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REFORMS IN THE PHILIPPINE SECONDARY EDUCATION MATHEMATICS CURRICULUM

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Abstract:

This study is a qualitative research that employed document analysis about the reforms in the Philippine secondary education, specifically focused on mathematics curriculum. Documents were utilized and interpreted to provide meaning and analysis on the topics at hand. Coding contents into themes gave highlights on the following: mathematics framework, mathematics syllabus organization, delivery of mathematics curriculum, and time allotment for the mathematics subjects. Comparison of the mathematics curricula in the local and global settings offered deeper understanding and insights on the themes. Changes made in the curriculum for Filipino students gave directions to mathematics education to align with international standards. For the reforms made in the Philippine mathematics curriculum to be functional, the stakeholders need to embrace the developments in the field and have to be locally responsive and globally oriented.

Key Words: Curriculum, Mathematics, Reforms & Secondary Education

Introduction:

In 2002, the Basic Education Curriculum (BEC) was executed in the Philippines (PH) to decongest the overcrowded curriculum then [1]. Reforms followed in 2010 when the Secondary Education Curriculum (SEC) was put into action to address the declining school performance during that period [2]. In 2013, the Enhanced Basic Education Act (EBEA) was implemented to strengthen further the curriculum and increase the number of years of basic education from ten years to twelve years [3]. This reform, also known as the K-12 program, retained the six-year primary education (grades 1-6) and increased the four-year secondary education to six (grades 7-12). In the new secondary education structure, grades 7-10 constitute the junior high school, while grades 11-12 comprise the senior high school. The first batch of graduates of the K-12 program completed their twelve-year basic education in 2018.

Literature Review:

Prior to the K-12 reform, records revealed that the performance of the Filipino students in the national and international mathematics assessments and competitions is below par compared with neighboring countries [4]. This, according to report, may be attributed to the ten-year basic education in the Philippines while other countries have over twelve years. In fact, the Philippines then was the sole country in Asia, and one of only a few in the world that had just ten years of basic education system [5].

While the Filipino students' performance is declining then, other Asian countries like Singapore (SG) and Hong Kong (HK) continued to dominate the rankings in the 2015 Trends in International Mathematics and Science Study (TIMSS) [6]. Moreover, the said two countries also got the top two places in the 2015 Programme for International Student Assessment (PISA) for mathematics, with Singapore on top, followed by Hong Kong [7]. The TIMSS and PISA results conveyed significant impact in the global communities to build reforms in mathematics education [8].

To benchmark from the neighboring countries' achievements, it is worthy to note the essential features of their education. In Singapore, the secondary education covers four to five years, depending on the chosen strand [9]. Hong Kong offers six years of secondary education, three years of junior level and another three years of senior level [10].

As to mathematics framework, the central focus of the SG framework is mathematical problem-solving. It stresses the five inert-related components: conceptual understanding, skills proficiency, mathematical processes, stresses on the attitudes, and metacognition [9]. HK framework, on the other hand, stresses on the knowledge and skills, as well as the values and attitudes that students need to build up at the higher level. This intends students to develop critical thinking and be creative, learn how to inquire and reason out mathematically, devise and answer problems using mathematics in daily life [10].

The SG syllabus is organized along three content strands: Number & Algebra, Geometry & Measurement, and Statistics & Probability. This also includes the strand Real-World Contexts which is designed with a listing of mathematical processes that cut across the said strands [9]. The HK syllabus for junior level comprises three strands: Number & Algebra; Measure, Shape & Space; and Data Handling; with the inclusion of

Further Learning Unit [11]. The senior-level syllabus includes the three said strands (compulsory part) with the two optional modules, the Calculus & Statistics and Algebra & Calculus (extended part) [10].

In building up mathematics content across the levels in education, SG curriculum adopted a spiral approach [9]. The HK curriculum is based on the principle of building on knowledge developed at the basic education level [10]. Both curricula stress the importance of having strong foundations in learning mathematics in the basic level and these have to be learned in sequence.

HK curriculum has a total lesson time for the compulsory part of the mathematics subjects in the senior level ranges from 250 to 313 hours, while 375 hours is allotted for the compulsory part with a module on the extended part [10].

Materials and Methods:

This study employed the qualitative type of research, specifically in the form of document analysis. In this method, the researcher, utilized and interpreted the documents to provide meaning and analysis on the topics at hand [12]. In analyzing the documents, the study considered coding contents into themes. The following documents were used: Orders from the Department of Education (DepEd) pertaining to the reforms in the basic education since 2002 and Curriculum Guides in Mathematics for secondary education issued by the DepEd.

In particular, the DepEd documents used include: (1) DepEd Order No. 25, series 2002, which pertains to the Implementation of the Basic Education Curriculum [1]; (2) DepEd Order No. 76, series 2010, which focuses on the Policy Guidelines on the Implementation of the Secondary Education Curriculum [2]; (3) DepEd Order No. 43, series 2013, also known as the Enhanced Basic Education Act, which contains the Implementing Rules and Regulations of Republic Act No. 10533 [3]; and (4) DepEd Order No. 8, series 2015, which refers to the Policy Guidelines on Classroom Assessment for the K-12 Basic Education Program [13]. Likewise, the documents on the Mathematics Curriculum Guides in the secondary education from 2002 to present were analyzed [14].

In the process of coding contents into themes, the following significant reforms were stressed in the PH curriculum: mathematics framework, mathematics syllabus organization, delivery of mathematics curriculum, and time allotment for mathematics subjects. To benchmark with the global standards, comparison of the PH curriculum with the curricula of the neighboring countries was made in the analysis.

Findings and Analysis:

PH Reforms in the Mathematics Framework:

In 2002, high school students were taught of mathematics subjects using the integrative and interactive teaching-learning approach as required in the BEC where the curriculum is delivered by group learning and sharing of knowledge and experiences. Changes in 2010 were made when SEC was introduced which was modeled after the understanding by design on teaching and learning. The curriculum then covered three stages, namely, results or outcomes, assessment, and learning plan. Reforms in 2013 were put into action through EBEA where the mathematics framework focused on critical thinking and problem solving, supported by the learning principles and theories of experiential & situated learning, reflective learning, constructivism, cooperative learning, and discovery & inquiry-based learning. It is essential to note from here that the local and neighboring countries' curriculum frameworks stress the value of developing learners' mathematical problem-solving skills. Mathematics has been considered as one of the most important allied subjects in the secondary education because of its facility to develop skills in solving problems in daily life [15].

PH Reforms in the Mathematics Syllabus Organization:

Under the 2002 BEC and 2010 SEC, mathematics was introduced in every level following the linear sequential approach. In this set-up, only Elementary Algebra is offered in the first year high school, followed by Intermediate Algebra in the second year, Geometry in the third year, and lastly, Calculus and Trigonometry in the fourth year. Reforms under the 2013 EBEA made the major changes in the organization of the syllabus. The Numbers & Number Sense, Measurement, Patterns & Algebra, Geometry, and Statistics & Probability are offered in the junior level, while General Mathematics and Statistics & Probability are given to senior level. Moreover, specialized subjects namely Pre-Calculus and Basic Calculus are required to the senior high school students in the Science, Technology, Engineering and Mathematics (STEM) strand and Business Mathematics in the Accounting, Business, and Management (ABM) strand. With these, it can be observed that the organization of the syllabus in the local and neighboring countries are alike in most contents. Likewise, the concept of offering additional strand in SG syllabus and the additional module in HK syllabus depending on the chosen field is even adopted in the PH syllabus, requiring specialized subjects to the students in the STEM and ABM strands.

PH Reforms in the Delivery of Mathematics Curriculum:

The integrative and interactive teaching-learning approaches stressed in the 2002 BEC continued in 2010 SEC in all learning areas across the curriculum. In 2013, to ensure mastery of knowledge and skills after each level of education, a reform in the delivery of curriculum was made by EBEA. In this curriculum, the spiral progression approach was employed. The basics are taught in the lower level, with a more complicated concept added as the learner progresses through subsequent levels. Similar to this, SG and HK curricula considered the same method of increasing the complexity of basic mathematics and reinforcing previous learning, thus,

building strong mathematical foundations. The spiral approach reinforced and solidified knowledge each time the learners revisit the subject matter. This encouraged the learners to apply the previous knowledge to the latter course of study and likewise allowed the logical progression of topics from simple to a more complex one [16].

PH Reforms in the Time Allotment for Mathematics Subjects:

Before the K-12 implementation, the mathematics classes were conducted five hours per week at the secondary level. The Philippines then had the longest time spent in teaching mathematics limited within four years, while other countries spend five years with shorter time allotment [17]. With the 2013 EBEA reform, the number of contact hours in the mathematics classes was reduced to four hours per week as required in all strands with 200 school days allocation per year. This made a total of 320 hours share for the mathematics subjects at the senior level. This figure is not far from the allotment in the HK curriculum for the compulsory part which ranges from 250 to 313 hours lesson time in mathematics at the senior level.

Recommendations:

From the presentation of findings and analysis, it can be gleaned that the reforms made in the mathematics curriculum for Filipino students gave directions to mathematics education to align with international standards. However, the crafted curriculum may not serve its purpose if not executed properly. To realize gain of having such curriculum, it is suggested to the mathematics educators, who are the key players of this endeavor, to consider the following: (1) examine carefully how to align the progression of mathematical knowledge and skills of the learners through the spiral approach; (2) conduct a regular assessment of the learners' performance as they level-up in the basic mathematics; (3) enhance students' capacity to adopt recent technological advances in learning mathematics; (4) explore strategic approaches in teaching such as the use of differentiated instructions to assist struggling students in mathematics; and (5) increase engagement in the national and international professional development programs to widen access on the latest trends in mathematics education.

Conclusions:

Reforms in the mathematics curriculum may not be enough to produce quality students who can fairly perform in the international assessments and competitions. Success in mathematics education cannot solely be attributed to the curriculum. Issues related to its delivery if remain unsolved will not make the curriculum functional. Challenges beyond the control of the mathematics educators must be given attention by the proper authorities, such as limited access to advanced technology, insufficient allocation of learning materials, and inadequate facilities conducive to learning. Issues such as these should be addressed abreast with the reforms being made by curriculum planners and being implemented by educators in mathematics. For the reforms made in the Philippine mathematics curriculum to be functional, the stakeholders need to embrace the developments in the field and have to be locally responsive and globally oriented.

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