

Assessment Practices of Teachers Implementing the Philippines and Singapore Elementary Mathematics Curriculum

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Abstract: Assessment Practices of Teachers Implementing the Philippines and Singapore Elementary Mathematics Curriculum. Objective: This study compared the assessment practices of Filipino teachers in public schools implementing the national elementary mathematics curriculum with those in private schools implementing the Singapore mathematics curriculum in the Philippines, and provide inputs to the Philippine Elementary Mathematics curriculum based on the findings. **Methods:** The researcher used document analysis, interviews, and classroom observations determine their assessment practices of the participants. Triangulation was done to ensure data validity to fulfill the study's purpose. **Findings:** The results reveal that there are similarities and differences in the assessment practices of elementary teachers using Philippines and Singapore Elementary Mathematics curriculum. However, the study did not test if Filipino elementary learners differ in their performance in the national assessments given to all learners in public and private schools. Hence, the study recommended that future analysis be made on how Filipino elementary learners differ in their performance in mathematics, considering their differences in the curriculum they are exposed to.

Keywords: assessment practices, elementary mathematics teachers, mathematics curriculum.

Abstrak: Praktik Asesmen Guru yang Melaksanakan Kurikulum Matematika Dasar Filipina dan Singapura. Tujuan: Penelitian ini membandingkan praktik penilaian guru Filipina di sekolah negeri yang menerapkan kurikulum matematika dasar nasional dengan praktik penilaian di sekolah swasta yang menerapkan kurikulum matematika Singapura di Filipina, dan memberikan masukan terhadap kurikulum Matematika Dasar Filipina berdasarkan temuan tersebut. **Metode:** Peneliti menggunakan analisis dokumen, wawancara, dan observasi kelas untuk menentukan praktik penilaian peserta. Triangulasi dilakukan untuk menjamin keabsahan data untuk memenuhi tujuan penelitian. **Temuan:** Hasil penelitian menunjukkan bahwa terdapat persamaan dan perbedaan dalam praktik penilaian guru SD yang menggunakan kurikulum Matematika SD Filipina dan Singapura. Namun, penelitian ini tidak menguji apakah kinerja siswa sekolah dasar di Filipina berbeda dalam penilaian nasional yang diberikan kepada semua siswa di sekolah negeri dan swasta. Oleh karena itu, penelitian ini merekomendasikan agar analisis di masa depan dilakukan mengenai perbedaan kinerja matematika siswa sekolah dasar di Filipina, dengan mempertimbangkan perbedaan kurikulum yang mereka terima.

Kata kunci: praktik asesmen, guru matematika SD, kurikulum matematika.

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■ INTRODUCTION

Assessment is critical in determining educational quality. It is a process of gathering and organizing qualitative and quantitative information that could be used in decision-making (Balagtas et al., 2020). It tells what the students have learned and the areas they need to improve. Assessment also informs how effective instruction is and the implemented educational programs. It is practiced at different levels, from classroom to national and international, and performed using appropriate methods (Sewagegn, 2019).

Since basic education was enhanced in 2013, the Philippines has implemented various assessment policies to evaluate educational reform. The Enhanced Basic Education or K to 12 Program in the Philippines required compulsory kindergarten and two years of senior high school instead of the 10-year primary education. These policies cover classroom, national, and international large-scale assessments (ILSAs) for system assessment (DepEd, 2013).

The Philippines participated in the Organization for Economic Cooperation and Development's (OECD) Programme for International Student Assessment (PISA) for the first time in 2018. This assessment for 15-year-old students aims to evaluate their reading, mathematics, and scientific literacy in various contexts (OECD, 2019). The results were released a year later, and the Philippines placed last among participating nations in reading and second last in Mathematics and Science. Singapore, a Southeast Asian neighbor of the Philippines, was also among the 79 participating countries ranked first in this assessment for 15-year-old learners (OECD, 2019; Balagtas & Montealegre, 2020; Balagtas et al., 2019)

However, in TIMSS 2019, Singapore was again at the top, with the Philippines at the bottom. In the same year, the Philippines participated in the Southeast Asia Primary Learning Metrics (SEA-PLM), a regional assessment coordinated

by the Southeast Asian Ministers of Education Association (SEAMEO) and the United Nations Children's Fund (UNICEF) (Marquez, 2020). The SEA-PLM was used to track learning performance in Southeast Asian countries and better comprehend the factors that help or impede student's effective learning (Shadiq, 2019).

The assessment results of the Philippines and Singapore could reveal disparity in the effectiveness of their primary education program, including their mathematics education. Singapore's Education System has progressed over time, including Mathematics Education. From 1946 to 2012, the present Singapore Mathematics Curriculum has been improved (Kaur, 2014); from these developments, the curriculum, teachers, learners, and the learning environment contributed to Singapore's high achievement in ILSAs (Bennet, 2014).

Moreover, assessment practices have played a big part in the repeated success of Singapore in the large-scale international benchmark. According to the Singapore Ministry of Education, providing students with opportunities to be engaged in higher learning experiences is the aim of the school mathematics curriculum, as reflected in the Mathematics Assessments Guides (Dietiker, 2022). Through the guides, the students become 1) *reflective learners* use the standards of excellence to evaluate how well they have achieved their goals and how did they attain their goals; 2) *strategic learners* are capable of constructing effective mental models of knowledge and resources; and 3) *engaged learners* are motivated about their meaningful and joyous learning (Black, 2018).

Furthermore, this study was conducted to determine the assessment practices of Filipino elementary mathematics teachers implementing Singapore and the national mathematics curriculum in the Philippines. It is hoped that such a comparison will provide lessons for the Philippines in improving its performance in ILSAs

based on the practices of those implementing Singapore mathematics. According to Yazcolu (2019), recognizing different countries' education systems could provide innovative teaching practices in education system and ensure educational equality and equity among different communities.

■ METHODS

Research Design

This research used descriptive comparative qualitative methodology to describe teachers implementing the Philippine Elementary Mathematics Curriculum and Singapore Elementary Mathematics Curricula assessment practices. Descriptive comparative may contribute enormously to public policy research (Seixas et al., 2018). It has also been viewed as a qualitative research strategy to check validity through information from various sources.

Research Participants

For the selection of participants of this study, the researcher chose (3) schools that implement Philippines Elementary Mathematics Curriculum and (3) schools that implement Singapore Elementary Mathematics Curriculum. The criteria in the selection of the participating Philippine and Singapore schools were as follows: the school must be implementing the curriculum in not less than 6 years, the school can be public or private, it should be using Elementary Mathematics Curriculum from Grade 1 to Grade 6. Meanwhile, there were (16) teachers who were selected purposively Philippine Elementary Mathematics Curriculum and (16) teachers who were selected purposively for Singapore Elementary Mathematics Curriculum. The criteria in the selection of participating teachers were as follows: 1). they should be teaching Mathematics at least one year 2). The teachers must be teaching from Grades one to Grade 6 level. Hence, purposive sampling is commonly used in

qualitative researches to determine cases related to the phenomenon of interest (Palinkas et al., 2015).

Data Gathering and Procedures

There were three phases of data gathering: pre-data gathering, actual data gathering, and post-data gathering. For the *pre-data gathering* procedure, the researcher sent permission letters to the participants and sought their consent for collecting their lesson plans and for them to be interviewed and observed. The researcher observed how the teachers used the Philippines and Singapore Elementary Mathematics curricula in the classroom in the *actual data-gathering* procedure. Taking pictures was not allowed for the data privacy of the pupils.

The notes from the observations were saved in the researcher's password-protected computer using the first initial, last initial, observation, and date as a marker. Regarding the observation organization, the researchers used a document label code to know when and whom to interview. After classroom observations, one of the researchers interviewed the teachers in the conference room to avoid distractions. Each interview lasted about an hour at the participants' most convenient time. Interview questions were given to the participants before the actual interview. Interviews were recorded with the consent of the interviewees. Interview transcripts were shown to the participants to allow them to review how they were quoted, make changes, or discuss the transcript with the researcher. Triangulation was done on the observations, interview results, and document analysis. The documents collected were sample lesson plans and teaching guides.

In triangulating data, the researcher attempts to provide comprehensive research evidence that is necessary to the attainment of the purpose of this study. The researcher is also able to confirm findings across data sets and

reduce the control of potential biases in a single study by comparing information gathered via different research methods (Halcomb, 2016). For the *post-data gathering* procedure, the interview responses of the participants were transcribed. Similar interview, observation, and lesson plan codes were highlighted, grouped, and interpreted (Campbell et al., 2018).

Research Instrument

The researcher developed an interview protocol and observation sheet to investigate the assessment practices of the participants. The interview protocol were comprised 9 questions. Additionally, to improve the validity and reliability of the interview protocol and observation sheet, content validation was done by qualified validators. To be qualified as a validator, the validator should have attained a Master's Degree with at least ten years of teaching experience. The validator should have an expertise in qualitative research in order to provide appropriate inputs on how to conduct a qualitative research.

Ethical considerations

To ensure the rights of participants being studied, the following ethical considerations were employed in the conduct of this study (based from Strauss & Corbin, 2008).

Anonymity and Privacy- The researcher respected the rights of each participant to privacy by seeking permission before conducting observations, interviews, document analysis and recording the conversations. Participants were invited in the most convenient time and place where no one can hear the conversation during the conduct of an in-depth interview with the researcher. No identifying information about the respondents was revealed in any forms of communication and written output of this paper. In case of identity of the institution, the researcher

asked permission before conducting the study in the research locale.

Informed Consent-Letter of permission to audiotape the conversation during the in-depth interviews, to observe the teachers and to gather documents for analysis was given to the participants and to gather information such as school records and faculty profile

Confidentiality-As stated in the letter of permission given to participants and to school, all information was utilized only for this study

Rapport-Since the study utilized interviews which are a qualitative research design, the researcher built a strong connection with the participants in order for them to feel comfortable in expressing their thoughts and feelings on variables being asked to them. However, the researcher also set some boundaries on the extent of closeness with the participation so that the validity of the information being narrated was not being affected, and the true experiences revealed.

Data Storage-All the data gathered had soft copy and were encrypted or password protected. The filename was anonymous. The data was accessed only by the researcher. For the **hard copies** such as photocopied documents, interview notes, and audio recording, these were kept securely in a locked filing cabinet.

Research sharing- The researcher is willing to share the results of this research to the participants if they requested for it. Yet, there is still consideration of sharing the results of these research (Shen, 2016). This consideration is the presentation of the results. Sharing it with the participants should be concise and understandable which means that the researcher would not just give the copy of finished thesis. The findings of the study should be summarized so that it can also be understood by a non-academic audience.

■ RESULTS AND DISCUSSION

Formative Assessment Practices of Elementary Teachers Implementing the Philippines and Singapore Elementary Mathematics Curricula

Several formative assessment practices have emerged from the interviews and class observations conducted. These include oral questioning, review, Seatwork, workbook group activities, differentiated instruction, determining proficiency level at the end of the lesson, remediation, and journal writing.

Oral questioning as formative assessment

Oral questioning as a formative assessment is used in every part of the teaching process. Most teachers who were observed orally questioned their pupils before proceeding to the new lesson. *“How do you add/ subtract similar fractions without regrouping? What can you say about their denominators? How do you add/ subtract similar fractions without regrouping? What can you say about their denominators?.”* (Grade 6, K-12 Mathematics Teaching Guide, p.8)

Oral questioning in the form of review

One formative assessment of elementary teachers used is review. Most of the observed teachers reviewed their pupils before proceeding to the new lesson. As also viewed by the respondent teachers, oral questioning determines if the child has prior knowledge of the lesson. One of the respondent teachers also mentioned that formative assessments do not always have to be in written form. As T10 answered, *“We always have formative, but formative does not always in the form of writing. It would help if you gave me what I want to hear when I call on you. This is a common practice that I do now and then.”* Meanwhile, Black and William (2009), as cited in Magno (2015), emphasized that oral questioning helps assess the

student’s progress by stimulating their thinking and comprehension and aiding them in expressing their ideas.

Workbooks and Seatwork as formative assessment.

Workbooks and Seatwork are evident in every mathematics class. These activities were common to all respondent teachers who were observed. During the observation, a first-grade teacher asked one pupil to go in front and write the numbers in the place value chart, while another teacher participant posted a paper poster for the Seatwork of the first-grade pupils. Meanwhile, the teachers also used Learners’ Materials from the Department of Education as Seatwork. *“Have the pupils do the activities under Activity 1, page 2 of Learners’ Material Math Grade 5. Check the pupils’ answers and feedback if needed. To reinforce the skill, let the pupils answer items under Activity Going, page 3 of Learners’ Material Math Grade 5.”* (Grade 5, K-12 Mathematics Teaching Guide p.5)

Additionally, most participant teachers utilized workbooks for the homework or independent practice of the pupils. As observed by one teacher respondent, he used workbooks as homework for his grade 6 pupils, while the other teacher participants used workbooks as independent practice. Well-developed seat works and workbooks could benefit students in managing the process by supporting them to work independently (Bicer, 2016).

Group Activities as formative assessments

The teacher participants implementing Singapore Mathematics Curriculum mentioned using group activities as an exploration activity. An excerpt from a lesson plan that shows group activity as a formative assessment in the exploration phase: *“Round-robin activity: The 8 clusters will be divided into four such that 2*

clusters will have the same question in each round. After 2-3 minutes, the paper will move to another cluster until all questions are answered.” (Grade 6-Math planner)

Based on the observations, one teacher participant also grouped the parents during the Parent-Teacher conference to explore adding and subtracting numbers using base ten blocks. In addition, another teacher grouped the pupils and gave them pieces of paper to use for the exploration phase. One teacher participant believes group activity promotes student collaboration and allows students to discover.

Group activity as differentiated instruction.

For the teacher participants implementing the Philippine elementary mathematics curriculum, differentiated activities were provided in each group as follows: “*Group the class into four. Give each group an activity. Read and write the numbers: Group 1: 35 352-46 500, Group 2: 79 351- 80 400, Group 3: Group 3: 66 651-86 900, and Group 4: 33 851-23 600.*” (Grade 4, *K-12 Mathematics Teaching Guide*, p.18). Another participant said that, “*In our group activities, for example, one will answer this problem, group 2 will compose a jingle, and the other group will make a short poem. This is a common practice for all of us teachers in this school. This is also included in our lesson plan.*” (T15, interview)

As observed by another teacher respondent who is implementing the Philippine elementary Mathematics curriculum, she gave differentiated activities to her pupils. For Group 1, the teacher gave an acting activity, group 2 had a dancing activity, and Group 3 was given a singing activity. Another teacher said that differentiated activities are for the interests of the pupils. She uttered: “*Every day is required to have group activities in every lesson. We also provide differentiated activities which fit the interests of our pupils. Usually, the activities*

that interest pupils are dancing, singing, role-playing, and drawing. As teachers, we also make sure that everyone participates. Meanwhile, all teacher participants implementing the Singapore Mathematics curriculum gave differentiated activities based on pupils’ abilities. One teacher said: “The differentiated activities are based on their abilities. It is formative regarding how far they have learned and what else they need to learn. In this way, all pupils can do tasks according to their pace and level.”

One teacher also affirmed that differentiated activities depend on the pupils’ capability level. In addition, one teacher assumed differentiated activities as low-floor high ceiling tasks. “*So there is one thing I have learned from one of our speakers: low floor; high ceiling. When you say low floor, all the basic things even a struggling student can reach; the low floor tasks are an example, numbers to 20, counting 1,2,3,4,-20, that is the low floor. The high ceiling is if they could like 5,10,15,20, that means they know how to skip count by five. They can skip count by two. They count one up to 20 for the low floor; but it is the same lesson. It is 20. Different strategies that they could form on their own that we also share during the sharing part of the routine; low floor; everybody can count to 20; high ceiling, there are different ways to count to 20. On a low floor, the easiest and simplest way to do it, but on a high ceiling, there are different ways.*” (T1, interview)

Group works are also utilized by teachers implementing the Philippines and Singapore elementary mathematics curricula. When formative assessment is combined with group learning activities, students’ critical thinking skills are enhanced (Lee et al., 2020). Hargreaves (2007) also looked into the reliability and validity group activities. He emphasized learning is more effective if it is

done in collaboration. Assessment using group works develop not just critical thinking but also empathy towards others (as cited in David & Sunga, 2016).

Determining proficiency levels at the end of the lesson

The teacher participants who implement the Philippine Mathematics Curriculum gave 1-5/1-10 items to pupils after the discussion and computed the proficiency level of the pupils during the class discussion. During the classroom observation, the pupils of Teacher 6 got an 82% proficiency level for the topic Ordering of Numbers. In comparison, the pupils of Teacher 11 got a 76.20% of proficiency level for the topic Estimating Products. Furthermore, all teachers implementing the Philippine elementary mathematics curriculum said they always do 1-5/1-10 item tests after each lesson. As T8 mentioned, *"Usually, my assessment is pen and paper. It is a 5-item or 10-item test used as a formative assessment. All pupils should attain at least 80% of proficiency level after taking the 5-10 item test. Some pupils will be subject to remediation classes if they do not attain 80% proficiency."*

(Sornson, 2022) attested that before moving to the following competency, the indicator that learners are ready for the new lesson is when most or all can display the target competency. The teacher can work out the task with them at a different time if about three or two learners are still struggling (Cathcart, 2020). There should be reteaching and reassessing learners to show that progress until such time that the learners are ready to take the summative assessment is attained (Lu, 2022).

Remediation as a result of non-attainment of proficiency level

Most teachers also said that the 1-5/1-10 item test has a proficiency level of 80%, and

remediation still needs to attain it. Additionally, one teacher explained during the interview that % proficiency level of 80% is already included in their daily lesson log. *She added: "Remediation is given if the pupil did not attain 80% proficiency level. He/she will not be able to proceed to the next lesson. The remediation class for that pupil will be conducted after class. We also inform the parents that their children will have remediation classes. As can be seen from the findings of Opitz et al. (2017), remediation class is necessary to overcome mathematical gaps. (Hope, 2022) added that remediation classes can provide a safe environment where students feel as though they belong, are more likely to participate, and feel that they are of value to the classroom."*

Journal writing as a formative assessment

Part of the formative assessments of teachers in the Singapore Elementary Mathematics curriculum is journal writing toward the end of the lesson. Another use of journals is that they focus on math communication, which highlights the Singapore Mathematics Curriculum. To quote: *"The journals can be focused on the math lesson that they discussed. Students' value from the math lesson depends on the math team. It is based on a question or scenario because math communication is one important highlight of a Singapore Math lesson. It is one of our focuses. We need to make students explain mathematically or whatever."* (T7, interview)

One teacher also said during the interview that journals sum up the lesson. Journals are also used to see the mathematics reasoning of children and to know how the pupils value what they understand in the lesson, as one teacher affirmed in an interview. As observed also, journals are used at the end of the lesson. Meanwhile, the lesson plan has some questions to be answered

by the pupils in their math journals. The excerpt follows: *“How is speed related to distance and time? How does each affect the other? In your own words, what is speed? What is the importance of speed in our lives?, How do you see speed in your daily lives?”* (Grade 6, *Mathematics Unit Planner*). In the study of, Rogers (2013), he enumerated the advantages of journal writing. These are determining what the students’ want to learn, understanding the significance of reasoning, and connecting new mathematical ideas to their prior knowledge.

Sharing strategies as formative assessment

As observed, all teachers implementing the Singapore elementary mathematics curriculum used sharing strategies as their formative assessments. Teacher 5 asked her grade 5 pupils to share and show their strategies to get the problem’s fractional parts. Also, Teacher 9 called one pupil for each cluster to share their strategies for getting the word average’s meaning based on their Activity. Moreover, some teachers explained the purpose of sharing. As T2 explained, *“Assessment is continuous to see if there is someone who needs help. You will see it during the sharing. Sharing is part of formative assessment. If some pupils struggle to share their ideas, we have to help them.* T4 added, *“The formative assessment comes from how we observe them in the classroom. The way they interact, share, and express their ideas. Here in our school, we give time to our pupils to express and share their ideas. We do not pressure our pupils to share what they have learned immediately.* Additionally, sharing knowledge improves understanding of the concepts discussed in the class and builds relationships with classmates (Peng et al., 2016). In addition, sharing is essential for effective learning and can result in trust, teamwork, and

instructors’ positive attitude, especially if done collaboratively (Majid & Chitra, 2013).

Summative Assessment Practices of Elementary Teachers Implementing the Philippines and Singapore Elementary Mathematics Curricula

Several summative assessment practices have emerged from the interviews and classroom observations conducted. These include periodical tests centralized from the division office, multiple-choice type of summative assessments, and team-planned summative assessments.

Periodical tests are centralized from the division office

Most teachers implementing the Philippine elementary mathematics curriculum mentioned that their periodical tests are centralized from the division office, and long quizzes are teacher-made. To quote: *“Our periodical tests are centralized from the division office, while our long quizzes are teacher-made. It is less burden for us to make periodical tests. However, I noticed that some periodical tests from the division office must be more suitable for our learners. (T1, interview) T3 added: The periodical tests from the division office are based on something other than our lessons. Most of our pupils have difficulty answering the periodical tests because they did not take it up. As a result, they got low scores on periodical tests.* Similarly, Mbatha et al. (2015) exposed some constraints in utilizing centralized assessments. These are low-quality questions, unreliable marking, and not suitable for learners.

Multiple-choice type of summative assessments

All the teacher respondents utilize multiple-choice tests in their summative assessments because they are encouraged to

take such. It also gives chances to struggling pupils to answer the test. To quote: *"Multiple choice is not required for us to make, but we prefer multiple-choice tests. If we make an identification and fill-in-the-blanks test, the struggling pupils cannot answer the test. We always make sure that all of our pupils can answer our multiple-choice items. (T10, interview)*

This finding is similar to Sparck (2018). He suggested that multiple-choice examinations improve the retention of non-tested, related material as students access and reject information associated with the alternatives. When well designed, a multiple-choice test can be a powerful pedagogical tool that can contribute to optimizing educational practices (Zhong & Guo, 2022).

Team-planned summative assessments

.Most teachers using the Singapore elementary mathematics curriculum collaborate to organize their summative evaluation. According to the teachers, the grade level team makes the summative assessments and checks by their coordinator, and they discuss everything on what lesson to put in the summative assessments. However, one of the teacher participants added that they tweaked their summative tests, but their coordinator made the term test. *"A team makes our summative assessments to ensure that it is appropriate and suitable for every learner. This team is a group of teachers that teach that subject. After the team makes the summative assessment, it will be checked by our coordinator." (T7, interview)*. Another participant added: *"We team plan our instruction, assessment, and activities in our school. We discuss everything as a group. Our coordinators ensure that everyone shares their ideas so we can make informed decisions. Collaborating with other teachers makes everything easy and fast. (T10, interview)*

According to Hiebert (1999), as cited in Woodland et al. (2013), teacher collaboration is

seen as instructors working together and interacting. The objective of reflective discussion is to improve practice and increase student learning. Effective teacher teams include ongoing teacher cooperation aimed at improvement—students' accomplishment of distinct learning objectives and the opportunity to watch them in action. Moreover, to contemplate the reasons behind their success (Munna & Kalam, 2021).

■ CONCLUSIONS

Elementary teachers in the two curricula also differ from one another. Most elementary teachers who use the Philippine Elementary Mathematics Curriculum set proficiency levels on their quizzes after the lesson. Additionally, the periodical tests they give are centralized by the division office. Meanwhile, most teachers that use Singapore Elementary Mathematics Curriculum give Mathematics journals towards the end or end of the lesson. They also plan and consider the test duration in crafting their quarterly tests. Still, elementary teachers in the two curricula create multiple-choice tests as an assessment tool.

The assessment tools provided by teachers from the two curricula are based on their relevance to the material and skills, as well as the best interests of the learner. The conclusions imply that mathematics journals should be utilized as formative assessments in the K-12 Mathematics curriculum to develop students' communication and reasoning skills. These skills are part of the K-12 Mathematics Curriculum Framework. Another implication is team planning in making summative assessments. Teachers should team plan their summative assessments to make them more appropriate to the level of the children.

Future studies should compare the performance of Filipino students in the Singapore Curriculum and the Philippine K-12 curriculum in national and international large-scale assessments since this study should have covered

such concerns due to limited resources and time constraints. A similar study should also be conducted on subjects such as English and Science. Future researchers should also consider more respondents and a longer duration of doing this kind of research to unveil teachers' instructional practices and assessment practices. This study should be replicated in the same type of schools as respondents to get unbiased results.

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