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A Proposed Competency Model for Secondary Mathematics Teachers

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Abstract

The goal of providing a well-defined and consistent message about the mathematics content and processes that students must understand and be able to perform is of utmost importance. Hence, this study identified the competencies needed by a competent mathematics teacher, determined the initiatives to develop these competencies and proposed a competency model. Results showed that the competencies needed by a competent mathematics teacher include professional knowledge, professional beliefs and disposition, and classroom management skills. Based on the findings, this study recommends that while the students are still in the pre-service programs, they may be encouraged to take part in discipline-specific competency-enhancement opportunities such as workshops, research collaborations, and best practices expositions to intensify their mathematics content knowledge and may consider the three major competencies in preparing the pre-service mathematics teachers: professional knowledge which can help future teachers strengthen their content or knowledge-base in mathematics, evaluate and monitor the pedagogy and initiate technological updates; professional beliefs and disposition which can support the future teachers in meeting new demands and challenges brought by trends and changing times; and classroom management skills which can aid the future teachers to manage classroom structure to keep students orderly, attentive and academically productive during a class.

Keywords
Competencies, mathematics education program, pre-service mathematics teachers, mathematics performance, competency model.

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Introduction

The dawn of the twenty-first century marks a profound shift in the way individuals live, work, and adapt to rapidly changing social and technological realities. In this increasingly complex world, people are expected to be competent and skillful—not only to survive, but also to remain responsive and relevant amid continuous change. Within this context, education stands at the vanguard of societal transformation. Education serves as the keystone through which young people acquire and develop the skills, attitudes, values, and scientific creativity necessary for a progressive and productive life. These elements collectively provide learners with the competencies required to meet the evolving demands of modern society (Eresia-Eke, 2011).

Correspondingly, higher education plays a critical role in national development, exerting a resonating influence on both economic growth and social advancement. It provides solid and relevant preparation for developing the talent and workforce needed to address emerging challenges and seize new opportunities, thereby ensuring economic viability (Harrison, 2017). In this sense, higher education functions as a bridge between academic preparation and real-world application, equipping students with the competencies required to transition effectively into professional and societal roles (Brooks, 2021).

At the core of this educational process lies teaching quality. Research consistently shows that the single most important factor influencing student learning outcomes is the quality of instruction (CEPPE, 2013). Consequently, all elements that shape teacher quality and teaching performance must be carefully examined and continuously improved (Diaz, 2015). Schools, in turn, must be prepared to deliver educational services that effectively meet established standards and learner needs (Sandoval De Luna, 2020). Hence, identifying the characteristics of highly effective teaching becomes essential in establishing a shared reference point for sound teaching and learning practices (Rasool et al., 2017).

In response to these imperatives, the Commission on Higher Education (CHED) introduced the New General Education Curriculum to strengthen the quality of Philippine higher education. This curriculum aims to produce reflective and socially responsible graduates grounded in humanist values, aware of their identities as individuals, global citizens, and environmental stewards (CMO No. 20, s. 2013). Furthermore, the enhanced curricula are aligned with the K–12 program, the Philippine Qualifications Framework

(PQF), and the ASEAN Qualifications Reference Framework (AQRF). Through this alignment, Filipino learners are prepared for the demands of the twenty-first century by enhancing work readiness, expanding practice and immersion opportunities, and meeting both local and international standards—thus making education locally responsive and globally attuned.

Within this broader educational landscape, the development of competencies emerges as a central concern. While a wide range of skills contributes to individual success, a high level of competency in these skills is particularly essential. Skills such as critical thinking, active learning, and complex problem solving must be complemented by the ability to reason deductively, inductively, and mathematically (Mathematical Association of America, 2019). These competencies are foundational not only to academic achievement but also to effective participation in a knowledge-driven society.

This emphasis on competencies is reinforced by the Framework for 21st Century Learning, which outlines the knowledge, skills, and dispositions learners need to succeed in both school and life. The framework integrates subject-matter expertise with essential skills and literacies, while also supporting teachers' engagement in professional learning communities that model effective classroom practices for fostering twenty-first-century competencies (P21 Framework, 2016).

In mathematics education, competency development is particularly significant. Learning to represent, communicate, and interpret mathematical ideas through language, diagrams, symbols, and other tools is a dynamic process of sense making constructed by the learner (Heaton, 2013). Although mathematics is abstract in nature, it becomes meaningful and accessible through application. This view is supported by Saxe et al. (2001), whose findings indicate that the effectiveness of mathematics reform curricula depends largely on integrated professional development that strengthens teachers' competencies.

Consequently, effective mathematical learning is closely linked to teacher competence. Teachers must possess a deep and flexible understanding of the mathematics they teach in order to support students' exploration of mathematical ideas. Such competence extends beyond knowledge acquired in university classrooms or through teaching experience alone (Marasigan, 2018). Mathematics teachers must be able to present concepts in challenging and meaningful ways, demonstrate real-world applications, and cultivate students' critical thinking skills (Sehrawat, 2024).

Effective mathematics instruction, therefore, is competency driven. It involves engaging students in meaningful learning experiences through problem-based tasks, active participation, and collaborative discourse. Through communication and exchange of ideas, students are encouraged to reflect on their understanding and make sense of alternative perspectives (Kersaint, 2015). Moreover, instruction should be anchored in relevant mathematical tasks connected to students' prior experiences, centered on big ideas, and linked across disciplines. Such well-designed learning experiences enable students to view mathematics as a coherent and meaningful whole that is relevant to their lives (AMATYC, 2014).

Given these demands, the preparation of competent mathematics teachers becomes a critical mandate of teacher education institutions in the Philippines. Achieving this goal requires the systematic development and mastery of essential learning competencies that support effective and productive teaching (Leikin et al., 2018). In this regard, professional mathematicians who teach undergraduate courses to prospective teachers play a vital role in shaping future educators' content knowledge and instructional readiness. Their perspectives influence not only what mathematics is taught at the university level but also how it is connected to school mathematics. Strengthening the alignment between university mathematics and school-level instruction is therefore essential in fostering effective mathematical learning.

Underlying these efforts is a clear understanding of competency itself. Competency is defined as a combination of knowledge, skills, attitudes, values, motivations, beliefs, and experiences necessary for performing professional teaching roles effectively (Nessipbayeva, 2012). While mathematical ability is often linked to economic development, mathematics education should not be dominated by this perspective alone. Instead, the curriculum must provide learners with opportunities to develop mathematical literacy—mastery of fundamental numerical and spatial skills necessary for critical engagement with quantitative information in everyday life.

From a theoretical standpoint, Weinert (as cited in Rieckmann, 2011) describes competencies as the available abilities to solve problems and apply solutions successfully in varying contexts. These competencies reflect self-organizing dispositions that integrate cognitive, emotional, motivational, and volitional components. Similarly, George-Reyes (2023) emphasizes that competencies enable individuals to function in complex environments, yet their development and expression depend heavily on instructional contexts, learning environments, and assessment practices. This reinforces the view that

effective mathematical learning is inseparable from the intentional development of competencies within supportive educational settings.

In light of these considerations, the present study aims to determine the competencies required of mathematics teachers as a basis for proposing a competency model. Specifically, the study seeks to answer the following questions:

1. What are the competencies needed by a mathematics teacher?
2. What initiatives can be undertaken to develop these competencies?
3. What competency model can be developed based on the results of the study?

1. Methodology

1.1 Research Design

This investigation utilized the descriptive research method using a qualitative approach. According to Travers as cited by Pacis (2018), the descriptive design is employed to describe the nature of a situation as it exists at the time of the study. It can be used to explore the course of a particular phenomenon and to discover facts on which professional judgments could be based. The qualitative approach was applied to substantiate the perceptual data gathered which were necessary to develop a model. Individual interviews were carried out which paved the way to conceptualize a competency model. The model was subjected to validation by three master teachers in Mathematics from DepEd Tanauan City. After all the revisions, it was presented to nine experts in the field of Mathematics through a focus group discussion.

1.2 Participants

The participants in this study were carefully selected based on specific criteria to ensure their relevance and expertise in the field of Mathematics education. The selection criteria included considering individuals with a strong educational background in Mathematics, leading to the inclusion of two principals and one head teacher who oversee mathematics education in their respective schools. Additionally, four master teachers directly involved in the teaching-learning process of Mathematics were chosen. This diverse group of participants provided valuable insights into the competencies required by competent mathematics teachers. The inclusion of principals and a head teacher offered a comprehensive perspective on competency requirements at the administrative level, while the master teachers brought practical and hands-on expertise. The interviews conducted

with the participants were recorded using cellular phones, enabling the accurate documentation of exact quotes and enhancing the reliability of the study results.

1.3 Materials

1.3.1. Interview guide

The interview guide provides a structured set of questions or topics that guide the individual interviews conducted with the participants. This interview guide was developed by the researchers and utilized for pilot testing. It consists of ten questions designed to explore key aspects of mathematics teaching, organized around the following main axes: content knowledge and mathematical understanding, pedagogical strategies and instructional practices, curriculum alignment and learning competencies, assessment and feedback practices, use of instructional materials and technology, and professional development experiences related to mathematics instruction. Beginning with inquiries about teaching experience and perceptions of effective mathematics teaching, the guide progresses to topics such as the importance of specific skills for mathematics teachers, awareness of 21st-century learners and their characteristics in the mathematics classroom, self-identification as a 21st-century mathematics teacher, necessary competencies to engage with 21st-century learners, the impact of these competencies on instruction, initiatives for competency development, and the future of mathematics teaching.

The guide also provides an opportunity for interviewees to share additional insights regarding their experiences in mathematics teaching. The guide was employed during the focus group discussion (FGD), which served as the primary method of data collection in this study. The FGD participants included an Education Program Supervisor for Mathematics, principals, head teachers, and master teachers with expertise in Mathematics. The discussion aimed to elicit collective views and perspectives on the developed competency model. Participants were encouraged to share their initial observations and engage in a moderated discussion, allowing for in-depth exploration of the competency model and the emergence of insights, recommendations, and commendations.

1.4 Data Collection

1.4.1. Focus group discussion and interview

The focus group discussion (FGD) was the main method of data collection in this study, complemented by individual interviews. The participants of the FGD included an Education Program Supervisor for Mathematics, principals, head teachers, and master teachers with expertise in Mathematics. The FGD aimed to elicit collective views and perspectives on the developed competency model. Participants were given the opportunity to share their initial observations and engage in a discussion facilitated by a moderator. This method provided a platform for in-depth exploration of the competency model and allowed for the emergence of insights, recommendations, and recommendations.

In addition, semi-structured interviews were conducted with selected participants to obtain more detailed and individualized insights that could not be fully captured during the group discussion. The interviews allowed participants to elaborate on their experiences, clarify their viewpoints, and provide further validation of the competency model.

1.5 Data Analysis

1.5.1 Thematic analysis

Thematic analysis was employed as the data analysis method in this investigation. It is a qualitative analysis technique that involves identifying, analyzing, and reporting patterns or themes within the collected data. The individual interviews and focus group discussions were transcribed and analyzed to identify recurring ideas, concepts, or categories related to the competencies needed by a competent mathematics teacher. The findings of the study align with the major categories of competencies, namely core behavioral competencies and leadership competencies. The significant relationship between length of service and service orientation, as well as its contribution to leadership ability, underscores the role of experience in strengthening both behavioral and leadership competencies. These results support the recommendation to adopt the intervention plan to further enhance these competency categories (Cuison, 2024.).

2. Results

2.1 Competencies Needed by a Competent Mathematics Teacher

When teachers are equipped with the competencies necessary for 21st-century Mathematics teaching, their delivery of effective and efficient instruction can be possible. Students can gain interest in learning Mathematics if the relevance of this subject to learners' lives is clarified and they will appreciate the subject as they recognize its importance. To identify the competencies needed to be developed among 21st Century Mathematics teachers, an interview guide was developed by the researchers and subjected to pilot testing prior to its implementation. The guide consisted of ten questions designed to explore key dimensions of Mathematics teaching competencies, organized around major axes such as content knowledge and mathematical understanding, pedagogical strategies and instructional practices, curriculum alignment and learning competencies, assessment and feedback practices, use of instructional materials and technology, and professional development experiences related to Mathematics instruction. The questions progressed from participants' teaching experiences and perceptions of effective Mathematics teaching to more focused discussions on the skills required of 21st-century Mathematics teachers, awareness of 21st-century learners and their characteristics, self-identification as a 21st-century Mathematics teacher, and the competencies necessary to engage contemporary learners. Further inquiries addressed the impact of these competencies on instruction, initiatives for competency development, and perspectives on the future of Mathematics teaching, while also allowing participants to share additional insights based on their professional experiences.

The interview guide was utilized during a focus group discussion (FGD), which served as the primary method of data collection in the study. The FGD participants included an Education Program Supervisor for Mathematics, principals, head teachers, and master teachers with specialization in Mathematics. The discussion was designed to elicit collective views and shared perspectives on the proposed competency model. Through moderated interaction, participants were encouraged to exchange observations, critically reflect on the identified competencies, and provide insights, recommendations, and commendations, thereby enriching the analysis and strengthening the validity of the developed competency framework. As an addition, the researchers utilized the top-down approach in analyzing the text data solicited from the interview conducted. Themes and subthemes which emerged from the text data were categorized within the TPACK

framework by Mustafa, Ismail, and Noh (2016), the teaching and learning in competency-based education by O'Sullivan and Bruce (2014), and the TPACK Model for Philippine STEAM Education by Morales et al. (2019) to ease the analysis of such responses. These are found in Table 1.

Table 1:
Competencies that 21st century mathematics teachers need to develop

Themes	**Subthemes**	**Exemplar Texts**
Professional Knowledge	General Pedagogical Knowledge	Use of teaching approaches and learning theories [P5]
	Mathematical Content Knowledge	Knowledge and mastery of the subject matter [P1] & [P2] Adeptness in numeracy and literacy skills [P4]
	Mathematics Pedagogical Content Knowledge	Knowledge of instructional planning and practices or pedagogy [P1] Sequenced teaching and learning processes [P3]
	Technological Knowledge	Integrating ICT on teaching using the available technology [P5] Globally inclined and technology literate [P4] Digital competence and creativity [P5]
	Technological Pedagogical Content Knowledge	Identifying and applying the best technology that can support teaching and learning [P6]
Professional Beliefs and Disposition	Beliefs on the Nature of Mathematics, Mathematics Teaching and Mathematics Learning	Passion for teaching, care and concern for learners [P1] Knowledge of the learner [P1] Create a friendly learning environment [P2]
	Mathematical Disposition	Commitment for teaching [P4] Employing a positive discipline [P7] Inclination to use mathematics in solving real-life problems [P3]
	Motivation and Self-Regulation	Values like efficiency and empathy, humility and open mindedness [P6]
Classroom Management Skills		Good classroom management [P2] Making use of aids and tools creatively to catch students' attention [P7] Providing a favorable environment for student learning [P6]

The analysis of the participants' responses on the conducted interview reveals three major competencies that 21st century mathematics teachers need to develop. These

major competencies include professional knowledge, professional beliefs and disposition and classroom management skills. Professional knowledge includes General Pedagogical Knowledge, Mathematical Content Knowledge, Mathematics Pedagogical Content Knowledge, Technological Knowledge and Technological Pedagogical Content Knowledge (TPACK). The importance of developing general pedagogical knowledge is affirmed by Aquino (2015) as having good content knowledge in the course is considered a prerequisite for effective teaching.

Mathematical content knowledge and mathematics pedagogical content knowledge were likewise deemed essential by the participants in 21st century mathematics teaching as these competencies can help teachers to simplify and translate complex mathematical concepts into practical application that can aid students in understanding abstractions by relating them to real world scenarios.

Providing opportunities for the students to relate themselves to mathematical concepts can increase their engagement and participation in classroom discussion. A participant describes the importance of developing mathematics content knowledge as follows:

> "... students can gain interest in learning Mathematics if taught in a way that is relevant and relatable to them; they will appreciate the subject and recognize its importance [P1]."

In addition, another participant justifies the importance of relating mathematical abstractions to students' lived experiences. This is recounted as follows:

> "…Learners shall develop critical thinking skills in dealing with problems encountered in Mathematics that are relevant to their lives; thus, the teacher may/should find ways on how to help learners gain these skills [P3]."

Participants' preference on technological knowledge reflects their initiatives of integrating technology tools and aids in instruction. As the presentation of educational content becomes more interactive, this technology integration in teaching can assist teachers convey knowledge in numerous formats through multiple sensory modalities that students can understand and modify. This multimedia-based interactive interface helps boost learners' motivation and interest in learning content across subjects. This notion is affirmed by one of the participants:

> "… Making use of aids and tools creatively to catch student's attention… This can also develop students' thinking and reasoning mathematically, posing, and solving mathematical problems, communicating in, with, and about mathematics. [P7]."

Likewise, Bañez and Yedra (2019) noted that students' exposure to ICT-related tasks or activities can help them develop skills and capabilities that are important in the digital era, such as creative thinking, higher-order thinking, and solid reasoning, as well as effective communication and high productivity. Participants who regard professional beliefs and disposition as essential competencies in 21st century mathematics instruction believe that these competencies can help teachers to promote a positive environment favourable for learning and exhibit excellence in instruction and classroom management for learners. These competencies enable teachers to exhibit strong commitment to motivate and influence their students to become lifelong learners. A participant stresses the importance of professional beliefs and disposition as follows:

> "… able to identify students' need since it is a crucial component of my job to get to know my students beyond instructional level, learning about their interest, recognizing changes in moods making sure that students are mentally and emotionally focused on learning [P4]."

Lualhati (2018) supported this observation by emphasizing that building harmonious relationships and fostering clear communication with students and their parents can help institutions develop a productive and positive classroom atmosphere, which can have a significant ripple effect that improves learning over time.

2.2 Initiatives which Need to be Undertaken to Develop the Competencies

In response to the regional integration brought by globalization that the country faces today, congruence of professional competencies to global standards becomes imperative. This situation necessitates the adoption of a "glocal perspective" among institutions of higher learning, requiring them to align the competencies of prospective graduates across disciplines with both national and global qualifications frameworks, thereby responding to local labor market needs while remaining internationally comparable (Allais, 2010). In pre-service mathematics training, the alignment of the institutional standards to the demands of the global community plays a pivotal role in producing quality mathematics teachers who will be tasked to strengthen and maintain the mathematical literacy of students not only in their respective countries but also in the entire ASEAN region.

The participants advocated initiatives that must be undertaken in order to develop the above mentioned competencies. These schemes are recapitulated in Table 2.

Table 2:
Initiatives that need to be undertaken to develop the competencies

Themes	Subthemes	Exemplar Texts
Institutional Level	Strengthening teachers' capability through trainings and community partnership	Education institutions should support faculty development program [P1] Ensure school-community partnership[P2]
	Improving instruction through provision of state-of-the-art facilities	Provision of the state-of-the-art facilities [P5]
Local Level	Empowering school leaders	Facilitating training for school leaders [P4]
	Crafting responsive curriculum for Filipino learners	Responsive curriculum for the 21st century [P1] Strengthening mathematics instruction through relevant curriculum crafted by CHED in coordination with PRC considering PPST [P6]
Global Level	Responding to global challenges	Revitalization of EFA through transparent leadership [P4] Achieving resiliency through educational innovation and reforms responsive to global trends [P5]

Legend: [P1] to [P7] means participant 1 to participant 7.

In securing competencies for a responsive 21st Century Mathematics instruction, initiatives that are supportive for acquiring these competencies by pre-service and in-service Mathematics teachers are seen as vital. These initiatives can be undertaken by Teacher Education Institutions (TEIs) to empower and refine pre-service and in-service Mathematics teachers' instructional practices. These initiatives operating at the institutional level include strengthening pre-service and in-service teachers' capability through training and community partnerships supplemented with the provision of state-of-the-art facilities. Within the local level, school leader empowerment and responsive curriculum for Filipino learners can be made possible through the collaboration and coordination of national agencies that are essential in developing competencies relevant to 21st century mathematics pedagogy.

With institutional and local initiatives for attaining competencies, Mathematics instruction in the country can respond to the global challenges of achieving resiliency through educational innovations and reforms responsive to the global trends. This responsiveness of education through multilevel initiatives supportive of developing 21st Century competencies on Mathematics teaching can ensure positive educational reforms beneficial for the citizens of the country. Hoy and Miskel (2012) asserted that positive educational reforms can be possible through the implementation of initiatives at various

levels aiming for quality education through school effectiveness, accountability, and improvement.

3. Discussion

3.1 The Proposed Competency Model for Secondary Mathematics Teachers

The interview conducted among a number of principals, head teacher and master teachers in Mathematics, emerged from the content analysis of the interview transcript, revealing the competencies needed by competent mathematics teachers. Three major competencies that 21st century mathematics teachers were highlighted with comprised professional knowledge, professional beliefs and disposition and classroom management skills. Hence, mathematics pre-service teachers' training is seen to revolve among these aspects.

This competency model in Figure 1 shows the framework of the set of skills and abilities which are deemed important in the workplace, in a sense that it is the blueprint of success in one's profession (Centranum, 2020). The researcher chose and constructed the circular shape of this model to convey the wholeness of all components coming together in developing the competencies an effective mathematics teacher of secondary learners should acquire. As it illustrates the proposed competency, the model aims to harmonize the institutional standards of teacher education institutions offering secondary teacher education programs specializing in mathematics with the emerging demands of the local and global community.

3.1.1 Professional knowledge

Professional knowledge can be equally broken down into competencies of General Pedagogy, Mathematical Content, Mathematics Pedagogical Content, Technological Knowledge and Technological Pedagogical Knowledge.

It is imperative that educators have extensive knowledge on the content area of the subject they are teaching and what to do and how to deliver the content to the learners—pedagogy. One's approach to teaching mathematics will likely be shaped by the teacher's competency on using general pedagogical knowledge.

General Pedagogical Knowledge refers to the understanding and use of teaching approaches, learning theories and modalities in general context and environment (SEI & MATHTED, 2011). While the use and application of pedagogical knowledge will vary in individuals, literature shows features such as adaptation, problem solving strategies, decision making and perception of classroom events and sensitivity to learners as among

the characteristics of a teacher expert (Guerriero, 2017) in this competency. General pedagogical knowledge is not unique to teaching mathematics alone. Rather, this encompasses the overall ability of a teacher to use available methods, strategies and resources to teach whatever should be taught.

Mathematical Content Knowledge requires knowledge base of the subject matter and this includes K-12 mathematics and University mathematics for first year to third year of mathematics teacher education program (SEI & MATHTED, 2011); mastery of the content within and across curriculum; adeptness in literacy and numeracy skills; conceptual knowledge of structuring and organizing principles of mathematics as a discipline.

Mathematics Pedagogical Content Knowledge is a specific aspect of pedagogical content which focuses on knowing how mathematics content is taught. This includes the teacher's expertise in assessment which includes analyzing or evaluating students' mathematical solutions and diagnosing and addressing misconceptions; instructional planning and practices; sequenced teaching and learning processes in real life context; knowing about typical pre-conditions of students and how to represent a topic in the best possible way; choosing materials that are appropriate in teaching the content; and applying teaching strategies that develop critical and creative thinking, problem solving and higher order thinking skills.

With many definitions of technology in education, the knowledge in relevant technological processes and resources made available to students is now a disciplined concept to classroom success. Technological knowledge includes the secondary teacher's literacy in technology, proficiency in digital abilities, positive use of ICT (DepEd & Teacher Education Council, 2017) and knowledge on available technology for educational purposes in the teaching and learning of mathematics.

Technological Pedagogical Content Knowledge (TPACK) on the other hand involves the skills in identifying appropriateness of technology and applying the best technology available to provide solutions and aid in facilitating student learning of a particular topic or mathematical concept. This competency also considers the variety of digital and electronic tools made available for the mathematics classroom (Dong Yu, 2019).

3.1.2 Professional beliefs and disposition

Apart from knowing professional knowledge such as pedagogy and content areas of mathematics and its teaching, teachers must also demonstrate professional attributes which influence facilitating the learning process. Professional beliefs include the credence on the nature and purpose of mathematics, and in mathematics learning and teaching. Professional dispositions allow teachers to prepare and conduct their classes in a manner expected of a mathematics teacher (Professional Dispositions in Education | Purdue Online, n. d.) such as commitment to teaching, employing a positive discipline and inclination to use mathematics in solving problems in real life. Students and other learners have the tendency of fearing mathematics when faced with challenging problems in what is called math anxiety or phobia which causes distress and apprehension (Beilock, 2019). It is therefore important that teachers display mathematical disposition that eases students into transiting and overcoming this situation.

Another aspect of this area is the teacher's motivation and ability to self-regulate (Richardson found in Blomeke and Delaney, 2012). Self-regulation is the teacher's ability to alter one's behaviour. Another way of looking at this competence is the adaptability and flexibility that enables a teacher to adjust and decide on one's actions as the situation demands it. Motivation, the drive to do something, is relevant and congruent to self-regulation (Baumeister & Vohs, 2007).

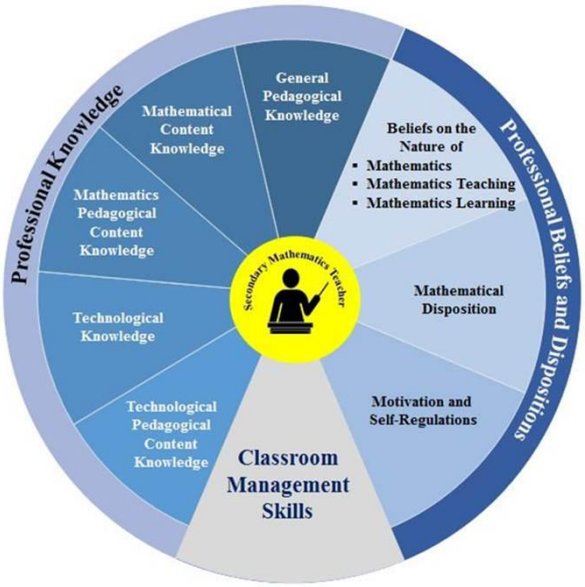
3.1.3 Classroom management skills

The last competency which makes up the model is classroom management skills. In the model, this is by no means less important nor the least in the degree of relevance. This competency is not unique to mathematics teaching but is at the core of every educator's skillset. This includes management in classroom structure for meaningful engagement and exploration, creativity in making tools and aids, classroom communication strategies which include the use of verbal and non-verbal communication strategies to support learners' understanding, participation, engagement, and achievement. Aside from those already mentioned, the teachers' approaches in providing a favorable environment for student learning including the physical set-up and the use of equipment, tools, kits, gadgets, and facilities are needed to effectively teach mathematics (SEI & MATHTED, 2011) are also essential factors in this competency.

3.2 Development of Secondary Mathematics Teachers' Competencies

The proposed competency model requires the harmonization of professional knowledge, professional beliefs and mathematical disposition, and classroom management skills in empowering pre-service Filipino mathematics teachers to be fully competent and globally competitive. A fully qualified mathematics teacher possesses good mathematical subject knowledge, as well as mathematics pedagogical expertise and managerial abilities, demonstrates an appropriate mathematical disposition, and values one's own professional development (SEI & MATHTED, 2011).

Figure 1: *The Proposed Competency Model*



Central to this competency model is the secondary teacher as shown in Figure 1. To sustain and achieve the competencies conveyed in this model, strengthening of the content or knowledgebase in mathematics, continuous evaluation and monitoring of the pedagogy, and technological updates can be initiated. Professional beliefs and dispositions of teachers must be supported as teachers meet new demands and challenges brought by trends and changing times. Classroom management skills must also be sustained to keep students orderly, attentive, and academically productive during a class. This competency model can serve as a basis for enriching activities and programs adapted by Teacher Education Institutions to empower the pre-service mathematics teachers.

4. Conclusions

Professional knowledge can help teachers acquire extensive knowledge on the content area of the subject they are teaching, master content within and across curriculum, apply teaching strategies that develop critical and creative thinking, problem solving and higher order thinking skills, use ICT for educational purposes in the teaching and learning of Mathematics, and apply the best technology available to provide solutions and aid in facilitating student learning. Professional beliefs and disposition can help teachers demonstrate professional attributes which influence facilitating the learning process, preparing and conducting classes, employing positive discipline and manifesting commitment to teaching, and enabling a teacher to adjust and decide on one's actions as the situation demands it. Classroom management skills can help teachers manage classroom structure for meaningful engagement and exploration and provide a favorable environment for student learning which include the physical set-up and use of equipment, tools, kits, gadgets and facilities needed to effectively teach mathematics. To develop the competencies, initiatives in the institutional, local, and global setting must be undertaken which involves strengthening pre-service and in-service teachers' capability.

This can be done through trainings and community partnerships supplemented with the provision of state-of-the-art facilities, empowering school leader and crafting responsive curriculum for Filipino learners through the collaboration and coordination of national agencies that are essential in developing competencies relevant to 21st century mathematics pedagogy, and responding to the global challenges of achieving resiliency through educational innovations and reforms responsive to the global trends. Ultimately, the harmonization of the professional knowledge, professional beliefs and disposition, and classroom management skills can empower pre-service Filipino mathematics teachers to be fully competent and globally competitive and these identified competencies in the model when acquired by secondary mathematics teachers can result to exemplary performance in the academe that would create reasonable impact in the institution and can mobilize the status of teachers' training in the country.

5. Recommendations

This study recommends that while students are still in the pre-service programs, they may be encouraged to take part in discipline-specific competency-enhancement opportunities such as workshops, research collaborations and best practices expositions to intensify

their mathematics content knowledge. In addition, they may consider the three major competencies in preparing the pre-service mathematics teachers: professional knowledge which can help the future teachers strengthen their content or knowledge-base in mathematics, evaluate and monitor the pedagogy and initiate technological updates; professional beliefs and disposition which can support the future teachers in meeting new demands and challenges brought by trends and changing times; and classroom management skills which can aid the future teachers manage classroom structure to keep students orderly, attentive and academically productive during a class. Teacher Education Institutions may consider fulfilling the provisions in the proposed competency model for secondary mathematics teachers in implementing their Teacher Education Program in mathematics.

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