

Teaching Science in Mother Tongue: Balancing Compliance with Self-Efficacy

Abstract. Educational policies show that multilingual education, which utilizes the mother tongue (MT) in instruction, can open extensive educational opportunities. However, teachers from multilingual contexts have struggled to comply with the policy due to lack of useful MT-based materials and difficulty in the translation of science concepts into the MT. This correlational study aims to determine how elementary science teachers in Cebu City, Philippines develop self-efficacy in teaching science despite the lack of MT instructional materials. It determined a correlation between self-efficacy in teaching science and self-rating in using the MT in science. Findings also showed that the use of the MT may hinder the science teaching self-efficacy of teachers. Focus-group discussion, however, established that the teachers were able to address MT-related problems by focusing on their self-efficacy through their openness to code switching and enthusiasm to use new teaching methods, production of practical teaching tools, and commitment to creating meaningful learning relationships with their students. It is recommended that administrators provide teacher training on essential skills to teach subjects in the MT and that the Department of Education strive to create more instructional materials to promote the goals of MTB-MLE.

Keywords: Mother tongue-based multilingual education, self-efficacy, science teaching, science teaching efficacy belief

Introduction

Cognizant of the EDCOM Report (1993) which determined that the use of English as a medium of instruction (MOI) under the 1987 Bilingual Education Policy was one of the causes of the decline of basic education in the Philippines, the Philippine government instituted the Mother Tongue-Based Multilingual Education (MTB-MLE) policy under the “Enhanced Basic Education Act of 2013” (Enhanced Basic Education Act of 2013) to address the MOI issue. The law stated that basic education should be delivered in languages understood by the learners. From Kindergarten to Grade 3, instruction, teaching materials, and assessment shall be in the regional or native language of the learners.

The utilization of the mother tongue in teaching early grades children has more positive effects than the use of English. These positive effects include better performance in reading comprehension, literacy, sciences and mathematics, and cultural identity and appreciation (Ocampo, 2005; Khan, 2016; Dekker, 2018; Cabansag, 2016).

Taking into consideration the substantial research on the use of mother tongue in instruction, the Philippines’ Department of Education (DepEd) deemed it essential to return to mother tongue instruction to further enhance students’ understanding of major subjects such as mathematics and science (Ball, 2011; Gboyega & Idiat, 2014; Cruz, 2015). Although the DepEd reform is sensitive to the diversity of Philippine languages and has promoted more interactive classroom discussions, the MTB-MLE policy has its share of curricular challenges, especially in teaching science concepts using the mother tongue. These problems include the lack of translated materials in the first year of the program’s implementation and qualified and trained teachers (Ganal, 2014; Bercasio, Remolacio, & Reonal, 2016; Cardenas, 2018), a very

serious issue since teachers are the critical component for a successful MTB-MLE program (Fillmore, 2014).

In addition, some terms are difficult to translate in science subjects, and most of the students experience challenges in understanding specific spoken mother tongue words because they do not use them at home or in their everyday communicative exchanges (Sanchez, 2013; Ganal, 2014; Cabansag, 2016). The challenge does not only lie in relearning the mother tongue but also in translating the concepts that have no equivalent terms in the mother tongue and the lack of support through materials and training in science teaching using the local language (Cruz, 2015; Valerio, 2015; Cardenas, 2018).

Despite these issues on the implementation of MTB-MLE, science teachers in public schools have implemented the curriculum since 2012. In Cebu City, Philippines, the DepEd identified Sinugbuanong Bisaya as the MOI. In its early implementation, it reproduced lesson plans in teaching the Sinugbuanong Bisaya (SB) language. However, there was none or limited materials on teaching science in SB. Science teachers handling K to 3 have experienced struggles, resilience, and efficacy. As shown in the studies of Lartec et al. (2014) and Alberto et al., (2016), teachers have managed to succeed by using strategies and improvising mother tongue instructional materials despite the absence of books in local languages and lack of vocabulary and teacher training.

This improvisation is considered as self-efficacy (Riggs and Enoch, 1990) which refers to the level of confidence of teachers in their ability to influence science learning among their students and their belief in their effectiveness in teaching a particular subject or using a specific language (Praver, 2014). Heightened self-efficacy beliefs often contribute to regulated learning and confident outcome (Zimmerman, 2000). Another aspect of self-efficacy is the teacher’s motivation to deliver

lessons. Science teaching self-efficacy belief meanwhile pertains to the level of confidence of individuals in their ability to influence science learning among their students (Riggs and Enoch, 1990).

This paper argues that teacher's self-efficacy and science teaching self-efficacy belief have a relationship in implementing the MTB-MBLE policy in teaching sciences. It also presents the experiences of selected teachers in Cebu City who implemented the policy with minimal mother tongue instructional resources but were self-directed to learn the Sinugbuanong Bisaya language's conversational and academic words and improvised their pedagogy in teaching science concepts and activities for the children.

Research Objectives

This study investigates the experiences of 20 teachers handling science subjects using Sinugbuanong Bisaya in two schools in Cebu City. Specifically, it seeks to determine the self-efficacy belief in science teaching and innovative practices of elementary science teachers in the light of the ongoing MTB-MLE implementation in the Philippines by answering the following questions:

1. What is the level of science teaching self-efficacy belief of the MTB-MLE teachers?
2. What is the self-efficacy rating of the teachers on the use of mother tongue in teaching science? What self-efficacy characteristics are shown by the respondents?
3. What is the relationship of their science teaching self-efficacy belief and their self-rating on the use of mother tongue in teaching science?

Review of Related Literature

The Mother Tongue-based Multilingual Education (MTB-MLE) was fully in place in 2012 when the Department Education started the nationwide implementation of the K to 12 Program (Enhanced Basic Education Act of 2013). The program expanded the medium of instruction (MOI) of schools from just Filipino and English to include the mother tongue of students which made it easier for rural schools to adapt to the changes in the new curriculum.

This move was not without any research support. A study in Lubuagan, for example, found that the students under the MTB-MLE program tended to have academic advantage over those under the two-language curriculum (Walter & Dekker, 2011). Multiple studies also stated that students learned concepts better using their mother tongue (Ganal, 2014; Paulson Stone, 2012; Dekker, 2018).

However, some skepticism was apparent with the preliminary results of the program. Parents and teachers were concerned over the long-term effects of the program, especially on the English communication skills of students, because they saw proficiency in the language as an important consideration in the future career and professional prospects of the children (Dekker, 2018). Because of this, many expressed support to the initiative but in reality covertly resisted through their actions or

by not taking any significant step to promote it (Paulson Stone, 2012; Burton, 2013; Porter, 2017). Teachers, on the other hand, had no choice but to comply with government policy and find ways to address the problems they experienced (Mata, 2014; Cruz, 2015). How will teachers deliver the concepts in mother tongue without weakening the ability of students to understand the same concepts in another language? How are they to deliver concepts that are challenging to translate? How should they help students in transitioning to a new language when they reach Grade 4? This is where the teacher's ability to improvise and devise teaching methods become important (Sanchez, 2013).

Teaching Self-Efficacy

Teaching efficacy is the belief of the teacher in his or her effectiveness in teaching a subject or using a specific language (Praver, 2014). It is said that heightened self-efficacy beliefs often contribute to regulated learning and confidence outcome (Zimmerman, 2000). Teachers with a higher judgment of their ability to teach often perform better and have higher teaching motivation than those with less efficacy belief (Schunk, 1991).

However, teachers lose their self-efficacy when they struggle with too much stress. Studies show that teachers with high administrative and materials support tend to have high self-efficacy belief and feel more in control even in tight or compromising situations such as having a new program or change in the curriculum (Cohen, Kamarck, & Mermelstein, 1983; Hoy & Spero, 2005). According to Kim (2007), there are several variables needed to attain self-efficacy, and these are the following: (1) teacher's character, preferences, and teaching attitude; (2) teacher's educational experience; and (3) administrative and institutional support and workplace health.

In the case of those implementing the MTB-MLE program, the lack of materials and training may cause frustration and lack of motivation (Wa-Mbaleka, 2014; Cabansag, 2016) among teachers. According to Gessert et al. (1993), external factors such as educational attainment does not affect a teacher's response to stress and self-efficacy. Instead, administrative support, availability of teaching kits, and office support have more influence on teachers.

Science Teaching Self-Efficacy Belief

Science teaching self-efficacy belief is the personal belief of individuals that has to do with their level of confidence in their ability to influence science learning among their students. This definition of Riggs and Enoch (1990) can easily be used to determine factors that may change the teacher's confidence in teaching which can be examined through the lens of Attribution Theory developed by Weiner (2000). Weiner's Attribution Theory deals with intrinsic and extrinsic realms of motivation. In the case of Mathematics and Science taught in Waray, teachers have to be very proficient in using the language to teach which becomes an internal motivation that most of the teachers struggle with (Sanchez, 2013).

Teachers with high science teaching efficacy belief have enthusiasm in teaching (Allinder, 1994) and commitment to the

profession (Klassen & Chiu, 2010) as shown in their lesson preparation (Allinder, 1994). They place the responsibility of learning on both teacher and student rather than solely on the learner (Ashton and Webb, 1986) and regard student mistakes as an avenue for correction rather than criticism. In terms of teaching, they have high level of patience when teaching low-achieving students (Ashton and Webb, 1986, Gibson and Dembo, 1984), spend less time on topics unrelated to the objectives of the lesson, and are open to new ideas and new instructional methods and techniques (Tschannen-Moran and McMaster, 2009).

Methodology

This correlational descriptive study conducted a survey to gather the teachers' profiles, self-efficacy belief, and self-rating on the use of mother tongue in science teaching. The relationship between science teaching efficacy belief and the self-efficacy rating was determined using Spearman's Rank Order Correlation. Interviews and focus group discussion were employed to validate the data and to determine the significant challenges and innovative practices of the teachers.

The Respondents

The teachers who served as respondents for this investigation were chosen through purposive sampling. They came from two big schools in Cebu City, Cebu, the Philippines. At least five teachers handled science subjects in the mother tongue at the time of the study. Twenty respondents from the two schools had an age range from from 31 to 40 when the data for this research were gathered.

The teachers from from the first school (School A) were purposely chosen for the FGD because they were part of the first batch of teachers who were internally trained by the Department of Education (DepEd) to translate several teaching guides into Sinugbuanong Bisaya and deliver them in their classes before the K to 12 curriculum was fully implemented. The school is also a pioneer for policy implementation and is known to have undergone pre-implementation testing. Its current training and experience in using the mother tongue may give insights on the qualities of the program and the issues that need to be addressed.

The teachers from the second school (School B), on the other hand, did not receive the same internal training as the teachers from School A and relied solely on the mass training that DepEd provided to supplement the needs of the transitioning educators. Their non-intensive training and lack of experience in the use of mother tongue in teaching may give insights on the struggles of teaching under the new program and the various methods they employed to resolve the problems they encountered.

Instruments and Protocols

The respondents answered the Science Teaching Efficacy Belief Instrument (Elementary Teacher's version) (Riggs & Enochs, 1990) and a self-rating on their efficacy in using

mother tongue in teaching science with five as excellent and one as poor. To validate the collected data, an interview and a focus group discussion were conducted.

The FGD used the Democratize Method (Focus Group Discussion Protocol, 2013) which used few manageable groups. The five teachers from School A were grouped together while the fifteen teachers from School B formed three groups. The FGDs lasted for about 60 to 90 minutes and were recorded with the consent of the participants. The researchers, being outsiders, mediated the proceedings. School heads were not invited as their presence may affect the openness of the teachers to describe their situations. The participants were also allowed to openly discuss ideas, build upon each other's ideas, refute arguments, and ask questions during the conduct of the FGDs.

Results and Discussion

Teachers' Science Teaching Efficacy Belief

Table 1 shows that the teachers' self-efficacy mean score was 3.422 (Very Satisfactory) with a 0.3751 standard deviation.

Table 1. The teachers' self-rating on their teaching science competence

	Mean	SD	Qualitative Description
Teachers' Science Teaching Efficacy Belief	3.4220	0.3715	Very Satisfactory

*4.21-5.00 Excellent, 3.41-4.20 Very Satisfactory, 2.61-3.40 Satisfactory, 1.81-2.60 Fair, 1.00-1.80 Poor

This very satisfactory rating may be due to the length of experience of teachers since all of them have been in the profession for at least ten years and many have attended training and conferences on MTB-MLE, factors that can significantly affect the teachers' idea of self-competence in teaching (Riggs & Enochs, 1990; Ramey-Gassert, Shroyer, & Staver, 1996).

The five teachers from from School A said during the interview that they participated in science teaching training conferences multiple times before the MTB-MLE implementation in 2012 since this was the pioneer school in MTB-MLE curriculum implementation in Cebu City. Hence, these teachers can be expected to have a good understanding of the curriculum. According to Paulson-Stone (2012), training and support are essential to uplift the competence of teachers undergoing abrupt curricular changes such as the use of the mother tongue in instruction. Albeit minimal, the DepED mass training may have also contributed to the teachers' self-efficacy belief.

Teachers' Self Efficacy on the Use of Mother Tongue in Science Instruction

Table 2 shows that mean score of teachers' belief in using mother tongue in teaching science was only 2.3000 (Fair) at

Table 2. Teachers' belief in using mother tongue in teaching science

	N	Mean	SD	Qualitative Description
Teachers' self-efficacy on the use of mother tongue in science instruction	20	2.3000	1.4179	Fair

*4.21-5.00 Excellent, 3.41-4.20 Very Satisfactory, 2.61-3.40 Satisfactory, 1.81-2.60 Fair, 1.00-1.80 Poor

When asked about the “Fair” self-rating, Teacher A said, “*I felt like I was learning a new language that should be learned by the students. The Sinugbuanong Bisaya I needed to teach was too formal.*” The response of Teacher A was shared by the rest of the teachers in the focus group discussion. The respondents stated that the Sinugbuanong Bisaya in the DepEd instructional materials was the formal or academic version of the language in which many of the words were not used in the daily basic interpersonal communication of the students (Cummins, 1981). This academic Sinugbuanong Bisaya language as the prescribed medium of instruction caused discomfort among the teachers.

Another reason that might have caused the ‘Fair’ self-efficacy rating was that teachers were not certain about their knowledge of the mother tongue. Teacher B admitted, “*We weren’t sure if our Sinugbuanong Bisaya is understandable to young learners who come from a different generation.*” According to teachers, they realized that their students were mostly multilingual who could not understand the pure version of the language. According to Sanchez (2013), mother tongue instruction can only work effectively if the students have a strong foundation in their first language. In this context, the teachers felt they did not have a strong foundation in the more academic variety of the Sinugbuanong Bisaya.

Section 4 of Republic Act 10533 defines mother tongue as “the language first learned by a child, which he/she identifies with and which he/she knows best, or uses most” (p. 2). Since language is dynamic and Cebu City has an increasing number of migrants due to tourism, business, and education (ADB, 2014), it can be inferred that Sinugbuanong Bisaya is a conglomeration of many languages. As bi/multilingual speakers, people in Cebu use Sinugbuanong Bisaya, English, Filipino, or Cebuano-English in communication. Therefore, students in Cebu City who use pure Sinugbuanong Bisaya may not be typical. Filipinos have a slight problem in identifying with their linguistic identity, which was brought about by the multicultural history of the Philippines (Nolasco, 2008; Pascasio, 2008; Cardenas, 2018).

Openness to new idea and method of code-switching

Although the respondents claimed that they had difficulty in using the academic variety of Sinugbuanong Bisaya, they still demonstrated self-efficacy in teaching science concepts through code-switching. They used the mother tongue and the English language simultaneously in the discussion. The teachers highlighted, “*We must code switch to help contextualize the lesson. We used Sinugbuanong Bisaya and English languages in front of the class, depending upon the topic.*” Teacher B admitted, “*We still use English in times of trouble when the students cannot understand the formal Sinugbuanong Bisaya.*”

This code-switching phenomenon is similar to the findings of Lartec et al. (2014) and Alberto et al. (2016) which showed that teachers code switch or translate the mother tongue

into English to assist their instruction. Code-switching is cognitive support (Canagarajah, 1995), which is a useful teaching strategy in transmitting the lesson content. Code-switching became a self-efficacy technique among the teachers, for they demonstrated openness to new ideas and tried new instructional methods and techniques in science instruction (Tschannen-Moran and McMaster, 2009). The teachers understood that English was the language of learning sciences (Strevens, 1976) and that it was easier to explain concepts using the mother tongue. They also saw that it was a struggle to translate clearly scientific terms that had no equivalent terms. To overcome these, they showed their self-efficacy character by demonstrating enthusiasm in teaching (Allinder, 1994) and commitment to the profession (Klassen & Chiu, 2010).

Morales (2015) also pointed out that teaching science in the mother tongue may help students if it was culturally contextualized. Code-switching helps the child coming from a multilingual background to quickly understand the range of meanings of the terms being introduced to them. These code-switching techniques validate that findings of Metila, Pradilla, and Williams (2016) that the modifications in the MTB-MLE policy allow the teachers to use the national lingua franca if monolingual mother tongue classes are not available.

Openness to using online translation resources

Teacher E admitted that the internet made it easier for them to translate their lessons. She said, “*We just translated some words using Google Translate and Bisaya.com.*” Although older teachers had difficulties accessing the internet, they still had advantage given their experience and command of the mother tongue. Aside from that, most of the older teachers often asked the help of the younger teachers in accessing the internet when they needed to. The teachers’ self-efficacy characteristic of having the initiative to use online translation supports the study of Doherty (2016) which showed that the modern computer-assisted translation tools could be an innovative technological solution to language barriers.

Enthusiasm and commitment to teaching

The respondents also showed self-efficacy through their enthusiasm in teaching (Allinder, 1994) and commitment to the profession (Klassen & Chiu, 2010). Teachers with a high level of commitment tend to create meaningful learning relationship with their students, especially those that need them the most. Teacher G, for example, provided more scaffolding to her student who had a different mother tongue---Tagalog. She said, “*I have a Tagalog-speaking student. I speak Tagalog to teach her.*” In one setting which could be considered as an inclusive way of teaching, Tagalog-speaking students were taught in Tagalog while the other pupils were taught in Sinugbuanong Bisaya. The teacher decided to code switch from English to Tagalog to accommodate the student which helped the student understand the concept while widening his vocabulary not just in Tagalog or Bisaya but also in English.

Openness to use of e-realia

Another way the respondents showed their

commitment to teaching was by providing instructional materials to improve learning. Most of them bought the materials needed for their classes since they could not ask the students to bring these materials. It was also common for teachers to do overtime work in preparing the lessons they had to deliver the following day. They often relied on realia to increase the students' understanding of a science concept just like what Teacher F demonstrated in this statement, *"If we need apples as examples, I bring apples. If I must teach a process, I bring all the materials to show the process."* The use of realia does not necessarily mean bringing real objects to class. Instead, realia can be in the form of videos, music, pictures, other electronic platforms (Baird, 2003), or real museums and landscapes. Sadly, this approach often entails the use of projectors in class and sometimes causes the teachers to utilize their own money in acquiring the equipment and things they need.

Placing the responsibility of learning to both teacher and student

The respondents also displayed self-efficacy by placing the responsibility of learning on both the teacher and the student rather than on the latter alone (Ashton and Webb, 1986). Teacher H said, *"We feel very sad about our Grade 4 pioneer students. They were the first one to have MTB Science since Grade 1. Now that Science is taught in English, they have difficulty in understanding the terms, and they tend to fail. Because of this incident, we now use charts and materials that are translated into both Bisaya and English."* Given that it was this teacher's responsibility to teach the pioneer students, it was also up to her to look for solutions should the students fail in class. She felt that the burden of learning in different languages could be lifted if the teachers found better ways to teach. Teacher J, although having a hard time teaching in the mother tongue, admitted, *"The translation process in the class may be a very long and arduous process, but the kids need us, and they need to learn no matter the language."* Teacher J's response showed a very high level of patience when it came to the learning curve of the students in Science taught using the mother tongue. This reaction to the new policy is needed given that students have to acclimate at the start of the year when Science taught using th mother tongue was introduced.

Relationship Between Science Teaching Efficacy Belief and Self-Efficacy Rating in Using Mother Tongue in Teaching Science

Table 3 shows the relationship between science teaching efficacy belief of teachers and their self-efficacy rating in using the mother tongue in teaching science. With a significant p-value of -0.594, the science teaching efficacy belief of teachers and their self-efficacy rating using mother tongue in teaching science seemed to have an inversely moderate to a strong relationship. This meant that a teacher believed that he/she was not effective in teaching science when he/she used

Table 3. Relationship between Science Teaching Efficacy Belief and Self-Efficacy Rating in Using Mother Tongue in Teaching Science

Variable about Teachers' Science Teaching Efficacy Belief	N	Test Statistic		
		Computed r	Tabled r	p-value
Teachers' self-efficacy on the use of mother tongue in science instruction	20	0.006	0.447	-0.594 [†]

[†]Spearman Correlation is significant at 0.01 level (2-tailed)

mother tongue often. It could be assumed that the use of mother tongue was considered as a limitation rather than an opportunity, and the teaching efficacy of the teachers was affected by the introduction of this limitation.

Although very scarce literature was present to supplement the somewhat negative relationship of these variables, the top-down model of policy implementation may provide useful insights on the teacher's response. MTB-MLE is a type of policy that can be considered as ambiguous due to possible variations in its implementation and conflict due to the influence of ethno-geographical limitations on the mother tongue. The development of this program must have high level of involvement of key players such as teachers and parents on the ground to make the program work. It should be noted that MTB-MLE program is one-size-fits-all, especially in an archipelagic and multilingual nation like the Philippines. However, the top-down implementation required the teachers and parents to carry the burden of being the "soldiers of the system" and to carry out the orders given to them (Burton, 2013). The arrangement puts the teacher in a stressful situation of following the order albeit not knowing how to deliver on the requirement. In addition, both students and teachers have an apparent language preference based on social and ideological structures (Tupas, 2014). According to Cabansag (2016), the teachers end up cooperating simply for compliance even if they are skeptical about the program.

This was demonstrated by the comments shared by teachers. Teacher D complained, *"We were told to use the mother tongue and to base the discussion in the science concept. But sometimes, we were confused about how to contextualize the concept without using the English language. For example, the word 'flow' can be used for the flow of water and the flow of air. But the word 'flow' has many translations in the mother tongue when used in context."* In the focus-group discussion, the teachers said that they felt that scientific concepts might get mistranslated if they used the mother tongue to discuss them. They also reasoned that they employed English because they felt that the suggested mother tongue was too academic and formal and not suitable to basic interpersonal communication.

Based on the foregoing discussion, it can be inferred why teaching self-efficacy must be studied. Teaching self-efficacy may play a very useful role in dealing with educational issues and limitations. The responses of teachers showed different characteristics of self-efficacy. It can be assumed that increasing their teaching self-efficacy will help them address the limitations they face and will aid in making both teachers and students adjust more effectively..

Conclusion

When there is a new language education policy, there can be variations in its early implementation. Although this research is delimited only to teachers' experience and assessment of the policy, the findings can help improve the implementation and evaluation of the MTB-MLE program of the government. The effectiveness of the policy relies on the self-efficacy of its direct implementors, the teachers. Teachers are considered to have an essential role in successful policy implementation (Fillmore, 2014). Despite the lack of instructional materials in Sinugbuanong Bisaya and the use of its academic variety as the

medium of instruction to multilingual students in Cebu City, the teachers handling science subjects managed to implement the curriculum because of their self-efficacy. Teachers' self-efficacy is demonstrated through their openness to code-switching, enthusiasm to try online translation sources, engagement in the translation process, development of new teaching tools, and commitment to create a meaningful learning relationship with their students.

To have a better MTB-MLE implementation, this paper recommends that school administrators provide more teacher training programs on teaching multilingual students, teaching language variations, using online resources, materials development, and teaching early grades. Furthermore, the Department of Education must create a pool of writers, illustrators, and evaluators to create more instructional materials that promote the goals of MTB-MLE - as a heritage language for preservation and as a language of instruction and for wider communication in the region.

References:

- Alberto, R., Gabinete, S. and Rañola, V. (2016) Issues and Challenges in Teaching Mother Tongue-Based Multilingual Education in Grades II and III: The Philippine Experience (April 22, 2016). Available at SSRN: <https://ssrn.com/abstract=2768558> or <http://dx.doi.org/10.2139/ssrn.2768558>
- Allinder, R. M. (1994). The relationship between efficacy and the instructional practices of special education teachers and consultants. *Teacher Education and Special Education*, 17, 86-95.
- Ashton, P., & Webb, R. (1986). *Making a difference: Teachers' sense of efficacy and student achievement*. New York: Longman.
- Baird, E. (2003). The use of realia in distance learning from museums.
- Ball, J. (2011). *Enhancing learning of children from diverse language backgrounds: Mother tongue-based bilingual or multilingual education in the early years*. Paris, France: UNESCO Education.
- Bandura, A. (1982). Self-efficacy mechanism in human agency. *American Psychologist*, 37, 122-147.
- Bercasio, R. O., Remolacio, L. Q., & Reonal, A. M. (2016). Effectiveness of mother tongue-based multilingual (MTB-MLE) Special Program in Enhancing the Competence of Preservice Teachers. *Rangsit Journal of Educational Studies*, 3(2), 1-20.
- Burton, L. (2013). Mother tongue-based multilingual education in the Philippines: Studying top-down policy implementation from the bottom up. *University of Minnesota, ProQuest Dissertations Publishing*. doi:3567404
- Cabansag, J. N. (2016). The implementation of mother tongue-based multilingual education: Seeing it from the stakeholders. *International Journal of Linguistics*, 6(5), 43-53.
- Canagarajah, A. S. (1995). Functions of code switching in the ESL classroom: Socialising bilingualism in Jaffna. *Journal of Multilingual and Multicultural Development*, 16, 173-196.
- Cardenas, M. (2018). From policy to local practice: An implementation study of the mother tongue based multilingual education in the Philippines. *Teachers College, Columbia University, Proquest Dissertations Publishing*. doi:10640221
- Cohen, A. S., Kamarck, T., & Mermelstein, R. (1983). A global measure of perceived stress. *Journal of Health and Social Behaviour*, 385-396.
- Congressional commission on education (1993). *Making education work*. Quezon City: Congressional Oversight Committee.
- Cruz, N. T. (2015). The implementation of mother tongue-based multilingual education in Grade 1 in the public elementary schools in Pangasinan I. *DLSU Research Congress 2015* (pp. 1-6). Manila, Philippines: De La Salle University.
- Dekker, D. (2018). Finally shedding the past: Filipino teachers negotiate their identities within a new mother tongue-based multilingual education policy landscape. *University of Toronto, ProQuest Dissertations Publishing*. doi:10254743
- Doherty, S. (2016). The impact of translation technologies on the process and product of translation. *Journal of Communication* 10: 947-969.
- Fillmore, N. (2014). Mother tongue-based multilingual education policy and implementation in Mindanao, Philippines: A grounded theory case. Faculty of Arts and Education, Deakin University, Australia. Master's thesis.
- Ganal, N. N. (2014). Demographic profile and perception of teachers and school heads on mother tongue as language of instruction. *Indian Journal of Management Science*, 4(3), 44-55.
- Gboyega, A. B., & Idiat, A. O. (2014). Contributions of mother tongue education in early childhood education. *European Scientific Journal*, 10.
- Gibson, S. & Dembo, M. H. (1984). Teacher efficacy: A construct validation. *Journal of Educational Psychology*, 76 (4), 569-582.
- Hoy, A. W., & Spero, R. B. (2005). Changes in teacher efficacy during the early years of teaching: A comparison of four measures. *Teacher and Teacher Education*, 21(4), 343-356.
- Jorolan-Quintero, G. (2018). Oral traditions: An aid to implementation of mother tongue-based multilingual education in the Philippines' basic education programme. *International Review of Education*, 64(6), 759-777. doi:10.1007/s11159-018-9743-9
- Kim, Y. E. (2007). Self-efficacy with regard to the teaching of science of early childhood education teachers in Korea (Order No. 3393772). Available from ProQuest Central; ProQuest Dissertations & Theses Global. (304834542). Retrieved from <https://search.proquest.com/docview/304834542?accountid=47253>
- Khan, M. T. (2016). Mother Tongue, an effective medium of instruction - (education which is a factor of human capital). *International Journal of Information, Business and Management*, 8(3), 207-225. Retrieved from <https://search.proquest.com/>

docview/1809941733?accountid=47253

- Klassen, R. M., and Chiu, M. M. (2010). Effects on teachers' self-efficacy and job satisfaction: Teacher gender, years of experience, and job stress. *Journal of Educational Psychology, 102*(3), 741-756.
- Lartec, J. K., Belisario, A. M., Bendanillo, J. P., Binas-o, H. K., Bucang, N. O., & Cammagay, J. W. (2014). Strategies and problems encountered by teachers in implementing mother tongue-based instruction in a multilingual classroom. *The LAFOR Journal of Language Learning, 1*(1), 1-16.
- Mata, L. (2014). Pedagogical competencies for mother-tongue teacher education. *Educational Sciences: Theory & Practice, 14*(1), 341-352.
- Metila, R., Pradilla, L., & Williams, A. (2016). The challenge of implementing mother tongue education in linguistically diverse contexts: The Case of the Philippines. *The Asia-Pacific Education Researcher, 25*(5-6), 781-789. doi:10.1007/s40299-016-0310-5
- Morales, M. (2015). Influence of culture and language sensitive physics on science attitude enhancement. *Cultural Study of Science Education, 951-984*. doi:10.1007/s11422-015-9669-5
- Nolasco, R. M. (2008). The prospect of multilingual education and literacy in the Philippines. In A. Bernardo (Ed.), *In the Paradox of Philippine Education and Education Reform: Social Science Perspectives* (pp. 133-145). Quezon City: Philippine Social Science Council.
- Ocampo, D. (2005). Reading comprehension of sentences among bilingual grade school students. *Philippine Journal for Language Teaching, 44*, 60-66.
- Pascasio, E. M. (2008). The Filipino Bilingual from a sociolinguistic perspective. *Current Issues in the Philippine Linguistics and Anthropology: Parangal para kay Lawrence A. Reid* (pp. 136-145). Manila City: LSP and SIL.
- Paulson Stone, R. (2012). A professional development program for the mother tongue-based teacher: Addressing teacher knowledge and attitudes about MTBMLE. *University of Massachusetts, ProQuest Dissertations Publishing*. doi:3518270
- Philippines. (2013) Republic Act 10533: Enhanced Basic Education Act of 2013: Official Gazette.
- Porter, C. (2017). Language, Tagalog regionalism, and Filipino nationalism: How a language-centered Tagalog regionalism helped to develop a Philippine nationalism. *University of California, ProQuest Dissertations Publishing*. doi:10287226
- Praver, M. (2014). *Japanese university English language teachers' self-efficacy beliefs: A mixed-methods exploration* (Order No. 3623235). Available from ProQuest Central; ProQuest Dissertations & Theses Global. (1548984893). Retrieved from <https://search.proquest.com/docview/1548984893?accountid=47253>
- Ramey-Gassert, L., Shroyer, M. G., & Staver, J. R. (1996). A qualitative study of factors influencing science teaching self efficacy of elementary level teachers. *Science Education, 80*(3), 283-315.
- Riggs, I. M., & Enochs, L. G. (1990). Toward the development of an elementary teacher's science teaching belief efficacy. *Science Education, 74*(6), 625-637.
- Sanchez, A. Q. (2013). Literacy Instruction in the Mother Tongue: The case of pupils using mixed vocabularies. *Journal of International Education Research, 9*(3), 235.
- Strevens, P. (1976). Problems of learning and teaching science in foreign language. *Studies in Science Education, 3*, 55-68.
- Tschannen-Moran, M., and McMaster, P. (2009). Sources of self-efficacy: Four professional development formats and their relationship to self-efficacy and implementation of a new teaching strategy. *Elementary School Journal, 110*(2), 228-245.
- Tupas, R. (2014). Inequalities of multilingualism: Challenges to mother tongue-based multilingual education. *Language and Education, 29*(2), 112-124.
- Valerio, M. B. (2015). Current Perspectives on Mother-Tongue Based Instruction in the newly Implemented K to 12 Curriculum of the Philippines. *British Journal of Education, 3*(9), 51-66.
- Vanzuela, E. A., Rabin, R. C., & Calimag, M. M. (2012). *K to 12 Toolkit*. Quezon City, Philippines: Southeast Asian Ministers of Education, Regional Center for Educational Innovation and Technology.
- Walter, S. L., & Dekker, D. E. (2011). Mother tongue instruction in Lubuagan: A case study from the Philippines. *International Review of Education, 57*(5-6), 667-683.
- Wa-Mbaleka, S. (2014). English teacher's perception on mother tongue-based education policy in the Philippines. *European Journal of Research and Reflection in Educational Sciences, 2*(4), 17-32.
- Young, C. (2002). First language first: Literacy for the future in a multilingual Philippine society. *International Journal of Bilingual Education and Bilingualism, 5*(4), 221-232.