considered a vital basis of mathematics teachers in doing assessment.

Teacher A expressed: "I consider the Table of Specification as a basis in constructing assessment. The content of my assessment will be based on the topics covered and the number of hours spent in discussing those topics."

Teacher C mentioned: "Table of Specification is an integral thing to consider in constructing assessment".

Level of understanding of learners is also a basis for mathematics teachers in constructing assessment.

Teacher A mentioned: "Level of mastery of learners. It is crucial to level the type of assessment we develop to the level of learners so that we can assess what we want to assess."

Teacher B said: "Understanding of students towards mathematical concepts." Also, topics discussed are considered bases of mathematics teachers in constructing assessment tools.

Teacher B expressed: "Topics discussed."

Teacher C said: "Lessons which are discussed to the class".

Teacher D added; " The topics that I taught to my students".

This demonstrates that mathematics teachers draw on multiple foundational elements when constructing assessment tools. The Table of Specification emerged as a central framework, guiding teachers in aligning assessment items with instructional time and content coverage. Additionally, the level of student comprehension was highlighted as a critical factor, as teachers aim to ensure that assessments are appropriate to students' cognitive readiness and capable of accurately measuring intended learning outcomes.

Research has demonstrated that meaningful learning is more likely to occur when students have a clear understanding of assessment tasks and their relevance to their own academic development (Schaffner et al., 2000). When learners are actively engaged in the cycle of instruction, assessment, and evaluation, the validity of the assessment process is enhanced (Steinberg, 2000).

Therefore, educators are encouraged to involve students in decisions related to classroom assessment, clearly communicating the purposes, formats, and expectations of assessment tasks (Dorman & Knightley, 2006; Gao, 2012).

Additionally, it is essential that students are made aware of the intended learning outcomes that these assessments are designed to measure (Biggs & Tang, 2009; Spady, 1994; Killen, 2000; Dagdag & Cardona, 2018).

IV. CONCLUSIONS

Instructional Demands Undermine Assessment Alignment.

The study reveals that alignment of assessment tasks with the Most Essential Learning Competencies (MELCs) is significantly compromised by competing

institutional demands. Teachers reported a steady decline in alignment from the first to the final academic quarters, primarily due to time constraints brought on by ancillary duties and school-related obligations. This indicates a systemic issue within the educational framework, where instructional priorities are often displaced by administrative responsibilities, leading to misalignment between curriculum delivery and assessment practices.

Student Comprehension Levels Hinder Assessment Quality

A critical insight from the study is the strong influence of students' mathematical understanding on assessment design. Teachers consistently noted that low levels of student comprehension hinder their ability to construct assessments that are both challenging and reflective of intended learning outcomes. Consequently, assessments are often simplified to accommodate students' limited mastery, which compromises the potential to gauge higher-order thinking and concept application.

Limitations in Assessment Variety Due to Learner Readiness

The selection of assessment types is heavily influenced by perceived student readiness. Teachers expressed reliance on simpler assessment formats such as multiple-choice and matching-type questions due to the low proficiency levels of learners. While such formats may offer accessibility, they restrict opportunities to assess deeper conceptual knowledge.

Table of Specification as a Structuring but Challenging Tool

The Table of Specification (TOS) is viewed by teachers as an essential framework in ensuring content validity and instructional alignment. However, time constraints and limited coverage of topics due to school-related activities inhibit the construction of comprehensive TOS documents. This highlights a need for capacity building support and structured time allocation that would allow teachers to systematically plan and implement assessments grounded in the TOS model.

Considerations Shape Assessment Practices

The study concludes that mathematics teachers rely on a combination of factors when designing assessment tools, including the Table of Specification, student comprehension levels, and the actual topics covered in instruction. This multidimensional approach reflects an adaptive response to real classroom conditions, where ideal alignment with MELCs is often compromised by contextual limitations. To enhance assessment effectiveness, institutional frameworks must support both curriculum fidelity and responsive teaching practices that consider learners' needs and realities.

V. RECOMMENDATIONS

To address the issue of declining alignment with the Most Essential Learning Competencies (MELCs), it is recommended that the Department of Education institutionalize designated periods within the school calendar exclusively for instructional and assessment planning.

Given the influence of students' comprehension levels on assessment quality, schools should develop structured remedial and enrichment programs in mathematics. These interventions should be tailored to address foundational skill gaps and support differentiated instruction. Strengthening students' conceptual understanding will allow for the design of assessments that evaluate not only recall but also analytical and problem-solving skills.

In response to challenges in constructing comprehensive TOS documents, the Department of Education and school leadership should provide ongoing training on effective TOS development. Additionally, institutional policies should ensure that sufficient preparation time is embedded within teachers' schedules to support thoughtful alignment between instructional content and assessment items.

Finally, it is recommended that educational leaders adopt a holistic framework that supports context-sensitive assessment practices. This includes considering not only curriculum standards but also classroom realities such as time limitations, student diversity, and instructional coverage. Encouraging teacher autonomy within a structured system can result in more meaningful assessments that reflect both intended learning outcomes and actual student experiences.

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