Chapter 7
Congruence Between Context and Opportunities for Professional Development of Mathematics Teachers in the Philippines

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Abstract Like in many other developing countries, mathematics education in the Philippines is often intertwined with macro problems that arise from the sociopolitical context of schools. We investigate the extent to which preservice and in-service education are able to prepare secondary teachers for teaching mathematics at the level of ordinary classrooms. Our analysis is based on the scholarly literature as well as on in-depth interviews with 22 classroom teachers from 12 of 17 Philippine regions who were accepted in a special credential program. We also discuss the macrostructures that exact considerable influence on classroom teaching.

Keywords Pre-service · In-service · Content knowledge · Mathematical pedagogical content knowledge

7.1 Introduction

Due to teachers' crucial role in improving student outcomes, it is necessary to examine teacher preparation at both the preservice and in-service level. The underlying assumption is that mathematics teachers may not be prepared to structure classroom activities that can facilitate mathematical learning. Indeed, studies have shown that mathematics lessons are dominated by rules and drills (Bernardo

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and Limjap 2012), and that teachers primarily view themselves as transmitters of knowledge (Golla and de Guzman 1998).

In this chapter, we discuss professional development (PD) from the perspective of secondary school mathematics teachers. If teachers are accountable for poor student performance, we find it necessary to also question whether teachers themselves have adequate mechanisms for professional growth. We investigate whether the conditions under which teachers work constrain their pedagogical choices. Specifically, we explore whether their opportunities for PD are aligned with the competencies that are required to teach effectively in Filipino classrooms.

This chapter consists of three parts. First, we present a brief overview of the preservice education for secondary school teachers in the Philippines. Next, we describe typical in-service (INSET) programs. Integrated within these two sections are the perceived effects of these PD programs in terms of addressing teachers' needs. The third section addresses the macrostructures that shape teachers' practice. Unless otherwise specified, our data was drawn from questionnaires and interviews with 22 secondary teachers from 12 of the 17 Philippine regions. These teachers are recipients of a competitive scholarship program for a master's degree in mathematics education. A copy of this chapter was sent to these teachers to validate their responses.

7.2 Context

The Philippine basic education system is governed and regulated by the Department of Education (DepEd). It is a highly centralized and hierarchical structure. All administrative and educational policies are defined by the Central DepEd office (Bernardo and Garcia 2006). According to its official Web site (http://www.deped.gov.ph), the DepEd is organized into 17 Regional offices, which is further composed of a total of 157 Division offices supervising a total of 40,763 elementary and 7683 secondary schools. Despite efforts toward decentralization and school-based management, the educational system is still very much a top-down bureaucracy serving a large number of widely dispersed schools (Luz 2008). Perhaps it is not surprising that within this model, a cascade model of PD is very common, despite its many shortcomings (Nebres 2006).

Like in many other developing countries, the Philippine educational system is fraught with macro problems, or external conditions that pose permanent challenges to mathematics teachers (Nebres 2006). These include large class sizes (i.e., 80 students), lack of infrastructure (such as classrooms or toilets), inefficient dissemination of educational materials, and a large dropout rate. It is within this context that the low achievement of Filipino students (for example, in TIMSS studies) should be considered.

7.3 Preservice Mathematics Teacher Education in the Philippines

Secondary school mathematics teachers typically undergo a 4-year university course leading to the degree of Bachelor of Secondary Education (BSEd) with a Major in Mathematics. In a report by Ogena and Golla to the 2008 IEA-Teacher Education Development Study in Mathematics (TEDS-M) (Tatto et al. 2008), the BSEd Major in Mathematics is offered by 546 teacher education institutions (TEIs). Its curriculum is guided by the Commission on Higher Education (CHED), which is the government body that oversees tertiary education in the country (CHED 2004; for further details, refer to Vistro-Yu and Villena-Diaz 2009).

As prescribed by the curriculum, preservice teachers specializing in mathematics complete 60 units of content courses. An analysis of the 19 TEIs that participated in the TEDS-M revealed that content courses varied considerably—in fact, there is not one mathematics subject that is taught by all TEIs (Basco et al. 2013). In our interviews, we learned that the content courses typically included college algebra, trigonometry, geometry, statistics, calculus, and to a less extent, more advanced subjects. These courses are comparable with the secondary school topics that the preservice teachers are expected to teach, a reality that has not changed since Golla and de Guzman's study in 1998.

The preservice program also includes 51 units of professional education courses. Typical subjects include foundations of education, measurement and evaluation, guidance and counseling, educational technology, and curriculum development. Notably rare are mathematics pedagogy courses, and in some institutions, are nonexistent. This presents a major gap in preservice teacher preparation, especially because mathematical pedagogical content knowledge has been identified as a weakness among mathematics teachers. For example, in a study involving 61 teachers from three Philippine regions, many teachers depended on mathematical rules and could not produce alternative solutions or explanations (MATHTED 2011).

In the context of a developing country, the notion of pedagogical content knowledge includes the macrostructures that surround the classroom environment (Johnson et al. 2000). As they argue, "the environment in which the teacher works still determines which classrooms strategies are workable and which are not." (p. 186). However, from our data, some teachers felt that preservice training hardly prepared them to confront problems that they eventually encountered in schools, such as large class sizes or poor English language proficiency. As Teacher A opined, educational principles are very idealistic but are not applicable in the field. To cite an example, Teacher B described cooperative learning as a teaching strategy encouraged in his preservice program. This setup, however, is not feasible in a crowded room of 70 students. Teacher C also described the strategy of roaming around the room to provide some guidance. In reality, though, his classroom was so cramped that he could not even walk between desks. Teacher A further lamented

that preservice teacher educators are often not exposed to public schools, so educational theories are seldom contextualized in local realities.

Teachers also observed that the content of many education courses are theoretical and have hardly been updated over several decades. Teacher D lamented, "we learned to memorize concepts, people, dates and they did not even teach us how these things were related to the kind of education right now." Teacher A felt that the content is shaped by western perspectives, echoing Vistro-Yu's (2008) position that the mathematics taught in the Philippines can be traced to the mathematics instituted by its colonial masters, with little consideration for the Philippine sociocultural context.

The prevailing disconnect between education courses and the local context is somehow addressed by one or two semesters of practice teaching (practicum). During their practicum, preservice teachers are given tasks such as checking assignments, helping students, acting as a teacher's aide and sometimes handling the classes themselves. Although the classes they handled for their practicum were often not comparable to the classes they would eventually handle as teachers, practice teaching is perceived to be the most useful component of the preservice program, primarily because it allows for a genuine experience of the learning environment.

7.4 In-Service Mathematics Teacher Education in the Philippines

An INSET program is annually incorporated in the school calendar released by the DepEd. This INSET may range from 3 to 5 days, and for some teachers, this is the only INSET program they may experience. However, its main focus is not mathematics because it is typically delivered to all secondary school teachers in one school or in one Division, regardless of the year level or the subject that they teach. The teachers we interviewed reported that they were not consulted regarding the design of INSET programs. Often, they only learned about the INSET structure on the day itself.

This annual INSET is obviously limited in terms of developing mathematics teaching. It focuses on assorted topics, including leadership, speech power, journalism, classroom management, children's rights, HIV, or "*kung ano lang mapagisipan ng* speaker (whatever the speaker thinks of)." At times, the topics are based on re-echoes of national or regional seminars that were attended by a selected group of teachers. Another possible INSET focus is on school administration concerns, such as the management of faculty club funds or computation of grades. The speakers or facilitators are sometimes a teacher selected by the supervisor [usually the *kadikit* (favorite)]. Moreover, a teacher may use the INSET to perform demonstration teaching in return for "points" that will contribute to their promotion.

In such a landscape, mathematically focused INSET is often implemented outside the annual school INSET. For example, Teachers E and F (from two different regions) described their INSET experience where a profiling survey was conducted to assess teachers' subject matter knowledge, and the least mastered topics formed the basis of subsequent INSET programs. Teachers met monthly and discussed mathematical lessons and teaching strategies. Teacher F explained that the program was fully supported by her principal and Division supervisors. There was also a level of professionalism whereby INSET facilitators needed to pass a stringent screening process that included a written exam in mathematics and an interview. Those who passed the screening process underwent a 5-day training seminar on how to be effective facilitators.

Indeed, there is no shortage of large-scale and smaller scale school improvement programs that include in-service development as a major thrust (Bernardo and Garcia 2006). These programs represent efforts toward decentralization of the DepEd, and they offer alternative forms of PD other than the cascade model. Outside of these initiatives, however, INSET programs that focus on mathematics education are mostly short term and sporadic. The teachers we interviewed said that the INSET opportunities often do not follow a coherent long-term objective.

Major curricular changes can also spur national-scale INSET. The teachers' experience of these mass trainings reflects Nebres' (2006) repeated accounts of poor implementation of PD. Training was often cascaded (i.e., "echoed") through several levels before reaching the majority of classroom teachers.

Teachers also reported some disjunctures between their INSET experiences and their classroom context. Some INSET seminars focused on the integration of technology in mathematics teaching, while some presented activities that required the use of an LCD projector. However, it is not sensible to expect that there would be enough of the required equipment in resource-poor schools. Additionally, the classroom culture is not always compatible with the teaching strategies presented during INSET. For example, a major focus of a secondary level INSET program was on critical thinking and exploration, but this was considerably different from the "spoonfeeding" method that their students were exposed to in their elementary school years. As one teacher mentioned, "*ikaw na nga gagawa ng activity, ikaw din ang sasagot* (you designed the activity but you end up answering it as well)." Further, for these strategies to work, teachers are compelled to provide worksheets and other materials for students at their own expense.

Several suggestions were offered as to how an "ideal" INSET program could be designed. The most common plea reiterated by the teachers was for more INSET that relate to the specific content and pedagogy of *mathematics*. For them, INSET programs that focus on mathematics are few and far between. A focus on mathematics content is crucial because the teachers themselves admitted that they have very basic knowledge of some secondary school topics. They also observed that many of their colleagues have misconceptions and are not comfortable teaching topics they had not taught before. They also maintained that some secondary school topics were not included in their preservice training, or that these were not taught with much depth.

Teachers also appealed for more INSET programs that focus on mathematics teaching strategies. They generally wanted to learn strategies for teaching basic concepts such as fractions and signed numbers that impede performance in secondary school mathematics. Many expressed the need to learn techniques to make it "easier" for their students to learn mathematics. Some also discussed the need to learn strategies that can increase their students' motivation to learn. In rural areas, for example, many students do not see any relevance in studying mathematics, especially if they do not have plans to pursue a university degree.

7.5 Prohibitive Macrostructures

Considering the data and the literature, three macrostructures were identified to impede student learning and professional growth. First, poverty is often cited as a major cause of absenteeism or dropping out. In rural areas, half the class may miss school to help their families work in the fields. Parents themselves do not necessarily provide enough support for students to stay in school.

A second prohibitive structure arises from the shortness of professionalism within the educational system. Luz (2008) describes how the educational system is largely credential driven, providing incentives for teachers to pursue graduate degrees relentlessly, even if it means enrolling in graduate schools of dubious quality. Because some INSET programs may focus on topics that are not necessarily connected to teachers' concerns, the main incentive for attendance tends to be the certificate handed out at the end.

The third prohibitive macrostructure is the culture of obeisance and the tolerance for corruption (Bautista et al. 2008). In our interviews, teachers describe how structures prevent them from giving students a failing grade, presumably to improve school performance. If they give a failing grade, they may even be summoned by the principal or Division supervisor. Their teaching abilities are questioned and they are blamed for student failure. While teachers are officially encouraged to help students learn, in reality, they are entrenched in a culture of "mass promotion" and "fake achievement." This opens up a cycle of problems wherein teachers themselves are challenged to teach mathematics to students who have not been adequately prepared to learn the expected competencies. The teachers mention examples of sixth-graders who still cannot read or fourth-year high school students who cannot perform operations on signed numbers. They indicate that one shortcoming of the intended curriculum lies in the assumption that students had mastered elementary mathematics. Insofar as teachers are evaluated on the basis of their students' grades and performance in national assessments, teaching practice will not necessarily reflect a teacher's beliefs of effective mathematics teaching (Vistro-Yu and Villena-Diaz 2009).

7.6 Discussion and Future Directions

Teachers are often implicated for poor student performance. In this chapter, we described teachers' perceptions of how PD opportunities are contextualized in local realities. Likewise, there are continuing, but at times sporadic, efforts to address poor mathematics performance. Thus, much work needs to be done in terms of systematically planning PD programs.

A main area of concern is the apparent lack of mastery of mathematics among future and in-service teachers, and the limited opportunities for developing mathematical pedagogical knowledge. Another pressing need is to curb the extent to which prohibitive macrostructures constrain professional growth. In the context of poverty, professional development is only one of many elements of improving education. Indeed, when an empty stomach is a more obvious learning obstacle, the provision of basic services should be included in any discussion about raising performance.

The flawed reward system and the culture of obeisance undermine the value of education. For as long as salary increases and promotion are based on mere certificates, then PD for teachers will remain a farce. For as long as corruption is tolerated at the administrative level, the teachers will see PD as a directive and not something that they could genuinely desire for their own selves.

Clearly, this has to change. Administrators need to temper expectations and relieve teachers from the pressure of reporting success at all cost. More power needs to be devolved to the Regional or Division offices so that PD programs can be followed up and be better suited to the local context. Additionally, stricter standards such as renewal of teaching licenses can help develop a culture of self-improvement and professionalization.

Perhaps due to the top-down structure of the educational system, teachers view themselves to be passive recipients of mathematics content and teaching strategies. Teachers must recognize that they are co-agents of change. In turn, PD programs must develop teachers' adaptive strategies, so that they can be better prepared to carry out the demands of teaching in challenging situations.

References

Basco, L.V., Dimaculangan, F. A., Gomez, B. G., Nool, N. R. Torino, I., Fortes, E., & Villena-Diaz, R. (2013). *Mathematics curriculum analysis of selected TEIs in the Philippines.* Paper presented at the 9th Biennial MATHTED Conference, Bacolod City, Philippines.

Bautista, C. R. B., Bernardo, A. B. I., & Ocampo, D. (2008). *When reforms don't transform: Reflections on institutional reforms in the Department of Education. HDN discussion paper series (2008/2009)* Retrieved May 7, 2011, from http://hdn.org.ph/wp-content/uploads/2008/10/dp02_bautista_etal.pdf

Bernardo, A. B. I., & Garcia, J. A. S. (2006). School improvement in a centralized educational system: The case of the Philippine basic educational system. In J. C. Lee & M. Williams (Eds.), *School improvement: International perspectives* (pp. 227–244). Haugpauge, NY: Nova Science Publishers.

Bernardo, A. B. I., & Limjap, A. (2012). *Investigating the influence of teachers' pedagogical beliefs and reported practices on student achievement in basic mathematics*. Paper presented at ICME 12, Seoul, Korea.

CHED. (2004). *CHED memorandum order no. 30 s. 2004*. Manila: Author.

Golla, E., & de Guzman, E. S. (1998). Teacher preparation in science and mathematics education: A situation analysis. In E. B. Ogena & F. G. Brawner (Eds.), *Science education in the Philippines: Challenges for development* (pp. 41–77). Quezon City, Philippines: NAST SEI CIDS, UP.

Johnson, S., Hodges, M., & Monk, M. (2000). Teacher development and change in South Africa: A critique of the appropriateness of transfer of northern/western practice. *Compare, 30*, 179–192.

Luz, J. M. (2008). *The challenge of governance in a large bureaucracy (Department of Education). HDN discussion paper series (2008/2009)* Retrieved November 9, 2013, from http://hdn.org.ph/wp-content/uploads/2009/05/dp01_luz2.pdf

MATHTED [Philippine Council of Mathematics Teacher Educators]. (2011). *Training Workshop to Develop Mathematical Pedagogical Knowledge*. Unpublished technical report submitted to Science Education Institute (SEI).

Nebres, B. (2006). Philippine perspective on the ICMI comparative study. In F. K. S. Leung, K.-D. Graf, & F. J. Lopez-Real (Eds.), *Mathematics education in different cultural traditions: A comparative study of East Asia and the West* (pp. 277–284). New York: Springer.

Tatto, M. T., Schwille, J., Senk, S. L., Ingvarson, L., Peck, R., & Rowley, G. (2008). *Teacher Education and Development Study in Mathematics (TEDS-M). A*msterdam: IEA.

Vistro-Yu, C. P. (2008). Ensuring access to quality mathematics education to overcome inequities: A developing country's perspective. A plenary panel presentation, ICME, Monterrey, Mexico, July 6–13.

Vistro-Yu, C. P., & Villena-Diaz, R. (2009). Teachers' beliefs, instructional practices, and culture: Understanding effective mathematics teaching in the Philippines. In J. Cai, G. Kaiser, B. Perry, & N.-Y. Wong (Eds.), *Effective mathematics teaching from teachers' perspectives: National and cross-national studies* (pp. 183–201). Rotterdam, Netherlands: Sense Publishers.