

The Development of Numeracy Skills of Primary Grade Pupils Through Mother Tongue-Based Multilingual Education: A Phenomenological Study

Ma. Jo-Ann Alfonso-Mendoza

Department of Education, Sorsogon City Division, Philippines

Email: majoann.mendoza@deped.gov.ph

Abstract— It has been eight years when the K to 12 Basic Education Curriculum was implemented in the country and Mother Tongue-Based – Multilingual Education (MTB-MLE henceforth) was inherent to its enactment. During this period, many issues have been raised concerning its overall impact specifically on the learning and acquisition of one of the most challenging content areas, the mathematical skills of each learner. This study explored on the experiences of teachers on the development of numeracy skills of primary pupils using MTB-MLE. Teachers’ experiences on the development of numeracy skills among primary pupils through MTB-MLE were a smooth flow of instruction in Mathematics when MTB-MLE is used as a LOI, enhanced engagement to instruction showing confidence, interest and enjoyment on the lesson, enriched parent-teacher partnership in building numeracy among the learners, difficulties for some pupils to count in Bicol, and difficulties met in localizing, contextualizing and translating teaching materials for mathematics instruction. Strategies teachers use to develop numeracy skills of pupils using MTB-MLE along pedagogy were use of locally-made materials or objects found in the community, exposing pupils to more drills and exercises, attendance to seminars is helpful, Differentiated Instruction (DI), using manipulative, real and tangible object as instructional materials, translation, using collaborative approach teaching; along learning engagement were play-based instruction, simple gifts as rewards and attractive and purposeful instructional materials through ICT; assessment of learning were differentiated assessment activities, and play-based assessment and observation. There were different learning activities implemented to develop numeracy particularly in Contextualization such as experiential learning; Translation such as English nursery rhymes in Bicol; Indigenization such as use of local materials as instructional materials and Localization such as involving community in the learning process. The gaps and issues encountered by teachers in developing literacy skills using MTB-MLE were the poor retention and low mastery of the four fundamental mathematical operation, complicating and varied learning

competencies in the Curriculum Guide, and difficulties encountered by the pupils in mathematical problems.

Keywords— Development of Numeracy Skills, MTB-MLE, Mathematics, Teachers’ Experiences, Phenomenological

INTRODUCTION

Given the shift of language of instruction in the Philippine education curriculum today, it is important for teachers in mathematics education to consider in their research the consequences of this shift to the teaching and learning scape. It has been eight years when the K to 12 Basic Education Curriculum was implemented in the country and Mother Tongue-Based – Multilingual Education (MTB-MLE henceforth) was inherent to its enactment. During this period, many issues have been raised concerning its overall impact specifically on the learning and acquisition of one of the most challenging content areas, the mathematical skills of each learner. It has been a notion that mathematics education is not a stand-alone learning content in the curriculum but by its nature inter-disciplinary, and language as a learning tool plays a crucial aspect to consider for teaching and learning to be successful.

As teachers and frontliners of this new curriculum have many challenges met at hand that must be addressed systematically. Barwell and Clarkson recommend that research for mathematics must bring about information on the practices of teaching mathematics in multilingual classroom. Research into multilingualism within mathematics education has drawn on a variety of theoretical perspectives including bilingual education, theories of cognition and approaches to socio-linguistics. Investigation on these areas leads to identify theories relevant to work in mathematics education, application of these theories in mathematics education, the challenges which arise from working with theories from other disciplines and the different implications to mathematics teaching that focused on the role of the teacher in supporting mathematics learning in multilingual mathematics classrooms. Although, the demands in research have become too challenging, it is but right to initially look at ‘ground zero’ of

implementing mathematics education via MTB-MLE in the local setting.

Despite the many claims on the effectiveness of using mother tongue as medium of instruction in the primary years, the problem on language proficiency as an obstacle to learning mathematics via the learner's mother tongue is a challenge. Basically, many mathematical terms in English language have no specific translations in Bikol-Sorsoganon that caused great difficulty if the learner's mother tongue is to be used exclusively to teach mathematical concepts. In the study of Burton, she included academic language as one difficulty in translating academic terminologies to Bikol. It pointed out that data consistently showed mathematics as well as science terms as the most difficult areas for using the mother tongue. The curriculum requires pupils to use Bikol numbers but in fact by itself is a challenge. In the classroom observation conducted by this study, pupils first counted objects in English spontaneously and then gave the final sum in Bikol as a mere translation of their answers. Teachers insisted this as by itself a problem because the problem was on learning the numbers in Bikol rather than learning the concepts being taught. Likewise, this challenge has arisen because of a disjointed language pipeline in which pupils have learned key mathematical concepts in English at home and Bikol in school might really be confusing. Mathematics education begins in language; it advances and stumbles because of language, and its outcomes are often assessed in language. This statement captured the important role of language as a resource in the teaching and learning of Mathematics.

There are also varying context in mathematics classroom brought about by the complicating factors concerning individual teachers as well as the different languages of communication used by pupils and teachers, and how both of them view and use them. It is useful to begin by looking deeply into teacher's role in situations and more researches are needed to clarify the roles that teacher may play. Setati and Adler discussed the language practices of teachers in some primary schools in South Africa where students' normal out-of-class talk is in a non-English language, but the official teaching language is English. They were interested in the code-switching behaviour of teachers suggested that it makes a lot of sense for teachers to encourage students to code-switch, and use this as a teaching strategy too, although there are challenges in this practice that cannot be overlooked.

For Gorgorio and Planas, it is hard to separate the social, cultural and linguistic aspects of mathematics teaching

and learning. Likewise, Khisty and Chval disclosed that a critical issue was the way teacher used precise and extended mathematical language in her verbal discourse with her class and promoted an expectation that the students would also use such language. The results of the investigation suggested that students did in the end use the formal mathematical language promoted by this teacher because the students were witnesses to deliberate examples of such discourse.

Meanwhile, the Philippine context for teaching mathematics through MTB-MLE needs to be looked into because the country is yet conceiving the academic and life-long effects of this new language policy to the numeracy skills of every Filipino. In the prevailing language policy of the country, the MTB-MLE shall be implemented into two modes: as a learning/subject area and as a medium of instruction. The learner's Mother Tongue (L1) shall be used as the medium of instruction (MOI henceforth) in all domains/learning areas from Kindergarten through Grade 3 except Filipino (L2) and English (L3). To comply with the guidelines, Mathematics as a specific learning area is taught using the pupil's L1 from Kindergarten to Grade 3.

As earlier mentioned, there are still grey areas for further investigation as to the implementation of MTB-MLE not only as a subject but as MOI. Specifically, for Mathematics which basic terms are in English language and Bikol as a language has limited and no exact translation or if there may be, are not familiar to pupils because their home languages are no longer the 'now archaic Bikol' but are being used as MOI. Also, more of the primary pupils are raised with Bikol, Filipino and English used all together in everyday conversation at home, with friends and other people in the community due to the proliferation of social media, people's mobility, marriage, employment and the like that makes people vulnerable to learning different languages and unknowingly use them interchangeably. From this real scenario, teachers are faced with pupils whose L1 is not the Bikol variations that they expect their pupils to speak and their pupils come from varied home languages and culture.

Now, the classroom scenario is really complicated. No matter how complicated, the teachers have the technical skills and competences to deal with the different facets of learning. Therefore, this research delved with the experiences teachers have along the implementation of MTB-MLE in teaching Mathematics at their own unique contexts. Their unique context may give relevant implications, assumptions and/or suppositions to the effects of L1 to numeracy skills of the learners that will

later on play an important role to ascertain its effect to every learner. This research likewise yielded practical and real inputs on different teaching styles, approaches and strategies to numeracy skills among learners along pedagogy, learning engagement, and assessment of learning; relevant classroom activities that comply with the principles of contextualization, translation, indigenization and localization; the gaps and issues that must be addressed and the proposed output that this study may undertake out from the data gathered. All these, for the researcher, may give timely data needed to improve the teaching of Mathematics in the midst of the new educational reform. This research, on the other hand, gave pictures of the actual situations of the teachers themselves to bring about information on the practices of teaching mathematics in a multilingual classroom. As demanded by the objectives of this present research, all these data were collected and framed according to the conventions of the Grounded Theory Approach as a tradition of qualitative research. Thus, this research was vital to be conducted.

This study explored on the experiences of teachers on the development of numeracy skills of primary pupils using MTB-MLE. Specifically, it sought answers to the following questions:

1. What are the experiences of teachers regarding the development of numeracy skills of primary pupils using MTB-MLE?
2. How do teachers develop the numeracy skills of pupils using MTB-MLE:
 - a. Pedagogy
 - b. Learning Engagement
 - c. Assessment of Learning?
3. What are the different learning activities implemented to develop numeracy skills particularly using:
 - d. Contextualization
 - e. Translation
 - f. Indigenization, and
 - g. Localization?
4. What are the gaps and issues encountered by teachers in developing numeracy skills using MTB-MLE?

MATERIALS AND METHOD

The participants of this research were the primary grades teachers from Kindergarten to Grade 3. There were two districts for elementary level involved for Sorsogon City Division, the Sorsogon East and the Sorsogon West Districts. In Sorsogon East District, participants came from Sorsogon East Central School and Balogo Elementary School. From West District, they came from Pangpang Elementary School and Guinlajon Elementary School.

Although, a qualitative research does not rely on the number of respondents as to the validity of the data, the researcher decided to conduct the written interview sheet to more than two teachers per school to compensate data whenever needed. In Sorsogon East District, there were 19 teachers who responded to the written interview sheet and Balogo Elementary School has 13 teacher-participants. In Sorsogon West District, there were 13 teacher-participants from Pangpang Elementary School, 11 from Guinlajon Elementary School and 6 from Bitan-o Elementary School. These teacher-participants were in the teaching service for more than five years already in handling primary grades. Most of them were able to teach before the K to 12 Basic Education Curriculum was implemented, when the MTB-MLE was given birth. This qualification entitled them to compare and contrast teaching before and during the use of MTB-MLE as a language of instruction and was essential in giving information to answer the research questions for this present research. Such information led to the different experiences encountered by primary grades teachers in teaching mathematics using MTB-MLE as LOI for nine years already.

This study utilized a descriptive qualitative research design. It was framed according to the conventions of phenomenological research approach as a tradition to qualitative research. It employed printed individual interview sheet as a main instrument for this present study. Focus group discussion and face-to-face interview sessions were restricted at the time that these data were being collected due to the prevailing COVID-19 pandemic which guidelines were issued by the AITF. Data categorization was done on the written responses of individual teacher. To categorize data, content analysis using conventional method (actual content of the text) was employed. Recurrent themes and categories based from the responses of the informants were taken as categorical themes to answer the different inquiries of this present research

RESULTS AND DISCUSSION

1. Teachers' experiences on the development of numeracy skills among primary pupils through MTB-MLE

Several teachers' experiences were shared with the researcher on the responses in the written interview sheet. The experiences shared were categorized accordingly and discussed in this portion one after another.

- ***Smooth Flow of Instruction in Mathematics when MTB-MLE is used as a Language of Instruction (LOI)***

Most of the teacher-informants shared that they had a smooth flow of instruction whenever they use their learner's home language inside their classroom. Smooth flow of instruction in such a way that pupils can understand what the teacher is saying so there are few diversions from the main focus of the lesson only to explain or translate what teacher has previously said. "*Lain na kaipuhan ulit ulit sa mga estudyante kun nano dapat sabihon kay nasasabutan naman ninda ina* (No need for me to repeat what has been said because I was understood by the pupils already)" one participant stated. Another shared that: "It is easy for pupils to understand the mathematical problem when said in their own language than English. They can easily understand and they know what to do with the mathematical problem."

For teacher-participant, use of appropriate language especially in teaching mathematics can contribute to successful teaching-learning experience. There are no distractions in the class especially when teaching math concepts where the focus and lesson engagement of the teacher and pupils are very much important. Some distractions arise when there are terms that pupils cannot understand because it was the first time that the pupils heard about the word, or teacher has to explain further the underlying terms so that pupils can understand the mathematics concepts. On the other hand, pupils most of the time pretend to be knowledgeable about the terms so that teacher may continue with the discussion. This may be found dangerous for the pupils because they could not understand the lesson any further because here were unlock difficulties that they still have.

As emphasized by Bejiga, common error in mathematics is dependent on several factors. Caburnoc emphasized in her study that lack of prior knowledge or background on the subject leads to student's poor performance. Hence, Mathematics is highly sequential, knowledge of its basic skill is necessary. There is a need for teachers to explain underlying concepts or terms to pupils before proceeding to the main focus of the lesson. Teachers need to be familiar with the sequences in the lesson presentation as well as the background knowledge of their pupils so that they can prepare for any need of additional discussion only to unlock some difficulties among their pupils when the need arises.

- ***Enhanced engagement to instruction showing confidence, interest and enjoyment on the lesson***

With MTB-MLE as LOI, pupils have shown confidence, interest and enjoyment during class discussion. These are essential affective elements to make teaching-learning engagement successful. One participants said

that "Pupils are more engaged, motivated and inspired in learning mathematics when I am speaking their language in teaching them." Language is a learning tool that serves as connection between what the teacher would like to teach and what the pupil has to know. In the example given by the teacher-participant, she said, during her lesson in understanding the concept of zero, she made a play-based instruction. In Bicol term, zero is 'wara'. She first presented the concept using 'wara' instead of zero using a game to inculcate in the minds of the learner what zero is all about before she constantly use the 'zero' term in the succeeding lessons. Because the concept was presented interestingly, pupils were able to gain strong foundational knowledge and information about a particular mathematics concepts essential in the progressing lessons in mathematics.

For another teacher-participant, she shared that "Home language is used in the classroom, pupils have become very comfortable to learning with less pressure and stress among the learners." She believed that when pupils are under pressure when learning, they could not focus on the lesson but on their feelings instead. They became involved to learn in the classroom. They had high energy to participate. They gained focus and they asked questions to clarify if they understood what she was telling them. They can also explain their answers in their own words. In one lesson, teacher was discussing about fraction to illustrate the idea of $\frac{1}{2}$. One-half in Bicol-Sorsoganon is katunga (half). Pupils are familiar with the term 'katunga' so teacher used first the word 'katunga' before using one-half. She presented then a picture of one circle and asked pupils to show its 'katunga'. Pupils were very eager to volunteer of what teacher asked them to do. Later on, one pupil came to ask about the idea of one-half in whole numbers saying "Ma'am, and katunga po san 20?, 10?." (Ma'am, one-half of 20 is 10). While others also asked, 'Ma'am, pira man po ang katunga pag tulo?' (Ma'am, how much is the one-half of three?)

Pupils were proactive on the lessons that were taught to them. They thought in advance because they understood the basic knowledge showed to them and they were able to relate them to other real aspects in life. In this case, teachers using mother tongue as medium of instruction must develop positive attitude on the new curriculum and make learning more interesting and appealing to children in order to help them develop positive attitude on the subject. Mathematics teachers under the MTB-MLE program ought to create interesting and non-threatening environment in their way to help children to develop positive attitude towards the subject and keep it without inhibition and hence improve their performance.

To enhance affective elements of pupils in learning mathematics, teacher's roles are very much important together with other learning tools such as language that pupils can understand.

- ***Enriched parent-teacher partnership in building numeracy among the learners***

For teachers, parents feel they are involved in the learning of their children only because they can teach their children using their own home language. Because of MTB-MLE, parents are also given the confidence that they can teach their children using the language that they both know. Most often, parents feel detached and uninvolved to their children's learning because they feel they do not have proficiency in English that might also affect their children. But this time, because of MTB-MLE, parents were also confident to teach their children because the language that they used is affirmed and accepted by the school and used in the learning environment of their children in school. With the parents helping teachers in the learning of their pupils may be a good partnership. Both the parents and the teachers are direct persons to monitor learning progress of the pupils not only in school but also at home. Parental involvement and community engagement to learning are effective factors to make children learn.

In the follow up interview conducted, parents shared that they were also comfortable with the school because they also understood that language used to teach their children. They could communicate to the teacher with the welcoming atmosphere affected by the language they use. Teacher-participant said that parents become more involved to the different school activities other than their child's learning. They participated in the different school activities and encouraged their children to join different extracurricular activities. Parents also initiated different school projects such as Gulayan sa Paaralan and Brigada Eskwela. One factor, teacher-participant said "*An mga proyekto namon sa school, kadianis kay damu na parents an nagpaparticipate, siguro dahil nafeel ninda na kabulig sinda sa pagtukdo namon sa mga batit ninda, pwede dahil ini sa surumaton namon, nagkakaintindihan kami.*" (Parents feel they are part of the different project in the school, they take active participation which might be brought about by the implementation of MTB-MLE in the school context.)

These categories previously mentioned all talked about the positive experiences that teachers have in the utilization of MTB-MLE as LOI in building numeracy skills among primary grades pupils. The following categories also state the negative experiences that teachers have about the said policy.

- ***Difficulties for some pupils to count in Bicol***

Those pupils who might be exposed to English in their homes such as through television and social media, they were already familiar counting in English and Bicol for them has become a second language. One participant said that "Napapagalan ang mga batit magsabot san Bicol lalo na kung lain sinda talagang Bicol sa balay. May mga estudyante akong nag English, lalo na sa section one kadamuan, English an suramaton." (Learners had difficulty understanding some Bicol terms because Bicol is not their home language. Especially those learners in the higher section, they are speaking English so they could not understand or speak Bicol). When teacher teach using Bicol, these pupils had difficulties in understanding Bicol language as a LOI. In this way, teacher-participant said that they really have to use English term so that this group of pupils can understand. So, shifting language, English to Bicol and Bicol to English is a common strategy for teachers to use. In a classroom that is exclusively using MTB-MLE, it would be a real burden for teachers if the pupils in it are using different languages. This is especially true to central schools compared to barangay elementary schools. In Sorsogon City, central schools are located right at the heart of the city where pupils from different barangays surrounding the city are also enrolled. Barangay schools are commonly enrolled by the pupils in that barangay alone and few enrollees come from other barangays. There are only few pupils enrolled in barangay or small schools who have complicated issues in language. While most pupils enrolled in big elementary schools such as central schools had issues in the use of MTB-MLE as LOI in mathematics. Some of them have difficulty pronouncing Bicol counting and other mathematical terms because they are used to speak these concepts in English.

Filipinos are said to be multilingual. There are varied languages in the community where every individual can be exposed to and adopt later on. It is a difficult task for a teacher to be consistent with only one mother tongue language in the classroom when she has different individuals in the classroom who were raised in different languages from their homes. The difficulty of some pupils to understand Bicol mathematical term may emanate from the fact that the language taught to them in the classroom was not their first and home language. In this case, it is essential for teachers to be familiar with the language background of their pupils. It is suggested that teachers may conduct profiling of their pupils including the language background of each pupil so that teachers can tell the different languages they can use in their classroom as well as they can have the idea on how

to approach every child in their learning given their language background.

- ***Difficulties met in localizing, contextualizing and translating teaching materials for mathematics instruction.***

This category was revealed by some teachers who raised their concerns on their experiences as to the difficulties they met when they do localization and contextualization of the materials being distributed by the DepEd Central Office. A participant shared her sentiments “*Napapagalan kami maghanap sin mayad na learning material kasi diyot pa lang ang available na materials in Bicol-Sorsoganon kaya kami na mismo nahimo lugod. May mga learning materials man from the Central Office kaya lang kaipuhan pa namon i-contextualize o i-localize para madali ma gets san mga pupils namon.*” (It was difficult for us to find for suitable learning material where home language of our learners is being used. What we usually do, we make our own materials. There are learning materials sent from the Central Office but we still have to contextualize and localize the material for our learners to understand them better.)

One of the aspects that may have influenced the difficulties is the fact that terms in Bicol are limited when translating some mathematical terms to Bicol. Materials from the Central Office are brought down to different regions and different divisions for teachers to localize and contextualize for their instructional purposes. One of the teacher-i participant said that there must an extra effort for teacher to be knowledgeable about the different culture and languages there were in Sorsogon City and nearby places and communities to help them with the localization and contextualization of their teaching materials. Teachers are encouraged to do localization, contextualization and translation of teaching materials so that they can make use of these materials to the context of their own classroom; however, because some teachers have little knowledge about other languages or they do not use the languages themselves, they found it difficult to do localization, contextualization and translation of teaching materials for mathematics instruction. Usually, what they do was to make their own learning materials instead.

This difficulty that teachers met in developing numeracy through MTB-MLE as LOI can be addressed through providing trainings and seminars to teachers that may enhance their skills and knowledge about do localization, contextualization and translation of teaching materials. They can also be provided with opportunities to do immersion in the communities that

their pupils belonged to give them a wider horizons to consider in their teaching.

- 2. ***Strategies teachers use to develop numeracy skills of pupils using MTB-MLE along pedagogy, learning engagement and assessment of learning***

Pedagogy

- ***Use of locally-made materials or objects found in the community***

One of the strategies that primary grade teachers used was the locally-made materials or objects that are found in their own communities. These can be in the form of stones, plants, fruits, vegetables, local products, sea shells, twigs and others. A teacher- participant shared “*Sinisikap talaga namon na magprovide ng mga materials na kilala ng mga bata. Pag alam kasi nila, mas madali silang turuan.*” She said that these locally-made materials or objects are the things which pupils are familiar with. Because of the principle of starting where the pupils are, this strategy can help pupils connect what they know with what they should be learning.

Another teacher- participant said that her classrooms are full of instructional materials that they can use whenever they teach math concepts. Some of them are true objects while others are illustrations, drawing and pictures. But they are conscious about using materials that are found in the community so that pupils will be able to understand easily because teacher is using materials that are acquainted among the pupils. Indeed, primary grades classroom is well-structured classroom but their structures are at the same time used as instructional materials. They are purposeful and for use in the pedagogical activities in mathematics.

Matang states that in order to gain interest in mathematics and make meaning out of what children are learning, their culture needs to be embedded in mathematics. He emphasizes that materials from children’s cultural background needs to be used as teaching aids to make more meaning to mathematics concepts and ideas taught. He also highlights that contextual meaning to abstract ideas needs to be provided in mathematics through culturally inclusive curriculum. In addition, mathematics teaching and learning at primary school level should be made user friendly to the students through incorporating children’s home language.

- ***Exposing pupils to more drills and exercises***

Another category that surfaced in the collected qualitative data was exposing pupils to more drills and exercises as strategy teachers use to develop numeracy

skills of pupils using MTB-MLE along pedagogy. One participant said: “*Pag nagtuturo ako ng isang concept sa math, nagibigay ako ng iba’t ibang activities o exercises sa kanila para mas ma apply nila ‘yong natutunan nilang math concepts. Halimbawa, nagbibigay ako ng quizzes, board activities, games, assignment, mga ganun’ na pwedeng nilang mapplyan ng mga concepts na itinuro ko.*” (Whenever I teach new math concepts, I make sure that there will be plenty of activities or exercises where they can apply what they just learn. For example, I gave them quizzes, board activities, games, assignments, things like that where they can apply the new concepts they learned in mathematics.)

This principle can be attributed to the behaviourist aligned techniques in which pupils are given the same materials repeatedly until mastery is achieved. Teacher iterates lessons through giving similar questions or activities to answer and perform, with a certain percentage of correct responses or actions elevating the pupils to the next level of difficulty. This technique can also be applied to developing numeracy skills through MTB-MLE. Such exposure may bring about learning that enables pupils to overcome activities from simplest to more complex ones even if the language used for instruction is MTB-MLE. It is a general principle applied to almost all context in the behaviourist way.

Another teacher- participant said that in addition lesson, she asked parents to buy practice materials for their children to be done at home such as the A-1 card for plenty addition exercises that pupils can do. The same type of activities can be done with subtraction, multiplication and division. Also, in the context of MTB-MLE, teacher constantly use terms in the teaching to make them familiar with the term and what the term means. Constant correct practice was one of the techniques found by the teacher- participant to be effective to development numeracy skills through MTB-MLE. Every mathematical concept that teacher teaches is followed up with ample drills and exercises to practice the new skills that they acquire.

A teacher- participant shared that even the curriculum was not yet integrated with MTB-MLE, they already believed in the principles of constant drills and exercises given according to the level of difficulty. This habit may lead pupils to mastery and ease of practice of the new skills learned.

- *Attendance to seminars is helpful.*

Another category that surfaced was that teachers found attendance to seminars to develop numeracy skills using

different strategies using MTB-MLE is very useful. One participant said: “*Damu kaming inatindiran na mga seminars and training regarding MTB-MLE. Nakabulig siya kasi may mga naaraman kaming strategies, approaches na pwede namon maapply sa laog san klase. Damu ako naaraman sa mga seminars na tig conduct san DepEd lalo na sa Division Level or miski na nga sa School-Based or LAC Session namon.*” (Attendance to seminars and trainings was really helpful to know more about MTB-MLE. We were oriented about strategies and approaches that we can apply inside our own classroom. I learned many things during these seminars conducted by DepEd in the Division Level or even at the School-Based Level or LAC Sessions.)

This way, teachers are coached and guided. They are given additional information to hone their teaching skills. They are refreshed of the underlying principles and theories where they can frame their teaching. MTB-MLE is another teaching area that needs training for teachers because it was just implemented since 2012. Although many studies were conducted about its benefit, still teachers have to find a way to be skillful and knowledgeable in teaching mathematics in MTB-MLE as LOI.

The DepEd Sorsogon City Division did not fail to empower its teachers through the different seminars conducted. Right from the beginning of the implementation, trainings were already given and teachers found them helpful especially that the policy was new to them. The shift in LOI then was sudden and abrupt. From English as a medium of instruction to sudden shift of MTB-MLE as LOI in every classroom of primary grades pupils. The fears and doubts of every teacher then were overcome because DepEd was untiring in providing different trainings and seminars. However, these trainings only provided the technical side of MTB-MLE. Still more effort and initiative should come from every teacher in familiarizing with every learner’s language and cultural background so that teachers can understand the level of their pupils.

In the study of Uayan, the findings illustrated that the relevant trainings attended by the teachers in the last three years in relation to K to 12 program. Based on the data, 92.11% attended the mass training of teachers on K to 12 curriculums, while 86.81% attended trainings on framework of K to 12 programs. The researcher perceives that these two relevant trainings are the introductory trainings that are necessary in realizing the K to 12 curriculums and its goals. On the other hand, 68.42% attended trainings on mother tongue as medium of instruction and 63.16% attended the teaching

strategies for mother tongue instruction. The researcher believes that these two are the core teaching skills that a teacher must acquire, however the result implies that 14 of the respondents was not able to attend the most important training on the teaching strategies for MTB-MLE instructions. This result is supported by the study of Benson⁶³ which found out that the main challenges of the implementation of the MTB-MLE is the willingness of the teachers in attending the trainings intended for MTB-MLE instructions. He further noticed that during the preliminary implementation of MTB-MLE only few teachers attended trainings prepared by both the national and regional DepEd Office.

- **Differentiated Instruction (DI)**

Differentiated instruction is a pedagogical philosophy that is anchored on the belief that every learner is a unique learner, and came to school with his innate ability in which school has to discover and improve. Every classroom is diverse with different learners, and teachers need to understand this diversity. In the data gathered by the researcher, teacher- participant revealed that DI is one approach they learned from seminars that can fit the feature of primary grade level classroom, diverse and unique learners. This is applicable in MTB-MLE classroom because every learner has a unique culture and family background. This is a factor to be considered by primary grades teachers.

Teacher- participant shared: “I identify my students in terms of their abilities. I needed first to observe them and conduct different activities that can show their talents and abilities. I sometimes engaged them to dancing, singing, speaking, drawing and other worthwhile activities that can show off their hidden talents. Also, I asked parents about the abilities their child has that they observed in their homes. Their former teacher from previous years can also attest to the ability each pupil possesses.” From this, their present teacher can already have background knowledge about her pupils. Likewise, learning preferences from pupil to pupil vary. These preferences also mark their differences. Teachers have to sensitive to this factor as they also play a significant role in teaching and learning transaction to become successful.

Tucker said that differentiated instruction is a teaching approach that tailors instruction to all students’ learning needs. All the students have the same learning goal. But the instruction varies based on students’ interests, preferences, strengths, and struggles. Instead of teaching the whole group in one way (like a lecture), a teacher uses a bunch of different methods. This can include

teaching students in small groups or in one-on-one sessions.

- **Using manipulative, realia and tangible object as instructional materials**

Another category that was revealed by the teacher-informants to develop numeracy skill was the use of manipulatives, real and tangible object as instructional materials. Most of the teacher- participant stated that they structured their classrooms in such a way that they become attractive to learners. They use different materials in reality, in pictures, in models and prototypes so that pupils may have a vast idea and experiences of the different learning avenues. On the other hand, teachers strived to use instructional materials that are familiar to the pupils so that it would not be hard for them to related these instructional materials to the lesson that they would be learning.

This strategy is based on the principles of Multisensory Approach where learning through the use of different senses helps students learn material in a more concrete manner (Learn Through Experience). Studies show that only certain parts of the brain activate during learning; therefore, visual learning will activate a different part of the brain than would olfactory learning, for example. It was cited in this blog that in a report by D.G. Treichler, he stated that “People generally remember 10% of what they read, 20% of what they hear, 30% of what they see, and 50% of what they see and hear.” Combining the senses, therefore, is of benefit to students of all learning styles. In the case of transcending learning contents in Mathematics, it is clear from this first phase that making learners understand Mathematics concepts is basically through the use of manipulative and concrete objects such as the ones presented in the pictures.

- **Translation**

Because of the complicated use of language of the learners and the differences of their language use at home, in their communities and in school, teachers have to make themselves familiar to these languages that their pupils used. This is an avenue for teachers to relate with their pupils and do necessary strategies to make them learn. One participants explained “*Minsan sa klase, may mga terms na lain nasasabutan san mga batit. Para mas masabutan, kaipuhan ko talaga sainda itranslate, from English to Bicol and Bicol to English.*” (Sometimes, in my class, I need to translate terms from Bicol to English and English to Bicol so that my pupils can understand.) Another participant said “*Dapat maaraman ko ang iba-ibang lingwaheng sinasabi san mga pupils ko para mas aram ko kung papanu ko itatranslate ang mga surumaton na di ninda nasasabutan.*” (“I have to know different

languages being spoken by my pupils so that I will know how to translate terms that they do not understand in one language.)

Teachers have to be familiar of the different Bicol-Sorsoganon languages so that she can translate the terms from one language variety to another when the need arises. Teachers also resort to translation when they can sense that pupils cannot understand the term. This is done so that pupils can have active participation in the process of teaching and learning. Translation can be an effective communication strategy between and among pupils and teachers. However, this strategy should be done with cautions as study showed that it can contribute to low level of accuracy in a certain language. Teachers need to be strategic in the use of translation method. At the early phase of language, translation can help but as the learner progresses, it can show low proficiency in language.

As stated by Al-Musawi, foreign language learners frequently use translation to facilitate language learning and to acquire the new language. Despite the fact that translation has played different roles in various methods of language teaching accommodated for students from different social backgrounds, most educators agree that translation is a powerful tool to help the student more confidently understand foreign words and expressions and express ideas in the target language. Nevertheless, some educators argue against using the native language in the class, considering it as a serious barrier to effective language learning.

- **Using collaborative approach teaching**

Another categorical theme that surfaced along the strategies used by teachers on pedagogy when developing numeracy skills through MTB-MLE was employing collaborative approach teaching. This strategy is also known as team teaching, co-teaching or cooperative teaching. Teachers belonging to one school are accustomed to collaborative approach to teaching. They shared with their colleagues any teaching insights, initiative and materials that they gathered from seminars, online resources, library and others. They help one another in collaborative approach to teaching. They also communicate with each other to reflect on the learning progress of their learners and what they can do with slow ones. This way, they come up with uniform teaching styles whenever they thought that such strategy or initiative is appropriate to apply to their learners. Such approach can also help one another in establishing for school culture and traditions they need to contribute to the total development and learning of their pupils.

Being in a co-taught classroom has many benefits. Students can spend more time with the teachers and get more individual attention. And with more than one teacher, it's easier to teach students in smaller groups or one-on-one. Students have the opportunity to learn from teachers who may have different teaching styles, ideas, perspectives, and experience.

Learning Engagement

- **Play-based instruction.** One participant shared “To keep pupils into learning, one category that surface along the course of data collection was the play-based instruction.” Most often, teacher-informants answered that for their pupils to be engaged in learning, one strategy they utilized was play-based instruction. Play-based instruction is a teaching approach where teachers integrate play to learn math and/or integrate math in plays. Mathematics helps children make sense of the physical and social worlds around them, and children are naturally inclined to use mathematics in this way. Teacher-informant said that her classroom has plenty of toys in it so that her pupils can play and she took the chance at play to teach mathematics. Such manipulative toys can help a child make sense of the world like putting stuffs in a basket and by doing so, teacher can take the chance to count the stuff being placed inside by the pupils. Also, when putting pieces of puzzles, teacher can take the chance to show the concept of fraction when the pupil has puzzled together $\frac{1}{2}$ or $\frac{1}{4}$ part of the puzzle. This strategy can be significant, interesting and purposeful with teacher's careful plan and skill on how to use play to keep learners engaged in learning mathematics concepts. Because young children's experiences fundamentally shape their attitude toward mathematics, an engaging and encouraging climate for children's early encounters with mathematics is important. It is vital for young children to develop confidence in their ability to understand and use mathematics— in other words, to see mathematics as within their reach. In addition, positive experiences with using mathematics to solve problems help children to develop dispositions such as curiosity, imagination, flexibility, inventiveness, and persistence that contribute to their future success in and out of school. In the point-of-view of a child, play is part of their daily activities and it is in play that a child sees the world with sense and meaning. With MTB-MLE, children's culture and language in play can be considered.
- **Simple gifts as rewards.** One very encouraging way for pupils to be more engaged to learning math

through MTB-MLE is by giving simple gifts as rewards. This strategy, as said by teacher-informant has been traditionally done by teachers. They gave simple things such as candies, chocolates, pencils, erasers, cut-out shapes that pupils can bring at home that pupils can show their parents that they have been rewarded for a very good performance in school. This strategy can boost confidence and can motivate pupils well, and these affective elements are very essential to learning.

Poor student achievement is often attributed to a lack of motivation, and rewards are given in an attempt to increase that vital student motivation. Student motivation affects every aspect of school life, from attendance, to academic performance, to extra-curricular activities. With the gifts as rewards, learners can be motivated and learners can keep themselves engaged to learning. This idea is based on the concept of Skinner's Theory of Operant Conditioning.

Operant conditioning means that if a reinforcer is delivered after a certain behavior, then the particular behavior will be strengthened. A reinforcer is anything given that will increase the chance of the behavior happening again. In school, reinforcers usually are things like stickers, praise, treats, and grades.

- **Attractive and purposeful instructional materials through ICT.** The use of gadgets may be interesting to pupils to learn mathematics through the use of MTB-MLE. Teacher-informant said that using her laptop during lesson presentation was really attractive to pupils and doing so could keep her pupils engaged to learning. With ICT, teacher-informant can present video lessons downloaded from the internet.

However, there is limited instructional materials for mathematics that are presented using the MTB-MLE. Teacher-informant said that considering the MTB-MLE in the instructional materials, there are no or limited materials in the internet to use. Teachers have to make their own instructional materials through the use of ICT and using MTB-MLE as LOI. This can be challenging to teachers because some of them do not possess mastery in using the ICT.

Teacher-informant said that good thing they applied collaborative teaching where other teachers who were skilful in ICT shared their teaching resources to them, or taught and assisted them to create their own instructional materials using ICT. With ICT, learning can be fun, exciting and purposeful, a teacher-informant said.

Assessment of Learning

- **Differentiated Assessment Activities.**

Differentiated assessment activities are applied in Mathematics classroom using MTB-MLE as LOI as revealed by the teacher-informants. As shared by the teacher-informants, what they did was initially conduct diagnostic assessment and explore the pupil's aptitude or interests. This idea of anticipating for different abilities of the pupils was anchored on Multiple Intelligences Theory by Howard Gardner. This initial assessment is very important component of assessment, the diagnostic because it would lead teachers to decide the most appropriate assessment task that they could give their learners especially during formative assessment. Differentiated assessment activities can also consider the features of MTB-MLE because teachers can consider the differences in language of her pupils as revealed in her findings during the conduct of diagnostic assessment. Glass mentioned that many research proved that by differentiating our classroom, students learn more, and they can achieve a greater learner autonomy.

- **Play-based Assessment and Observation.**

Play are commonly used as engagement or motivating activity to instruction; however, play as an assessment is a seldom practice. A teacher-informant said that this strategy is done to keep pupils still motivated and interested without the pressure of undergoing a test because the pupils may simply think that he/she is just into a play or game. Not only is play an important part of children's daily routine, it is also a window into their developmental levels and a context where valuable teaching and learning can occur. Play assessment is an appropriate approach to evaluating the needs of young children. The additional and powerful benefit of play assessment is that it also leads directly to interventions and progress monitoring in the same play context. Finally, play assessment has been suggested to be a culturally sensitive practice. According to Kelly-Vance and Ryalls, the origins of play assessment and intervention stem from psychoanalytic work with children at the turn of the twentieth century. Therapists used information from children's play to determine their mental health needs and then used the play context during therapy. This practice continues in many different therapeutic approaches. More recently and for the reasons discussed above, school psychologists working in early childhood began using play assessment as an observational strategy in the 1980s.

3. Different learning activities implemented to develop numeracy particularly in Contextualization, Translation, Indigenization and Localization

Contextualization

- **Experiential Learning.** Experiential learning comprises of learning activities, both inside and outside the classroom that are designed to actively engage students to learn by doing, and then reflecting on the process and experience and actively creating their own understanding. Experiential learning activities can be designed and incorporated into any learning environment, from kindergarten, through school. One teacher-informant said that she is applying experiential learning as a mean of contextualizing teaching. Pupils learn from experiences and the insights they gained can be used as a springboard to learning new mathematics concepts. Teacher-informant said that these experiences are essential to introduce learning of fundamental mathematical operation and worded problems, and other numeracy skills such as counting, measuring, sorting, noticing patterns. According to Barton, examples of experiential learning activities include field trips for conservation, outdoor activity, or exploring employment, group work in and out of the classroom, open ended discussion activities and active and open ended questioning guidance. Research has proven that students of all ages learn better during initiatives that involve applying concepts in practice, in order to solve real world problems, actively make decisions, and then reflect on the outcomes or consequences of their learning actions and decisions. The teacher becomes more of a facilitator when designing experiential learning activities. Experiential learning is not new, and it may have various names in education around the world such as flexible learning, service learning, community service, community engagement or outdoor activity.

Translation

- **English Nursery Rhymes in Bicol.** Translating English nursery rhymes to Bicol is what teachers do so that pupils can enjoy the nursery rhymes being sung in the language that they know. Teacher-participant said that nursery rhymes in Bicol are more appreciated by the pupils. They sing them heartily and with full of energy. For teachers, it was such a delight to hear these pupils singing a nursery rhyme in a native language. "*Maogmahon ang mga batit magkanta na surumaton ninda ang gamit. Bihira na kaya niyan ang kantang gamit ang local na surumaton, kadamuan Filipino o English. Dahil*

sa natranslate namon ang nursery rhymes, maogma sindang nagkaranta." (Learners are happy each time they sing nursery rhyme in language that they know, their home language. It is seldom that songs are written in the local language, most use Filipino or English. Because nursery rhymes were translated, learners know what the song meant and they sing them happily.)

- **Translating mathematical terms from local language to English.** Most of the time, teachers do translation of different mathematical terms to local language. However, due to limited terms in Bicol for the various terms in mathematics, teachers have nothing to do but to use the English term. "*Kapagal panu magtranslate sa English san ibang mathematical terms. Halimbawa, geometry, fraction, set, mga terminong mapagal mahanapan sin translation sa local language. Kaya nangyayari, English na gihapon an term ang ingagamit namon.*" (We found difficulty in translation mathematical terms from local language to English. Examples, geometry, fraction, set, these terms have almost no translation in local language. So, what we did we used the English terms instead of using the local terms.)

Indigenization

- **Use of Local Materials as Instructional Materials.** To indigenize instructional materials, teachers use local materials. Similar to what has been previously said, primary grades classroom are fully structured with learning materials. These are materials familiar to their learners, can be found in the locality and indigenous. "*Minsan nagagamit kami kung nano yada lang sa palibot. Halimbawa sa pagbilang, naggagamit kami mga bato (syempre lalinisan mi man... laughs...) . Mga madali lang mahanap nan mga familiar sa mga batit na bagay. Pag strange panu sainda ang sarong bagay, mapagal naman sainda ipaliwanag. Sinisimplehan ko lang ang ingagamit ko na learning materials para lain man madipisilan ang mga batit lalo na kung mga slow learners din sinda.*"

(Sometimes, we used stuffs that are available just around us. Example, when counting we used stones we can pick (of course, we cleaned them first...laughs.). These things are familiar to them. If we present materials that are strange to them, it would take time again to explain and show them the learning materials which some of them may find difficult. We are trying to use simple objects as learning materials so that it would be easy for learners to use the concepts we teach with these materials.

Localization

- **Involving community in the learning process.** One of the activities that teachers do to exemplify localization in their teaching is through the involvement of the community in the learning process. Teacher-participant shared that sometimes she invited a parent who is a baker to come to the classroom and show to pupils how to make a pizza pie. From this activity, she related it to illustrate fraction in mathematics lesson. *“Minsan nag invite ako ki parent an maghimo pizza sa klase. Sa hinimo niya na pizza, nag illustrate ako sin fraction. Naruyag ang mga batit, may pizza na, may pagkaon pa sinda.”* (One time, I invited a parent to come to the class to make a pizza before my pupils. I took this opportunity to teach fraction to my learners. They were very happy; they got pizza and learned something about fraction.)

4. Gaps and issues encountered by teachers in developing literacy skills using MB-MLE

Since 2012 when MTB-MLE as LOI started to be implemented, there were already different gaps and issues being encountered. In line with the present study, the following gaps and issues were gathered:

- **Retention and mastery of four fundamental mathematical operations.** Some teacher-informants shared their sentiments on the poor acquisition of skills on the four fundamental mathematical operations. Pupils encountered difficulties to do addition, subtraction, multiplication and much more with division. *“Napagal ang mga batit talaga sa four fundamental mathematical operations. Kaipuhan ulit-uliton sinda ang process bago ka naman makaakadto sa mas masakit na concepts. Minsan lain na kami nakakadto sa dapat namon na lesson kay stock na kami sa dati ko naman sinda natukdo.”* (Learner indeed have difficulty with the four fundamental mathematical operations. I need to repeat my lesson, the process again and again before we can proceed to a more difficult math concept. Most of the time, we stayed in the previous lesson I taught them because we are not progressing.)
- **Complicating and varied learning competencies.** The different complicating and varied competencies of the curriculum guide made the teaching even more complicated and confusing as what teacher-informant said. She suggested that learning contents be simplified for primary grades. According to a teacher-informant, the MTB-MLE as LOI can be an avenue for a successful learning but the learning content varied and complicated made it hard for teacher to link one lesson with

another. *“Bilang maestra, naobserverbahan ko, kadamu mga learning contents, learning objectives na dapat namon tutukan sa mga batit. Para sa akon complicated na sya. Di na namon nakakay itukdo minsan sa laog sin tama na oras lalo na kung mga maluya ang mga learners ko. Kaipuhan pirmi mag-adjust sinda.”* (As a teacher, I am confronted with different learning contents and learning objectives that I need to teach within a given period of time. For me, they are complicated. We can no longer grasp the teaching time over the given time especially with slow learners, we really have to adjust.)

- **Difficulties encountered by the pupils in mathematical problems.** Teachers relayed that indeed their pupils faced difficulties when given mathematical problems. Teacher-participant attributed this difficulty to poor mathematical foundational skills especially their skills in the four fundamental mathematical operations. *“Kulang ang foundational learning san mga batit. Mahahalata mo sa mga batit lalo na sa Grade 3, kadamuan maluya pa din mag-add, lalo na mag multiply nan mag divide. Pag lain maaram sa basic operations, pirmi mapapagalan magka nuod sa iba pang mathematics concepts.”* (Most of the learners have lack in foundational learning. As a teacher, I can observe, when they are in Grade 3, most of them are still poor in adding, especially in multiplying and dividing. They still lack the foundational skills needed to learn more difficult concepts.)

CONCLUSION AND RECOMMENDATION

Primary grades teachers have varied positive and negative teaching experiences on the development of numeracy skills of primary pupils using MTB-MLE. Primary grades teachers applied different strategies in the pedagogy, learning engagement, assessment of learning to develop numeracy skills of primary grades pupils. Primary grades teachers implemented varied and different learning activities implemented to develop numeracy skills particularly using Contextualization, Translation, Indigenization, and Localization. There were gaps and issues encountered by teachers in developing numeracy skills using MTB-MLE. Pedagogical knowledge of primary grade teachers be refreshed, reviewed and upgraded. Other strategies of primary grades teachers be used to upgrade their pedagogy, learning engagement in the classroom. Other learning activities on different relevant learning activities be developed using contextualization, translation, indigenization and localization. Relevant information, knowledge and skills be equipped to the primary grades teachers so that they themselves may

address the existing gaps and issues encountered in developing numeracy skills using MTB-MLE.

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