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Research paper

Mathematics Assessment Framework for Junior High Schools in The Province of Batangas

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Abstract

This research evaluated the classroom assessment practices based on the National Council of Teachers of Mathematics (NCTM) stan-dards as the basis for designing mathematics assessment framework for junior high school (JHS). Specifically, this study aimed to describe the characteristics of the respondents; evaluated the mathematics assessment practices of teachers and determined the manifestation of the mathematics assessment purposes. It also identified the significant difference in the evaluation of mathematics assessment when grouped according to the respondent's characteristics and the significant relationship between the evaluation of mathematics assessment and its purpose. The exploratory method of research was utilized through questionnaires. The respondents of this study are the 289 JHS mathematics teachers in the province of Batangas which were selected using stratified proportional random sampling. The study revealed that most of them are new in the teaching profession, have baccalaureate degree, have only 1 to 3 relevant trainings in the past 3 years and in their maturing stage in using technology. Moreover, their assessment practices adhere to the NCTM standards. Additionally, there is a moderate extent of manifestation of the mathematics assessment purpose relative to evaluating mathematics curriculum, making instructional decisions, evaluating student's achievement, and monitoring student's progress. Furthermore, significant differences in the evaluation of mathematics assessment with reference to NCTM standards when grouped according to the respondents' characteristics varies. Likewise, there are significant strong positive relationships between the evaluation of mathematics assessment and its purpose. The designed framework aims to meet the purpose of classroom assessment and develop mathematically literate students.

Keywords: *Assessment Framework; Assessment Practices; Junior High School; Mathematics Assessment; NCTM Standards.*

1. Introduction

Quality education stimulates the growth and development of an individual. It shapes one's future as it opens varied opportunities for advancement. Through this, a person's attributes and skills can be developed into their maximum potential. Teachers play an important role in meeting this goal. They are expected to comprehend the subject matter deeply and flexibly so they can help students find ways to explore ideas, acquire and synthesize new information, and frame and solve recurring problems. Hence, they should be able to engage the learners on how to think, focus on higher order thinking skills, make decisions, and be able to apply concepts into real life situations. Moreover, they acknowledge the importance of a carefully organized system for assessing students' learning.

Assessment is a critical component of the educational system. The basic assessment procedures in dealing with the K to 12 learning competencies, most essential competencies, and enabling and enrichment competencies should comply with the provisions of DepEd Order No. 8, s. 2015 or the Policy Guidelines on Classroom Assessment for the K to 12 Basic Education Program. Although assessment is done for a variety of reasons, its main goals are to make instructional decisions, monitor student's progress, evaluate student's achievement, and evaluate the curriculum. Amidst the COVID-19 pandemic, the assessment still plays a great role in the continuity of education.

Learners are assessed through various processes and measures appropriate to and congruent with learning competencies defined in the K to 12 curriculum. Alarmingly, several students receive passing marks on the subject but are lacking the knowledge and skills needed to continue learning the course. Moreover, based on the assessment tools used, the average number of students reflected good performance which contrasts with the National Achievement Test (NAT) and Programme for International Student Assessment (PISA) results. National and international assessments show that the Philippines has poor markings in the subject. As such, international standards must be looked into as the basis in assessing the student's performance in mathematics. This is to allow teachers and students to adjust and be able to cope up with the standard on a global scale.

Interestingly, the National Council of Teachers of Mathematics (NCTM) is the world's largest mathematics education organization. It provides assessment strategies and practices to enable teachers and others to assess students' performance in a manner that reflects the ability of every student to achieve high potential and offers teachers the opportunity to be fair and consistent judges of diverse student performances. NCTM recognized and published the assessment standards. These are the learning standard, equity standard, openness

standard, inferences standard, coherence standard and mathematics standard. It is the aim of the council to ensure that the learning goals are met through comprehensible assessments.

To meet the objective of delivering comprehensible assessments, an assessment framework can be materialized. According to Pearce, J. et al. (2015), an assessment framework details how an assessment is to be operationalized. It provides a structured conceptual map of the learning outcomes of a programme of study. Moreover, it describes how the various design factors should be balanced across the assessment. Having an assessment framework may provide solution to the gap between the assessment and its result.

Being aware of the learning standards of the K to 12 curriculum, the lack of external confidence on internal assessments, the assessment standards set by the NCTM, the purposes of assessment, and the importance of assessment framework, it is the goal of the researcher to design a framework for classroom assessment in Junior High School mathematics. The difficulty of students to show mastery on the subject despite having a passing grade, the historical result of NAT and the result of PISA 2018 prompt the researcher to develop a framework anchored to the global standards set by the world's largest mathematics organization. The improvement in classroom assessment will make a strong contribution to the improvement of learning.

This study aimed to evaluate the classroom assessment of junior high school mathematics teachers based on the National Council of Teachers of Mathematics (NCTM) standards as a basis for designing a mathematics assessment framework for junior high schools in the province of Batangas. Specifically, it aimed to describe the characteristics of the teacher-respondents in terms of years in service, highest educational attainment, number of relevant training, and technology preparedness; evaluate the mathematics assessment practices of teachers with reference to the NCTM standards; determine the extent of manifestation of the mathematics assessment purposes relative to evaluating mathematics curriculum, making instructional decisions, evaluating student's achievement, and monitoring student's progress; identify if there is significant difference in the evaluation of mathematics assessment when grouped according to the respondents' characteristics; ascertain if there is significant relationship between the evaluation of mathematics assessment based on the NCTM standards and the purposes of assessment; and design a mathematics assessment framework for junior high schools.

2. Literature Review

The quality of learning is greatly influenced by the quality of teaching. Therefore, it is imperative to hire good teachers and support their development in the teaching profession [7]. Teachers should use appropriate assessment to establish and successfully provide quality mathematics education for all. This includes their carrying out good assessment practices [4]. They should use appropriate assessments to establish and successfully provide quality mathematics education for all. Santiago et. al. [16] reiterated that countries may strengthen teachers' assessment roles since teachers are able to observe students' progress toward the full range of goals set out in standards and curriculum over time and in a variety of contexts. Their assessments help to increase validity and reliability of summative assessments. It is important that teachers are seen as the main experts not only in instructing but also in assessing their students, so teachers feel the ownership of student assessment and accept it as an integral part of teaching and learning. Extra approaches include supporting teachers in their daily practice through clear student goals and grading criteria and building capacity through adequate training on assessment literacy. These strategies mostly build on teacher professionalism.

As stipulated in DepEd Order No. 8, s. 2015 [6], classroom assessment is a joint process that involves both teachers and learners. It is an integral part of teaching and learning. Teachers provide appropriate assessment when they aim to holistically measure the learner's current and developing abilities while enabling them to take responsibility in the process. This view recognizes the diversity of learners inside the classroom, the need for multiple ways of measuring their varying abilities and learning potential, and the role of learners as co-participants in the assessment process. Appropriate assessment is committed to ensure learner's success in moving from guided to independent display of knowledge, understanding and skills and to enable them to transfer this successfully in future situations. DepEd Order 21, s. 2019 [7] emphasizes that classroom-based assessment is composed of formative and summative assessments administered by teachers. Assessment monitors learning and ascertains where the child is at – vital information that will advise teachers and parents of the child's progress. It is crucial in identifying the child's total developmental needs. It is best conducted on a regular basis so that timely response or intervention can be made to improve learning.

Assessment is a vital element in the curriculum development process [5]. It is needed for continued improvement and accountability in all aspects of the education system. Administrators and school planners use assessment to identify strengths and weaknesses of the program. They designate program priorities, assess options, and lay down plans for improvement. Furthermore, assessment informs instructional practice. It reveals which teaching methods and approaches are most effective. They provide direction as to how teachers can help students more and what teachers should do next. It also provides information about the students' achievements which in turn reflect the quality of education. The data gathered from assessment are used to make decisions regarding promotion or retention of students.

Classroom assessments can influence the course of instruction for both teachers and learners [10]. While these assessments can play an important role in promotion to the next grade, they are rarely used for high-stakes decisions such as admission to the next level of the education system. Such a type of assessment can have great potential in accelerating learning for all learners. Other decisions, like program assessment, need to be made on a shared basis at the national and institutional level. The prime concern is the evaluation of an overall academic program. As posited by Suskie [17], effective assessment practices yield reasonably accurate and truthful evidence of student learning. Using a variety of assessments acknowledges the variety of experiences that students have. Nevertheless, most of the teachers now still use some of the traditional assessments or the pen and paper tests. Sample traditional assessments used in algebra are in the form of a quiz, exercise, homework, seatwork, and the like. They also used the common type of test, which are multiple choice, identification, fill in the blanks, and problem solving. This is happening in spite of the fact that teachers had the technical skills needed for teaching while using technology [2]. Therefore, Ozan and Kincal [14] inferred that school-based in-service training seminars or lessons should also be organized so that formative assessment practices can be widely used.

National Council of Teachers of Mathematics (NCTM) [12] is factual in stating that a strong foundation in mathematics, for each and every student, is vital to the nation's economic stability, national security, workforce productivity, and full participation in democratic society. NCTM recognized and published assessment standards such as learning standard, equity standard, openness standard, inferences standard, coherence standard and mathematics standard. This serves as the basis for the development of the mathematics assessment framework. According to Pearce, J. et. al. [15], assessment frameworks provide a structured conceptual map of the learning outcomes of a programme of study. Where curriculum frameworks detail what is to be taught, assessment frameworks detail what is to be assessed as evidence of learning described by the requisite curriculum content. Built into an assessment framework are assessment concepts and their definitions, along with theoretical assumptions that allow others to relate to the framework and potentially adapt it to other domains of assessment.

Further, an assessment framework details how an assessment is to be operationalized. It combines theory and practice and explains both what and how.

3. Methodology

3.1. Study design

This study utilized the descriptive correlational research (exploratory) design. Fraenkel and Wallen [9] state that this design is effective for investigating the extent to which variations in one factor correspond with variations in another, without manipulating the environment. In this study, the descriptive phase was used to evaluate the classroom practices based on the National Council of Teachers of Mathematics (NCTM) standards, while the correlational phase determined the statistical relationship between the evaluation of mathematics assessment practices of the teachers and its manifestation on the mathematics assessment purposes to develop the proposed framework.

3.2. Participants of the study

Based on the existing records of the division offices in the province of Batangas for SY 2021-2022 The population of Junior High School mathematics teachers in the public schools in the province is 1149. To get the sample size of 289, the Raosoft calculator at 5% margin of error was used. The respondents were 189 teachers from the Division of Batangas province, 38 from the Division of Batangas City, 38 from the Division of Lipa City, and 24 from the Division of Tanauan City. The sample size for each subgroup was proportional to its size within the population.

3.3. Research instrument

A researcher-made questionnaire was designed to meet the objectives of this study. This was carefully developed to ensure that the results were valid and reliable. It has three parts: the characteristics of the respondents, the evaluation of the mathematics assessment practices of teachers with reference to NCTM standards, and the extent of manifestation of mathematics assessment purpose. The draft of the questionnaire was presented to the experts in the field. They gave suggestions for further revisions and improvements. The revised draft was sent to the validators for approval. Three external validators were added to the internal panel. Physical and online consultations were made. For the technological preparedness of teachers, a standardized test was recommended. A checklist assessing technological readiness was adopted. A 3-scale questionnaire adopted from a standardized checklist for assessing technological readiness was used to reveal the technological preparedness of the Junior High School teachers in the province of Batangas. The scale is categorized as developing, maturing and advanced since that is the scale commonly used in schools.
A dry run was conducted to 25 junior high school mathematics teachers who were not part of this study. The respondents in the pilot testing came from the province of Quezon and Laguna. Cronbach's alpha was utilized in determining the reliability of the items in the questionnaire. Overall Cronbach's alpha of 0.974 shows that the items in the questionnaire are excellent. Only one of the items in inferences standards was removed.

3.4. Data collection procedure

The researcher gathered information from books, unpublished and published thesis, journals, DepEd Orders and online materials about education, mathematics, mathematics assessment, NCTM standards and assessment framework. The final draft of the questionnaire was converted to google form. This was administered to the target respondents. Furthermore, unstructured interview was conducted to substantiate the interpretation of the study. It is used to confirm or negate the results of this research and clarify certain points in this study.

3.5. Statistical treatment

The statistical treatments used in this study are frequency, percentage, weighted mean, analysis of variance, and Pearson's r. It was through the use of these different statistical approaches that the data collected have been crystallized into meaningful information.

4. Results and Discussion

After the analysis of data, the researcher arrived at the following findings:

4.1. Characteristics of junior high school mathematics teachers

This section describes the characteristics of the respondents in terms of years in the service, highest educational attainment, number of relevant training and technological preparedness.

4.1.1. Years in the service

One of the characteristics of junior high school mathematics teachers that this study focused on is the years in the service which is presented in table 1. Majority of 289 teachers or 33.2% are in the service for 1 to 5 years, 87 teachers or 30.1% of the respondents are teaching for 6 to 10 years, 34 teachers or 11.8% of the respondents are in the service for 11 to 15 years, 17 or 5.9% are teaching for about 16 to 20 years and 55 or 19% are already in the service for more than 20 years. It can be noted in the findings that most of the Junior High School mathematics teachers are somehow new in the teaching profession. It is also noticeable that a great number of mathematics teachers are still active in the service for more than 20 years. Their exposure in the different forms of assessment shaped their assessment practices.

Table 1: Distribution of Respondents in Terms of Their Years in the Service

Years in Service	Frequency	Percentage
5 years & below	96	33.2
6 to 10 years	87	30.1
11 to 15 years	34	11.8
16 to 20 years	17	5.9
More than 20 years	55	19.0
Total	289	100

4.1.2. Highest educational attainment

As another variable in the present study, frequency and percentage distribution of the respondents when grouped according to highest educational attainment is shown in table 3. Out of 289 teachers, there are only 4 teachers who are doctorate degree holders, 111 teachers or 38.4% of the respondents are master's degree holders, and 174 teachers or 60.2% are baccalaureate degree holders. It is good to note that at present, most of them are pursuing master's degrees which means that they strive to continue further studies for their professional development. The doctor-respondents of this study are also proof of the teachers' drive to grow in their profession and contribute more to the field.

Table 2: Distribution of Respondents in Terms of Their Highest Educational Attainment

Highest Educational Attainment	Frequency	Percentage
Doctorate Degree	4	1.4
Master's Degree	111	38.4
Baccalaureate Degree	174	60.2
Total	289	100

4.1.3. Number of relevant trainings

The profile of the respondents in terms of the number of relevant trainings attended is presented in table 3. Majority of the respondents have only 1 to 3 relevant trainings in the past 3 years having 57.1% of the respondents or 165 teachers, 58.1 or 168 teachers, 69.9% or 202 teachers and 43.9% or 127 teachers attended trainings/seminars about mathematics curriculum, instruction, assessment, and research related to mathematics education, respectively. These facts are alarming. It can also be deduced that the trainings in the past 3 years are not centered in the four categories. Topics on training must be reconsidered to attain balance in the educational system.

Table 3: Distribution of Respondents in Terms of Their Number of Relevant Trainings

No. of Training	Math Curriculum		Instruction		Assessment		Research	
	f	%	f	%	f	%	f	%
None	54	18.7	26	9.0	10	10.4	142	49.1
1 to 3	165	57.1	168	58.1	202	69.9	127	43.9
4 to 9	44	18.7	69	23.9	46	15.9	15	5.2
More than 9	16	5.5	26	9.0	11	3.8	5	1.7
Total	289	100	289	100	289	100	289	100

4.1.4. Technology preparedness

The junior high school mathematics teachers are expected to be technologically prepared. Table 4 and 5 display the distribution of respondents in terms of their technology preparedness and their assessment on their level of preparedness in using technology and online platforms in education.

The indicators are divided into basics, file management, presentations, multimedia and social media, asynchronous platform, and synchronous platform. An overall mean of 1.99 indicates that the Junior High School Mathematics teachers are in their maturing stage in using technology. A composite mean of 2.08, 2.33, 2.15, 2.06, 1.90 and 1.82 shows that the respondents are in their maturing stage on the basics category, file management, presentations, multimedia and social media, asynchronous platforms, synchronous platform category, respectively. This reflects that teachers integrate technology in enriching their lessons. They already have prior knowledge and skills about ICT but there's still room for improvement.

Moreover, 177 respondents or 61.2% are in their maturing stage in being computer literate and skilled in keyboarding, 175 or 60.6% are also in their maturing stage in managing calendar and timed assignments, 170 or 58.8% are also in their maturing stage in designing and editing course modules. On the other hand, 157 or 54.3% of the respondents are in their developing stage in using TurnItIn and SpeedGrader and 154 or 53.3% are also in their developing stage in tracking student's progress with Gradebook features. Conversely, 136 or 47% of the respondents are in their advanced stage in using email. This knowledge is now fundamental for teachers since most of the learning materials provided by the DepEd can be accessed through DepEd Commons.

Additional information and learning materials can also be found in different educational websites like Edmodo. Likewise, some of the teachers' reports are now handled through the internet. Professional transactions such as transferring of students' records can be initially done through email while waiting for the air mail of files.

Table 4: Assessment on the Level of Technology Preparedness of the Respondents

Indicators	WM	VI
Basics	2.08	Maturing
File Management	2.33	Maturing
Presentations	2.15	Maturing
Multimedia and Social Media	2.06	Maturing
Asynchronous Platform	1.90	Maturing
Synchronous Platform	1.82	Maturing
OVERALL MEAN	1.99	Maturing

Table 5: Distribution of Respondents in Terms of Their Technology Preparedness

Indicators	Developing		Maturing		Advanced	
	f	%	f	%	f	%
Basics						
1. Computer literate and skilled in keyboarding.	43	14.9	177	61.2	69	23.9
2. Comfortable in Mac or PC environment.	64	22.2	166	57.4	59	20.4
3. Able to record audio.	55	19.0	139	48.1	95	32.9
4. Familiar with Email (reply/reply to all, attach documents).	31	10.8	122	42.2	136	47.0
5. Easy access to different internet browsers (Google Chrome, Mozilla Firefox, Internet Explorer, Safari).	44	15.2	148	51.2	97	33.6
File Management						
6. Capable in creating, uploading and organizing files.	40	13.8	125	43.3	124	42.9
7. Able to manage file formats and versions (.doc, .docx, .jpeg, .pdf, .wav, etc.)	48	16.6	126	43.6	115	39.8
Presentations						
8. Skilled in creating, editing and saving presentations (Power-Point, Prezi, Keynote, Adobe Presenter)	51	17.6	167	57.8	71	24.6
9. Good in adding multimedia and/or narration to presenta-tions.	66	22.8	156	54.0	67	23.2
Multimedia and Social Media						
10. Familiar with conferencing tools (Zoom, MS Teams, Google Meet, Google Hangouts, Skype)	43	14.9	168	58.1	78	27.0
11. Aware of social media (Facebook, Twitter, YouTube, blogs, etc.)	30	10.4	139	48.1	120	41.5
Asynchronous Platform						
12. Able to design and edit course modules (hide, lock/unlock, organize contents).	88	30.5	170	58.8	31	10.7
13. Capable of creating announcements, discussions, forums and content pages.	78	27.0	165	57.0	46	16.0
14. Good in managing calendar and timed assignments.	70	24.2	175	60.6	44	15.2
15. Skilled in creating assignments and quizzes.	66	22.8	160	55.4	63	21.8
16. Familiar in using TurnItIn and SpeedGrader.	157	54.3	119	41.2	13	4.5
17. Knowledgeable in tracking students' progress with GradeBook features.	154	53.3	121	41.9	14	4.8
Synchronous Platform						
18. Aware of different sections of the platform.	80	27.6	161	55.8	48	16.6
19. Able to share documents/desktop	46	15.9	159	55.0	84	29.1
20. Comfortable in working through concepts using a digital whiteboard.	108	37.4	151	52.2	30	10.4
21. Familiar with advanced tools (breakout rooms, polls, etc.)	106	36.7	148	51.2	35	12.1

4.2. Mathematics assessment practices of teachers with reference to NCTM standards

The respondents' evaluation on their mathematics assessment practices with reference to NCTM standards are presented here.

Table 6: Evaluation on Mathematics Assessment Practices of Teachers with Reference to NCTM Standards

NCTM Standards	Composite Mean		
	WM	SD	VI
1. Learning Standards	3.17	0.52	Practical
2. Equity Standards	3.16	0.50	Practical
3. Openness Standards	3.16	0.53	Practical
4. Inferences Standards	3.20	0.51	Practical
5. Coherence Standards	3.22	0.49	Practical
6. Mathematics Standards	3.28	0.61	Practical

WM-weighted mean, SD-standard deviation, VI-Verbal Interpretation.

The composite mean of 3.17 suggests that according to 289 respondents, the assessment practices of mathematics teachers adhere to learning standards. They observe assessment as an integral part to enhance mathematics learning. Mathematics teachers integrate assessment in the teaching-learning process with a weighted mean of 3.28 and a standard deviation of 0.61 and they give the students opportunity to realize that there are many right ways to solve a problem with a weighted mean of 3.27 and an SD of 0.28. The participants agreed that once students were given the chance to perform learning tasks or board exercises, they started figuring out how to apply the knowledge gained prior to the activities. Questions arose and answers were given. In return, vague information becomes clearer while assessment is conducted.

A composite mean of 3.16 indicates that mathematics teachers' assessment practices ensure that all students have access to a challenging mathematics assessment. Teacher's assessments enable students to feel free to do their best thinking because their ideas are valued with a weighted mean of 3.26 and an SD of 0.59. Additionally, their assessments encourage respect for diversity by using a wide variety of assessments and exhibit equality against students of particular backgrounds, socio-economic classes, ethnic groups, or gender with a weighted mean of 3.24 and an SD of 0.62. The individual differences of learners shall be considered not only in teaching but also in assessing. Students are provided opportunities to express themselves and show what they have learned. Some students cannot perform well in problem solving but are good in identifying the terms. Having different kinds of tests in an assessment will give the learners opportunities to recognize that they are still learning.

It can also be deduced that openness standards are evident in the assessment practices of mathematics teachers with a composite mean of 3.16. Their assessment practices are made public, participatory, and dynamic. Making the quality and correctness of questions and answers open for discussion and debate had the highest weighted mean which is 3.33 and an SD of 0.61. The learners must be heard. This will allow them to learn deeper and clarify ideas that are still vague to them. Inferences standards are evident in the assessment practices of mathematics teachers with a composite mean of 3.20. The assessment practices of mathematics teachers both show students' improvement and

reflect what the students learn with a weighted mean of 3.25 having an SD of 0.56 and 0.57, respectively. Also, according to the teacher respondents, their assessment practices report both failures and successes with a weighted mean of 3.24 and an SD of 0.54.

A composite mean of 3.22 signifies that the assessment practices of mathematics teachers emphasize the importance of ensuring that each assessment adheres to coherence standards. According to the respondents, their assessment practices are coherent to national and international assessment, consistently apply the grading criteria, and have phases that fit together with a weighted mean of 3.33 having an SD of 0.64.

Also, a composite mean of 3.13 reveals that according to 289 respondents, their assessments reflect the mathematics that all students need to know and be able to do. With a weighted mean of 3.25, the respondents agreed that the assessment practices of the respondents prioritize mathematical knowledge and skills that students will always remember, they put emphasis on deep and profound learning, and they have systematic grading procedures, having an SD of 0.54, 0.54, and 0.71, respectively.

4.3. Manifestation of mathematics assessment purposes

The extent of manifestation of mathematics assessment purposes relative to the four categories presented by the NCTM Assessment Standards for School Mathematics which are evaluating mathematics curriculum, making instructional decisions, evaluating students' achievement, and monitoring students' progress are discussed here.

4.3.1. Evaluating mathematics curriculum

Mathematics education program evaluation is done through assessment. Table 7 contains the manifestation of mathematics assessment purposes relative to evaluating mathematics curriculum.

Table 7: Manifestation of Mathematics Assessment Purposes Relative to Evaluating Mathematics Curriculum

Indicators	WM	SD	VI
1. Address the most essential learning competencies.	3.18	0.55	Moderate Extent
2. Assess the curricular content if it determines the student's readiness for the next grade level.	3.43	0.53	Moderate Extent
3. Demonstrate logical sequence of topics.	3.24	0.57	Moderate Extent
4. Determine whether the curricular program is adequately serving both the gifted and the low-achieving student.	3.25	0.55	Moderate Extent
5. Elicit some information on skills if the balance among topics is appropriate for the intended purpose.	3.20	0.53	Moderate Extent
6. Ensure that the full spectrum of mathematical content is addressed by incorporating a variety of assessment methods.	3.19	0.54	Moderate Extent
7. Explicitly articulate the content and performance standards.	3.17	0.56	Moderate Extent
8. Help focus on the skills/knowledge needed by students.	3.16	0.56	Moderate Extent
9. Make program decisions based on high-quality evidence from multiple sources.	3.29	0.54	Moderate Extent
10. Provide information about students' performance, along with other evidence, to judge the quality and success of the curriculum.	3.13	0.55	Moderate Extent
COMPOSITE MEAN	3.23	0.46	Moderate Extent

WM-weighted mean, SD-standard deviation, VI-Verbal Interpretation.

A composite mean of 3.23 indicates that there is a moderate extent of manifestation of mathematics assessment purposes relative to evaluating mathematics curriculum. According to the findings of the study, the teachers' assessment manifests the goal of assessing the curricular content in determining the student's readiness for the next grade level with a moderate extent having a weighted mean of 3.43 and an SD of 0.53.

4.3.2. Making instructional decisions

A composite mean of 3.22 indicates that this purpose is achieved to a moderate extent. The purpose of assessment to guide decisions about what knowledge and skills to teach next are manifested in a moderate extent with a weighted mean of 3.29 having an SD of 0.53. Likewise, as assessed by the respondents, their practices lead the teacher to construct immediate and future instructional activity, to a moderate extent with a weighted mean of 3.27 and an SD of 0.56.

Table 8: Manifestation of Mathematics Assessment Purposes Relative to Making Instructional Decisions

Indicators	WM	SD	VI
1. Allow the teacher to tailor instruction based on individual students' needs.	3.26	0.57	Moderate Extent
2. Direct plans of activities based on the new information gathered.	3.16	0.56	Moderate Extent
3. Enable the teacher to decide whether or not to change the instructional strategies, methods, or procedures.	3.15	0.55	Moderate Extent
4. Guide decisions about what knowledge and skills to teach next.	3.29	0.54	Moderate Extent
5. Identify instructional interventions that can help students continue to progress.	3.23	0.51	Moderate Extent
6. Identify the instructional strategies that work best in meeting the learning objectives.	3.18	0.56	Moderate Extent
7. Lead the teacher to construct immediate and future instructional activity.	3.27	0.56	Moderate Extent
8. Promote individualized instruction and use of different procedures and materials in teaching.	3.22	0.53	Moderate Extent
9. Provide evidence about the effectiveness of instruction or the need to develop instructional plans.	3.29	0.53	Moderate Extent
10. Provide relevant information concerning problem solving, reasoning, communication, mathematical connections, and use of tools and technology.	3.24	0.55	Moderate Extent
COMPOSITE MEAN	3.22	0.47	Moderate Extent

WM-weighted mean, SD-standard deviation, VI-Verbal Interpretation.

4.3.3. Evaluating student's achievement

Evaluating student's achievement is one of the purposes of assessment. The table below presents the manifestation of mathematics assessment purposes relative to this purpose. The results of this study showed that the assessment practices of teachers evaluate students' achievement to a moderate extent with a composite mean of 3.24 and an SD of 0.52. Having developed systematic grading procedures with a weighted mean of 3.34 and being able to gauge overall learning and identify learning gaps with a weighted mean of 3.33 and an SD of 0.53, are manifested to a moderate extent.

Table 9: Manifestation of Mathematics Assessment Purposes Relative to Evaluating Students' Achievement

Indicators	WM	SD	VI
1. Compare students' performance with specific performance criteria.	3.20	0.54	Moderate Extent
2. Conduct self-assessment to allow students to examine their own data and set learning goals.	3.22	0.52	Moderate Extent
3. Develop systematic grading procedures.	3.34	0.52	Moderate Extent
4. Enable the students to clarify and justify their ideas using a variety of assessment tools.	3.30	0.54	Moderate Extent
5. Gauge overall learning and identify learning gaps.	3.33	0.53	Moderate Extent
6. Give feedback that is descriptive, specific, relevant, timely, and encouraging.	3.24	0.54	Moderate Extent
7. Involve students in the process of collecting evidence about their skill development.	3.17	0.55	Moderate Extent
8. Provide opportunities for all students to demonstrate their knowledge, skills and understanding.	3.17	0.56	Moderate Extent
9. Reflect each student's level of mathematical understanding.	3.13	0.56	Moderate Extent
10. Use as a basis in making important decisions for students, such as admission, placement, or certification.	3.23	0.54	Moderate Extent
COMPOSITE MEAN	3.24	0.47	Moderate Extent

WM-weighted mean, SD-standard deviation, VI-Verbal Interpretation.

4.3.4. Monitoring student's progress

Monitoring student progress serves as the fourth purpose of assessment in this study. A composite mean of 3.24 reflects that this purpose is manifested to a moderate extent. Having a weighted mean of 3.30 and a standard deviation of 0.55, assessment practices reveal each student's need to have a deep understanding of students' personalities and abilities, and even insight into their learning styles. In addition, these assessment practices elicit students' knowledge and misconceptions and their prior knowledge on a topic with a weighted mean of 3.28 and an SD of 0.57.

Table 10: Manifestation of Mathematics Assessment Purposes Relative to Monitoring Students' Progress

Indicators	WM	SD	VI
1. Contain questions or tasks that elicit, engage, and challenge each student's thinking.	3.26	0.57	Moderate Extent
2. Determine whether students have mastered the learning objectives.	3.25	0.55	Moderate Extent
3. Determine which topics and skills students do and do not possess.	3.24	0.55	Moderate Extent
4. Determine the strengths and needs of students	3.26	0.54	Moderate Extent
5. Elicit students' knowledge and misconceptions and their prior knowledge on a topic.	3.28	0.57	Moderate Extent
6. Inform audiences beyond the classroom walls about the performance of individual students or groups of students.	3.26	0.57	Moderate Extent
7. Reveal each student's need to have a deep understanding of students' personalities and abilities, and even insight into their learning styles.	3.30	0.55	Moderate Extent
8. Screen all students to ensure early identification of students needing extra assistance.	3.21	0.56	Moderate Extent
9. Summarize student's gained knowledge and skills.	3.21	0.56	Moderate Extent
10. Use assessment results to ensure that all students have the opportunity to achieve their potential.	3.21	0.56	Moderate Extent
COMPOSITE MEAN	3.24	0.50	Moderate Extent

WM-weighted mean, SD-standard deviation, VI-Verbal Interpretation.

4.4. Difference in the evaluation of mathematics assessment when grouped according to the respondent's profile

Significant difference in the evaluation of mathematics assessment practices of teachers with reference to NCTM standards when grouped according to the respondents' profile is shown here.

It was revealed in the study that there is a significant difference in the evaluation of mathematics assessment with reference to learning and inference standards when grouped according to their years in service having computed F–values of 3.351 and 2.483 with a p-value of .011 and .044 (<.05), respectively. However, there is no significant difference in the evaluation of mathematics assessment practices of teachers with reference to NCTM standards when the respondents are grouped according to highest educational attainment having computed F–values of 1.39, 1.539, 1.131, 0.700, 2.457 and 0.662 with a p-value of .251, .216, .324, .498, .087 and .517 (>.05), respectively.

In addition, computed F–values of 3.55 and 3.000 with a p-value of .015 and .031 (<.05), respectively indicates that there is a significant difference in the evaluation of mathematics assessment with reference to learning and openness standards when grouped according to number of relevant trainings about mathematics curriculum. Between the two standards, it is only the learning standards that appear to be significant with a p-value of 0.35. A mean difference of 0.23818 in the evaluation of mathematics assessment relative to learning between respondents with only 1 to 3 trainings and 4 to 9 trainings, through pairwise comparison, indicates that trainings do make a significant difference.

On the other hand, the computed F–values of 3.786, 3.489, 2.771 and 3.005 with a p-value of .011, .016, .042 and .031 (<.05), respectively indicates that there is a significant difference in the evaluation of mathematics assessment with reference to learning, equity, openness, and mathematics standards when grouped according to number of relevant trainings about instruction. With a p-value of .36, only the learning standards appear to be significant among the standards for learning, equity, openness, and mathematics. Trainings on instructions do make a significant difference, as shown by the mean difference of 0.31859 in the evaluation of mathematics assessment relative to learning between respondents with only 1 to 3 trainings and more than 9 trainings through pairwise comparison.

Moreover, the computed F–values of 3.662, 3.094, 4.169, 2.968 and 4.904 with a p-value of .013, .027, .007, .032 and .002 (<.05), respectively indicates that there is a significant difference in the evaluation of mathematics assessment with reference to learning, equity, openness,

coherence, and mathematics when grouped according to their number of relevant trainings about assessment. Only the mathematics standards appear to be significant, with a p-value of .32, when compared to the other standards. The mean difference of 0.22891 in the evaluation of mathematics assessment relative to mathematics standards among respondents who have only 1 to 3 trainings and 4 to 9 trainings through pairwise comparison indicates that trainings on assessment make a substantial difference.

Nevertheless, no significant differences were noted in the evaluation of mathematics assessment practices when the respondents are grouped according to the number of relevant trainings about research related to mathematics education. Lastly, the computed F–values of 40.533, 30.198, 27.861, 27.479, 20.142 and 29.79 with a p-value of <.001, <.001, <.001, <.001, <.001 and <.001 (<.05), respectively indicates that there is a significant difference in the evaluation of mathematics assessment with reference to learning, equity, openness, inference, coherence, and mathematics standards when grouped according to teachers' technology preparedness. All the assessment standards set by the NCTM appear to have significant difference using pairwise comparison among the developing, maturing, and advanced stages of using technology.

4.5. Relationship between the evaluation of mathematics assessment based on the NCTM standards and the purpose of assessment

The significant relationship between the evaluation of mathematics assessment based on the NCTM standards and the purpose of assessment is described here.

Significant relationship between the evaluation of mathematics assessment based on the NCTM standards and the purpose of assessment in evaluating the mathematics curriculum is revealed through the computed r–values of 0.583, 0.574, 0.619, 0.649, 0.631 and 0.599 with a p-value of <.001, <.001, <.001, <.001, <.001 and <.001 (<.05), respectively. Similarly, the computed r–values of 0.565, 0.580, 0.648, 0.629, 0.603 and 0.592 with a p-value of <.001, <.001, <.001, <.001, <.001 and <.001 (<.05), respectively indicates that there is a strong positive relationship between the evaluation on the mathematics assessment practices of teachers with reference to learning, equity, openness, coherence, inference and mathematics standards and the extent of manifestation of the mathematics assessment purpose relative to making instructional decisions.

Also, there is a significant relationship between the evaluation of mathematics assessment based on the NCTM standards and the purpose of assessment in evaluating students' achievement having computed r–values of 0.582, 0.571, 0.627, 0.629, 0.596 and 0.587 with a p-value of <.001, <.001, <.001, <.001, <.001 and <.001 (<.05). Additionally, there is a strong positive relationship between the evaluation on the mathematics assessment practices of teachers with reference to NCTM standards and the extent of manifestation of the mathematics assessment purpose relative to monitoring student's progress having computed r–values of 0.566, 0.529, 0.576, 0.585, 0.536 and 0.586 with a p-value of <.001, <.001, <.001, <.001, <.001 and <.001 (<.05).

4.6. Mathematics assessment framework for junior high school

The designed mathematics assessment framework for Junior High School manifested the positive effect of NCTM standards to evaluate mathematics curriculum, evaluating student's achievement, making instructional decisions and monitoring student's progress.

Among the NCTM assessment standards, only the inferences and coherence standards have a significant positive effect on evaluating mathematics curriculum. It is based on the computed t- value of 2.772 and 2.027 with p- value of .006 and .044 and β - value of positive 0.265 and 0.176, respectively. While, years in the service and openness standards have a significant positive effect on making instructional decisions, based on the computed t- value of 0.600 and 3.254 with p- value of .019 and .001, and β -value of 0.038 and 0.307, respectively.

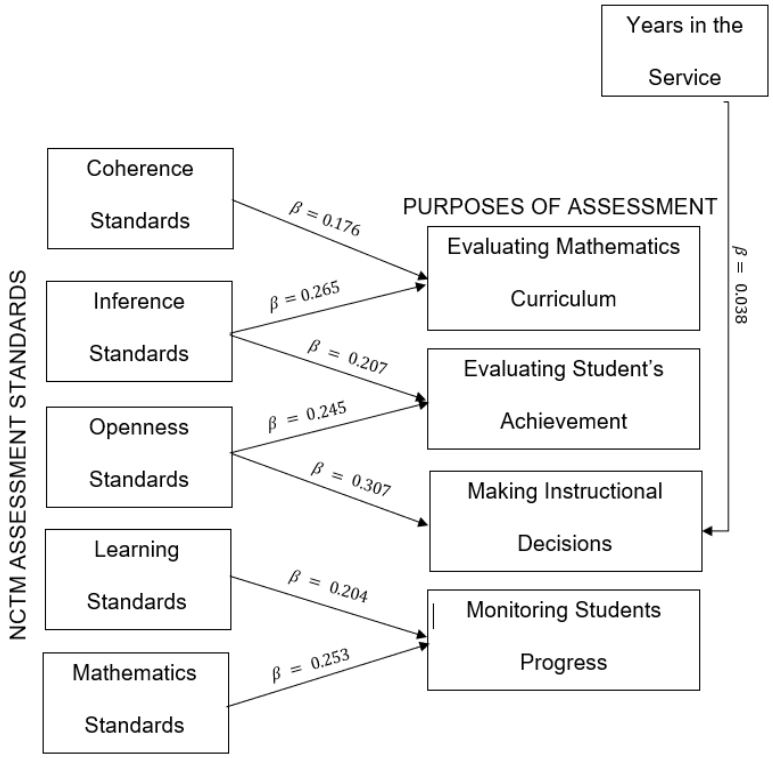

Fig. 1: Mathematics Assessment Framework for Junior High Schools in the Province of Batangas.

Additionally, only the openness and inferences standards of the NCTM assessment guidelines significantly effect this assessment goal. It is based on the computed t- value of 2.545 and 2.077 with p- value of .011 and .039 and β - value of 0.245 and 0.207, respectively. Moreover, among the NCTM assessment standards, it is the learning and mathematics standards that have a significant positive effect on monitoring student's progress. It is based on the computed t- value of 2.254 and 2.861 with p- value of .025 and .044 and β - value of positive 0.265 and 0.005, respectively.

The mathematics assessment framework for Junior High School which is the output of this study is presented in the next figure. The variables that can be found in the assessment framework have the NCTM assessment standards, the purposes of assessment. The whole paper contains title page, table of contents, foreword, foundation, objectives, presentation of framework and utilization.

5. Conclusion and Future Work

Most of the Junior High School mathematics teachers are new in the teaching profession, attained the highest education of baccalaureate degrees, have only 1 to 3 relevant trainings in the past 3 years and in their maturing stage in using technology. The assessment practices of Junior High School mathematics teachers adhered to the NCTM standards. There is a moderate extent of manifestation of the mathematics assessment purpose relative to evaluating mathematics curriculum, making instructional decisions, evaluating student's achievement, and monitoring student's progress. Significant differences were found in the evaluation of mathematics assessment with reference to learning and inferences standards when grouped according to years in service; learning and openness standards when grouped according to number of relevant trainings about mathematics curriculum; learning, equity, openness and mathematics standards when grouped according to number of relevant trainings about instruction; learning, equity, openness, coherence and mathematics standards when grouped according to number of relevant trainings about assessment; and all of the NCTM assessment standards when grouped according to technology preparedness. There are significant strong positive relationships between the evaluation of mathematics assessment based on the NCTM standards and the purpose of assessment. The mathematics assessment framework aims to meet the purpose of classroom assessment while helping the students to be mathematically literate.

5.1. Limitations

Mathematics teachers in elementary and senior high school were not included in this study. This was also true for teachers, who were teaching other than mathematics. Mathematics teachers from private schools in the province of Batangas, from any other level were excluded. Other teachers from other provinces, public or private, from any other level were also excluded. This study is also limited to NCTM assessment standards as reference to teacher's assessment practices. It did not include other assessment standards, other purposes of assessment and other variables of mathematics assessment.

5.2. Future directions

Considering the significant findings revealed and conclusions drawn in this study, the following recommendations are offered. Junior High School mathematics teachers must continue to grow professionally through engaging in post-graduate studies and attending relevant trainings, including the use of technology. The division offices in the province of Batangas and the Learning and Development coordinators must consider providing trainings about mathematics curriculum, instruction, assessment, and research related to mathematics education. The mathematics assessment framework may be used to raise the quality of assessment, and it may be tried out for validation. A parallel study may be conducted in other subjects.

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