

# *Competency Level of Grade 10 Mathematics Teachers in Pangasinan, Philippines*

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**Abstract**—The study investigated the competency level of Grade 10 mathematics teachers in Pangasinan II as a follow-up of the Mass Training of Teachers in mathematics, a National Training Program conducted by the Department of Education in preparing its teachers for the K to 12. The descriptive survey method was used in the study. A year after the training, the teaching competence along content and pedagogy was determined through self-assessment via questionnaire training was conducted. There were eight topics for content and four components for pedagogy namely the use of 21<sup>st</sup> century skills, differentiated instruction, localization and contextualization, and classroom assessment. The Grade 10 Mathematics teachers were dominated by females who are young and are presently pursuing a master's degree with a position of Teacher 3. The teachers assessed themselves as competent to teach Grade 10 mathematics along pedagogy. For content, they assessed themselves as either highly competent or competent in teaching seven of the eight topics and not competent in teaching the topic 'Permutations and Combinations'. They also considered themselves as needing in-service training on the topics 'Probability of Compound Events', and 'Permutations and Combinations' which are topics on Probability.

**Keywords**—*mathematics, K to 12 education, in-service training, teacher readiness, teaching competence*

## I. INTRODUCTION

Mathematics, together with English and Science, are foundation subjects for lifelong learning. These subjects are the tools for the individual's capacity to systematically analyze and share ideas and knowledge necessary for further self-development and work. The quality of basic education graduates is determined by the adequacy and quality of the basic education curriculum, the quality of teachers, and the capacity of schools to adopt new technologies in delivering instruction (Valisno, 2012). A sample of problems and constraints frustrating attempts at attaining higher quality education in the Philippines as found by a study commissioned by the Asian Development Bank (ADB) were limited teacher's in-service training, low teacher salaries, and teachers not teaching their specialization or misallocation of teachers (Chapman and Adams, 2002). This finding is backed by data from the National Economic Development Authority (NEDA). Based on its report on education, teacher qualifications in the public schools remained to be an issue, especially at the secondary education level, both regarding content and pedagogy. For mathematics, only 80 percent of the public secondary teachers teaching mathematics are Math majors. The other teachers are generalists. What is alarming is even for teachers who are math specialists, their level and quality of subject

competency is also wanting (NEDA-MTPDP, 2004-2010). The objective of this study is to determine the teaching competence of Grade 10 mathematics teachers along content and pedagogy which will serve as a basis for in-service training.

To upgrade the quality of Philippine education and to be consistent with the ASEAN Integration, the Department of Education (DepEd) adopted the K to 12 curricula starting School Year 2011-2012. The curriculum was built on previous reform initiatives such as the EDCOM Report of 1991, BESRA, and the UNESCO's four pillars of education (<http://www.depedmisor.net/uploads>). Its primary legal bases were the Enhanced Basic Education Act of 2013, and the Kindergarten Education Act.

The curriculum was anchored on the nature and needs of the learner which implies that the curriculum is learner-centered (Corpuz, 2006). It was also anchored on the needs of the national and global community (<http://www.depedscpc.com/wp-content/uploads>). The curriculum is contextualized to address national and global needs, strategy to reduce poverty, and consistent with ASEAN 2015 which made the science and mathematics curricula spiral (<http://www.seameo-innotech.org/>). However, one big question remains whether our teachers are

prepared for the challenges of the new K to 12 curricula regarding its content and pedagogy.

The Pangasinan State University – College of Teacher Education, being a Center of Excellence in Teacher Education, is a service provider of different training needs for the DepEd teacher. Training included the Mass Training of Teachers (MTOT). To be more particular is the Grade 10 MTOT for mathematics. For a follow-up on the Grade 10 mathematics teacher trainees, the researcher determined their teaching competencies and training needs. Their level of teaching competence was based on their honest to goodness self-assessment after teaching the subject for one year.

The Grade 10 Mathematics teachers determined their teaching competence on the content of Grade 10 mathematics. The different topics on content included (1) Sequences, (2) Polynomials and polynomial equations, (3) Polynomial functions, (4) Circles, (5) Plane coordinate geometry, (6) Permutations and combinations, (7) Probability of compound events, and (8) Measures of position (Mathematics Grade 10 Learner’s Material, 2015). They also determined their competence along pedagogy particularly on the use of 21<sup>st</sup> century skills, differentiated instruction, localization and contextualization, and classroom assessment.

The output of the study served as a basis for providing in-service training to Grade 10 mathematics teachers concentrated on specific content areas where teachers’ competence is wanting. It can upgrade the quality of instruction in mathematics.

## II. METHODS

The researcher used the descriptive survey method of research. A total of 116 Grade 10 mathematics teachers who attended the Mass Training of Teachers (MTOT) were the subjects of the study. MTOT is a national training program of the Department of Education (DepEd) where the Pangasinan State University–College of Teacher Education (PSU-CTE) is a service provider.

Survey questionnaires were distributed to the different Grade 10 mathematics teachers of Pangasinan II during the last quarter of the school year 2015-2016. The questionnaires were administered to gather quantitative data. Based on the teachers’ self-assessment, they rated their teaching competence on a scale of 1 to 3 with 1.0 as not competent, 2.0 as competent and 3.0 as highly competent. The data collected were analyzed using

simple frequency counts, average weighted mean (AWM) and ranking.

## III. RESULTS AND DISCUSSION

### A. Profile

The female dominates grade 10 Mathematics teachers in their 30’s and 40’s. They are still young in the teaching profession who are pursuing master’s degree with teaching position of Teacher 3. Indeed, the teaching profession is female-dominated (Ferrer, 2015). Due to the annual increase in enrolment resulting in the need for additional items for teachers, a majority of them are still young in the teaching profession. With the advent of globalization and competition, this young generation of teachers is more aware of the need to grow professionally. Thus they pursue graduate studies. ([http://www.aph.gov.au/Parliamentary\\_Business/Bills\\_Legislation/bd/bd0304/04bd110](http://www.aph.gov.au/Parliamentary_Business/Bills_Legislation/bd/bd0304/04bd110)).

TABLE 1. PROFILE OF GRADE 10 MATHEMATICS TEACHERS

Profile	Frequency	Percentage
<b>Sex</b>		
1. Male	41	35.34
2. Female	75	64.66
<b>Age</b>		
1. 20-29	14	12.07
2. 30-39	33	28.45
3. 40- 49	41	35.34
4. 50-59	26	22.41
5. 60 and above	2	1.73
<b>Years of Teaching Math</b>		
1. 0-9	60	51.72
2. 10- 19	32	27.59
3. 20-29	17	14.66
4. 30 – 39	7	6.03
<b>Highest Educational Attainment</b>		
1. Baccalaureate degree	41	35.34
2. Baccalaureate with masteral units	54	46.55
3. Masterate degree	15	12.93
4. Masterate with doctoral units	3	2.59
5. Doctorate degree	3	2.59
<b>Teaching Position</b>		
1. Teacher 1 (T1)	39	33.62
2. Teacher 2 (T2)	10	8.62
3. Teacher 3 (T3)	55	47.41
4. Master teacher 1 (MT1)	8	6.90
5. Master Teacher 2 (MT2)	4	3.45

**B. Content and Pedagogy**

To determine the teaching competence of Grade 10 mathematics teachers, the researcher considered

two areas namely, content and pedagogy. The competency level of Grade 10 mathematics teachers along content is shown in Table 2.

TABLE 2. COMPETENCY LEVEL ALONG CONTENT

Content	Average Weighted Mean	Competency Level
1. Polynomials/polynomial equations	2.58	highly competent
2. Polynomial functions	2.56	highly competent
3. Sequences	2.47	highly competent
4. Circles	2.38	highly competent
5. Plane coordinate geometry	2.28	competent
6. Measures of position	2.21	competent
7. Probability of compound events	1.93	competent
8. Permutations and combinations	1.47	not competent
<b>Overall Competency</b>	2.21	competent

The Grade 10 mathematics teachers are highly competent to teach four of the eight topics of Grade 10 mathematics. These topics are *Polynomials & Polynomial Equations*, *Polynomial Functions*, *Sequences*, and *Circles*. They are competent to teach three topics namely *Plane Coordinate Geometry*, *Measures of Position*, and *Probability of Compound Events*. However, they are not competent to teach the topic *Permutations and Combinations*. This topic falls under Probability, a subject considered by most math major students and mathematics teachers in the

field as difficult to understand and more difficult than calculus. When asked why they were encountering difficulties, they simply reply "It's so confusing." On the other hand, the first three topics identified where the teachers were highly competent are topics in algebra. The reason for this is that algebra is considered by math majors and teachers as easy for once a pattern is established, it can be followed easily. Table 3 shows the competency level of Grade 10 mathematics teachers along pedagogy.

TABLE 3. COMPETENCY LEVEL ALONG PEDAGOGY

Pedagogy	Average Weighted Mean	Competency Level
1. Classroom assessment	2.38	highly competent
2. Localization & contextualization	2.17	competent
3. 21 <sup>st</sup> century skills	2.16	competent
4. Differentiated instruction	2.14	competent
<b>Overall Competency</b>	2.22	competent

Grade 10 mathematics teachers are highly competent in classroom assessment. They are competent in localization and contextualization, the use of 21<sup>st</sup> century skills, and differentiated instruction. Therefore, the Grade 10 mathematics teachers are competent in pedagogy. Since Mathematics teachers do computations daily, preparation and computation of grades become an easy task. Preparing of rubrics in scoring answers to test items which are in numerical data is quantifiable. As far as localization and contextualization are concerned, due to the flexibility and creativity of math teachers, they can easily make do with what resources are available in their locality. They know how to adapt their discussions with different kind of students which is a requirement for differentiated instruction. The use of 21<sup>st</sup> century skills is not a problem because they belong to the older generation

of the millennial; hence the use of technology, internet and mass media for classroom instruction is not new to them.

The overall self-assessment of Grade 10 mathematics teachers regarding pedagogy and content of Grade 10 mathematics is competent.

**C. Training Needs**

To determine which from among the eight topics on the content of Grade 10 mathematics is to be included for in-service training, each teacher identified two topics where they still need additional discussion. The top three identified topics are summarized in Table 4.

TABLE 4. TOPICS FOR FURTHER TRAINING

Topics	Frequency	Rank
1. Probability of compound events	78	1*
2. Permutations and combinations	75	2*
3. Measures of position	34	3

\*needs further training.

The topics *Probability of Compound Events* and *Permutations and Combinations* were identified by the Grade 10 mathematics teachers as topics where they needed additional training. Out of the 116 teachers, more than two-thirds of them admit that they are not knowledgeable on these subject areas. Findings agree with Table 2 where these topics were rated as the two lowest as far as competency level of teachers is concerned. Many mathematics teachers even at the collegiate level consider the subject Probability where these two topics belong as difficult because of the kind of analysis that it requires before one can decide about its solution. As mentioned earlier, its higher form is considered by experts in math as more complicated than Calculus.

#### IV. CONCLUSIONS AND RECOMMENDATION

Grade 10 mathematics teachers are young and female dominated who are presently pursuing master's degree with teaching position of Teacher 3. They assessed themselves as competent to teach Grade 10 Mathematics regarding content and pedagogy. However, they still need additional in-service training on the topics *Probability of Compound Events* and *Permutations and Combinations*.

Since there were two topics identified by the Grade 10 mathematics teachers where they need further discussion or in-service training, the researcher recommends a six-weekend in-service training program of nine hours a weekend to be conducted by the College of Teacher Education. This can be credited as a 3-unit subject in the masteral or

doctoral programs subject to the approval of the Commission on Higher Education (CHED).

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