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RESEARCH ARTICLE

An Empirical Study on the Implementation of the Policies and Standards on Mathematics Education among Teacher Education Institutions in the Philippines

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ARTICLE INFO	ABSTRACT
	The purpose of the research was to determine whether or not the objectives of the Commission on Higher Education (CHED) are aligned with the substance of the curriculum as well as the rules on faculty, student admission, and continued enrollment in Teacher Education Institutions (TEIs). In order to accomplish this aim, research methodologies from both the qualitative and quantitative approaches were used. Results showed that certain TEIs followed the curricular material and rules provided by CHED perfectly, while others differed in terms of the course names, the number of comparable units, and the overall number of units. Certain educational institutions took advantage of the leeway given to TEIs to create the mathematical content and pedagogy of their courses in order to go above and beyond what was required by CHED. In addition, the strong faculty members who possessed master's degrees were responsible for delivering the mathematical subject matter expertise to the aspiring mathematics instructors. The survey also discovered that not all educational institutions conformed closely to the basic conditions that CHED lays forth for the admission of students to programs leading to certification as teachers. As compared to those of other institutions, normal schools had stricter policies regarding the retention of students. The findings of the research indicate that there is a demand for more in-depth monitoring and assessment of TEIs to guarantee that they are in accordance with the goals and requirements of CHED.

INTRODUCTION

It is important to note that the curriculum is an ongoing process and that the newly implemented curriculum for mathematics education in the nation mandates that all students interested in becoming high school mathematics teachers must finish 60 units of mathematics as opposed to the 30 units required under the previous teacher education curriculum. To make it better, however, you might elaborate on the adjustments that have been made to the new curriculum's content or key courses, as well as how it would help build internationally competitive teachers who are equipped with pedagogical knowledge and abilities. This would be a step in the right direction. (CHED CMO 30 s2004)

The Commission on Higher Education (CHED) of the Philippines is in charge of formulating the guidelines and requirements that must be adhered to by all teacher education institutes (TEIs) in the country. The rules and standards established by the CHED cover a variety of areas, one of which is mathematics education. In a number of different nations, research has been conducted to investigate the process by which these rules and standards are put into practice. To establish whether or not these rules and standards are being properly implemented by the TEIs in the Philippines, there is a need to assess whether or not this can be done. In this research, the curriculums of nine (9) TEIs that

provide the Bachelor of Secondary Education (BSEd) are analyzed in terms of the number of units, the programming of courses, and the number of mathematics major courses offered in comparison with the minimal standard requirements established by CHED.

Problem-solving, mathematical exploration and modeling, instructional materials creation in mathematics, technological advancements in mathematics, and action research in mathematics are each given their own dedicated course in the updated curriculum, which has resulted in an increase in the overall quality of the content. These classes were included into some of the most significant classes offered in the previous curriculum. In addition, the new program of study incorporates other significant topics into the curriculum, such as abstract algebra, modern geometry, advanced statistics, and the history of mathematics. Because of these improvements, instructors will be able to build a more profound grasp of mathematics and the ways it may be applied. (Bernardo, 2007), (CHED.1999)

The study of mathematics takes up a significant portion of the standard school day in the Philippines. This is because the country places a strong emphasis on the subject. Students nowadays need to be educated with the abilities essential to be successful in the 21st century since the world is undergoing tremendous transformation. Their educational program has undergone major revisions in order to place a greater emphasis on the cultivation of fundamental abilities that are necessary for success in the modern world. They believe that by placing an emphasis on the development of critical thinking, creativity, collaboration, communication, and digital literacy, their students will be better prepared to face the challenges of the future and make meaningful contributions to society. The updated curriculum prioritizes the development of these skills. In addition, the Philippines is dedicated to ensuring that its kids are well-equipped to flourish in the 21st century and beyond, and they think that this new curriculum is a vital step in the direction of accomplishing that goal. In spite of this fact, there is still an issue with the TEIs not being able to successfully implement these regulations and standards in the subject of mathematics teaching.

The minimal criteria established by CHED for programs that prepare teachers necessitate the incorporation of certain mathematics major courses, as well as a certain number of units and course sequencing. These prerequisites guarantee that aspiring math educators will receive an appropriate level of training from the teacher education programs they enroll in. In addition to this, the CHED minimum requirements provide direction for the formulation and execution of educational policies and programs pertaining to mathematics.

Every educational institution pursues its goal and vision in accordance with a distinct and one-of-a-kind philosophy. Although the goal of Teacher Education Institutions (TEIs) is to produce high-quality teachers who are able to compete on a global scale, there will inevitably be differences in the knowledge and skills acquired by individual students. In a similar vein, the performance of TEIs on many valued measures like as the Licensure Examination for Teachers (LET) may also be rather variable. The potential educators who are interested in being licensed come from a variety of educational settings, each of which has its own focus. The Teacher Examination for Teachers, generally known as the LET, is offered by several educational establishments. The potential educators who are interested in being licensed come from a variety of educational settings, each of which has its own focus. Some educational establishments provide programs in teacher education that are separate from those offered in other curricular areas, while others link their teacher education courses to specific academic departments or colleges. There are several that do not provide any kind of Teacher Education program at all. Some students in the school get a perfect score on all of their exams, while others have passing rates that are very low or even zero percent. A analysis of the findings of the LET revealed that many educational institutions have many satellite campuses where programs that are similar to Teacher Education are given; nevertheless, these educational institutions do not produce certified teachers, which would justify their continued existence.

To ensure that students get an education of a high standard, it is essential that educators have valid teaching credentials and extensive subject-matter expertise, especially in the area of mathematics. The ability to do mathematics is an essential talent that is required in order to accomplish the

educational objectives of the nation and to improve the lives of the people living in the country. Countries that have acknowledged the significance of science and mathematics in their development have made significant strides ahead.

The migration of a large number of Filipino educators outside of the nation has a negative impact on the quality of education available to young people in the Philippines. Because there are many job opportunities available in other countries that provide better benefits and opportunities, the pool of experienced teachers in the country, particularly in the field of mathematics, will gradually decrease. If this scenario persists year after year, it will have a negative impact on the human resources of many Teacher Education schools (TEIs) in the Philippines. This would be especially true for those schools that have a strong performance in the LET. mainly due to the fact that the majority of the teaching staff at these institutions is comprised of veterans and other experts who are likely to be recruited for work in other countries. It is probable that non-professional educators will be in charge of the education of future teachers in training.

Research on the application of policies and standards in mathematics education has been conducted in a variety of nations (Cai & Lester, 2010; Selden, Selden, & Mason, 2006; Zeichner, 2012). These studies may be found in Cai & Lester (2010), Selden, Selden, & Mason (2006), and Zeichner (2012). According to information provided by the Commission on Higher Education of the Philippines (CHED, 2017), it is the duty of the country's teacher education institutes (TEIs) to adhere to the rules and standards that are established. Nonetheless, it is necessary to ascertain whether or not these policies and standards are being successfully implemented by the TEIs (Bernardo, 2007). According to the findings of one research (Oracion, 2013), there is a significant disconnect between the policies of the CHED and the way the curriculum is actually being taught in TEIs.

There have been attempts made in the Philippines to enhance the mathematics education system by improving the curriculum as well as the teaching methodology. According to the Philippine Department of Education (2010), the latest curriculum program's implementation in 2004 and 2013 has the intention of improving the overall standard of education offered across the nation. (Philippine Department of Education, 2013) As part of this initiative, the mathematics curriculum was updated to incorporate new content on problem-solving strategies, mathematical modeling, and technological advancements. Several studies (Herrera & Tuy, 2019; Sarinas & Ramirez, 2016) have demonstrated that the new curriculum program has resulted in an increase in the mathematical accomplishments of students.

In addition, there have been studies conducted in the Philippines on the topic of the professional development of mathematics educators. According to the findings of one research (Dela Cruz, 2016), the vast majority of mathematics instructors lacked chances for professional development. According to the findings of another research (Roxas & Ramos, 2014), teacher education programs should place a greater emphasis on strengthening the content and pedagogical understanding of future mathematics instructors.

Previous research has shown that there is a mismatch between the policies established by the CHED and the way in which the curriculum is actually being taught in TEIs. According to the findings of one survey, the vast majority of mathematics educators lacked chances for professional development. According to the findings of yet another piece of research, education programs for prospective math instructors should put more of an emphasis on training them in both subject and pedagogical expertise. However, there is a pressing need for additional research on the implementation of the CHED's policies and standards on the mathematics education provided by TEIs in the Philippines.

The abovementioned literature triggers the researcher to come up with a study to investigate the implementation of CHED's policies and standards on mathematics education in teacher education institutions (TEIs) in the Philippines. While there have been studies on the policies and standards in mathematics education in various countries, and on the professional development of mathematics teachers in the Philippines, there is limited research on the actual implementation of CHED's policies and standards in TEIs in the Philippines. The motivation for this study is to determine if the policies and standards set by CHED are being effectively implemented by the TEIs, and to identify any gaps in the implementation that need to be addressed to improve the quality of mathematics education in the Philippines.

MATERIALS AND METHODS

This is a quantitative and qualitative review of the execution of pre-service education programs by Teacher Education Institutions (TEIs), with a focus on curricular content as well as certain typical rules on faculty, student admission, and student retention. The Mathematics Curricula that were mandated by CHED and executed by the nine institutions were meticulously compared in order to ascertain whether or not the expectations of CHED are completely satisfied in terms of the mathematical content and the pedagogical abilities. In addition to this, the nine institutions' programming for mathematics subject courses and professional education courses was investigated and analyzed. In order to establish the educational backgrounds of those teaching mathematics and professional education, a questionnaire was developed and sent to those instructors. In order to assess whether or not the TEIs were genuinely implementing the CHED standard standards for student admission and retention, the student admission and retention rules from each of the nine institutions' student handbooks were scrutinized.

The nine (9) universities were chosen for further in-depth research and analysis. Three of them are located in Region 13 (the National Capital Region-NCR), one in Region 03 (Central Luzon), three in Region 02 (the Cagayan Valley), one in Region 6 (Western Visayas), and one from Region X (Mindanao). The data sources that are used to determine whether or not they are really providing what is expected of them by CHED in terms of the curriculum's contents, as well as certain regulations and requirements for Teacher Education, come from the institutions themselves. Actual data collected from these educational establishments include the following: a curriculum checklist for the BSEd mathematics major; the student handbook; a faculty profile of mathematics faculty members; enrollment records; and a list of alumni of the BSEd mathematics program.

Quantitative methods such as frequency distributions, percentage breakdowns, and arithmetic mean comparisons were used to the data in this research. In the qualitative analysis, the data were further broken down and classified in order to develop a set of interconnected ideas or themes that arose from the data.

RESULTS

Mathematical content knowledge

The curricula of the nine (9) Teacher Education Institutions (TEIs) for Bachelor of Secondary Education (BSEd) were analyzed in terms of mathematics major courses, number of units and programming of courses compared with the CHED minimum standard requirements. For the purpose of confidentiality, each university is represented by letter A to I. The table below reveals the results.

Table 1: Comparison of teacher education institutions in regions i, ii, vi, x and xiii on programming of courses (math content courses)

Univ ersit y	Year 1			Year 2			Year 3			Year 4		Total
	1st	2nd	Su m	1st	2nd	Sum	1st	2nd	Sum	1st	2nd	
A	-	-	-	Advanced Algebra, Plane Geometry and Trigonometry (9 units)	Solid Geometry and Analytic Geometry (6 units)	History of Math, Instrumenta tion in Mathematics and Special Topics in Statistics (7 units)	Seminar in Problem Solving in Math, Calculus I & Number Theory (9 units)	Calculus II, Elem. Statistics, Linear Algebra and Mathematical Investigations & Modeling (12 units)	Advanced Statistics and Action Research in Math Educ. (6 units)	Modern geometry, Seminar on Technology in Math and Abstract Algebra (9 units)	-	60
B	-	-	-	History of Mathematics (3 units)	Basic Statistics, Plane Trigo and Advanced Algebra (9 units)	Plane Geom and Analytic Geom (6 units)	Advanced Statistics, Solid Geometry & Calculus I (9 units)	Calculus II, Probability, Abstract Algebra and Number Theory (12 units)	Mathemati cal. Investigati on, Linear Algebra and Modern Geo. (9 units)	Seminar in Prob. Solving in Math, Instrumenta tion in Math, Technology in Mathematics & Action Research in Mathematics (12 units)	-	60
C	-	-	-	Adv. Algebra, Plane Geometry, Trigo. and Elem. Stats (12 units)	Solid Geom, Set Theory & Logic, Set Theory & Logic, Analytic Geo. and Adv. Stat. (12 units)	-	Number Theory, Math Prob. Solving, Math Investi gation & Modeling, Research in Math 1 and Calculus 1 (14 units)	Calculus 2, Research in Math 2, Instrumentati on in Math and Linear Algebra (16 units)	-	History of Math, Probability and Modern Geometry (9 units)	Elem. Differential Equations and Abstract Algebra (9 units)	75

D	Advanced Algebra (3 units)	Trigonometry and History of Mathematics (6 units)		Plane Geometry, Sem. on Prob. Solving in Math and Statistics (9 units)	Analytic Geom, Advanced Statistics and Solid Geometry (9 units)		Math'l. Investigation & Modeling, Linear Algebra & Calculus 1 (9 units)	Calculus II, Number Theory, Instrumentation in Math & Seminar on Technology in Mathematics (12 units)		Probability, Abstract Algebra, Modern Geometry and Differential Equations (12 units)	-	60
E	-	-	-	Buss. Math, Number Theory, Modern Geometry (9 units)	Trigonometry, Fundamentals of Statistics, Adv. Algebra & Mathematics Investigations & Modeling (12)	-	Differential Calculus, Linear Algebra 1 and Analytic Geometry (12)	Research in Educ., Linear Algebra II, Integral Calculus (11 units)	-	Probability & Inferential Stat., Seminar on Prob. Solving in Math, Differential Equations & Abstract Algebra (13 units)	-	60
F	-	Analytic Geometry & Calculus 1 (6 units)	-	History of Math and Analytic Geometry & Calculus 1 (9 units)	Survey of Statistical Methods and Analytic Geometry & Calculus 1 (11 units)	-	Elem. No. Theory and Seminar on Problem Solving in Math (6 units)	Plane & Solid Geom, Linear Algebra, Math'l Investigation & Modeling and Logic & Set Theory (12 units)	Math Instrumentation (3 units)	Abstract Algebra, Geometric Structures and Research in Science Educ. (9 units)	-	59
G	-	-	-	Adv. Algebra, Plane Geometry, Trigo. and Elem. Stat. (12 units)	Solid Geom, Set Theory & Logic, Set Theory & Logic, Analytic Geo. and Adv. Stat. (12 units)	-	Number Theory, Math Prob. Solving, Math Investigation & Modeling, Calculus 1 (14 units)	Calculus 2, Research in Math 2, Instrumentation in Math and Linear Algebra (16 units)	-	History of Math, Probability and Modern Geometry (9 units)	Elem. Differential Equations and Abstract Algebra (9 units)	75

| H | Plane Trigono-metry. (3 units) | Plane Geometry and Col. Algebra II (6 units) | - | Solid Geom. & Abstract Algebra (6 units | Analytic Geo., Instrumenta-tion in Math, Sem. in Prob. Solving & Calculus I (12 units) | - | Intro. to Probability Theory, Theory of Numbers & Calculus II (9 units) | Basic Statistics II, Linear Algebra, Math'l Investigation & Modeling & Mathematics of Investment (12 units) | - | Action Research in Math Educ., Col. Geometry, Seminar on Technology in Math, History of Math (12 Units) | - | 60 |
| I | - | - | - | Trigonome-try, Advanced Algebra & Plane Geo. (9 units) | Analytic Geom., Linear Algebra, Solid Geom, History of Math & Sem. in Prob. Solving in Math (15 units) | - | Calculus I, Statistics, Number Theory and Probability (12 units) | Calculus II, Adv. Stat., Instrumenta-tion in Math and Math'l Investigations & Modeling (12 units) | - | Modern Geom. and Action Research in Mathematics (6 units) | Abstract Algebra, Seminar on Technolo-gy in Mathema-tics (6 units) | 60 |

The table below provides an overview of the Math Content Courses that may be taken as part of the four-year undergraduate curriculum at Universities A through I. The table lists the classes that were taken throughout each academic year. The academic year is broken up into numerous semesters as well as the summer session. The number of units earned for each class is included in parentheses, and the total number of units earned at each university is also supplied. According to the data in the table, universities C and G have the largest total number of units for courses that include mathematical material, with 75 units apiece. The number of total units on math subject courses at universities A, B, D, E, H, and I is equal to sixty. This is the case for all of these universities. With a total of 59 units, University F has the fewest total units devoted to the study of mathematical topics. The total number of units on math content courses is also included in the table. This figure is subject to change depending on a variety of variables, including program requirements and the number of students enrolled.

Table 2: Comparison of Teacher Education Institutions in Regions II, III, VI, X and XIII on Programming of Professional Educational Courses

University	Year 1			Year 2			Year 3			Year 4		Total
	1st	2nd	Sum	1st	2nd	Sum	1st	2nd	Sum	1st	2nd	

A	-	-	-	Child & Adolescent Devt., Educ'l Tech. 1 & Field Study 1 (6 units)	Facilitating Learning, Educ'l Tech I, Principles of Teaching I & Field Study 2 (10 units)	Special Topic I (Special Topics in Statistics (1 unit)	Curriculum Dev't., Principles of Teaching 2, Assessment of Learning 1, Field Study 3 and Field Study 4 (11 units)	The Teaching Profession, Developmental Reading I, Assessment of Learning 2, Field Study 5 and Field Study 6 (11 units)	-	Guidance & Counseling with SpED and Social Dimensions of Educ. (	Practice Teaching, Special Topic 2(Intro. to Research in Educ) & Special Topic 3 (Action Research in Educ.) (8 units)	**54**
B	-	-	Social Dimensions of Educ. (3 units)	Child & Adolescent Devt., Principles of Teaching 1 & Field Study 1 (7 units) Foundations of Educ., Child Adolescent & Devt. Theories of Learning, Guidance & Counselling	Facilitating Learning, Principles of Teaching 2, Field Study 2 and Educ'l Tech. 1 (10 units) Curr. Devt., & Instruc'l Planning, Intro. to Special Ed., Educ'l Tech., Developmental Reading and		Educ'l. Tech. 2, Field Study 3, Assessment of Student Learning 1, Curriculum Devt. and Field Study 4 (11 units) Principles & Methods of Teaching, Assessment & Eval'n of Learning and Field Study	Assessment of Student Learning 2, Field Study 5, Devt'l. Reading 1 and Special Topic 1 (8 units) Relevant Laws for Teachers	-	The Teaching Profession, Field Study 6 and Special Topic 2 (5 units) Development in Education	Practice teaching (6 units) Practicum (6 units)	**50**
C	-	-	-						-			**48**
				Field Study 1 (12 units) Child & Adolescent Devt., Values Ed. and	Field Study 2 (12 units) Principles of Teaching 1, Facilitating	Educ'l Technology and The Teaching	3 Devt'l. Reading 1, Educ'l. Tech. 1, Assessment	Educ'l. Tech. 2, Assessment of Student Learning 2,		Curriculum Devt., Special Topics, Field Study 5 & Field Study 6 (8 units)	Practice Teaching (6 units)	**48**

D	-	-	-	Guidance & Counseling (9 units) Social Dimensions of Educ, Facilitating Learning, Developmental Reading and Field Study 1 (10 units) Social Dimensions of Educ., Human, Growth, Dev't. & Learning and Contemp Issues & Trends in Ed for Secondary Teachers 1 (10 units)	Learning, The Teaching Profession (9 units) Principles of Teaching I Assessment of Student Learning, Curr. Dev't. and Contemp Issues & Trends in Ed for Secondary Teachers 2 (7 units)	Profession (6 units)	of Student Learning 1, Principles of Teaching 2, Field Study 1 & Field Study 2 (14 units) Principles of Teaching 2, Assessment of Learning 1, Curriculum Dev't. and Field Study (11 units) Educ'l Tech. 1, Principles & Methods of Teaching, Contemp Issues & Trends in Ed for Secondary Teachers and FS 1 – Observation: The School (8 units)	Social Dimensions of Educ., Intro to Research, Study 3 & Field Study 4 (14 units) Assessment of Learning 2, Research in Education and Field Study 3 (9 units) Teaching Sec. Math, Methods of Research, Educ'l Tech. 2 and FS 2-Observation: Classroom Mgt. & Skills (10 units)		Developmental Reading 1, Seminar on Teaching Math, FS 3-Microteaching and FS 4-Team Teaching (10 units)	Practice Teaching, Special Topic 1, Special Topic 2 and Special Topic 3 (9 units) Practice Teaching (6 units)	48
E	-	Child & Adolescent Devt -	-									48
F	-	-	-									51
G	-	-	-	Foundations of Educ., Child Adolescent & Devt., Theories of Learning, Guidance & Counseling and Field	Curr. Devt., & Instruct'l Planning, Intro. to Special Ed., Educ'l Tech., Developme		Principles & Methods of Teaching, Assessment & Eval'n of Learning and Field Study 3	Relevant Laws for Teachers	-	Developments in Education	Practicum	48

				Study 1 (12 units)	ntal Reading and Field Study 2 (12 units)						
H	Dev't. Reading 1 (3 units)	-	-	Child & Adolescent Devt., Facilitating Learning, The Social Dimensions of Educ., Principles of Teaching 1 and Field Study 1 (13 units	Educ'l. Tech. 1, Principles of Teaching 2, Field Study 2 (7 units)	-	Educ'l. Tech. 2, Assessment of Student Learning 1, Field Study 3 and Special Topic 1 (8 units)	Logical & Critical Thinking in Teaching, Intro. to Curriculum Devt., Field Study 4 & Special Topic 2 (8 units)	-	Assessment of Student Learning 2, The Teaching Profession, Filed Study 5, Field Study 6 and Special Topic 3 (9 units)	Practicum (6 units)	**54**
I	Dev't. Reading 1 (3 units)	Seminar in Educ. (3 units)	-	Child & Adolescent Psychology, Principles of Teaching 1, Facilitating Learning, Field Study 1 & Field Study 2 (11 units)	Principles of Teaching 2, Educ'l. Tech. 1, Field Study 3 & Field Study 4 (	-	Educ'l. Tech. 2, Assessment of Student Learning 1, and Field Study 5 (7 units)	Social Dimensions of Educ., Assessment of Student Learning 2 and Study 6 (7 units)	-	Curriculum Devt. and Practice Teaching 1 (6 units)	Practice Teaching 2 (3 units)	**48**

The table below gives an overview of the Professional Education Courses that can be taken at Universities A through I as part of their four-year bachelor programs. The table shows what classes were taken during each school year. The school year is split into two or three semesters and a summer course. In parentheses is the number of units won for each class, and the total number of units earned at each school is also given. In addition, the table compares the total amount of Professional Education units that each university offers. Each college or university is represented by a letter, from A to I. The numerical data in the table that goes with that letter shows how many math subject units that college or school offers in total. The universities have varying total number of units on professional education courses, with university A having the highest at 54 units, followed by universities H and B with 54 and 50 units, respectively. On the other hand, universities C, D, E, and G all have 48 units, while universities F and I have 51 and 48 units, respectively.

The following thoughts emerged from implementation based on documentary analysis:

1. TEIs' mathematics curriculum prepares and instills deeper content to students.
2. TEIs' program major courses according to their own philosophy of preparing students in mathematical knowledge and skills.
3. Each TEI is free to implement a well-thought-out-plan and design of content courses relative to mathematical content.
4. TEIs implement more than the requirement of CHED.

Seven of the 9 TEIs surveyed implement the CHED 6-unit requirement for general education mathematics (GE Math) in terms of course titles while the two TEIs have opted to offer subjects of their choice considering the needs of their students. Only three (3) TEIs implement exactly the mathematics major courses prescribed by CHED in terms of title, corresponding number of units and total number of units. Other TEIs lamp together related major courses, or include other major courses not prescribed by CHED, and also increase the corresponding number of units for some major courses. The TEIs implement more than, or the exact number, of the CHED required units for major courses. Only three TEIs implement exactly the CHED requirement for both GE Math and major courses.

On mathematics content development, five of the institutions surveyed adhere to the basic mathematical knowledge through the initial offering of the following mathematics major courses: Advanced Algebra, Trigonometry and Plane Geometry in the programming of the BSEd curriculum for secondary education. The other institutions have almost similar practice as these five institutions but program one or two of the three courses jointly with other mathematics major courses in the first two to three semesters of the 4-year degree program.

Some institutions are into developing students' appreciation for mathematics by offering History of Mathematics as the first mathematics major course taken by the students. The other institutions program History of Mathematics as one of the last mathematics major courses taken by the students.

Majority of the institutions offer Seminar on Problem Solving in Math, Instrumentation in Math and Technology of Mathematics in the second and third year of the four-year degree program while only one offer it in the last semester prior to the taking of Practice teaching. This practice would allow students to have wider experiences in problem solving as the teacher does not limit problem solving activities within the context of the content areas taken by the students previously but in all the content courses. Also, students will be able to develop varied and appropriate instructional materials; likewise the use of technology in teaching the different mathematics content areas.

On pedagogical content knowledge

A content analysis of all the professional education (PE) core subjects in the curricula of different TEIs was undertaken to determine whether the institutions follow the CHED plan. The following thoughts emerged from this analysis:

1. Prospective mathematics teachers of the TEIs gain and acquire relevant and adequate teaching rudiments.
2. Some schools provide and equip their prospective mathematics teachers with diverse teaching capability.
3. TEIs program professional education courses according to their own philosophy of honing the teaching capability of students.
4. The freedom of TEIs to plan and design their own pedagogical content provides them a way to implement more than what the CHED requires.

Five schools strictly adopted all the 48 units required by the CHED for professional education (PE) courses. Four schools supplement the number with 2 to 9 units in the following PE courses: Guidance and Counseling with Special Education, Special Topics (Statistics, Research/Action Research in Math, Environmental Education, Values Education, Logical and Critical Thinking in Teaching. Some schools have not strictly adopted the CHED professional education requirements in terms of course titles and number of units, and have opted to maintain some in the old curriculum instead of the CHED recommendation of splitting and doubling the number of units in some courses. These include, Principles of Teaching, Assessment of Learning and Educational Technology. Some institutions have not adopted other CHED prescribed subjects such as Social Dimensions of Education and the Teaching Profession, but have opted to offer other subjects instead. These include Foundations of Education, Introduction to Special Education, Guidance and Counseling, Relevant Laws for Teachers, Developments in Education, Teaching Secondary Math, Seminar on Teaching Math and also Contemporary Issues and Trends in Education for Secondary Teachers. The topics included in The Teaching Profession are almost the same as the topics in Relevant Laws for Teachers. Some of the topics in Social Dimensions of Education are included in Foundations of Education and Developments in Education.

The pedagogical knowledge of the prospective mathematics teachers in two schools is set off through the sharpening of their reading proficiency as an essential tool for learning as they enroll Developmental Reading in the first semester of the BSEd program.

Almost all the TEIs adhere to the philosophy of having the future teacher equipped first with a full understanding of the development processes prior to undertaking the other professional education courses. To achieve this goal, the schools offer Child Adolescent Development or Human Growth, Development and Learning as one of the initial PE courses taken by the prospective mathematics teachers.

Some schools offer Social Dimensions of Education as the first and solely professional education course, or jointly with other professional education courses. This exposes students first to the social science theories such as in economic, socio-cultural, political, geographical and environmental in order for them to understand the four pillars of learning and prepare them to become critical and logical thinkers.

Three schools program Practice Teaching as the only required PE course in the last semester of the prospective mathematics teachers in the BSEd program while 5 of the 9 schools offer practice teaching in the last semester, but together with other professional education courses, mathematics major courses and general education courses ranging from 2 to 14 units. One school splits the 6-unit course into subjects of 3 units each and offered for semesters. All the TEIs require six units of Practice Teaching. The attention of prospective teachers of some institutions undertaking their practice teaching would be divided due to other subjects they enrolled simultaneously. Prospective teachers should be provided with quality time in undertaking their practice teaching experience. Student teachers agreed that they rely on actual teaching experience in developing pedagogical knowledge rather than formal pedagogy courses (Yu, 2007).

Implementation of policies on faculty, student admission and retention

Almost all the institutions implement the CHED requirement for faculty except for a few institutions with very few full-time and part-timer mathematics faculty without master's degrees. Almost all the TEIs in the sample implement the CHED policy requiring the passing of a college admission/entrance test to enter to the BSEd program. Some go beyond the CHED policy by imposing additional

requirements such as the integration of high school performance particularly in the three tool subjects (math, science and English) to assessing the college entrance performance, or as an entry prerequisite for taking the admission test, passing interviews, and other requirements set by the college of teacher education. The sample institutions set retention policies as expected by CHED. Appropriate status is based on the range of failing grades of a delinquent student.

The LET performance of institutions who strictly follow the CHED standard requirements in the implementation of BSEd curriculum may be either high or low.

Institutions which do not strictly follow the standard requirement of CHED performed high in LET. High performing institutions require additional admission requirements. The finding of Shiller and Muller (2003) supports this finding that the more graduation requirements required of students in high school, the greater chance to succeed in higher level courses.

CONCLUSIONS

TEIs must strengthen their implementation of the teacher education curriculum to produce a sufficient supply of potential secondary mathematics teachers to replace teachers leaving the country to work abroad and teachers reaching retirement age in order to sustain quality education.

TEIs must strengthen student recruitment and strictly observe retention policies, require newly hired faculty to grow professionally in their field of specialization and impose verticalization of graduate degrees, that is, pursuing advanced degree programs which are in line with the faculty members' undergraduate major field of specialization.

The students have very limited in time and exposure in the preliminary actual teaching experiences since student-teacher classroom placement usually starts in the last semester of fourth year of the BSEd program. This scheme speeds up and limits their chances to hone themselves for actual classroom teaching. Hence, a stronger and wider redefinition of policies which support teacher education approaches at the universities. Programming of courses should be considered to allow student teachers to undertake practice teaching at an earlier time.

The CHED and the TEIs' standard requirement for admission to teacher education is not stringent enough; that is why many students flock to these programs. Strengthening the policy on student admission and retention is imperative. The entry requirement should be based not only on high school general weighted average but also set on minimum numerical grade of, say, 85 in all subject areas. Students belonging to the upper 10% to 15% of the high school graduating class and graduates of special science curriculum, honors class and other highly screened sections/classes should be given high priority in admission. A quota on the number of students to be admitted should be set for teacher education programs.

PRC must intensify and upgrade the requirements for obtaining the LET based on the innovations prescribed by CHED. The CHED must see to it that syllabus of LET must coincide with the innovations in the curriculum; that is, test items should be reviewed periodically. This way, the TEIs will be challenged in their implementation of the teacher education curriculum. The existing policy on the required number of units for both professional education and major courses should be reviewed.

The capability of the TEIs to produce more licensed teachers is not in the strict compliance with what the CHED prescribed in terms of the implementation of BSEd curriculum, particularly on curricular content. Most of the high/top performing institutions are in NCR or in the city, majority of which come from private sectarian institutions. State universities and colleges should produce fewer LET re-takers but potential LET passer.

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