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Examination of School Mathematics Observation Protocol on Activities (MOPA)

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Abstract:- This paper explores the development of a mathematical classroom observation protocol for Grade 6 students in Myanmar, based on research-based observation protocols by Gleason and the organisation. Classroom evaluation may be a good means of enhancing teacher productivity by watching them teaching and sharing thoughts with other students. The instrument was developed and performed in order to investigate instructor facilitation and student participation. The analyses presented in this study reveal the extent to which teachers and students cooperate with the practices promoted by national associations and initiatives, using a two-factor system of Instructor Facilitation and Student Participation. The aim of MOPA is to find the best ways to make teachers more successful.

Keywords:- *Mathematics Teaching Practices; Instructor Facilitation (IF); Student participation (SP); Observation Protocol; Mathematics Understanding*

I. INTRODUCTION

In the framework of the "Communities of Learners," the teacher's job is to provide a teaching structure, to target the students' zone of proximal development, and to promote positive discourse norms within the classroom by Vygotsky [1] and Poly [2]. Student involvement in the class entails fully engaging in the lesson, persisting through the problem solving process, and positive dialogue in order for a conceptual comprehension of math to be gained. Neither of these output features is achievable without the other. For an effective mathematics classroom, instructor and student must perform their positions and responsibilities. Well prepared to satisfy the criteria for the School Mathematics Observation Procedure in the field of event-based mathematics. The MOPA is grounded in the Instruction as Touch framework through initial and revision approaches such that the teaching of mathematics is accomplished by teacher facilitation and student involvement [3].

Classroom surveillance is a method of active monitoring of instructional events as they take place in real time, with the participant or researcher conducting analyses and/or marking of training activities in the classroom or by video lectures. Two applications for classroom insights are most common: to facilitate job learning and to assess and/or analyse teaching standards [4]. Construction of logical comprehension relies on the association of students by dialogue between mathematical operations, representation, form, logic and modelling. Hiebert and Grouws [5] argued that there is no justification to suggest, on the basis of experimental findings or theoretical explanations, that a specific teaching method is the most effective way to meet all types of learning goals.

➢ *Research Questions*

1. What are the Mathematics Classroom Observation Procedure for Activities (MOPA) score descriptions?
2. What is the researcher looking for a new sample of the Mathematics Classroom Observation Procedure for Activities (MOPA) based on a theoretical framework?
3. What are the main elements of instructor facilitation (IF) and student participation (SP) in MOPA?

➢ *Research Methodology*

Descriptive Method (Literature Survey)

II. THEORETICAL FRAMEWORK FOR THE MOPA

MOPA has become an important tool for secondary mathematics teacher training programmes to convey requirements for mathematics teaching, to give guidance to secondary mathematics students as they have planned and incorporated courses, and to assess the outcomes of the curriculum. The MOPA was designed to reflect the important qualities of instruction in mathematics as advised by the profession. Conceptual comprehension focuses, for example, on students drawing, inferring, and eventually making connections between mathematical operations, representations, form, logic, and modelling through material interaction and debate. That said, a pre-service teacher's lesson would not suit well into the logical comprehension objective if the lesson concentrated exclusively on procedural fluidity and reliability through teaching methods such as drill worksheets stressing procedures to be taught through rote. This approach can be useful at times within the broader sense of mathematics teaching, but it should not be the main form of instruction; it should not involve students in mathematics instruction and comprehension outside formal fluidity. From the outset, the theoretical model of instruction of Cohen, Raudenbush and Ball [6] has inspired the development of the MOPA framework for conceptual comprehension through various teaching methods. In Figure

1, the UA Teaching as an Interface Model describes three inputs: teacher responsibilities, the mathematical content of the classes, and student engagement. At the conclusion of the above study, a two-factor configuration of the MOPA was found, as opposed to the initial architecture of the three factors seen in the Instruction as an Interface Model. The final instrument is more closely associated with Rogoff, Matusov and White[7], a system defined by a group of learners in which power and accountability are shared between students and teachers. The instructor creates expectations and targets for the lesson based on the learning objectives as well as enhances student understanding by dialogue. Likewise, the task of students to participate in the mathematical content of the lesson by problem solving and dialogue is a mutual obligation which will promote all sides of responsibility and increase the probability of mathematical learning. MOPA stresses that teachers and students each have distinct positions within the special learning community of the mathematics classroom.

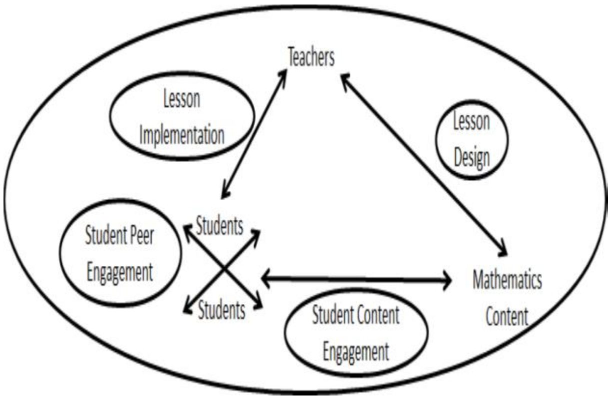

Figure 1. Instruction as a Model of Interaction
Source: Cohen, al (2003).

III. LITERATURE SURVEY APPROACH PROCEDURES

Firstly, the reliable and relevant information was gathered by extensive reading. Various primary and secondary resources such as books, magazines, pamphlets, newspapers, and other periodicals were obtained. And then, the reliable facts were obtained from published research journals and research articles. From the research journals and research articles, the researcher will develop sample MOPAthat based on Gleason, et al., (2015)and how to score it and then will present key elements of instructor facilitation (IF) and student participation (SP).

IV. FINDINGS

➢ *Scoring for School Mathematics Observation Protocol on Activities (MOPA)*

The MOPA tests two distinct Instructor Facilitation (IF) and Student Participation (SP) variables across two subscales of 9 items each. (The MOPA was not developed to include a single score in a classroom.) The Teacher Facilitation Score scale (Cronbach's alpha: 0.850) tests the role of the teacher as the one who creates structure for the lesson and leads the problem-solving process and classroom debate. The ranking for the Instructor Facilitation subscale is based on the scores from the four elements (4, 6-11, 13, and 16) and their summation. The Student Participation subscale (Cronbach alpha of 0.897) tests the amount of engagement of the student in their learning process. Instead of adding all five sub scales, one should apply the ratings for items 1-5 and 12-15.

Items	**Student Participation (SP)**	**Instructor Facilitation (IF)**
(a)	*	
(b)	*	
(c)	*	
(d)	*	*
(e)	*	
(f)		*
(g)		*
(h)		*
(i)		*
(j)		*
(k)		*
(l)	*	
(m)	*	*
(n)	*	
(o)	*	
(p)		*

Sample School Mathematics Observation Protocol on Activities (MOPA)
Name for Activity: ____
Students’ Grade: ____
Date of teaching: ____
Name of teacher: ____

Question: In Δ ABC, ∠ A is greater 20° than ∠ B, and ∠C is greater 10° than ∠B. Find all degrees of each angle in that triangle.

1. Students interested in exploration/investigation/solving issues.

Teacher asks the following questions to know the entry behaviors of students.

For example: 1. How many angles are there in triangle?
2. How many angles are there in square and quadrilateral?
3. What's the number of the angles in the triangle?

1.**rate score (SP)**	**3**	**2**	**1**	**0**
Characterization	Students are actively participating in study and exploration. For example, 1. three angles 2. four angles 3. 180°	Students are sometimes engaged in exploration, investigation, or problem-solving.	Students scarcely participated in discovery, investigation, or problem-solving.	Students did not participate in discovery, investigation, or problem-solving.
Comments				

2. Students used a number of means (models, sketches, graphics, concrete materials, manipulatives, etc.) to depict ideas.

Teacher asks the following questions to the students.

For example: 1. Can you draw right triangle?
2. Can you draw a triangle that all sides are equal?
4. Can you draw a triangle that two sides are equal?

1.**rate score (SP)**	**3**	**2**	**1**	**0**
Characterization	Students draw right triangle and measure that it. Example: In right triangle, one angle is 90° Students draw triangle that all sides are equal and measure that it. Example: if all sides equal, there must all angles in triangle.	Students draw right triangle and measure that it. Students draw triangle that all sides are equal and measure that it.	For example, if all sides are equal in Δ ABC, ∠A, ∠B and ∠C must be 60° for each angle.	Neither were there any symbols used in the lesson, nor did they engage with the representation themselves.
Comments				

2. Students have been active in mathematical activities.

1.**rate score(SP)**	**3**	**2**	**1**	**0**
Characterization	Many students expend two-thirds or more of their lessons on mathematical practice at the required level for the curriculum.For example 1.Degrees in triangle 2.Solving unknown number in equation step by step	Many students devote less than 80% of their learning time in the classroom.	Half of the students spent less than one-quarter of the lessons on the wrong subject.	Half of the students devote less than a quarter of the class on one or more parts of the lesson.
Comments				

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5. Students tested multi-stage methodological approaches.
Students are grouped with six members in each group to solve the problem.

rate score (SP&IF)	3	2	1	0
Characterization	More than half of the students evaluated the mathematical methods objectively. For example: Over 15 students because of 30 students who are in experimental group.	At least two but fewer than half of the students evaluated the mathematical methods objectively.	The particular student evaluated the mathematical methods objectively.	Students have not analyzed the statistical methods objectively.
Comments				

5. Students have persevered in addressing challenges.
Students can find the truth, the key facts of the issue, and the methods to solve the dilemma.

1. **rate score (SP)**	3	2	1	0
Characterization	The majority of students searched for entry points and alternatives, tracked and measured progress, and, if possible, modified courses. For example, Over 15 in 30 students	For example, 15 students	For example, Less than 15 students	The students could not persevere in solving problems.
Comments				

6. The lesson focused on the fundamental premises of the subject that shape perception in relation to other topics.

1.**ratescore (IF)**	3	2	1	0
Characterization	For example, $\angle A + \angle B + \angle C = 180°$ $\angle A = \angle B + 20°$ $\angle C = \angle B + 10°$ $\angle A = ?$ $\angle B = ?$ $\angle C = ?$ $\therefore \angle B + 20° + \angle B + \angle B + 10° = 180°$	$\angle A + \angle B + \angle C = 180°$ $\angle A = ?$ $\angle B = ?$ $\angle C = ?$	$\angle A = \angle B + 20°$ $\angle C = \angle B + 10°$ $\angle A = ?$ $\angle B = ?$ $\angle C = ?$	The lesson consists of several questions that do not have a comprehensive solution plan.
Comments				

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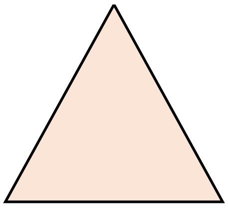
7. The lesson encouraged mathematics through simulation.

1.**ratescore(IF)**	**3**	**2**	**1**	**0**
Characterization	For example, ∠A + ∠B + ∠C = 180° ∠A = ∠B + 20° ∠C = ∠B + 10°  	For example, ∠A =∠B + 20° ∠C = ∠B + 10° Take ∠B = 45° So ∠A = 65° ∠C = 55°	The teacher describes some mathematical model but the students are not involved in sports.	The lesson does not involve statistical simulation.
Comments				

8. The lesson offered an opportunity to explore the mathematical structure. (Symbolic notation, trends, generalizations, conjectures, etc.)

1. **ratescore (IF)**	**3**	**2**	**1**	**0**
Characterization	Students have enough time and ability to search at and make use of mathematical form or patterns. For example, to solve ∠B +20° + ∠B +10°+ ∠B = 180°	Students are not given ample time to thoroughly grasp the generalization.	Students had no hope of finding these generalizations	Students are not given the ability to analyse or appreciate the mathematical structure of the case.
Comments				

9. The lesson contained activities that had multiple routes to a solution or multiple solutions.

1.**ratescore (IF)**	**3**	**2**	**1**	**0**
Characterization	For example, ∠A+∠B+∠C=180° ∴∠B+20°+∠B+∠B+10° = 180° 3∠B = 180° ∴∠ B = 50°**(or)** ∴ x + 20°+ x+ x+ 10° = 180° 3x = 150° ∴x = 50°	∠A + ∠B + ∠ C = 180° **Note:** The sum of three angles inside triangle is always 180°	Multiple options and/or multiple routes are small.	strongly discourages students from using various methods
Comments				

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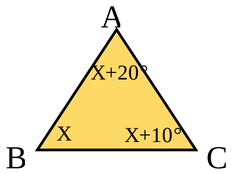
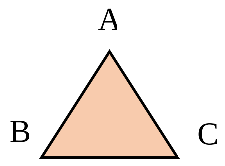
10. The lessons encouraged the accuracy of mathematical expression.

1.**ratescore (IF)**	**3**	**2**	**1**	**0**
Characterization	For example, $\angle A + \angle B + \angle C = 180°$ $\therefore \angle B + 20° + \angle B + \angle B + 10° = 180°$ (or) $\therefore x + 20° + x + x + 10° = 180°$ $3x + 30° = 180°$ $3x + 30° - 30° = 180° - 30°$ $3x = 150°$ $x = 50°$	Teachers "wait for accuracy" in all contact during the class.	The teacher's making a lot of wrong remarks.	The instructor has repeatedly made false comments.
Comments				

11. The teacher's talk encouraged student thinking.

1.**ratescore (IF)**	**3**	**2**	**1**	**0**
Characterization	For example, $\angle A + \angle B + \angle C = 180°$ $\therefore x + 20° + x + x + 10° = 180°$ $3x + 30° = 180°$ $3x + 30° - 30° = 180° - 30°$ $3x = 150°$ $x = 50°$ $\therefore \angle B = 50°, \angle A = 70°$ $\angle C = 60°$	Let $\angle B = x$ $\angle A = x + 20°$ $\angle C = x + 10°$ 	 $\angle A + \angle B + \angle C = 180°$	There was no hope that the students would respond.
Comments				

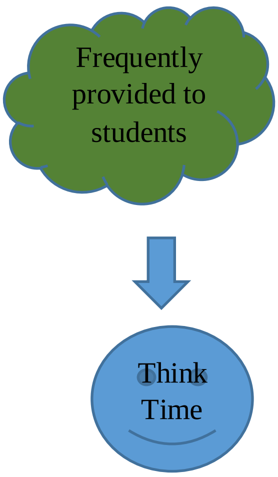
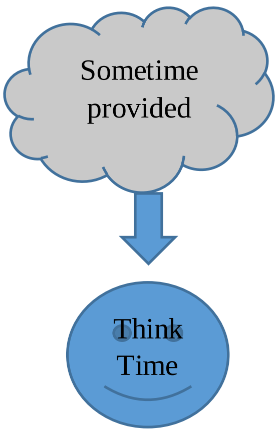
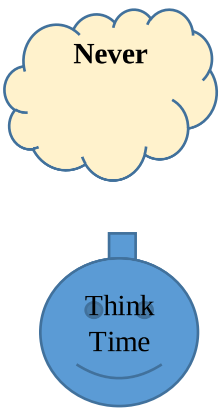
12. There was a high percentage of students learning about mathematics.

1.**rate score (SP)**	**3**	**2**	**1**	**0**
Characterization	More than three quarters of the students were talking about the mathematics of the lesson at some point in the lesson. For example, Over 20 in 30 students are inquiry explored the solutions.	More than half, still fewer than three-quarters of schools. For example, Over 15 but less than 20 students	Less than half of the students spoke about the mathematics of the lesson. For example, Less than 15 students	No students were talking about the mathematics of the lesson.
Comments				

13. There was a climate of appreciation for what other people wanted to say.

1.**rate score (SP&IF)**	**3**	**2**	**1**	**0**
Characterization	Many students share, ask, and comment during the class, including their challenges. Students also listen (actively), explain and consider the thoughts of others. ***For example:*** Not only within each group but also in all participants	Some students share, ask, and complain throughout the class, including their challenges. Many of the students are listening.	Only a handful share the call from the instructor.	There were no students exchanging thoughts.
Comments				

14. Generally speaking, the instructor gave the wait-time.

1.**ratescore(SP)**	**3**	**2**	**1**	**0**
Characterization				The instructor has never allowed a significant amount of "think time" to the depth of a task or question.
Comments				

15. Students became interested in expressing their thoughts to others (peer-to-peer).

1.**rate score (SP)**	**3**	**2**	**1**	**0**
Characterization	A considerable amount of time (more than half) has been spent with peers in peer dialogue (pairs, clubs, entire classes) on the exchange of thoughts, methods and solutions.	Any class time (less than half, but more than a few minutes) was spent peer-to-peer (pairs, groups, whole class).	The lesson was mainly aimed at teachers and there were few chances for peers to peers.	There were no peer-to-peer (pairs, classes, entire class) conversations during the lecture.
Comments				

16. The instructor uses student questions/comments to improve the intellectual comprehension of mathematics.

1.**ratescore (IF)**	**3**	**2**	**1**	**0**
Characterization	Teachers also use student questions/comments to mentor students, promote intellectualcomprehension, and encourage discussion. Teacher sequences student responses that will be presented in an intentional order, and/or links various student responses to key mathematical ideas.	Teachers often usequestions /comments from students to improve intellectual comprehension.	Teachers seldom use student questions/comments to improve conceptual mathematical comprehension. The emphasis is more on the procedural awareness than the contextual knowledge of the content of the tasks.	The teacher never uses student questions/comments to improve mathematical comprehension.
Comments				

➢ *Instructor facilitation (IF)*

Key factors to remember with teacher facilitation include the amount of scaffolding Anghileri [8] effective struggle Hiebert & Grouws [9], the level of inquiry and peer-to-peer dialogue that arises with mathematical assignments, while bearing in mind the uncertainty that exists between teacher decisions and student answers Brophy & Good [10]. Educators are responsible for developing and sustaining dialogue that promotes students' thought and communicating [11]. The discussion must be open, student-centered and peer-to-peer and student-to-teacher to create equitable environments where all students have the capacity and authority to participate equally [12]. The accomplishment of these fundamental characteristics of quality mathematics education is a difficulty, even for excellent teachers, but should be the goal of all teachers [13].

➢ *Student Participation (SP)*

Student learning cannot take place without the participation of the student. Bruner[14] and Vygotsky (1978) stressed the student experience as one of the social relationships to be created, studied and understood. Interactions between the student and the instructor have this important learning culture that varies from that of compliance. Commitment includes both emotional and behavioral contributions Marks [15] to mathematics learning and requires the degree and consistency of involvement in classroom events, such as the willingness of students to make a material and confidential contribution to ongoing work and to draw on each other's long-term contributions [16]. As part of a mathematics community, students must take part in and contribute to the learning process and cultivate certain mathematical behaviors [17] that include creating connections that allow students to find correlations and use repeated reasoning for relevant tasks and experiences that provide the foundation for a rational understanding of mathematics [18]. Students should explain their logic using a variety of methods (models, drawings, diagrams, objects, manipulatives, and/or equations) and equate their own tactics and strategies with those of their peers and teachers in order to process and understand mathematics. Students are more interested by answering questions and being able to clarify their understanding of the intended text.

V. CONCLUSIONS

MOPA insights may provide informative and substantive guidance accounts. Classroom perspectives provide comprehensive and accurate knowledge of classroom processes that cannot be gleaned by any other method. This survey also captures aspects of the local organizational and classroom background that cannot be captured by any other research method. It is only by the analysis of actions that it becomes possible to discern what individuals do and why. Observed proof can be used to support or disprove conclusions. The effects of classroom observations can provide useful evidence for a variety of uses, including educational assessment and career development. MOPA student data can be used in the identification of appropriate teaching strategies. It is impossible to use observations to classify good teaching practices, but there are opportunities to use those observations to identify effective teaching practices. According to Murray[19], teaching activity can be assessed by the content of the speech and the purpose of the lecture, the style of the teaching materials and the enthusiasm of the teacher (e.g.,). According to Guerena and Stacy[20], observation is particularly useful in capturing non-cognitive skills, such as communication and self-expression, which have been shown to be important for long-term student achievement. This approach may be helpful when capturing reliable results of successful instruction.

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