ACHIEVING EQUILIBRIUM BETWEEN STANDARDS AND PRACTICE: A CLOSER LOOK ON MATHEMATICS TEACHERS' PEDAGOGY AND PERSONAL PROFESSIONAL ATTRIBUTES

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ABSTRACT: *Both international and local mathematics teacher standards served as a blueprint of how teachers should perform in school and stakeholders would have a clear and shared understanding of what is expected in schools. Professional teacher standards in mathematics such as the Southeast Asian Regional Standards for Mathematics Teacher (SEARS-MT) is considered to be a vehicle for quality teaching and positive learning outcomes. However, it is still a question whether there was an equilibrium between this standard and practice of the mathematics teachers. This study examined the level of secondary public school mathematics teachers' pedagogy and personal attributes as professional indicators of the SEARS-MT and its implications to the teaching and learning of mathematics. Data were collected from 147 secondary mathematics teachers in the Department of Education (DepEd), Division of Cagayan de Oro City through survey questionnaires and analyzed using descriptive statistics such as mean and standard deviation. Results reveal that the mathematics teacher-respondents performed very satisfactory in terms of professional teaching and learning process as well as their personal attributes. However, it is recommended that mathematics teachers may be further developed professionally through the establishment of professional learning communities where they can be mentored and DepEd may continue to conduct regular professional development programs on content and pedagogy to foster quality performance.*

Keywords: mathematics teacher professional standards, pedagogy, personal attributes

1. INTRODUCTION

Over the years, educational policies have shifted from a focus on guaranteeing free access to education to ensuring quality learning outcomes achieved by students in the school system [1]. International (Programme for International Students Assessment (PISA), Trends in International Mathematics and Science Study (TIMSS)) and national (National Achievement Test (NAT)) testing comparisons highlight student outcomes and gaps between countries who best and least performed in science and mathematics literacy as well as reading comprehension and this has become public attention around the world. The Department of Education (DepEd) of the Philippines shifted from the "Education for All" theme to "*Sulong Edukalidad*" which is an initiative in response to the rapidly changing learning environment of present and future learners and will introduce aggressive reforms to globalize the quality of basic education in the country [2]. This initiative calls for quality teaching from educators and the need to comply with the international professional standards for mathematics teaching is highly required.

The Southeast Asian Ministers of Education Organization (SEAMEO) regional standards for mathematics teachers is one of the professional standards which benchmarks for monitoring improvement in teacher quality across all member countries including the Philippines. This is specific to countries within Southeast Asia which were considered to be one of the major corridors of development and because it is on the premise that the importance of providing quality mathematics teachers for sustained academic achievement which in turn will contribute to the sustained economic growth of the country. The Southeast Asian Regional Standards for Mathematics Teachers (SEARS-MT) can be utilized in three ways to enhance the professional development of mathematics teachers as a guide to provide benchmarks or aspirational goals for relevant educational agencies in formulating policies to improve the quality of teacher development programs that prepare and equip pre-service and in-service mathematics teachers, second, it would serve as a guide in structuring teacher education programs in both pre-service and in-service teacher preparation. Finally, it is a guide for teacher development at a personal level. Teachers can use this document as a roadmap to guide their own personal professional development as a mathematics teacher [3].

Although various initiatives were conducted and some are still underway to improve the performance of both teachers and students, recent international assessment survey such as the PISA 2018 showed that the Philippines still lags behind other countries in terms of mathematical literacy and reading comprehension and this poses a challenge for DepEd and mathematics teachers to carry out aggressive reforms in their ways of teaching and in order to provide a piece of baseline information for this situation, that is, if there exists an equilibrium between mathematics regional standards and practice of mathematics teachers in the country.

This study determined the level of public secondary mathematics teachers' level of professional teaching and learning processes and personal attributes and discussed its implications to mathematics education and the need for professional development efforts for mathematics teachers, particularly in the division of Cagayan de Oro City.

2. OBJECTIVE OF THE STUDY

This research study sought to determine the status of the quality of mathematics teacher competence as stipulated in the different dimensions in the Southeast Asian Regional Standards for Mathematics Teachers (SEARS-MT) created by the SEAMEO RECSAM particularly on the second and third dimensions. Specifically, this study determined the levels of mathematics teachers:

(1) Professional Teaching and Learning Process
  1.1 Mathematical Task and Discourse;
  1.2 Planning for Learning Process;
  1.3 Implementing Teaching Strategies;
  1.4 Monitoring, Assessment and Evaluation and
  1.5 Reflection on Teaching and Learning

(2) Personal Attributes
2.1 Personal Attributes
2.2 Personal Professional Development
2.3 Personal Responsibilities towards Community

3. MATERIALS AND METHODS

This study utilized a descriptive survey method where the data was collected using the validated SEARS-MT dimensions qualification checklist questionnaire. This main instrument was already utilized by the study of Lomibao on ensuring teacher quality through Lesson Study [4] and this instrument was already validated. The respondents of this survey were the 147 public secondary mathematics teachers of DepEd, Division of Cagayan de Oro City. The research team secured permission from the Schools Division Superintendent through the Education Program Supervisor to conduct the survey. After the request letter was approved by the DepEd officials and in order to gather these teachers in one venue, the Department of Mathematics Education of the College of Science and Technology Education (CSTE) while conducting an extension program for mathematics teachers, the survey was conducted and data were gathered and analyzed using descriptive statistics such as mean and standard deviation.

4. RESULTS AND FINDINGS

The table below shows the result of the first dimension of teachers' professional knowledge.

Table 1. SEARS-MT Dimension 2 (Professional Teaching and Learning Process)

Indicators	Mean	SD	Verbal Description
Mathematical Tasks and Discourse	3.80	0.602	VS
Planning for Learning Process	3.96	0.600	VS
Implementing Teaching Strategies	3.92	0.601	VS
Monitoring, Assessment, and Evaluation	3.90	0.631	VS
Reflection of Teaching and Learning	3.59	0.725	VS
Overall	**3.83**	**0.632**	**VS**

Legend:

Mean Interval	Verbal Description
4.50 – 5.00	Excellent (E)
3.50 – 4.49	Very Satisfactory (VS)
2.50 – 3.49	Satisfactory (S)
1.50 – 2.49	Fair (F)
1.00 – 1.49	Needs Improvement (NI)

With respect to the teachers' professional teaching and the learning process, it can be observed from the table that in all indicators, the teachers showed a very satisfactory performance which indicates that the secondary mathematics teachers in the field are making their best in their classes to exhibit their professionalism in terms of mathematical pedagogical knowledge. This is true because according to Hill, mathematics content is equally important with pedagogical knowledge [5]. In order to develop this further, mathematics teachers need continuous training to improve their pedagogical knowledge as well as pupils' achievement. The indicator of planning for the learning process received the highest mean, among all indicators which indicated that teachers really value in planning the lesson ahead before the actual class demonstration. It would be beneficial for both educators and learners if the lesson was well planned because, in this way, both students and teachers can assess and ensure the educational objectives are achieved during the classroom encounter. Planning begins with thinking about how you would like your students to approach their learning of mathematics, and what you would like them to understand, know or be able to do by the end of the session. Reflection of teaching and learning earned the least rating which indicates that teachers need to improve in this area. Some recent studies proposed alternative methods wherein mathematics teachers can reflect on their teaching to improve themselves. In the study of Steeg [6], she noted that reflection was considered as an interchange between observation and interpretation [7], yet it is difficult for teachers to observe themselves and reflect within the action of teaching. She proposed that teachers can use video-based reflections of their teaching and learning of their students. Video enables teachers to watch complex classroom interactions from multiple perspectives. When groups of teachers engage together around video, they can share different interpretations [8], [9]. Either way, if mathematics teachers would really reflect on their teaching to help themselves improve, it is also important that mentoring teachers may be enacted during the process because in this way will be advised on what to retain and what to delete which might affect the students' opportunity to learn best and hopefully gain what they needed in the next level of learning ladder.

Table 2. SEARS-MT Dimension 3 (Personal Attributes)

Indicators	Mean	SD	Verbal Description
Personal Attributes	4.24	0.591	VS
Personal Professional Development	3.84	0.758	VS
Personal Responsibilities towards Community	3.65	0.772	VS
Overall	**3.91**	**0.707**	**VS**

Legend:

Mean Interval	Verbal Description
4.50 – 5.00	Excellent (E)
3.50 – 4.49	Very Satisfactory (VS)
2.50 – 3.49	Satisfactory (S)
1.50 – 2.49	Fair (F)
1.00 – 1.49	Needs Improvement (NI)

Table 2 unfolds the level of personal attributes of the mathematics teachers and results reveal that they have very satisfactory performance. Mathematics teachers are engaged in lifelong learning opportunities to grow professionally. They continuously enrich and upgrade their knowledge and skills by enrolling to their graduate education and attendance at seminars and training design to capacitate teachers with content and pedagogy. The Department of Education (DepEd) conducts mass training for mathematics teachers most especially for the senior high school mathematics content subjects. Also, in order to provide quality teaching for the senior high school teachers, DepEd hires displaced teachers from higher education institutions during the transition period to really ensure that the mathematics content was really available for students because these teachers had

been teaching college mathematics subjects for many years. In order to gain support from outside stakeholders of the school, teachers need to work closely with the community by showing support to projects of the local community. This is manifested by the teachers' attendance in the different barangay activities such as SOBA (State of the Barangay Address) of the local captain, fiesta, health programs, environmental projects, assisting the election process, and among others. Teachers also extend their services or help, especially to those depressed families in the area. According to Kennedy, professional development programs are based on different theories of how students learn and different theories of how teachers learn. The idea that professional development (PD) can foster improvements in teaching was widely accepted [10]. The government through the Department of Education (DepEd) spends large sums on the design and implementation of PD programs aimed to improve teachers' content and pedagogy. Thus, it is hoped that after the result of this study, USTP would be more than willing to help DepEd to train these teachers most especially in those areas where they performed lowest and needs intervention.

5. CONCLUDING STATEMENTS

Quality assurance in teaching mathematics and other disciplines is a major consideration in educational systems. In order to improve teaching performance, teachers need to be evaluated to strategically design a professional development program. The present study has shown that the public school mathematics teachers of the DepEd, Division of Cagayan de Oro City had an almost excellent performance and it can be inferred that there is still room for improvement especially on areas of professional teaching and learning process and personal professional attributes. Perhaps, the regular in-service training of mathematics teachers may be also shifted on these areas not only on their content knowledge to achieve equilibrium in both standards and actual practice. Higher education institutions such as the USTP may also help DepEd to improve these mathematics teachers professionally. The Department of Mathematics Education of the CSTE of USTP continually conducts extension programs on enhancing teacher quality in content and pedagogy. It is recommended for future research to cross-validate teacher competence using other stakeholders and conduct class observations to ensure that these mathematics teachers are actually doing what they have mentioned in the survey. The school leaders such as the principal and master teachers may also be given a chance to evaluate these mathematics teachers and determine the impact of this performance on the learning outcomes of students. Also, it might be good also to have focus group discussion for the different stakeholders to derive a better understanding and appraisal of mathematics teacher performance in the field. These quantitative and qualitative data may give more meaning to the analysis of the performance of mathematics teachers on the professional standards set by local or international organizations.

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